

RFgen.

Investing in Warehouse Innovation

How to Evaluate Cost-Savings and ROI for
New Warehouse Automation Software



ABOUT THIS GUIDE

Supply chains are facing more pressure than ever to adapt, innovate, and evolve in order to remain competitive and deliver the highest level of customer service. Meanwhile, factors such as shrinking operating margins, supply chain disruptions, rising consumer expectations, and tightening regulatory compliance drive the need to improve warehouse performance while simultaneously cutting costs. For many, the answer to performance and cost concerns lies in warehouse technology.

But with so many products available, choosing the right solution can be challenging.

This guide aims to help supply chain professionals understand how to evaluate return on investment (ROI) criteria for warehouse automation software. It is intended as a tool to use in collaboration with managers, business users, analysts, and executives as they assess automation technologies and their impact on budgets and total cost of ownership (TCO).

By the end of this guide, you will gain a greater understanding of where to look for cost savings and how to calculate ROI more effectively for new automation software.

In this guide:

- ▷ Why Warehouse Automation Software?
- ▷ ROI Criteria to Consider:
 - ▷ Criteria #1: Inventory Factors
 - ▷ Criteria #2: Labor Costs
 - ▷ Criteria #3: Solution Impact
 - ▷ Criteria #4: Indirect Influences
- ▷ Case Study: ROI in Action



WHY WAREHOUSE AUTOMATION SOFTWARE?

As supply chains evolve to become faster, more efficient, and more cost effective, warehouse operations have increasingly become the target for cost-saving technologies like automation. By automating manual paper processes and outdated technologies with intelligent automation software, warehouse managers can enhance daily operations, alleviate workforce challenges, and transform inefficient liabilities into true value-adds. Improving internal operational health allows businesses to pass on new levels of value to customers.

Warehouse automation software remains a focal point of digital transformation efforts across the globe due to its low-cost, long-term benefits and short ROI period with low risk. A short ROI period is crucial because, once achieved, your technology investment can then proceed to add value and increase profitability for your business.

Automation software takes many forms, from mobile barcoding solutions to best-of-breed warehouse management systems (WMS). Regardless of your ultimate decision, it's crucial to understand if the solution will fit your budget and ROI requirements.

While there are too many ROI criteria to discuss in this guide, let's explore the most common areas proven to provide optimal efficiency and performance gains for your investment dollars.



80%
OF ORGANIZATIONS
PLAN TO INVEST IN
NEW WAREHOUSE
TECHNOLOGIES*

*Source: Zebra Warehousing Vision Study 2024



KEY ROI AREAS TO CONSIDER

For warehouse operations, automation ROI is affected by four primary pillars of influence:

Inventory Factors, such as:

- ▷ Inventory Accuracy
- ▷ Carrying Costs
- ▷ Speed and Throughput

Labor Costs associated with:

- ▷ Worker Efficiency
- ▷ Talent Acquisition and Retention

Solution Impact, based on:

- ▷ Size and Weight
- ▷ Maintenance and Future Development

Indirect Influences that affect ROI.

Next, let's take a look at how to evaluate the cost savings associated with each criterion listed above. Adding the dollar values will enable you to compare the total cost savings associated with your new solution against the investment amount of the solution itself.

CRITERIA #1: INVENTORY FACTORS

Inventory is the lifeblood of the warehouse. Due to its importance, inventory control is an ideal target for automation, making it a go-to area for cost savings and ROI. Inventory factors focus primarily on the challenges of tracking and locating inventory, as well as human-made mistakes associated with a lack of automation.

Traditionally, inventory is tracked through paper tickets, spreadsheets, or old software. Information must be returned to a central repository and filed in a cabinet or manually keyed into a computer workstation. In many cases, warehouses rely on human memory and tribal knowledge, meaning valuable information is lost every time an employee is absent or leaves the company.

Because of this, inventory management is a hotspot for inefficiencies and spending leaks that bloat overhead with unnecessary waste and effort. Gartner estimates that mobile software can reduce lost sales due to inventory factors by as much as 55%.

Inventory Accuracy

Inventory accuracy is critical to a healthy warehouse. Errors don't just cause delays in the warehouse; they translate directly to cost. While inaccuracies may seem insignificant at first, their impact grows in severity as they travel through the warehouse and later get used to make important decisions. Now magnify the problem by hundreds or thousands of transactions per day. The greater the volume handled, the greater the losses, cutting into already slender profit margins.

The average cost per error ranges between \$50 and \$500, with picking accuracy having the largest impact. This value takes into account the direct and indirect factors contributing to lost revenue, such as:

- ▶ Time wasted on data entry and extra handling labor.
- ▶ Productivity loss from trying to locate missing inventory.
- ▶ Inventory shrink from lost, damaged, expired, and depreciated goods.

- ▶ Shipping and production delays from insufficient stock levels.
- ▶ Emergency rush orders for materials required to meet demand.
- ▶ Costs of returns, chargebacks, penalties, and additional handling.
- ▶ Loss of future sales due to decline in customer satisfaction.

Calculating Accuracy ROI

Assuming an optimistic \$100 per error, a warehouse processing 100 order lines per day at 95% accuracy yields a 5% error rate, or 5 inaccurate transactions. Even at this conservative estimate, 5% inaccuracy costs the company \$500 in direct and indirect costs per day. After 261 working days in a calendar year, this \$500 balloons to \$130,500 at the lower end, although the cost may be as high as \$652,500 annually. At 1,000 order lines per day, the company could be hemorrhaging \$1.3 million per fiscal year from an accumulated 18,250 errors.

Even a modest increase of 1% to 96% accuracy would reduce inventory write-offs by \$26,100 annually at 100 order lines. At 1,000 order lines, the savings become \$261,000 annually. Therefore, introducing a warehouse solution that increases accuracy quickly pays for itself.

A mobile barcoding solution that automates data collection can increase accuracy to world-class levels of 99.9% or higher, generating even greater savings. Even at 99%, the cost savings for the above examples would exceed \$104,400 and \$1.04 million per year, respectively.

Imagine the impact of 99.999% accuracy on ROI.

That's what IT managed services company Cybercore Technologies achieved after automating data collection with RFgen mobile barcoding.

Read the story here



Carrying Costs

One of the major side effects of inefficient warehouse processes revolves around carrying and storage costs associated with overstocking. A warehouse using manual inventory processes can't trust that inventory levels are true or accurate. Therefore, the warehouse inadvertently or deliberately stockpiles large amounts of extra inventory to compensate for potential shortages.

This not only ties up additional working capital that could be spent on process improvements or growth, but also costs extra money to store. Meanwhile, the stored products may deteriorate in quality, depreciate in value, expire, or become obsolete while sitting dormant. Instead of generating revenue, the goods turn into a liability, hitting the bottom line as a write-off expense.

Therefore, implementing a software solution that generates real-time inventory visibility is a cost-effective way to optimize stock levels and drive down carrying costs. Mobile inventory software assists in achieving this, creating a single, reliable source of truth that enables 3-5% reductions in inventory levels and up to a 10% reduction in losses from product deterioration and obsolescence.

Calculating Carrying Cost ROI

A warehouse holding \$1 million in on-hand inventory can be carrying costs equal to 20% of that inventory value, or \$200,000. By reducing its on-hand inventory levels by 5%, the warehouse reduces its carrying costs by 5% to \$190,000, putting \$10,000 back into liquid assets and recovering previously occupied floor space. This cost savings can then be re-invested in infrastructure upgrades, new technologies, and expansion.

Indirect cost savings are created in other areas as well, such as:

- ▶ Freed capital from over- or double-ordering
- ▶ Reduced shrinkage and depreciation
- ▶ Increase storage efficiency and utilization
- ▶ Lower insurance premiums, taxes, and energy waste

Speed and Throughput

Manual inventory processes are not only inaccurate but slow. Material crawls through the warehouse. Incoming stock can take days to put away. Pick, pack, and ship operations struggle to keep up with production and customer demand.

Automating these laborious activities releases this wasted time by taking over repetitive, high-frequency tasks, freeing your team to focus on increasing volume. Automation catalyzes new levels of performance and accuracy not possible with manual handling methods. Faster material flows increase inventory turns and shorten fulfillment times while eliminating unnecessary steps, stimulating your ability to compete and deliver optimal customer service.

Automation generates ROI by:

- ▶ Reducing inventory processing time
- ▶ Enabling faster transactions
- ▶ Improving productivity
- ▶ Creating scalable processes

Calculating Speed & Throughput ROI

In a manual warehouse, pallets of new items often wait several days on the dock while the receiving team struggles to process a backlog by hand (at substandard accuracy). Received pallets can wait another 2 days before getting stored. Meanwhile, pickers waste time each day looking for materials that haven't been stored yet—that space is still empty. Eventually, the pickers may give up and inform their manager, who rush-orders another shipment on overnight freight to ensure the customer's items are delivered on time. The rushed order is picked, packed, and shipped. Only afterward does the team realize they have double-ordered. After taking up storage space for 6 months, the items become obsolete and are discarded.

After automating with mobile barcoding, the receiving team reduces overall intake time for each pallet from 28 hours down to 2. Estimating an equal amount of time for put-away and also pick, pack, and ship, the lifecycle's grand total becomes 6 hours—a reduction of almost 80%. By combining both the inbound (28 hours) and outbound movements (28 more hours), the time spent on the pallet in question plummets from 56 hours to 4 hours, multiplying speed by a factor of 14.

CRITERIA #2: LABOR COSTS

Labor costs are a key source of ROI. In today's pressurized supply chain market, where hiring and retaining sufficient headcounts remains a significant challenge, finding ways to improve efficiency and job tenure are paramount—but often overlooked.

Minimum wage levels and minimum salary thresholds for overtime-exempt employees continue to rise. Understaffed teams pay higher overall wages from extra overtime while high turnover incurs hiring and onboarding costs. Then there is overhead bloat from manual processes, as we explored earlier.

However, warehouse automation can combat these pressures by making workers more productive and accurate with shorter training periods. Studies conducted by mobile hardware manufacturer, Honeywell, found that organizations could reduce direct labor by nearly 3,000 hours per year by increasing process efficiency—the primary function of warehouse automation. Automation can also improve job attractiveness and satisfaction, ease of task completion, and contribution to the organization, translating to added value for your business.

Worker Productivity

Warehouse automation's primary purpose is to create labor-saving efficiencies by taking control over as many tasks as possible. Making your team more efficient increases their productivity. When combined with higher inventory accuracy, mobile automation software that interacts with other technology systems in real time, such as your ERP, maximizes the efficiency of your employees' task execution.

For warehouses using largely manual systems, automation technologies like mobile barcoding can effectively increase labor efficiency by 30% or more in the first 12 months, and up to 100% within 24 months. Therefore, after two years, you can double the efficiency of your warehouse employees without adding new positions. In this way, mobile automation can act as a force multiplier for small teams, enabling fewer people to perform more work, more quickly, and with greater accuracy.

Calculating Productivity ROI

Even a simple task like moving inventory to a new location in the warehouse can be hugely time-consuming without automation. A rack of 2,000 items must be verified against a paper print-out, physically moved, the data updated by hand, then given to someone else to key in to the system of record. At 30 seconds to process each item (includes all steps), the task can easily take 15 hours or more—two full workdays. Even then, the data accuracy may be questionable and extra time may be needed to physically move the materials.

With mobile barcode scanning, the employee can instead scan each item and rack in seconds, automatically updating the new location and quantity in the system of record with perfect accuracy. This eliminates the need for paper printouts, data entry, cross-checking, and extra commuting on foot. At just 2 seconds per item, the employee spends 93% less time for the same outcome. With a more sophisticated automation technology like License Plating, the employee can simply scan the pallet license plate barcode to confirm the entire transfer in bulk in less than 10 seconds in total time.

In both cases, automation demonstrates its vast labor-saving potential. Newly freed productivity can then be redirected to more profit-generating initiatives. Other ways automation generates ROI include:

- ▶ Reallocation of labor to more meaningful tasks
- ▶ Reduced spend on wages and overtime
- ▶ Minimized labor hours spent on physical/cycle counts
- ▶ Scalability for higher volume and growth



89%
OF WAREHOUSE
MANAGERS BELIEVE
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Talent Acquisition and Retention

Hiring and retaining workers continues to be a major struggle for supply chains. Shifting ideals among younger workers and competition against mega giants like Amazon and Walmart over a shrinking pool of potential talent have necessitated higher workforce productivity through automation.

Equipping workers with intuitive technologies that make their jobs easier increases the attractiveness of the job. Successful enterprise companies attract talent by investing in automation tools that make employee jobs easier to do efficiently and less physically exerting. Completing more work with less effort is a win for both company and employee.

For warehouses using manual processes, attempting to reach high levels of output strains workers' physical and mental well-being. Not only is this demoralizing, but employees know they can leave the company at any time for a competitor that equips them with the right tools for the job.

Reduced Turnover

Improving morale and job satisfaction directly impacts tenure. A study released by The Society for Human Resource Management (SHRM) called the Human Capital Benchmarking Report determined the average cost-per-hire at \$4,129. Meanwhile, sudden employee departures and seasonality necessitate hiring new staff. Therefore, retaining employees for as long as possible—even through warehouse technology—returns both direct and indirect labor cost savings that factor into ROI.

Shorter Training Times

Onboarding can also be costly since new employees don't reach full productivity for several months. Using an easy-to-learn mobile technology in the warehouse can decrease onboarding time by 80% or more. Workers reach full productivity in 1/5 of the time, adding their maximum value to the organization for the remaining 4/5. For warehouses with seasonal surges in headcount, the financial impact can be significant.

Fewer Injuries

Workplace safety is often ignored when it comes to technology ROI. And yet, the impact can't be understated. Automation eliminates traffic jams, repetitive movements, climbing, overreaching, and other unsafe workplace behaviors. A safer workplace improves employee confidence in knowing that their company cares about their well-being, improving productivity and tenure—and contributing to ROI.

Financially, fewer accidents reduce the number (and thus cost) of incident investigations, accident claims, and insurance and disability expenditures. The National Safety Council estimates the average cost per medically consulted injury to be \$42,000. Each injury prevented could mean \$42,000 in ROI.

Calculating Workforce ROI

- ▷ \$4,129 per retained worker (annually)
- ▷ 80% of worker wages during training period
- ▷ \$42,000 per prevented injury requiring consult

CarlisleIT Realizes Labor ROI

Leading aerospace manufacturer gained 30% efficiency with mobile barcoding, enabling the company to reassign one full-time employee and eliminate two part-time positions.

Read the story here



CRITERIA #3: SOLUTION IMPACT

Size and Weight

If your business is facing barriers to growth due to reliance on manual processes, then breaking down barriers with automation may seem attractive. You may consider implementing a best-of-breed, full-function technology solution, such as WMS software. While alluring, in reality the solution may be too complicated and costly to truly benefit your operations.

The more complex or “heavy” the technology is, the more time, money, effort, and maintenance will be required. Complex solutions present a higher risk of failure in terms of implementation and ROI. Ideally, a potential automation solution should represent a “right fit” for your operational needs, allowing for a reasonable time-to-deployment that doesn’t hinder daily tasks or strategic growth.

For example, if adding a new WMS to your existing ERP will cost \$500,000 and requires 18 months to implement, then the efficiency gains will have to create \$500,000 in direct cost savings before the end of 18 months to achieve a full ROI. However, ROI is unlikely to begin until after the implementation. Meanwhile, indirect expenses from wages, consultation, bug fixes, and data migration further inflate the total cost of ownership. Meanwhile, your operation can’t benefit from the new solution. Should the implementation fail, the operation could end up in worse shape than before.

Compare that scenario with a more lightweight, flexible solution like mobile data collection for the warehouse. A mobility solution elevates accuracy, efficiency, and productivity with instant point-of-work ERP transactions while providing the most essential WMS-like functionality. Like WMS, workers can benefit from intelligent routing for put-away, picking, and replenishment. Unlike WMS, the automation can be deployed quickly and in phases, rather than all at once.

While individual situations will vary, let’s assume this alternative solution costs only \$125,000 and requires just 4 months to implement. After a brief period, the warehouse solution begins repaying itself. By the time a new WMS would begin returning on investment, the

mobile data collection solution has recouped its cost, enabling the organization to reap the benefits of added value for a year or longer. Because implementation was simpler and shorter, the risk of failure is significantly lower. Clearly, this was a better outcome in this situation.

Maintenance and Future Development

After implementation, maintaining and developing your new warehouse solution can represent a hidden cost factor, especially as business priorities evolve and change. In the case of WMS, the solution may be too complex for in-house personnel to re-configure or repair without outside assistance, or the intervention of the software vendor. Relying on external resources can be expensive and sluggish, potentially affecting ROI. A complex solution like a full WMS will demand constant maintenance.

Because of this, you may consider identifying technology platforms that make maintenance and development as painless as possible. Ideally, a solution that allows in-house personnel to easily make adjustments or develop new functionality will deliver the best ROI. This approach is also much more agile.

RFgen Mobile Edge™ includes built-in low-code developer tools for simple mobile app development at scale. Intelligent app creation makes time-to-deployment up to 95% faster than coding from scratch. Instead of sinking budget into keeping your solution operable, internal IT staff can support your warehouse with minimal effort while creating additional value through added capabilities. An enterprise mobility solution also requires very little maintenance compared to the burden of WMS software.

When calculating ROI, compare the hourly rates of external vendors to the effective rates of internal staff. For instance, a vendor may charge \$250 per hour while in-house IT personnel have effective rates of \$75 per hour. Even if two potential automation solutions require the same amount of support hours per month, the difference in cost—\$175 per hour—adds up, year after year.

CRITERIA #4: INDIRECT INFLUENCES

It's easy to focus on tangible, direct cost savings. As a result, indirect influences often get overlooked. Indirect effects may impact your business more than you realize. Although more difficult to calculate in terms of actual dollars, ignoring indirect factors can cause unexpected disruptions during implementation and rollout—and beyond—leaving your organization with unnecessary risks and liabilities.

Indirect influences vary widely. However, these factors often negatively impact operations:

- ▷ Loss of sales and business due to insufficient customer service.
- ▷ Lack of continuity due to operational gaps and bottlenecks.
- ▷ Invisible labor time from manual processes, implementation, or maintenance.
- ▷ Time to start delivering efficiency benefits.
- ▷ Environmental factors like natural disasters or economic disruption.

On the inverse, new automation software can deliver savings and added value in indirect ways:

- ▷ Enhanced agility and scalability.
- ▷ Quantifiable performance data and analytics.
- ▷ Uncovering and solving hidden inefficiencies.
- ▷ Better decision-making from greater transparency.
- ▷ Downstream benefits to elsewhere in the enterprise.

Depending on your business, there may be more. Regardless, indirect variables require careful analysis to reveal and convert into dollar amounts.



Industry & Regulatory Compliance

Compliance represents a major indirect influence on ROI. Failure to meet government and industry-specific regulatory compliance can have costly consequences. Automation software with “track and trace” capabilities can provide transparency, genuine part validation, product ancestry, and the granular tracking needed to mitigate and contain risks associated with noncompliance issues and product recalls.

In 2012, peanut butter produced by Sunland, Inc. was recalled over salmonella concerns. The subsequent combination of revenue loss, reputation damage, safety countermeasures, and decreased demand for peanut butter resulted in a cost of nearly \$1 billion. A traceability solution could have reduced the scope of the recall by up to 95%, according to the International Trade Centre, a savings of \$950 million—now that's ROI!

CASE STUDY

ROI IN ACTION: ESCC SAVES \$3.9 MILLION

To illustrate how ROI calculations can be used to offset investment costs, let's look at calculations from a real manufacturer that we will refer to as Enterprise Supply Chain Company (ESCC) for privacy purposes.

ESCC conducted an ROI workshop with an RFgen expert for a new mobile warehouse solution, covering criteria from this guide as well as several others unique to ESCC. With 12 facilities, their payback amount to reach a full ROI totaled \$400,000, to be paid back over a brief nine-month period and with a total cost savings of \$3.9 million in the next five years.

Here are the results of ESCC's ROI workshop:

ESTIMATED ANNUAL SPEND		TOTAL PROJECTED ANNUAL SAVINGS	YEAR 1	YEAR 2	YEAR 3
Inventory Value	\$1,000,000.00	Inventory Reduction	\$20,000.00	\$21,000.00	\$22,050.00
Growth Write-Off	\$20,000.00	Reduction in Write-Off	\$10,000.00	\$10,500.00	\$11,025.00
Non OT Labor	\$361,920.00	New Hire Labor Savings	\$0.00	\$9,048.00	\$9,500.00
OT Labor	\$1,800.00	Overtime Labor Savings	\$900.00	\$945.00	\$992.00
Data Entry Labor	\$29,120.00	Data Entry Labor Savings	\$14,560.00	\$15,288.00	\$16,052.00
Total Labor	\$363,720.00	Labor Efficiency Increase	\$36,372.00	\$38,190.60	\$40,100.10
Picking Error Cost	\$900,000.00	Picking Error Reduction Savings	\$450,000.00	\$472,500.00	\$496,125.00
Cycle Count Labor	\$960.00	Cycle Count Labor Savings	\$480.00	\$504.00	\$529.00
		TOTAL YEARLY SAVINGS	\$532,312.00	\$567,975.60	\$596,373.10



How Much Can You Save?

Every day you wait could be costing your company thousands of dollars in wasted effort and inefficiency. Take the first step toward better supply chain health by talking with a knowledgeable expert to learn how a mobile solution can enhance your operation and enhance profitability.

[Talk to a Supply Chain Expert Today](#)

[LET'S TALK ROI](#)

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