



SURVEY REPORT

Inventory, Labor
and Sustainability:

How RFID Solves
Today's Supply
Chain Challenges

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Optimism is growing among supply chain professionals now that pandemic-related disruptions are passing. Still, concerns remain, including optimizing supply chains, managing labor shortages and meeting sustainability goals.

Optimization is a key focus for supply chain companies in the wake of everything they experienced over the past few years. In 2022 alone, we saw ongoing COVID-19 lockdowns in China, the Russian invasion of Ukraine and a slowdown in U.S. rail service — all of which slowed the bounce-back of resources from the worst of the disruption caused by the pandemic.

Fortunately, the wider implementation of Internet of Things (IoT) technologies such as radio-frequency identification (RFID) provides organizations with better end-to-end supply chain visibility than ever before. As a result, they're well-positioned to optimize their processes and get more done with the same or fewer resources.

Meanwhile, labor is in especially short supply, and sustainability is rising to the top of many company agendas. Finding a new normal for the supply chain industry will rely heavily on implementing tools and technologies that help the remaining workers do their jobs more quickly and efficiently while reducing operational emissions and waste.

RAIN RFID is particularly suited to solving these and other supply chain challenges. For example, by simplifying processes, it can help reduce time spent on manual tasks and shorten the employee onboarding process. By providing visibility across the supply chain, it can help reduce product waste and cut CO² emissions.

The technology's capabilities are proving attractive to supply chain companies, as our recent survey showed. **Just 3% of respondents indicated their company had no plans for adopting RFID.**

What is RAIN RFID?

RAIN RFID is a passive, battery-free IoT technology that can identify up to 1,000 items per second within a range of a few centimeters to multiple meters — all without requiring a direct line of sight. By adding RAIN RFID tags — consisting of a battery-free RAIN RFID tag chip and an antenna — to individual items, packages, pallets and more, supply chain organizations can use tag reading devices or readers to wirelessly track things across their supply chain and communicate that data to the system software. The software then aggregates and transforms the data, offering real-time visibility into operations. This provides businesses with valuable information for managing and improving processes to save time and money.



As senior vice president of enterprise sales at Impinj, a leading RAIN RFID provider and IoT pioneer, Todd Farley is well aware of the industry's challenges and changes. He offers reasons for optimism and caution today.

"The COVID-19 disruption shone a spotlight on existing inefficiencies in the supply chain, so those challenges are being addressed now. However, the core challenges of trying to get more done with either the same or fewer resources won't change."

TODD FARLEY

Senior Vice President of Enterprise Sales at Impinj

The supply chain industry has reached a critical turning point in how it operates, says Hunter Abbey, account executive at global enterprise technology solutions provider Velociti: "Things we're experiencing today will continue to be a challenge as fewer people come back to the workforce. It'll improve, but it may not ever be the same as it was before 2019."

In 2023, Impinj and Supply Chain Dive surveyed 100 U.S. supply chain professionals across a range of industries, from automotive to transportation to warehousing to wholesale/retail trade. The results uncovered some of the supply chain industry's biggest challenges and concerns. The findings also revealed how IoT/RFID implementation trends have changed over the past year, and how these technologies can help supply chain professionals now and in the future.

The State of the Supply Chain Industry in 2023: Key Concerns & Challenges

This year's survey found that the majority of supply chain professionals were optimistic that the supply chain industry challenges would improve in the near future (63%) and confident in their organization's ability to meet the issues and pressures (96%). However, concerns remain about many specific supply chain issues.

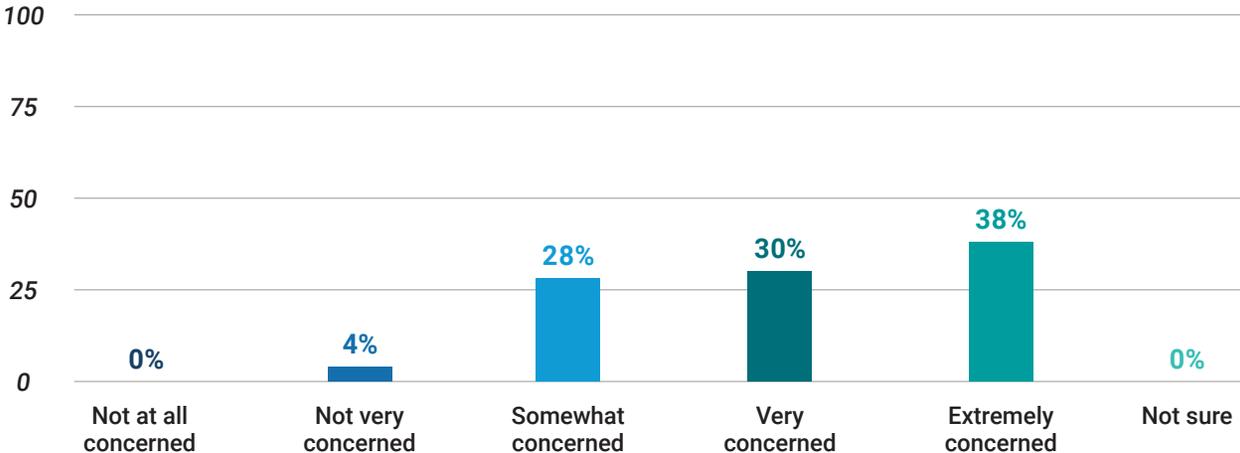
Most respondents indicated they were somewhat, very or extremely concerned about:

- Labor shortages (96%)
- Current economic conditions (92%)
- Meeting sustainability/carbon emissions goals (86%)
- Regulations/restrictions on freight movement (84%)
- Geopolitical issues (82%)

MANAGING LABOR SHORTAGES

Labor worries dominated supply chain concerns in this year's survey, with nearly all respondents saying their organization was at least somewhat concerned about finding enough workers.

How concerned is your organization about labor shortages in your supply chain? – All Respondents





The crux of the labor problem is that workloads aren't decreasing in line with the lack of workers. This situation leaves organizations trying to manage more throughput with less labor, as well as highlights the need for greater efficiency throughout the entire supply chain.

If you are a supply chain professional, that need for efficiency is especially apparent when onboarding the employees you *are* able to find. The more optimized your processes are, the easier they are for new employees to understand and the shorter the training time you need to get those workers up and running.

Fortunately, Impinj's Farley and Velociti's Abbey highlight this area as one where IoT technologies like RAIN RFID can deliver the greatest benefit.

"When you simplify processes through technology [such as RAIN RFID], your ability and speed at which you can onboard new employees are significant," says Farley.

Abbey agrees, detailing how the technology can improve training operations and enable companies to do more work with fewer employees.

"When you use IoT/RFID solutions, you shorten the training cycle. New employees learn faster how to intelligently do the job."

HUNTER ABBEY

Account Executive at Velociti

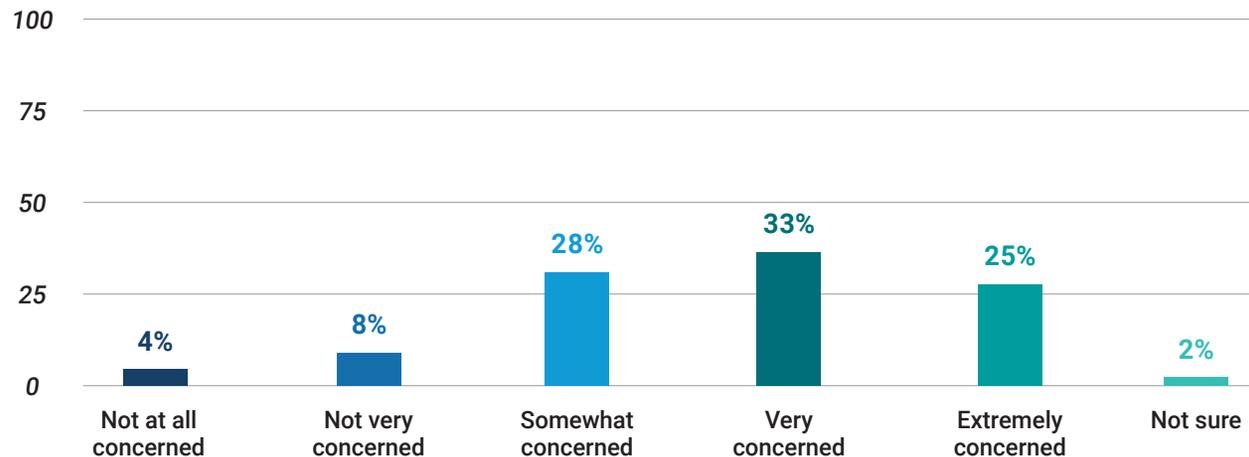
Abbey notes that even if you're not adding new workers or are having trouble filling those positions, IoT/RFID technology makes your existing team more efficient. It helps reduce the time you spend figuring out where your inventory is and, if you need to replace items, contacting suppliers and determining which one has the shortest lead time.

Survey respondents agreed with this sentiment, with labor listed as one of the business operations they felt would see the biggest impact from adopting an RFID solution. **Among those who have implemented RFID for supply chain management, 19% said it has already reduced their labor costs.**

MEETING SUSTAINABILITY GOALS

Another top supply chain concern for respondents was sustainability, with 86% saying their organization was at least somewhat concerned about meeting sustainability and emissions goals.

How concerned is your organization about meeting sustainability/carbon emission goals? – All Respondents



Forward-thinking companies have placed sustainability near the top of their agendas for two main reasons: *It's good for the planet, and it's good for business.* However, even the most well-meaning organizations shifted their focus during the past few years when major supply chain disruptions forced them into reactive mode. Just maintaining daily operations became a struggle for many companies.

Abbey believes that we are coming out of those tough times and that companies will refocus on sustainability. "The past couple of years have been challenging. As we reach a new normal, sustainability will become more top of mind."

Companies bringing sustainability initiatives back to the forefront see IoT solutions, particularly RFID, as a factor in the success of those initiatives.

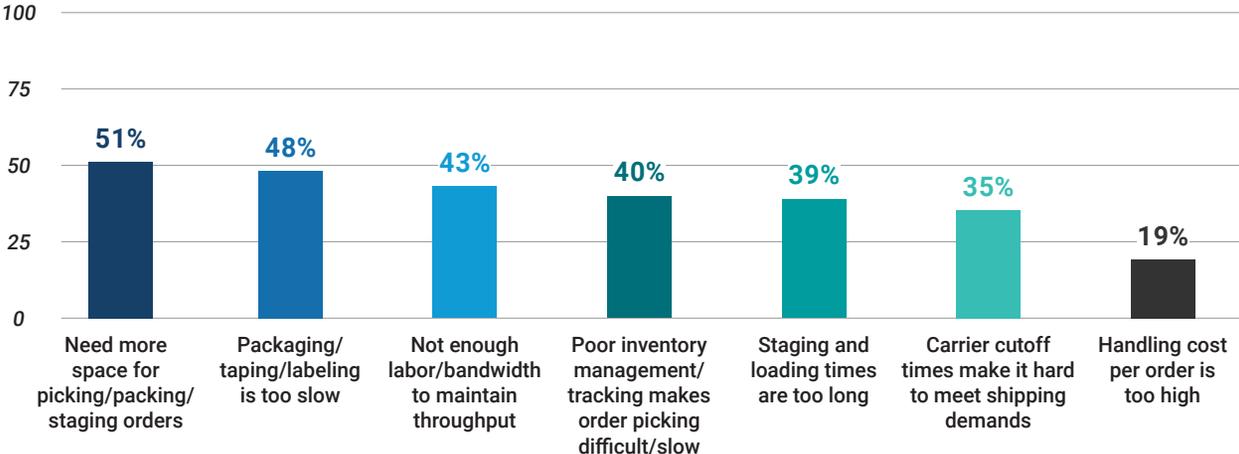
Our survey revealed that **21% of respondents believe RFID will have the greatest operational impact on sustainability initiatives.** In fact, 21% indicated they already use RFID to track perishable or expiring goods, while 8% already use it for waste reduction.

By providing visibility into "things" across the supply chain, RFID systems can help improve inventory management, shipping and other parts of operations. For example, the technology helps reduce product waste by enabling supply chain professionals to track inventory so it doesn't get lost or expire. It also can lead to reductions in carbon emissions by giving the visibility needed to plan better routes and minimize the number of trips each truck takes.

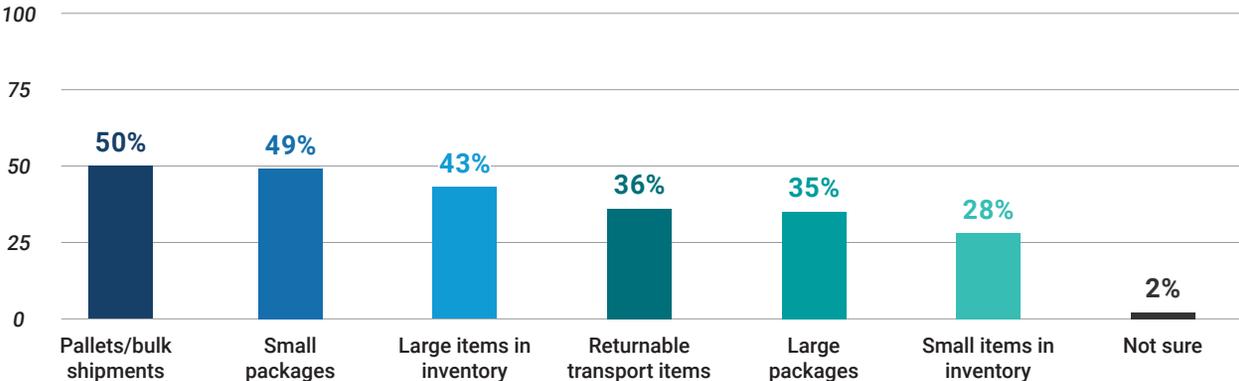
SHIPPING AND TRACKING CHALLENGES

In addition to asking respondents about overall supply chain concerns, the survey also asked about challenges specific to shipping and tracking. Labor and visibility were again among the issues highlighted, with 43% of respondents reporting that labor shortages affected their ability to maintain throughput. Meanwhile, 40% reported that order picking was slowed because of trouble managing inventory tracking.

What challenges do you face when preparing and shipping packages? – All Respondents

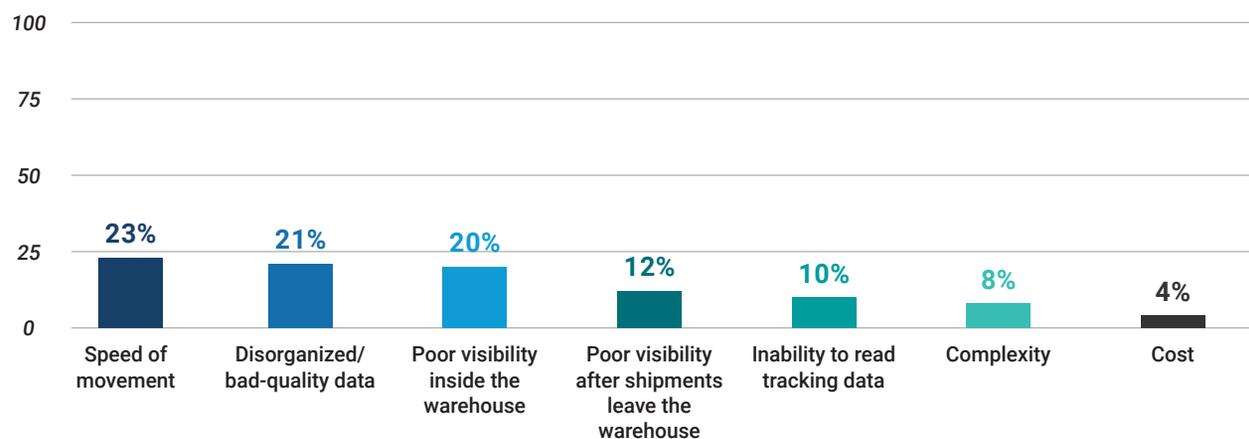


Respondents also detailed their difficulties with real-time tracking at the item, package and pallet levels. Their biggest real-time or near-real-time tracking issues were with the following:





The biggest challenges respondents faced in tracking these difficult items were:



These areas can be improved using IoT technologies like RFID. By implementing a RAIN RFID system for supply chain management, your organization can experience:

- **Automated, more accurate data collection.** Automatic RFID tag scanners eliminate the need for manual data entry, saving your team time and reducing errors.
- **Real-time tracking for better inventory management.** Having real-time information about current inventory stock levels and locations reduces the chance of stockouts and makes picking and packing easier and faster.
- **Better operational efficiency.** Automating inventory management cuts down on the time your team has to spend on finding inventory, tracking down misplaced items and scrambling to get more inventory due to stockouts.

“Lack of visibility prevents companies from planning ahead.”

TODD FARLEY

Senior Vice President of Enterprise Sales at Impinj

However, if a company gains visibility into parcel or pallet shipments at an earlier step in the supply chain, the operations manager can plan product flows to leave the facility more efficiently and on better-optimized routes. This approach saves the company money, improves sustainability by decreasing the overall distance driven and reducing the number of trips to the same or similar locations, and cuts down on shipping time to better meet or exceed customer expectations.

As organizations understand more about RFID and its capabilities, the granularity of tracking is increasing, with more companies moving from pallet-level tracking to package- and item-level tracking. While 60% of respondents were tracking at the pallet level two years ago, 58% are tracking at the pallet level today, and 48% indicate they will be tracking at this level two years from now.

By contrast, two years ago, 38% of respondents were tracking by the item. That percentage has jumped to 52% today, and 56% expect to employ item-level tracking two years from now.

While the most granular level of tracking supply chain companies could achieve with accuracy in the past was pallet level, today's technology enables accurate tracking down to the package or item level. Farley explains that organizations are trending toward more granular tracking for a variety of reasons, namely improving visibility and reducing mistakes.

“If I'm a manufacturer building pallets of cases of all the same item,” he says, “it's most important to know how many cases I need to build a full pallet. But at the distribution level, I'm likely breaking up that pallet to make mixed pallets to meet the needs of retail partners – 50 of this item, 30 of the next, and 20 of another. If the pallet goes to the right spot but has the wrong mix, that can be a costly mistake.”



RAIN RFID:

A Solution to the Biggest Supply Chain Challenges

Getting real-time visibility across the supply chain is crucial to avoiding or minimizing major impacts from the next big disruption. But to be effective, the supply chain management solution has to be lightweight enough to deploy without significant resources and intelligent enough to provide the data necessary for making business decisions.

RAIN RFID ticks those boxes. It can read 1,000 items per second at a distance of up to several meters away without needing a direct line of sight, giving operations a major efficiency boost.

While the initial investment in RFID infrastructure (particularly the readers) can be large depending on the use case, the individual tags are inexpensive. This low cost makes it more affordable for companies to tag more things, allowing them to optimize processes and scale up operations over time.

Additionally, the tag data can be sent to the cloud, enabling all major stakeholders – manufacturer, freight carrier, customer and more – to have the visibility they need to make decisions at their step of the supply chain.

With labor and sustainability among the top concerns for supply chain professionals, RFID's ability to boost efficiency is another selling point. For example, tracking an item's entire journey through the supply chain can highlight inefficiencies. If items tend to sit for a long time on a loading dock, for instance, the operations manager can adjust processes and routing to keep products flowing.

Overall, the many benefits of RFID technology enable companies to have better confidence in the resilience of their supply chains.

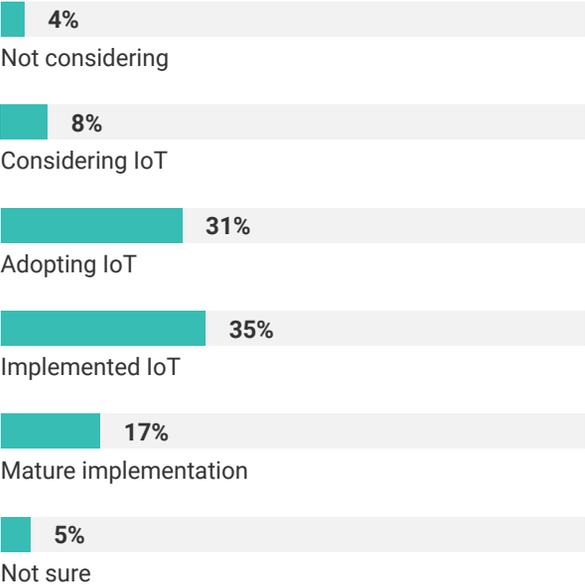
The survey found that 75% of survey respondents from companies that implemented RFID indicated they were very or extremely confident in their organization's ability to meet supply chain issues/pressures in the next two years, given their current technological toolkit. In contrast, 51% of survey respondents from companies that have not implemented RFID indicated the same.

Why Companies Are Using IoT/RFID Technology for Supply Chain Operations

Many of the benefits of RAIN RFID are reflected in the real-world use cases that respondents reported in the survey. Labor management, inventory management and sustainability are among the top uses for RFID in respondents' organizations.

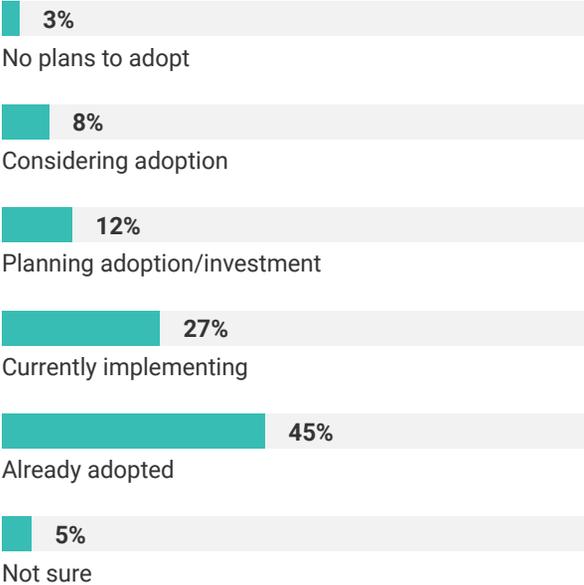
While overall IoT implementation has remained about the same year over year (83% of respondents with some level of implementation this year vs. 84% last year), mature implementation increased – from 14% in 2022 to 17% this year.

Which of the following best describes your organization's evaluation of Internet of Things (IoT) solutions? – All Respondents



Interest in RFID technology, specifically, has risen dramatically. **While the 2022 survey found that 17% of respondents indicated no plans to adopt RFID, just 3% said the same in this year's survey.** Additionally, more respondents in 2023 said their organizations are considering, are implementing or have already adopted RFID.

Please indicate your organization's plans for adopting RFID, specifically for supply chain management. – All Respondents



Not only are companies moving toward RFID, but more have already succeeded. Nearly twice as many respondents said their organization has mature RFID implementation today than a year ago, and more than double that number expect to have it in the next two years.

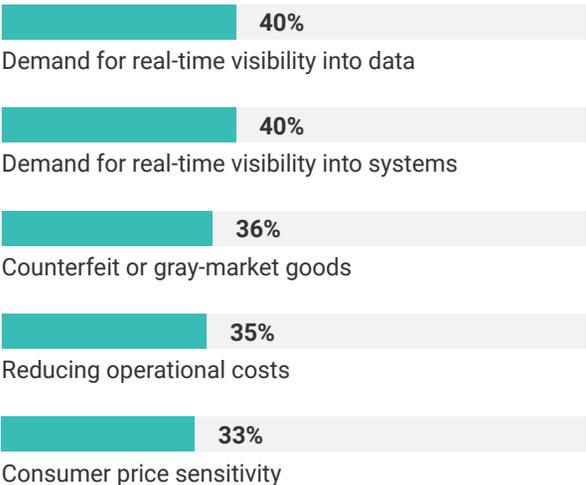
Which of the following best describes the stages of your organization’s RFID adoption for supply chain management in each of these time periods? – All Respondents

Field	Not Considering RFID	Considering RFID	Adopting RFID	Implemented some RFID	Mature implementation	Not sure/Not Applicable
Two years ago	13%	15%	29%	30%	11%	2%
Today	4%	11%	28%	35%	20%	2%
Two years from now	2%	3%	9%	33%	48%	5%

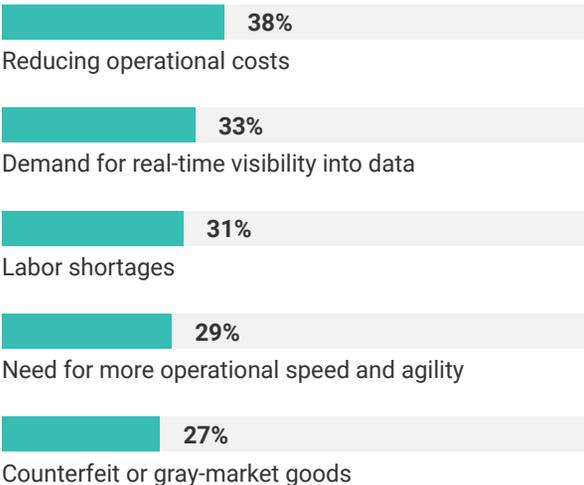
WHY ARE COMPANIES INTERESTED IN RFID?

A variety of concerns are driving the current interest in RFID – and those concerns differ between companies that have implemented the technology and those that haven’t.

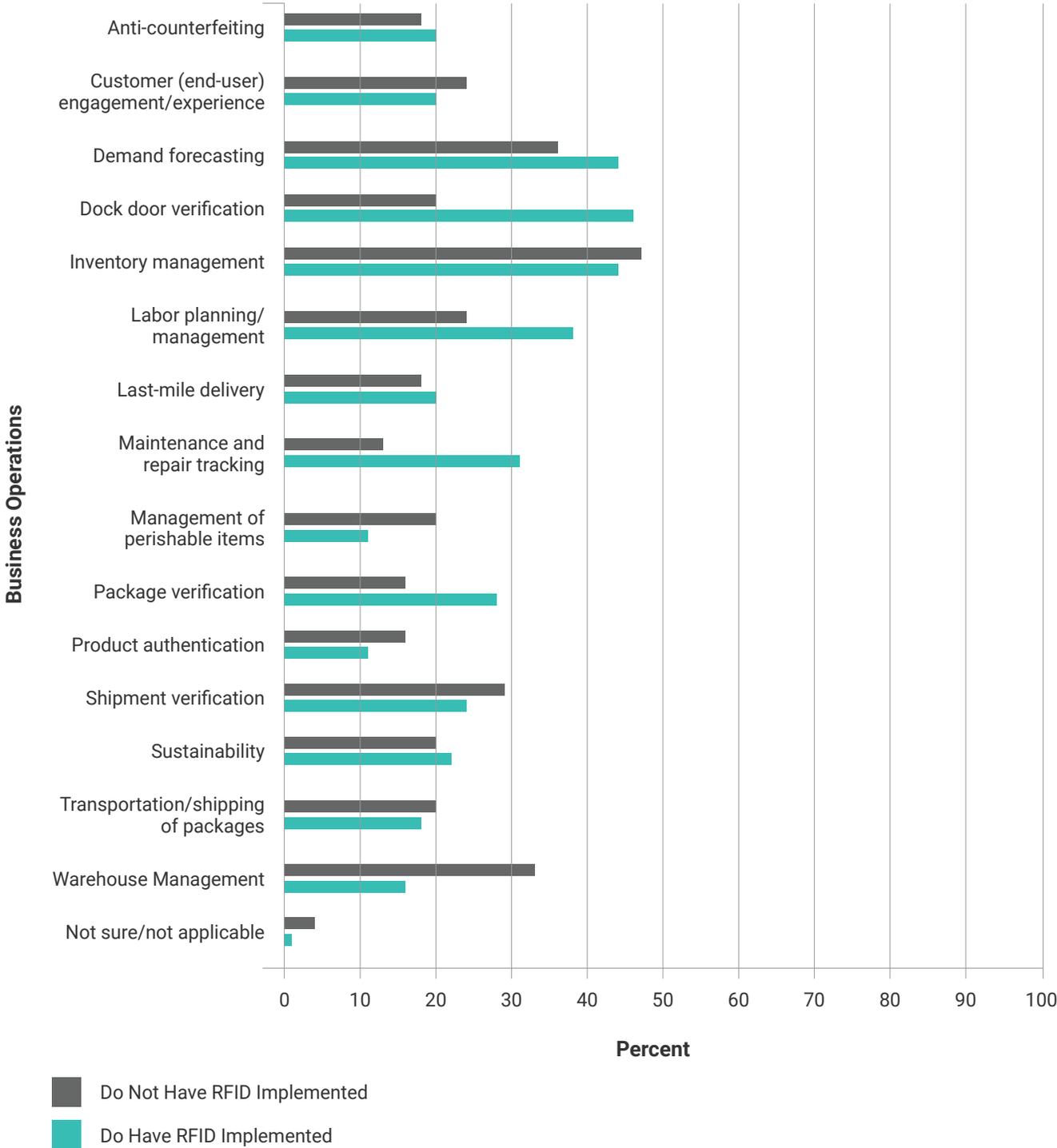
Among respondents from RFID-enabled companies, the biggest drivers they see for interest in the technology include:



Respondents from companies that haven’t implemented RFID have a somewhat different set of concerns:



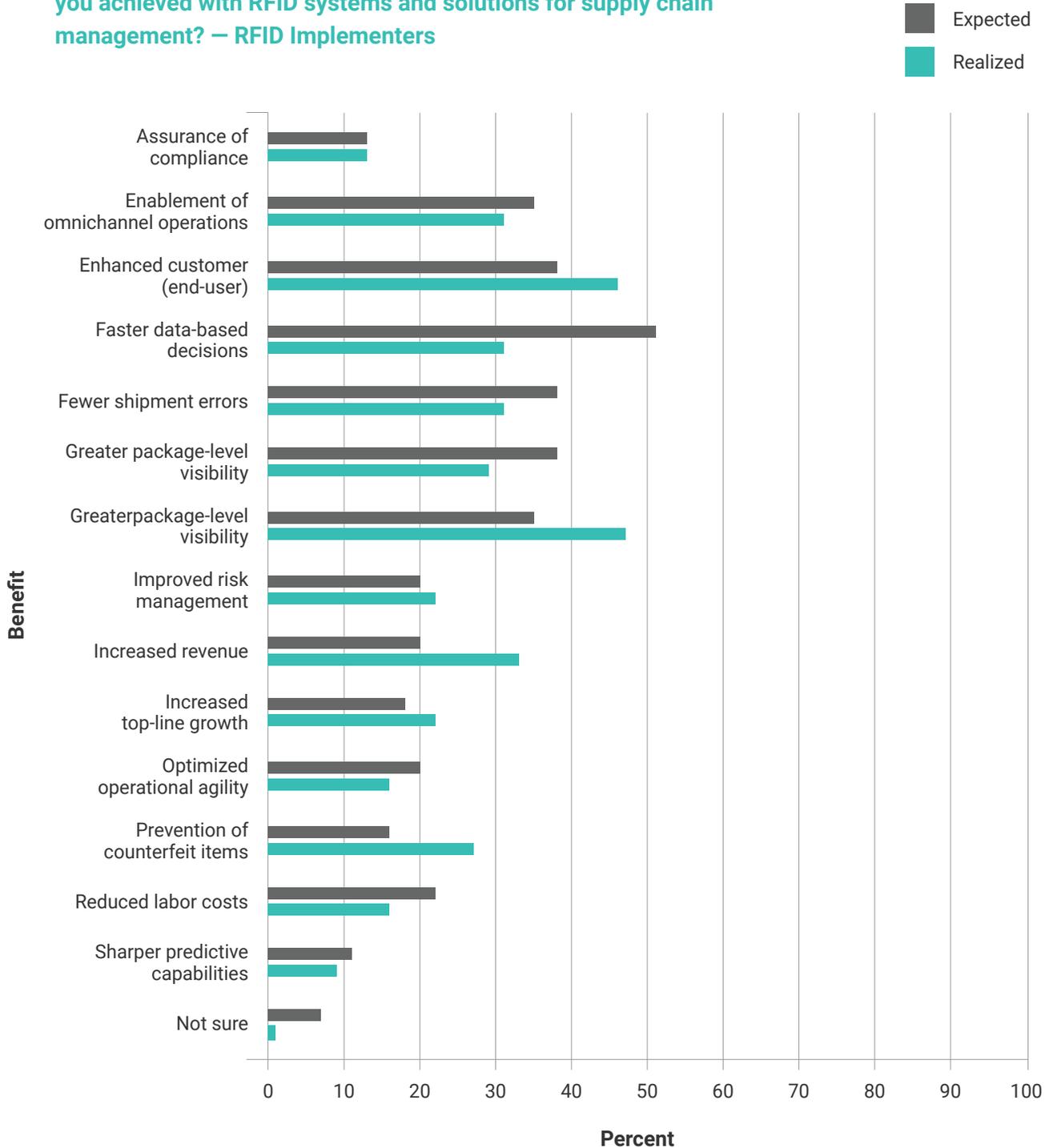
What business operations would realize the greatest possible impact from adopting RFID systems and solutions for supply chain management? – RFID Implementers vs. Non-RFID Implementers



BENEFITS OF IOT/RFID – EXPECTED VS. REALIZED

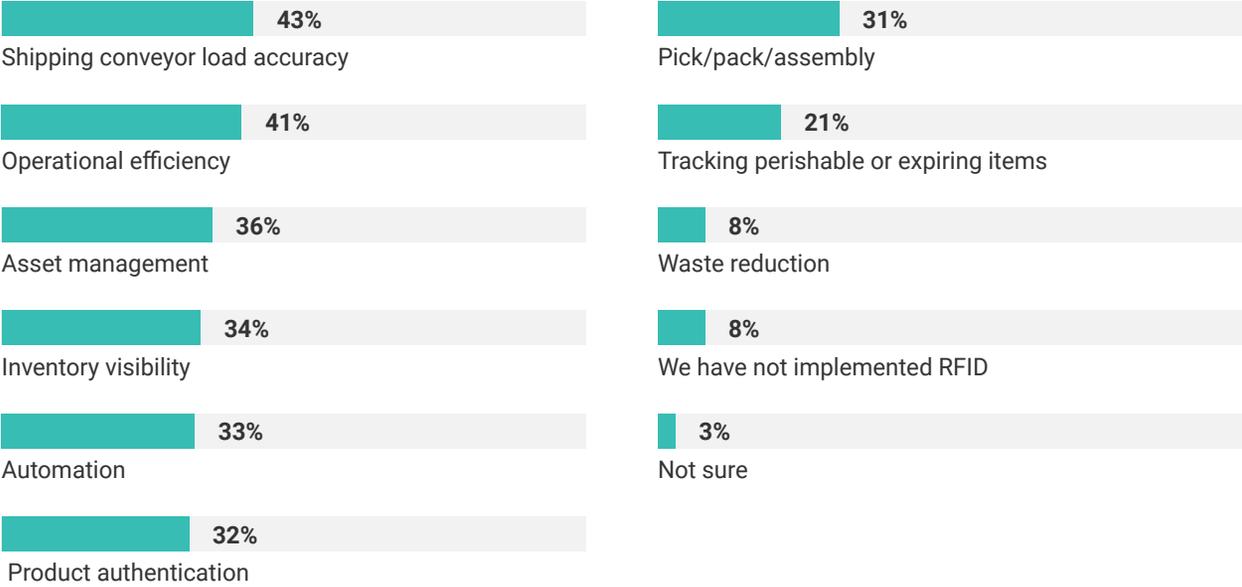
The survey also highlighted differences between RFID technology’s expected and realized benefits/uses. For example, 20% of companies without RFID named dock door verification as an area of great possible impact, whereas 46% of RFID adopters did.

Which of the following benefits would you expect to achieve/have you achieved with RFID systems and solutions for supply chain management? – RFID Implementers



USES FOR IOT/RFID – ALL RESPONDENTSS

If you've implemented RFID systems or solutions for supply chain management, what are the technology's primary uses in your organization?

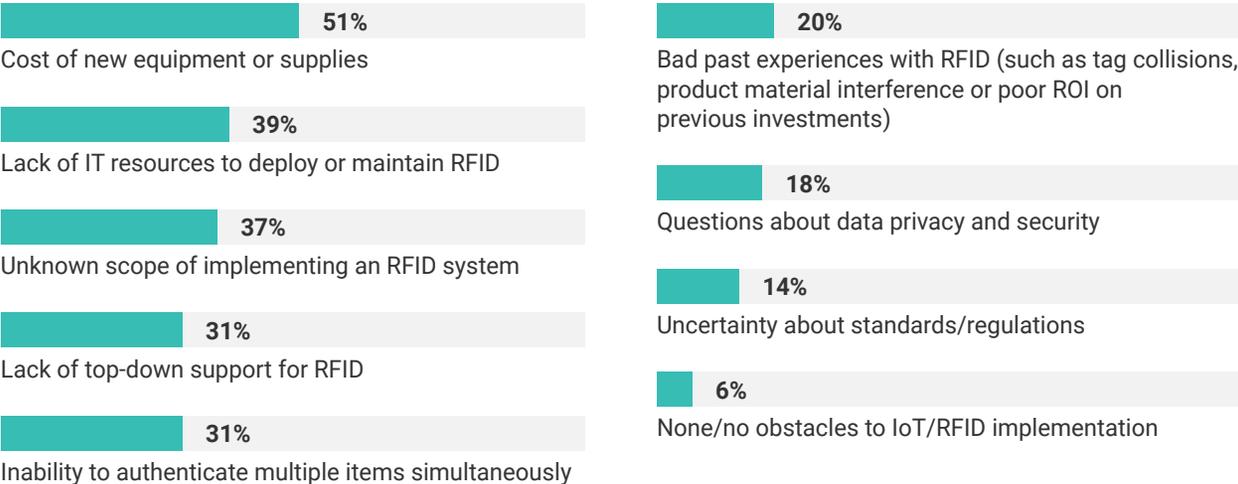


Product authentication is especially noteworthy since creating fake luxury items and pumping them into the market is a huge business – to the tune of hundreds of billions of dollars a year. But with the latest RAIN RFID technology, companies can automatically authenticate products in real time at steps along the supply chain. In fact, **16% of respondents expect RFID systems and solutions for supply chain management will help in preventing counterfeiting.**



Obstacles to IoT/RFID Adoption

As with any investment in tools or technology, supply chain professionals face several challenges to adopting IoT/RFID technologies, including getting leadership buy-in. Respondents reported that the biggest obstacles to implementing IoT/RFID technologies were:



Perceived costs associated with new technology is the leading concern, which is understandable when an industry is still in recovery mode. But if you're a supply chain professional making a case for IoT/RFID implementation in your organizations, know that you don't have to deploy a huge tech infrastructure all at once. RFID is highly scalable and repeatable, so you can choose a smaller initial deployment and build on it as you see the return on investment (ROI).

RFID's benefits can also address the next leading concern among respondents: the lack of IT resources to deploy or maintain a system. RFID is a relatively low-intensity solution from an IT standpoint.

In some use cases, you may not even have to rely on your IT team for installation. Hardware is relatively easy to deploy, and communication between tags and readers can be handled via cloud software outside your network, preventing costly IT integration projects.

The relatively easy deployment and use of RFID solutions mean your company can quickly generate ROI from greater visibility and the ability to drive more powerful automation. Faster ROI makes RFID a much easier sell to cost-conscious or effort-sensitive leadership.

Get Control of Your Biggest Challenges with IoT/RFID

If you're looking to improve inventory tracking, do more with less and meet your organization's sustainability objectives, you can embrace the power of IoT technologies, including RFID. Highly scalable RFID solutions enable you to start small and build as your organization or deployment grows.

The key is to define an initial project with a specific goal in mind. To realize the greatest return on your RFID investment in the shortest amount of time, ask yourself a few crucial questions:

- What's the business problem we're trying to solve?
- What impact does that problem have on the company?
- What would solving that problem do for our company? How much more could we get done?
- How much money could we save by using technology to solve this problem?

For example, if your biggest business challenge is a labor shortage, your business problem may be optimizing and automating processes to make jobs easier for your workforce. By using RFID, you can spot pinch points in your system, automate repetitive tasks such as data entry and speed up inventory movement without burdening your workforce.

Using IoT technologies like RFID gives you a better handle on your biggest supply chain challenges and bolsters your resilience, so you can meet your business goals and grow more successful – even in the midst of disruption.





Impinj helps businesses and people analyze, optimize and innovate by wirelessly connecting billions of everyday things – such as apparel, automobile parts, luggage and shipments – to the internet. The Impinj platform uses RAIN RFID to deliver timely data about these everyday things to business and consumer applications, enabling a boundless Internet of Things.

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