



Pharmaceutical Supply Chain Vision Study

Technology-led Transparency Drives Resiliency

Rising consumer expectations and industry requirements have precipitated supply chain improvements for new levels of agility, visibility and safety.



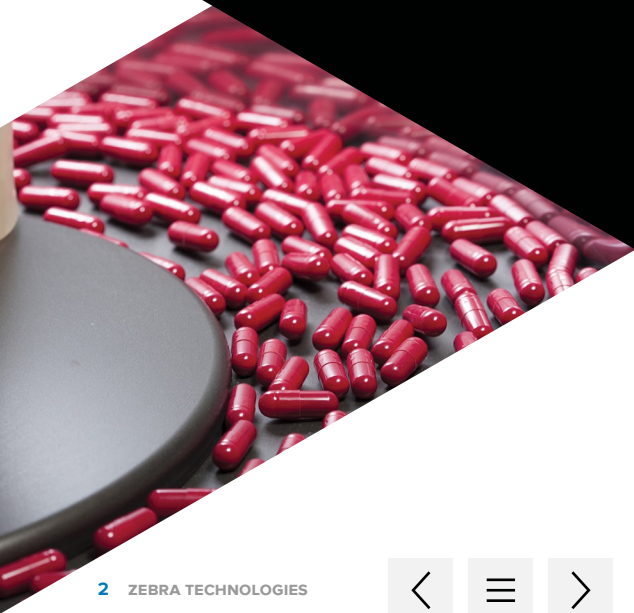
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About the Study

Zebra's Pharmaceutical Supply Chain Vision Study was conducted among a global audience of over 3,500 patients and pharmaceutical industry decision-makers to evaluate perceived supply chain stability, gauge supply chain responsibility and trust in its entities, and identify needs for improving supply chain visibility and transparency. Respondents were surveyed in Asia Pacific, Europe, Latin America and North America. Patients are adults with medical health issues requiring prescription medication or treatment that was filled at a pharmacy. Pharmaceutical industry decision-makers are executive-level leaders in healthcare, manufacturing, pharmacy retail, or transportation and logistics organizations who maintain operations in the pharmaceutical or biopharmaceutical supply chain. All data was collected and tabulated by third-party research firm Azure Knowledge Corporation.

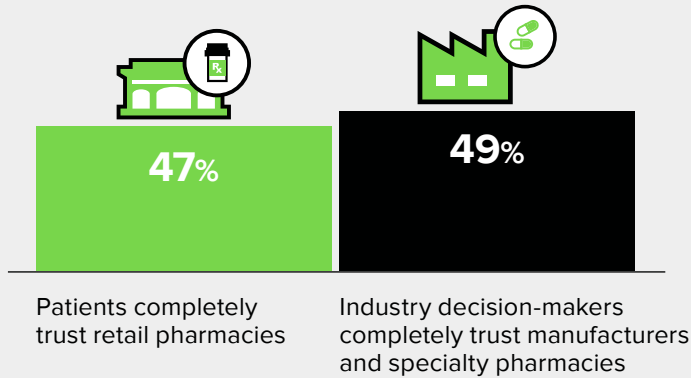


The Story in Numbers

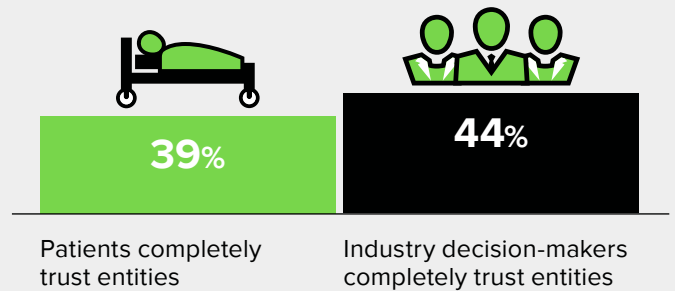
Top Trends: Comparing Patient Perceptions Against Industry Decision-Maker Priorities

Building Trust Is Essential

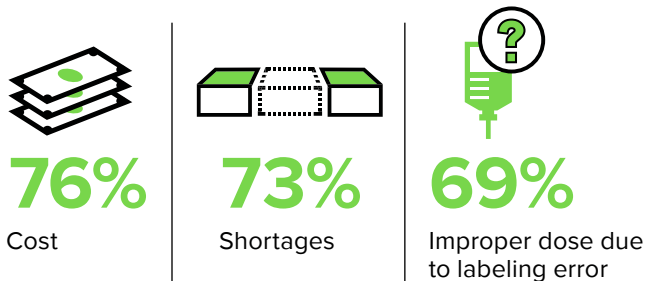
Most Trusted Entities



Average Trust Level in Pharmaceutical Supply Chain Entities



Patients' Medication Concerns

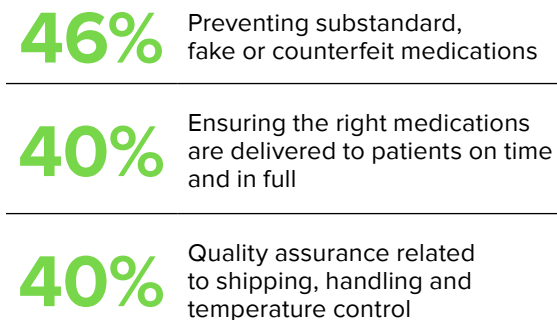


Necessary Operational Changes to Avoid Future Business Disruptions

Industry decision-makers agree:

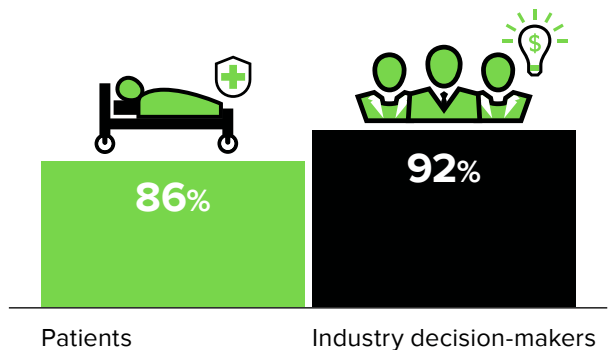
- 1 Diversify reliance on external suppliers
- 2 Improve ability to adjust inventory to meet fluctuations in demand
- 3 Identify vulnerabilities, risks and failure points

Enterprise Leading Challenges



Technology Investments

Respondents agree technology investments provide a competitive edge in managing supply chain stability, security and traceability.





One-Minute Read

Examining the Health of the Global Pharmaceutical Supply Chain

The COVID-19 pandemic upended businesses across nearly every category, profoundly altering how society does everything from going to work and school, shopping, getting medical care, and more. The pandemic also exposed vulnerabilities in the global pharmaceutical supply chain. Retailers, healthcare providers and consumers alike shared concerns about potential drug shortages, quality issues and price volatility from the pharmaceutical sector as the world's focus intensified on healthcare.

Pharmaceutical enterprises—including manufacturers, transportation and logistics providers, and healthcare organizations—recognize the potential consequences of an inadequate supply chain and the importance of agility and resiliency. At the same time, each party in the supply chain grapples with the best manner to meet continually rising regulations from governments and industry agencies.

Businesses are increasingly embracing technology to enhance quality, traceability and adherence to regulatory requirements. Industry leaders agree that technology holds great promise in helping them safeguard operations against future disruptions or new regulations, avoid or eliminate fines and chargebacks for medications, and ultimately better protect patients.



One area of particular concern is the level of patient trust in the entities within the pharmaceutical supply chain. Overall, complete trust is low for both patients and industry decision-makers. Industry decision-makers indicate that integration of enhanced track and trace solutions is key to strengthening supply chains and meeting patient expectations around medication authenticity, availability and quality assurance.

In a sector where quality and efficacy are paramount, investment in enterprise technology supports the achievement of regulatory compliance as well as patient protection. A culture of data quality and integrity empowers and motivates change for a safer, more agile and more resilient supply chain that can stand up to future market disruptions.



Enterprises are continuing to leverage technology to improve supply chain operations.

96%

of enterprises agree supply chain visibility provides a clear competitive advantage

92%

of industry decision-makers are planning to increase investment in pharmaceutical manufacturing and supply chain monitoring

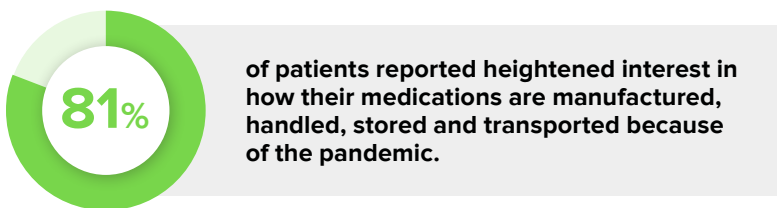


Market Watch: The Impact of Public Health Crises and Increased Regulation

Current events and a shifting regulatory environment drive the need for supply chain enhancements and transparency from raw materials to manufacturer to pharmacy.

While the COVID-19 pandemic posed outsized challenges to the pharmaceutical industry, many of its supply chain issues were not new. Industry decision-makers recognize the value of enhanced trackability and traceability and the power of technology to help improve overall operations. Industry decision-makers acknowledge that operational improvements are necessary to meet an increased need for regulatory compliance and protect the public reputation of the enterprise in the long term.

Meanwhile, the pandemic inspired new awareness in patients around the realities of global supply chain vulnerabilities. Patients want to know more about how their medications are manufactured, stored, handled and transported. With their health at stake, many patients do not tolerate issues with their prescriptions and have no trouble switching pharmacies, providers or brand names when unsatisfied with an experience.



Industry decision-makers are also conscious of the threats of an unreliable supply chain. Diversifying reliance on external suppliers and distributors, and the ability to adjust inventory to meet fluctuations in demand, top the list of solutions that decision-makers have realized they must pursue.

Regulatory Compliance Is an Issue

While most enterprises across manufacturing, transportation and logistics, and healthcare are meeting or exceeding regulatory compliance, about one in 10 lags in meeting regulatory requirements. Despite success, it remains a potential threat for the pharmaceutical industry:

- About one-third of industry decision-makers surveyed rank compliance among their top five challenges facing their business today.
- Among the pharmaceutical industry verticals, manufacturing experiences the most significant lag in compliance.

Industry Decision-Makers Cite Top Five Supply Chain Issues

1



Regulatory delays
(facility inspections, longer approval timelines, more in-depth inspections, increased quarantines)

2



Production limits

3



Distribution and storage problems

4



Shipping capacity constraints

5



Transportation delays

Supply Chain Stability Heightens Patient Satisfaction

Patients and industry decision-makers alike recognize the potential negative consequences of an unstable supply chain. They are aligned in their respective perceptions of the most significant risks posed if the pharmaceutical supply chain is not improved. Medication quality and efficacy due to improper storage, related principally to refrigeration and temperature control, top the list among both segments. Patients also cite perceived risk of illness and possible death due to contaminated, tainted, falsified or counterfeit medications making their way into the supply chain.

Issues with Prescription Medication Are Common

The majority of patients surveyed report experiencing issues in the past with either purchasing or taking a prescription medication. Out of stocks and availability issues remain a crucial factor for patients in determining their overall satisfaction; this sentiment mirrors some of the major pain points also experienced in the retail sector in general.

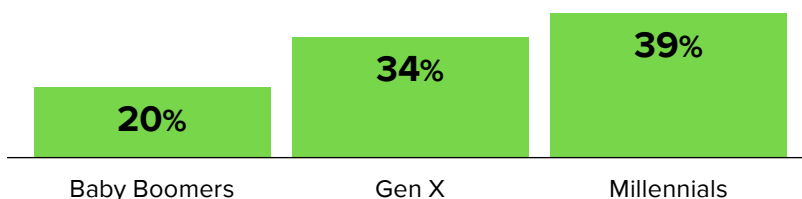
Patients Do Not Tolerate Issues with Their Medications



Millennials Drive Pharmacy's Digital Transformation

As digital natives age, more consumer behavior moves online. This reality, compounded by the impact of the COVID-19 pandemic, encouraged many people to explore new digital alternatives for everything from groceries to prescription drugs. By generation, millennials are the most likely to report experiencing a problem and making a change as a result; they are also the most likely to say they changed their pharmacy, with 21% among those experiencing a problem reporting they switched from brick-and-mortar stores to mail-order outlets.

Respondents Who Changed Pharmacy Because of an Issue or Poor Experience with Medication or Treatment



Leading Issues with Prescription Drugs Reported Among Patients

32%

needed medication that was unavailable or out of stock

29%

received only a partial amount due to unavailability at the time

27%

found the same product at a lower price elsewhere

22%

did not receive on time or when needed

Patients Want More Transparency and Education

Only 48% of patients surveyed report being familiar with traceability at all, and less than two in 10 say they are very familiar. Although most patients are not very knowledgeable about the concept of pharmaceutical traceability, they are certainly impacted by the advantages track and trace offers, including:

- Assurance that only authorized pharmaceuticals circulate in the legal supply chain
- Reduced risk posed by substandard, spurious, falsely labeled, falsified and counterfeit (SSFFC) medications
- Prevention of dispensation of expired, prohibited or recalled medications

As digital natives and savvy consumers, millennials have the highest level of familiarity compared to other generations. The differences across regions are striking, with consumers in Asia Pacific and Europe leading and North America reporting the lowest level of understanding.

Patients Prioritize Traceability

Though patients may not fully understand it in concept, the issues related to traceability are very important to all. Safeguarding product authenticity is a leading issue for patients, as is understanding the origin and medication journey end-to-end.

The relationship between manufacturers and end consumers is largely a perceptual one, as the two entities often only interact with healthcare providers or retail pharmacies as an intermediary. In patients' minds, manufacturers, regulators and pharmaceutical enterprises are responsible for instilling public trust by ensuring that falsified or counterfeit medications do not enter the supply chain.

There is a gap between patient and industry decision-maker perceptions regarding the industry's preparedness to manage traceability and transparency. While 84% of industry decision-makers say they are prepared, only 65% of patients feel the same.



Information Is Vital

76%

of patients and

86%

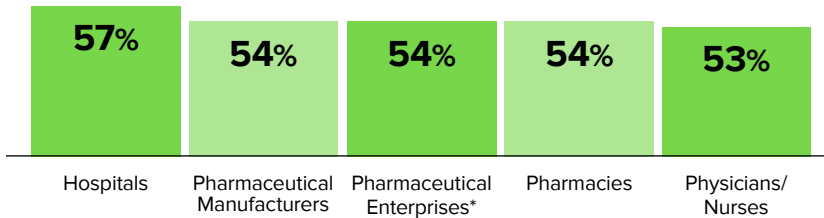
of industry decision-makers agree that accessing supply chain information digitally makes it easier to learn more about medications.

Who Is Responsible for Safety?

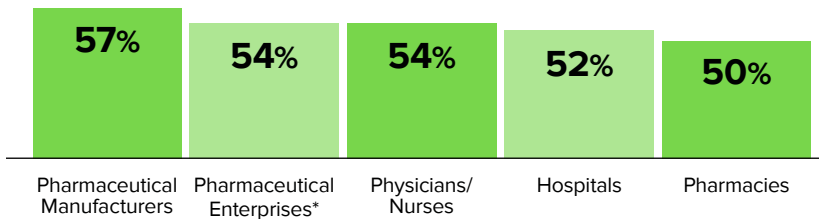
The burden of responsibility for the safety of the pharmaceutical supply chain is shared among those who regulate, manufacture, dispense and administer medications. However, complete patient trust in these entities is relatively low. Improved collaboration between enterprises and regulatory agencies could inspire greater consumer trust while building an industry better prepared to address future public health crises.

Responsibility for Medication Safety

According to Patients



According to Industry Decision-Makers



Enterprises realize the power of technology to enhance digital access to supply chain history. This information is vital in educating patients and ultimately building trust. More patients need the benefits of digital education, as well as to learn more about their medications.

* Pharmaceutical enterprises, other than manufacturers, include transportation and logistics providers and healthcare organizations.



Pharmaceutical Organizations Transition from Reactive to Predictive Operations

Over half of both patients and industry decision-makers agree that investments in technology will provide a competitive edge in all key areas of the pharmaceutical business and across the end-to-end supply chain. Devices and technologies that track medications from raw materials to patients are top industry priorities.

Realizing the Benefits of Modernized Operations

The list of specific solutions trusted by industry decision-makers to improve traceability is led by technology that enables next-level visibility and traceability.

Industry Decision-Makers Agree Devices and Technologies Help Improve Traceability Within the Supply Chain



1

Temperature-sensitive labels and item/batch level monitors



2

Location technology



3

Temperature monitors and sensors



4

Mobile barcode labels and thermal printers



5

Rugged scanners and the Internet of Things (IoT) and artificial intelligence (AI) technologies

Meeting Digital Challenges to Build Long-Term Patient Trust

As the online pharmacy category continues to grow, it creates challenges for the industry that must ensure the ease of arranging shipping and delivery and protecting temperature-sensitive medications throughout the journey and during the last mile to reach the patient. Technology enables faster and more secure fulfillment, whether online or from a traditional brick-and-mortar pharmacy. Clearer inventory visibility and powerful devices like thermal label printers are becoming increasingly important to deliver faster and more efficient fulfillment.



Increasing Confidence and Enabling Agility

Industry decision-makers expect to shift to more responsive and predictive operations over the next five years as enterprises leverage real-time data to build more efficient and resilient supply chains.

Pharmaceutical Industry Decision-Makers Describe the Shift in Supply Chain Operations

	Currently	Trending	In Five Years
Siloed and Reactive Operating with legacy systems and devices	7%	▲	10%
Standardized Standardizing to improve and streamline specific touchpoints and processes	37%	▼	25%
Integrated Integrating enterprise-wide systems for greater visibility	33%	▼	28%
Responsive Responsive to digital signals throughout the supply chain	15%	▲	22%
Predictive Digital transformation is the way of the business	7%	▲	15%

Areas Industry Decision-Makers Believe Technology Helps Improve Traceability



46%

Supply chain optimization



46%

Risk reductions with proper handling, transportation and storage



43%

Track and monitor product temperature



43%

Maintain drug efficacy, quality and stability



41%

Regulatory compliance on pharmaceutical safety guidelines

Technology Investment Drives Supply Chain Resiliency

Forward-thinking pharmaceutical-sector enterprises are harnessing the benefits of technology to improve operations and better protect patient health. Spending on enterprise devices and solutions is expected to increase, with a focus on pharmaceutical manufacturing and supply chain monitoring tools.

Industry Decision-Makers' Strategies Prioritize IT Investments

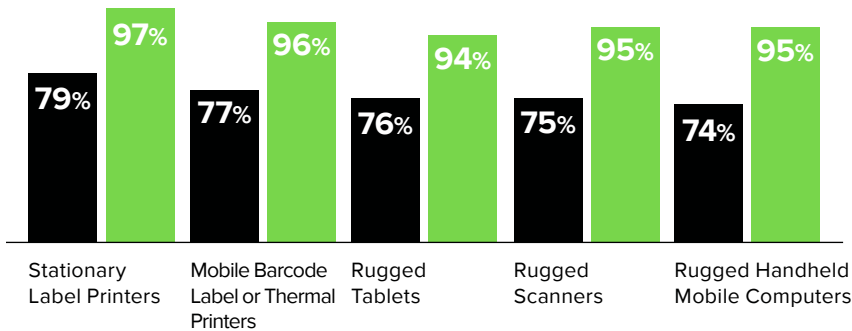


89% plan to increase IT spending within the next year, with 42% indicating the increase will be more than 10%.

92% plan to increase IT spending on supply chain monitoring tools.

Device Implementation Plans to Manage the Pharmaceutical Supply Chain

● Within the Next Year ● Over the Next Five Years



Location Technology Leads Future Deployment Plans

Enhanced visibility is key to an agile and efficient supply chain. Location solutions, such as Radio Frequency Identification (RFID) and Real-Time Location Systems (RTLS), automatically sense the status of assets and inventory to provide real-time visibility across the facility. For pharmaceutical manufacturers and distributors, this can streamline production workflows and help to avoid shrink due to lost or potentially compromised products. Interestingly, 76% of industry decision-makers say that they have already deployed location services technology or plan to in the next year.





Priorities for Technology Investment Now and in the Future

The combined solution of devices and software can enhance productivity, add invaluable visibility to the supply chain, and provide the security necessary to future-proof operations.



Industry Decision-Makers Rate Top Five Benefits Technology Provides

- 1 Ability to detect and respond to risk posed by counterfeit or substandard products
- 2 Keeping patients safe from compromised medications or other products
- 3 Improving team productivity and workflow conformity
- 4 Increasing product/asset visibility and utilization
- 5 Enabling informed real-time decision-making and regulatory compliance



Industry Decision-Makers Cite Technology Implementation Plans in Five Years

97%

Location Technology

94%

Temperature Monitors and Sensors

94%

Temperature-Sensitive Labels

93%

Prescriptive Analytics

89%

Machine Learning



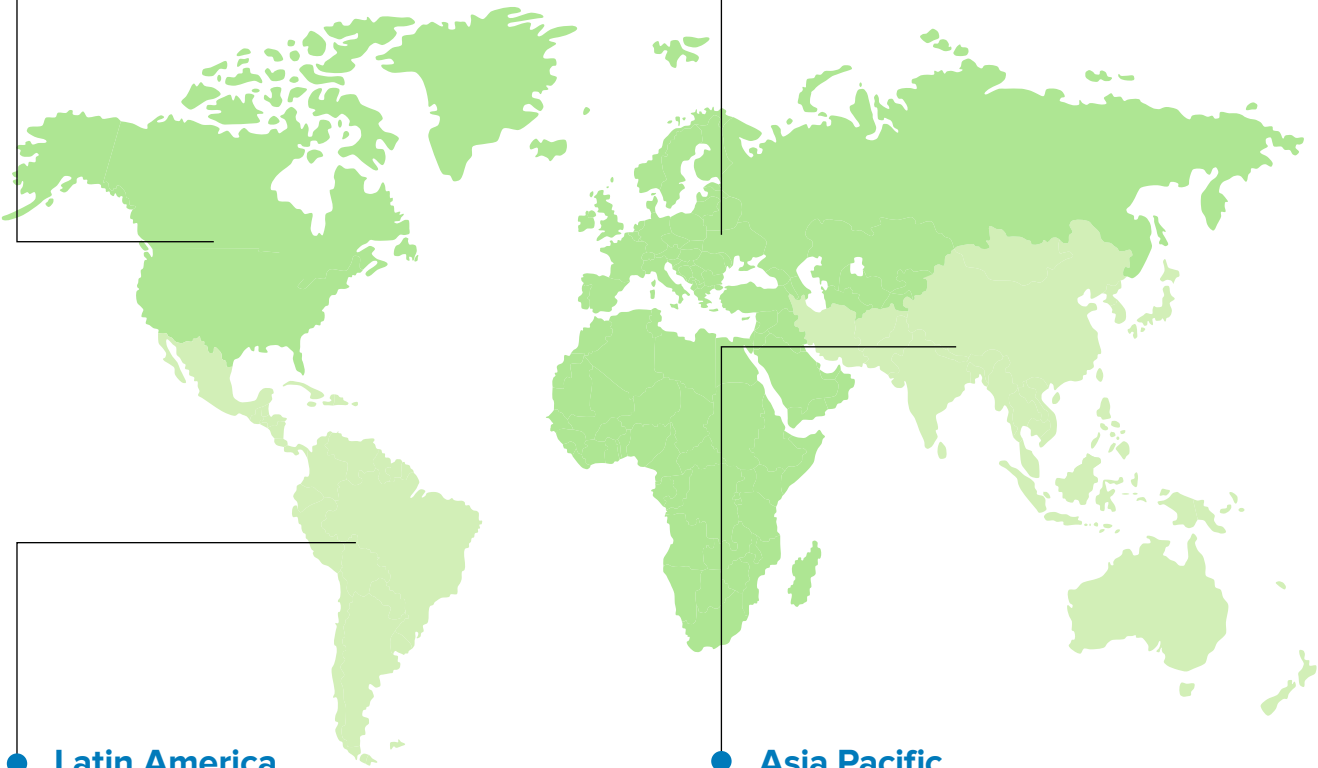
Regional Findings

North America

In this region, 51% of patients and 46% of industry decision-makers report that they completely trust retail or community pharmacies to ensure that medications and other treatments are kept safe—the highest level of trust among all regions.

Europe

Only 64% of patients and 74% of industry decision-makers in European countries agree that direct-to-patient delivery of medications by mail is a convenient and consistently safe way to receive medications—the lowest agreement level regionally.



Latin America

Patients in Latin America do not tolerate issues with their medications, as most report making a change due to a poor experience. With 87% of patients reporting a change in behavior, it's the highest compared to all other regions.

Asia Pacific

About six in 10 patients in the Asia Pacific region believe delays in delivery (62%) and exposure to extreme temperatures (60%) are top issues among mail-order pharmacy users—the highest compared to other regions.

Enabling a Safe, Stable and Reliable Supply Chain

Recent years have posed unprecedented challenges to global pharmaceutical supply chains. Despite disruptions, however, protecting the stability, security, quality and efficacy of medications and treatments remains the highest priority. To do so, and to protect patients and their business from the impact of future crises, requires a shift to more predictive and responsive operations. Supply chain resiliency is on the horizon as more industry decision-makers are investing in track and trace technology to enable end-to-end visibility, streamline operations and achieve compliance.



Build a Safe, Efficient Pharmaceutical Supply Chain

To learn how Zebra can help you digitalize your pharmaceutical supply chain for improved visibility, agility and business resilience, please visit: zebra.com/pharmaceutical

About Zebra

Zebra (NASDAQ: ZBRA) empowers the front line of business in manufacturing, transportation and logistics, healthcare, retail, and other industries to achieve a performance edge. We deliver industry-tailored, end-to-end solutions that intelligently connect people, assets and data to help our customers make business-critical decisions.



NA and Corporate Headquarters
+1 800 423 0442
inquiry4@zebra.com

Asia Pacific Headquarters
+800 1302 028
contact.apac@zebra.com

EMEA Headquarters
zebra.com/locations
contact.emea@zebra.com

Latin America Headquarters
+1 866 230 9494
la.contactme@zebra.com

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KEY TAKEAWAYS



Patient concerns align with the same challenges industry decision-makers are facing. Both segments understand the impact of unstable supply chains on the availability and efficacy of medications.



Patients and industry decision-makers agree: The responsibility for keeping the supply chain safe and secure is a collective effort shared between those who manufacture, distribute, administer and regulate medications.



The impact of the pandemic increased both patients' and enterprises' awareness of the need for improvement across the pharmaceutical supply chain globally.



Increased trackability and traceability leads to risk reductions with proper handling, transportation and storage, particularly when it comes to temperature-sensitive medications.