

TOP 25 Material Handling KPIs to track in 2025

Infographic

Optimize warehouse performance, reduce costs and improve efficiency by continuously measuring and analyzing these metrics. Tracking the right **key performance indicators (KPIs)** optimizes warehouse operations, improves productivity, reduces costs and enhances customer satisfaction to help you stay competitive.

This guide highlights the **top 25 KPIs** that every material handling professional should monitor across automation, cost management, safety compliance and customer service. By focusing on these key metrics, you'll know where to apply **AI, robotics and real-time data** so you can connect to what's possible.

»» Take your material handling operations to the next level by measuring what matters.

1. KPIs for smart automation & operational efficiency

These KPIs showcase how automation and smart technology enhance warehouse operations by improving accuracy, speeding up fulfillment and reducing downtime. With tools like AI forecasting and predictive maintenance, you can build a more efficient, reliable and future-ready supply chain.



1. Order picking accuracy (%)

Ensures fewer picking errors to minimize returns and improve customer satisfaction.

2. Automated order fulfillment rate (%)

Tracks the percentage of orders processed without manual intervention to improve efficiency.

3. Warehouse robotics utilization (%)

Measures the proportion of warehouse tasks handled by automation.

4. Pick-to-ship cycle time (hours)

Tracks how long an order takes to fulfill from picking to shipment to measure operational speed.

6. AI-based demand forecasting accuracy (%)

Evaluates AI's ability to predict inventory needs to prevent to stockouts and overstock.

7. Predictive maintenance success rate (%)

Measures how effectively AI-driven maintenance prevents equipment failures.

5. Dock-to-stock time (hours)

Measures how quickly received inventory is put away and ready for fulfillment.

8. System downtime due to errors (hours/month)

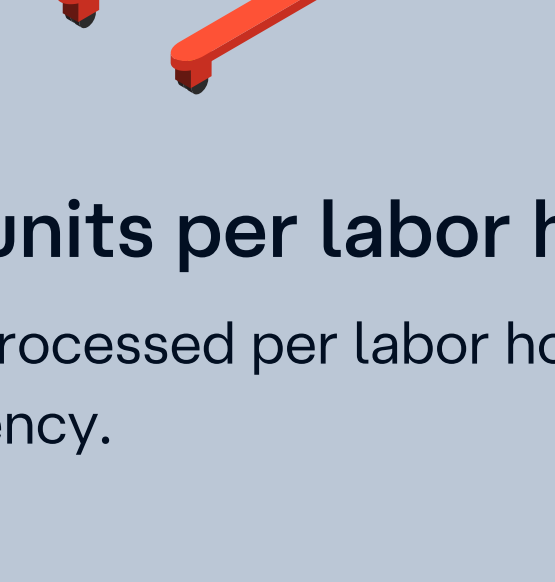
Tracks disruptions caused by warehouse management system (WMS) failures or automation malfunctions.

2. KPIs for warehouse performance & sustainability

From space and labor to energy and materials, these metrics give you a well-rounded view of how efficiently you use your resources. By keeping these areas in check, you can boost productivity, improve order accuracy and support sustainability efforts all at once.

9. Storage utilization (%)

Measures how efficiently warehouse space is used to maximize capacity and minimize costs



11. Order fulfillment rate (%)

Percentage of orders delivered on time and in full (OTIF) to ensure reliability.

12. Inventory accuracy

Compares real-time system inventory data with actual stock to reduce errors and discrepancies

13. Energy consumption per order (kWh/order)

Measures warehouse energy efficiency per processed order.

14. CO₂ emissions per order (kg/order)

Monitors the environmental impact of material handling operations.

15. Packaging waste reduction (%)

Tracks improvements in packaging waste reduction to support sustainability goals.



3. KPIs for cost management & safety compliance

Together, these metrics help you keep a close eye on costs, space efficiency and logistics, while also ensuring that your team stays safe and is well-trained. By tracking these areas, you can make smarter decisions that improve productivity and employee well-being.

16. Cost per order (\$/order)

Calculates the total expense to process each order to identify cost-saving opportunities.

17. Warehouse operating costs (\$/sq. ft.)

Measures total costs per square foot to ensure efficient use of space and resources.

18. Freight cost per unit shipped (\$)

Tracks transportation costs per shipped unit to optimize logistics.

19. Incident rate (OSHA recordable incidents per 100 employees)

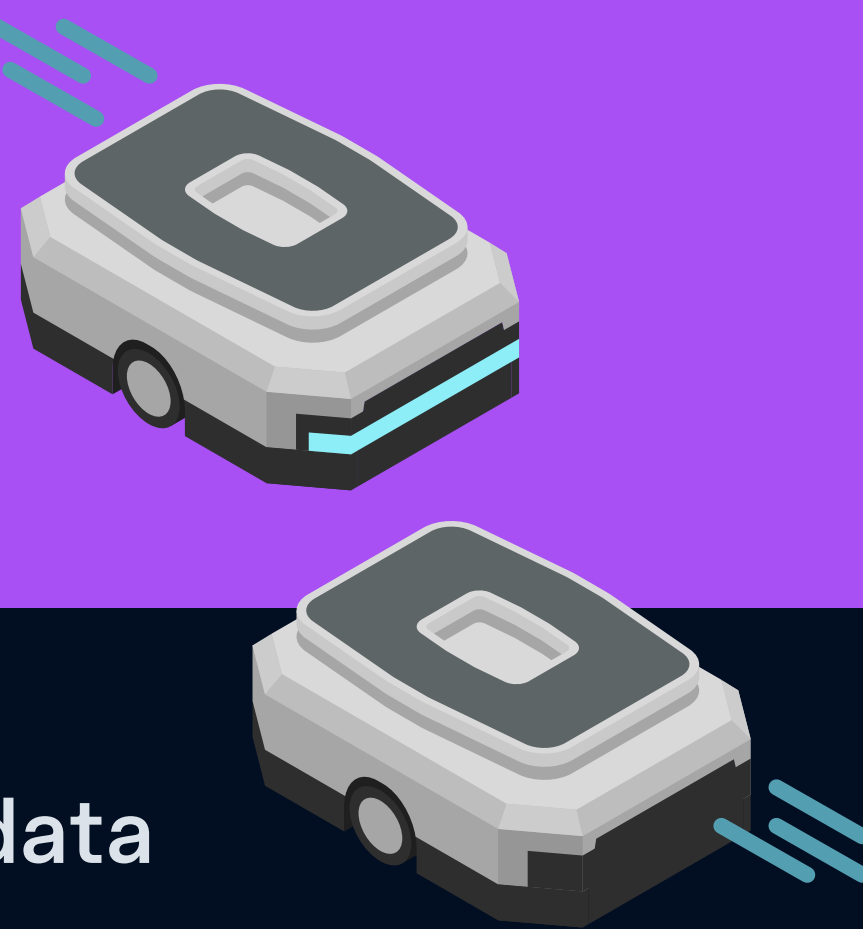
Monitors workplace injuries to maintain a safe environment.

20. Lost time injury frequency rate (LTIFR)

Measures injuries resulting in lost time to evaluate productivity and assess workplace safety.

21. Training compliance rate (%)

Tracks the percentage of employees who are up to date on safety and technology training.



4. KPIs for seamless networks & real-time data

Without a solid network foundation, even the most sophisticated automation strategies can crumble under the weight of lag, loss or lack of visibility. These KPIs track the availability and resilience of your OT/IT network to help you determine how capable it is of transmitting data to machines, sensors, software platforms and control rooms.

22. Network downtime (minutes/month)

Tracks disruptions in warehouse connectivity to measure effectiveness of automated operations.

23. Cybersecurity threats prevented (#/month)

Measures the number of cyber threats blocked to evaluate warehouse data security.

24. Data read accuracy (%)

Evaluates how accurately automated scanning systems track inventory.

25. Real-time inventory visibility (%)

Measures the percentage of inventory trackable in real-time to ensure supply chain efficiency.



»» Data-driven KPI optimization

Boosting performance across key KPIs—like order picking accuracy, cycle time, labor productivity and energy efficiency—requires a robust OT/IT network and accurate, real-time data captured from the right sources, whether they're automation systems, sensors or workforce tracking tools.

When your data is unified and fed to the right systems, it enables seamless monitoring and actionable insights. This level of data interoperability drives continuous improvement and connects you to what's possible. You'll be able to identify inefficiencies, respond quickly and hit your performance targets with confidence.



»» Take action today

By tracking and optimizing these **25 critical KPIs**, you can improve efficiency, reduce costs, enhance safety and build a more sustainable operation. **Take your warehouse performance to the next level by measuring what matters.**

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