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# BIG DATA IN LOGISTICS: KEY BENEFITS & 5 REAL USE CASES

# Introduction

An efficient supply chain today needs to access real-time data, analyze it and enable quick decisions. According to Gartner, only 7% of supply chains can do this today. Big Data in logistics helps to automate the execution of all these stages, improving performance across the end-to-end value chain.

As a result, fulfillment specialists improve operations efficiency, businesses provide faster and transparent shipments for less cost, and customers are satisfied with timely service.

"Collecting data is of prime importance for the logistics company. For instance, you need info about the vehicle's condition, the road it travels, and fuel consumption. Data about the number of drivers, their well-being, the time it takes them to leave the warehouse will also come in handy. All this information can help decide on the areas and means of optimization", says Oleksii Glib, CEO at Acropolium.

In this article, we want to share our expertise, discussing how logistics & supply chains can benefit from Big Data, how to choose bespoke software, and why this task is so challenging.
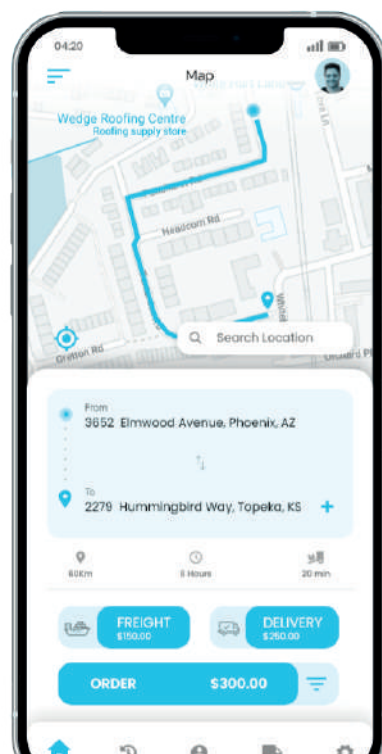
# How Is Logistics Using Big Data?

Big data in logistics refers to the collection, processing, and analysis of complex datasets related to logistics management operations. You can use sensors, GPS devices, RFID tags, and enterprise resource planning (ERP) systems. A comprehensive approach improves transportation, inventory, warehouse management, demand forecasting, and supply chain optimization.

Most transportation companies already employ a data-driven approach to decision-making. According to the 2022 Inbound Logistics Report, the majority of 3PL providers use IT capabilities for EDI (94%), transportation management (86%), visibility of orders and inventory (78%), ERP integration (74%), and customer relationship management (65%).
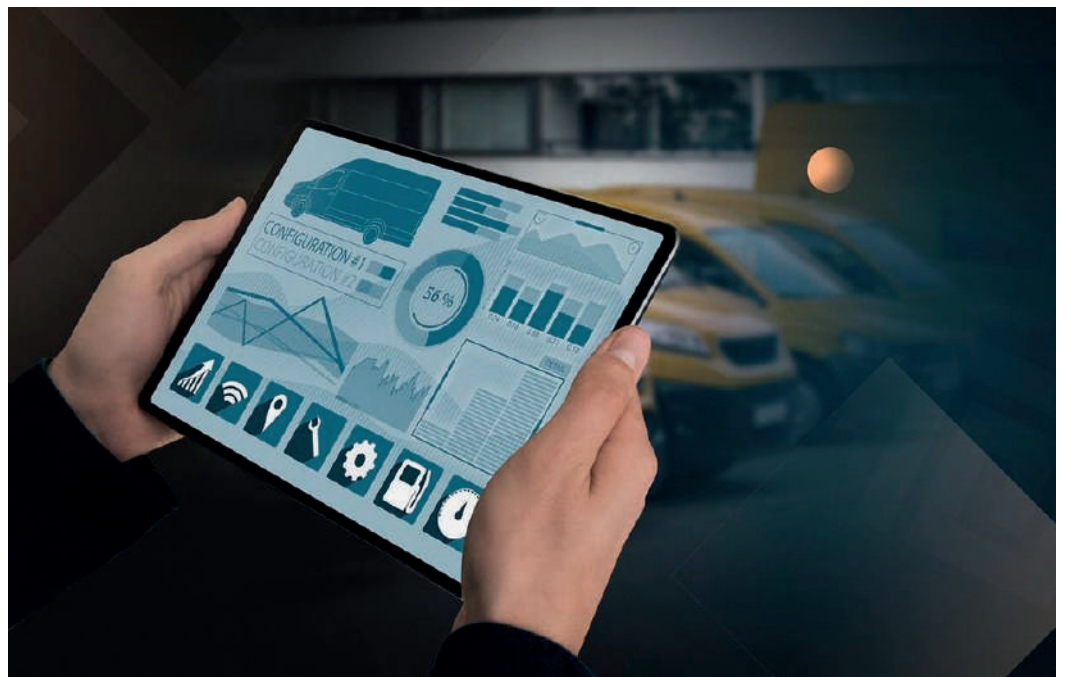


The full potential of Big Data in the logistics industry is yet to be harnessed. Firstly, it can help to utilize maximum resources and improve transparency, thus enhancing operational efficiency. For instance, automated transportation management systems use intelligent software which controls the fleet, schedules shipments, and automates routine tasks.

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Secondly, this innovation can assist businesses in improving customer experience by maintaining customers' loyalty and retaining them. On top of it, implementing an effective data-driven business model results in increased revenue.

Businesses mention that big data supply chain analytics provides real-time operation visibility. Thus, logistics companies can monitor inventory levels, track shipments, and identify potential disruptions. The outcome is improved supply chain agility and responsiveness.

Also, logistics companies can use big data to predict equipment failures and maintenance needs. Try it to reduce downtime, increase equipment utilization, and extend the lifespan of assets.

"Fulfillment and supply chain as a whole is both extremely data-driven, but at the same time are far behind technologically compared to other industries. To adapt to incredibly dynamic supply chains, our customers are demanding cutting-edge tech, and thus, we are demanding cutting-edge tech to serve them properly," says Frazer Kinsley, CEO of Hook Logistics.

# How to Choose the Right Logistics Management Software?

Transportation companies get data from a wide variety of sources, from GPS trackers to advertising response stats. However, huge unstructured datasets can impede decision-making. Businesses need technology, structuring the information and converting it into actionable insights. Therefore, having the right logistics management software is very important.

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A really powerful tool should handle all aspects of transport operations. That includes inventory tracking, supply chain mapping, route optimization, warehousing improvement, etc. The characteristics of the top-notch logistics management software include:

* Real-time logistics tracking, which helps to establish transparency, improve accuracy, and exchange information

* Multi-client architecture, which can be deployed quickly and easily

* Invoicing functionality to apply and process partnership policies, manage invoices on time, etc.

* Comprehensive reporting system with access to all necessary records

The ideal instrument embraces all the functions to make your logistics and supply chain management really "smart." Alternatively, it should seamlessly integrate with other tools and solutions. Give preference to cloud-based software to ensure its scalability and adjustability.

Note that many businesses may partner with 3PLs, cooperating with cargo carriers. Therefore, several different companies are involved in the transportation pipeline. That's why important all partners need to be able to exchange data with each other smoothly. It contributes to the seamless coordination of their actions.

At the same time, many logistics companies have a unique set of metrics important for them. Each of those businesses may accumulate data from a different set of sensors on their vehicles. Therefore, it's almost impossible to find a one-size-fits-all off-the-shelf Big Data software for logistics. Acropolium offers custom software development services in many areas, including transportation. We can help you with a project requiring Big Data development for logistics. Read on to learn more about our expertise.

# The Impact of Big Data in Logistics

Implementing this new technology in your business processes may be costly, time-consuming, and complex. However, the use of big data in logistics has significant advantages. Let's look at how Big Data impacts logistics:

## Machine Learning

Machine learning (ML) algorithms identify patterns and trends in logistics data, such as delivery times, transport routes, and inventory levels. What can an analysis of these patterns give logistics companies? Optimized operations, improved supply chain visibility, and streamlined data-driven decisions.

## Artificial Intelligence

Artificial Intelligence (AI) automates logistics scheduling and routing. By using predictive analytics, AI helps logistics companies anticipate potential problems and mitigate these risks. For example, big data in warehouse management leverages AI to optimize warehouse layouts, fleet routes, and inventory management processes.
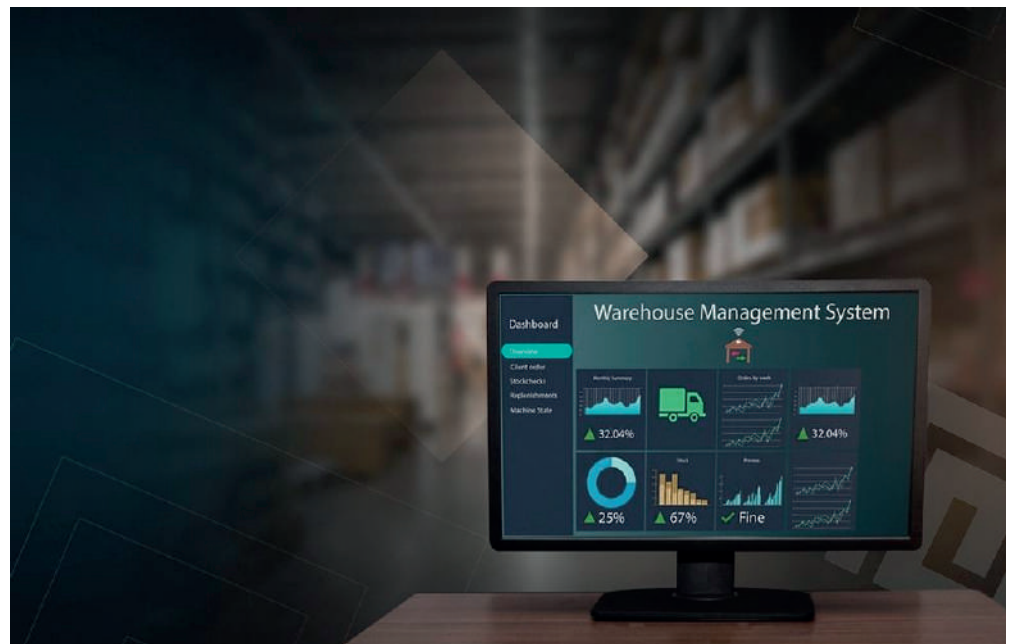
# Cost reduction and enhanced operational efficiency

Internet of Things (IoT) sensors collect real-time data on shipments, vehicles, and warehouse operations. Analyze this information to optimize supply chain visibility and improve decision-making. For example, IoT sensors track inventory levels, monitor the condition of goods in transit, and maximize the use of warehouse space.

# Key Benefits of Big Data in Logistics

By integrating supply chain and data analytics, logistics companies get many benefits. Let's discuss the most crucial ones:

# Improved visibility and transparency

Big data analytics in supply chain, together with GPS devices and other tracking tools, allow logistics companies to monitor the movement of goods in real-time. That information is combined with traffic data, fleet data, and on-road network data. As a result, logistics managers can easily plan and schedule deliveries, considering predictions about weather conditions or accidents.

Using big data helps logistics companies gain insights into their supply chain management to identify bottlenecks and streamline operations. Enhanced transparency increases customer satisfaction by providing real-time tracking information and building customer trust. As a result, using big data in shipping enables risk mitigation and drives better outcomes.

The result is not only increased efficiency of logistic operations but more real-time updates for the customers and partners. They can monitor the delivery status of parcels in real-time. Moreover, the customers get automated notifications if any delay is expected.

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# Cost reduction and enhanced operational efficiency

There are many ways in which the use of Big Data in logistics can help save money. These are the main areas of cost-reduction:

* Route optimization. Big Data technology can help to find the best route for delivery. Analyzing data from sensors in vehicles as well as weather reports and traffic updates, advanced logistics software can help to select the optimal course of action. As a result, the companies can save a great deal of money, mostly due to reduced fuel consumption.

* Predictive maintenance and driving optimization. Advanced analytics systems can dig into the driving habits such as speeding up, braking, driving time, etc. Some inefficient practices can be spotted and weeded out. On top of it, the data about fleet conditions allows companies to conduct maintenance in advance. The result is reduced fuel consumption and fewer delays due to vehicle breakdowns.

* Smooth last-mile delivery. According to Insider Intelligence data, last mile delivery costs represent 53% of the total shipping expenses. The most cost-related pain points include working with carriers (42%), reliance on manual processes (41%), driver retention (41%), fuel costs (32%), WISMO ("Where is my order?") calls (28%), and cost of returns (28%). And these are just the moments that can be optimized with the help of big data.

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Big Data in logistics can help analyze the information about all stages of the delivery process, including the last mile. As a result, logistics companies detect specific patterns to optimize their delivery strategies.

* "The data can reveal behavioral patterns of drivers and delivery crews that have local knowledge about their route territory and know better than any algorithm or data source where to park, which shortcut to take, or which congestion hotspot to avoid. Extracting this knowledge without having to disrupt crew member workflows can achieve significant improvements in route planning, shipping speed, and more effective delivery instructions", claims Matthias Winkenbach, the Director of the MIT Megacity Logistics Lab. DHL sees great promise in digital twins, based on big data, as they can predict the behavior of assets and systems, simulating and optimizing route management.

* Efficient warehousing. Big Data provides warehouse managers with detailed insights into the process of loading, carrying, and unloading goods. On top of it, they understand the change in customers' behavior changes and expectations from supply chain managers and manufacturers. This information allows managers to improve routes and scheduling deliveries, boosting warehouse throughput.

* Real-time tracking and management. With live tracking, logistics companies can identify and proactively mitigate potential delays, minimizing costs associated with disruptions and delays. By optimizing routes and schedules based on real-time big data in supply chain, logistics companies improve shipping management and reduce time and fuel consumption.

# Improved Responsiveness and Customer Experience

Big data analytics in the supply chain & logistics has a profound impact on its performance. A responsive supply chain allows companies to meet consumer expectations delivering quality products on time. Big data analytics helps managers understand the market situation, predict its future state, segment customers, and find new sales opportunities. In the end, the logistic companies get more control over inventory and more satisfied customers.

# How Does It Work: Big Data Use Cases in Logistics

To understand the potential of this new technology for the transportation industry, let's look at three examples of application of Big Data in supply chain management & logistics.

## Warehouse Automation by Amazon



The advancements in robotics, Big Data, and the Internet of things make smart warehouses real. Amazon fulfillment centers provide vivid examples of logistics automation.

The company began using robotics in 2012 as it acquired a Boston-based Kiva systems company (renamed Amazon Robotics). In 2014 the company used around 15,000 mobile drive unit robots in its warehouses. By 2018 this figure grew to 100,000 units, and in 2021 it reached an astounding 350,000 units.

Big Data technologies are of top importance in operating such warehouses. The algorisms have to process huge amounts of data to choreograph hundreds of robots. They determine how many bots should be deployed, which routes they should use, how fast they should move, etc. Complex simulations are run to determine the optimal parameters.

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Robots operate at dozens of more than 175 fulfillment centers across the globe. However, their goal is not only to allow the world's largest online marketplace to keep up with the torrent of orders. The company officials believe that new advanced robots and control systems will help achieve the goal of reducing incidents at all Amazon operations sites in the U.S. by 50% by 2025.

# On-Road Integrated Optimization and Navigation technology (ORION) by UPS



UPS, one of the largest shipping couriers globally, began testing its ORION algorithm in 2003, but it was deployed only in 2012. In 2019, the company added UPSNav to its route guidance platform. UPSNav provides turn-by-turn directions to guide drivers to specific package pickup and drop-off locations near the recipients, even if they are not visible from the street. ORION implementation resulted in a route reduction of eight miles per driver.

The latest upgrade, which is being rolled out in 2021, is called "dynamic ORION." Its distinctive feature is reoptimized routes, which are fine-tuned depending on changing conditions. The latter may include traffic, pickup commitments, or changes in delivery orders. The result is driver routes, which are shorter by an average of two to four miles per driver. Almost all UPS vans use the new system.

The company claims that ORION has saved around 100 million miles and 10 million gallons of fuel each year. The new version is expected to push those figures even higher.

# DHL SmarTrucking



DHL, the German-based transportation giant, offers another of IoT, AI and Big Data in supply chain examples. In 2018 the company launched its innovative trucking solution — DHL SmarTrucking. A large portion of its fleet can transport perishable goods, requiring specific temperatures (from -25°C to +25°C).

The smart vans are filled with IoT-enabled sensors monitored through the control tower. As a result, both operations teams and customers can track the consignment and its temperature in real-time. Status updates are also sent through the customer portal and mobile applications. The accumulated data about the vehicle and its condition is used for route optimization and preventive maintenance.

According to DHL, these innovations resulted in reducing transit times by 30% in comparison to the conventional trucking industry. Moreover, DHL SmarTrucking claims to provide 95% on-time delivery. At present, the company operates in India, having 745 trucks and 12 SmartHubs at its disposal.

# Deutsche Bahn Preventive Maintenance

Deutsche Bahn is one of the largest railway operators in Europe. The company began using predictive maintenance in 2015 as part of its "Maintenance 4.0" program to improve operations efficiency and reliability.

DB implemented predictive maintenance by installing sensors on its trains. These devices collect data on various performance indicators, such as vibrations, temperature, and speed. The information goes to a central platform and gets analyzed using ML algorithms that identify patterns and predict equipment failures.

By using big data for transportation for predictive maintenance, DB optimized its train maintenance schedules, reduced repair costs, and minimized downtime, improving the overall service reliability. The accuracy of support planning grew, enabling the company to refocus its resources.

Today, DB invests in preventive rail maintenance, where the HSG train grinds the rails and records important data about their condition. That train travels 80 km/h, allowing DB not to close the track. Today, the contract covers 3,500 km of usage routes, but by 2030 it is planned to expand to 9,000 km

# FedEx Route Optimization and Delivery Tracking



FedEx has used route optimization and delivery tracking technologies for many years as part of its overall efficiency strategy.

In the late 1990s, the company experimented with software that could automatically create optimized delivery routes. In the early 2000s, they introduced SenseAware with sensors and GPS technology to track high-value and time-sensitive packages in real time.

By optimizing its delivery routes, FedEx has reduced fuel consumption and vehicle maintenance costs while improving delivery times and customer satisfaction. Real-time tracking has also helped minimize lost packages and improve customer communication, further enhancing their experience.

Today, SenseAware is a customer portal that allows parcel tracking with temperature, humidity, light exposure, and pressure trackers. You can also receive information about shock events, route, and location alerts, etc. FedEx uses big data analytics in shipping industry to serve companies in various industries, from healthcare to aerospace.

# Why Choose Acropolium for Implementing Big Data in Logistics Project

Acropolium has the expertise and experience necessary to build complex Big Data solutions for supply chain. Our agency delivered 84 software solutions for 56 clients from different spheres, including logistics. We can offer you tailor-made software for freight forwarding optimization, supply chain, warehouse management, document generation systems, etc

To understand our background better, let's have a look at the logistics app development cases we've completed for our clients.

# Mobile App for the Shipping Service Provider

Our client, a US logistics company, required an efficient mobile app for truck drivers and brokers to track the number of working hours. Brokers refused to pay for the extra hours, and drivers were forced to work due to external circumstances, such as vehicle breakdowns, traffic jams. Brokers suspected that the drivers were exaggerating the time required for delivery. The software solution had to solve the issue.

**The main goals were as follows:**

✱ Protect brokers from drivers overstating their amount of work

✱ Provide drivers with solid proof of extra hours they are required to complete the delivery

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✳ Deliver the MVP in three months

Our developers audited the existing web solution and Android mobile application. We found several critical issues resulting in scaling, maintenance, user experience, and security problems. Our specialists optimized the core architecture, detected and fixed existing bugs. The dedicated team developed an iOS application from scratch. We completed the whole project within a tight timeframe of three months.

As a result, both brokers and drivers got a user-friendly app with maps and real-time geolocation tracking.



## MVP VERSION IN JUST 3 MONTHS

α.  A client got investments for further solution development

β.  Real time geolocation update

γ.  Drivers can get payment for geolocation update each minute

**90%** INCREASE OF SECURITY LEVEL

**28%** INCREASE OF SESSION SPEED

# IoT-Based GPS Fleet Tracking App Development

A logistics software vendor asked us to refine a test prototype of a GPS tracking application. The disadvantages of the solution were the low-quality code, limiting modernization, and the unstable integration mechanism. Ultimately, it blocked displaying hundreds of trucks in real time.

We optimized the base code, increased the number of connected IoT devices to 1000, and the number of trucks displayed on the map from 100 to 1000. New features include real-time visualization of truck movement, data visualization and reporting, and remote command processing.

Improved code and new functionality make this solution one of the best GPS fleet tracking systems on the market.

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IoT-based GPS fleet tracking app

Modernization of the TMS (Transportation Management System) allowed the forwarding company to improve the speed of data access, connect new functions, and increase the customer base to 1 billion shippers.

We automated document flow for an international trade software provider, validated country shipping requirements, and created order and shipping templates. It helped attract 37% more customers, reduce operating costs by 60%, and increase annual revenue by 65%.



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# Final Thoughts

The transportation industry faces new challenges as customers strive for higher delivery speed and transparency. At the same time, AI, IoT, and Big Data in logistics allow companies to optimize routes, reduce fuel consumption, improve warehousing, and understand consumer needs.

However, creating and implementing technologies without IT outsourcing may be tricky. Acropolium has been working with clients from the transportation industry for 8 years, and our experience in Big Data technologies allows us to address those challenges.

Contact us to unleash the full potential of Big Data for logistics in your company together.

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## IOT-BASED GPS FLEET TRACKING APP DEVELOPMENT

## EXPLORE MORE LOGISTICS INSIGHTS





Transport Management System modernization

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