

Big data and analytics in travel and transportation

Beyond the hype: Solutions that deliver big value



Across industries, big data has generated big buzz—and the travel and transportation sector is no exception. In fact, travel and transportation CEOs rank the “information explosion” among the top drivers of transformation for their organizations.¹ Many IT professionals are attracted by the promise of big data’s ability to mitigate the costs of managing a growing volume, velocity and variety of data. However, despite plenty of talk about big data capabilities, many wonder about the reality beyond the hype. Here we reveal ways in which big data solutions can drive business results, allowing travel and transportation companies to rise above the big data hype and reap big benefits.

Executive summary

The term “big data” has been used to convey all sorts of concepts, including huge quantities of data, social media analytics, next-generation data management capabilities, real-time data insights and much more. Whatever the label, organizations are starting to understand and explore how to process and analyze a vast array of information in new ways to help drive business results.

In fact, the IBM global study on big data, “Analytics: The real-world use of big data,” found that almost two-thirds of respondents report that the use of information—including big data—and analytics is creating a competitive advantage for their organizations.² In addition to providing solutions to long-standing business challenges, big data is inspiring new ways to transform processes, organizations and entire industries.

Companies across the various travel and transportation industry segments—airlines, airports, railways, freight logistics, hospitality and others—have been handling large amounts of data for years. However, in today’s instrumented and interconnected world, unprecedented amounts of data are captured from almost every kind of system or event—and much of it is non-standard data (for example, social, geospatial or sensor-generated data that does not fit neatly into traditional, structured, relational data warehouses).

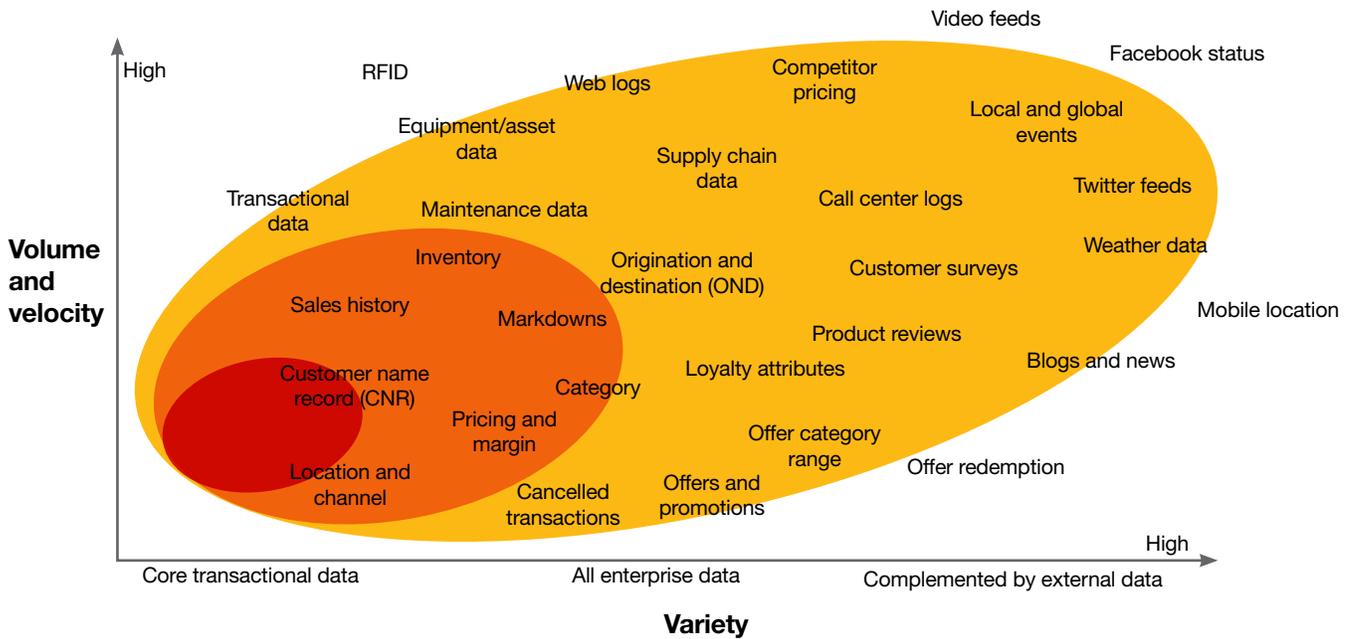


Figure 1. Travel and transportation companies must consider an increasing amount of information to make strategic decisions.

In addition, today's advanced analytics technologies and techniques enable organizations to extract insights from data with previously unachievable levels of sophistication, speed and accuracy. Data itself has become an important strategic and competitive asset. In this new era, with real-time structured and unstructured data captured from a vast array of sources in unprecedented volumes, it can be difficult to determine which data is most valuable (see Figure 1).

Analytic tools can be especially useful in helping travel and transportation companies mine and refine data to determine which information is valuable for optimizing business outcomes. Today, big data capabilities enable integration of existing and new sources of data without the higher costs associated with the traditional data warehouse environment. Big data and analytics also allow for more rapid capture and integration of time-sensitive data from numerous varied sources, such as instrumented equipment.

IBM's global big data study revealed organizations that implemented big data projects were 15 percent more likely to report a significant advantage from information and analytics compared to those relying on traditional analytics alone.³ Given the momentum in the marketplace, we have identified three key big data business use cases that are delivering positive business outcomes:

- **Customer analytics and loyalty marketing:** Big data and analytics can help companies create a comprehensive 360-degree view of the customer, dramatically improving customer interaction at every touch point and across the end-to-end customer experience. More complete “persona-level” customer profiles can help organizations discover new ways to interact with individual customers, as well as improve service delivery and marketing strategies.
- **Capacity and pricing optimization:** Because travel and transportation companies face capacity constraints, a sharp focus on capacity and pricing optimization is crucial. The ability to analyze more historical information with higher frequency—even in near-real time—allows for more dynamic and smarter pricing actions, optimized capacity planning and effective yield management.
- **Predictive maintenance analytics:** In the asset-intensive travel and transportation industry, success is dependent on the safe and reliable performance of those assets. By capturing and analyzing more complete operational data, big data and analytics can help travel and transportation organizations manage and maintain their assets to improve safety, performance and equipment life.

To learn more about these emerging usage patterns and how big data and analytics are driving improved business outcomes, please read on.

Customer analytics and loyalty marketing

Travel and transportation leaders are committed to improving the end-to-end customer experience while optimizing customer service, marketing spend and wallet share. By capturing information from customer interactions and other sources, organizations can gain a 360-degree view of the customer and improve customer lifetime value.

In addition to revealing strategic insights into customer buying patterns, the 360-degree view also helps equip front-line, customer-facing employees with the right information to offer an optimal customer experience. They are better positioned to successfully engage customers in personalized and relevant ways and to learn from past customer interactions, building a continued customer history and forging trusted relationships.

Building this view often requires going outside the organization for data to enrich existing customer loyalty and master customer reference data. In doing so, companies can gain more customer-centric capabilities across key functional areas—marketing, sales customer service, etc. These capabilities help enable persona-level segmentation, improved product/services launch strategies, optimized return on marketing spend, and the ability to leverage social media analytics and mobile device proliferation (see Figure 2).



Figure 2. Expanded data sources, analytics, devices and channels provide travel and transportation companies with new capabilities.

Persona-level customer segmentation

Deep analysis of customer buying behavior patterns across all channels allows travel and transportation organizations to move beyond marketing to the masses and toward more segmented, targeted marketing tactics. Analytics insights help develop more relevant marketing strategies and self-service capabilities to meet individual customer's needs.

In addition, such granular segmentation provides more visibility into the client's household and relationships, leading to a more accurate estimation of a customer's lifetime value. It can also help identify key "influencers" and brand advocates—those who have the ability to influence other consumers, such as individuals who control travel policy for large organizations. In addition, persona-level segmentation provides more in-depth information on elite customers, allowing companies to cater to them based on their individual preferences. This persona-level segmentation is a cornerstone of big data and analytics.

Real-world success: Customer analytics and loyalty marketing

Seeking to improve the effectiveness of its loyalty program and increase the lifetime value of each customer, a major US airline implemented a big data and analytics solution to more precisely profile and segment its customers. The airline was able to deliver real-time personal offers and create more effective targeted e-mail campaigns. The company's efforts yielded a 30 percent reduction in the loyalty program dropout rate and the ability to deliver personalized marketing campaigns in hours rather than weeks.

An Asian airline utilized a big data and analytics solution to address revenue "leakage." The airline identified two areas of missed revenue: missing segments (segments without a corresponding pair segment, indicating the flier had flown another airline a portion of the trip) and partner segments (segments flown on partner airlines, for which the airline issued points but did not fly the passenger). Missing segment customers received incentives to fly roundtrips, while those in the partner segments category received incentives to fly key routes. A response rate of 2 percent from both programs lead to the recovery of approximately US\$8.4 million in fares.

Improve products/services launch

Deeper customer insights can help identify new product and service opportunities and improve the success of product and service launches. The ability to analyze large amounts of customer sentiment data enables companies to better gauge the acceptance and adoption rates of new products and services, allowing for incremental improvements and strategy shifts. In addition, it offers improved insights into the utilization of assets and employees to optimize product or service delivery.

Real-world success: Capacity and pricing optimization

Airlines publish fares on a daily basis, such as market specific, point-to-point destinations and fare rate class. A major international airline sought more automation to analyze fare data to gain insights on competitor behavior, seasonality and market opportunity. Using big data and analytics, the airline can now optimize fares across multiple markets and better predict price changes—resulting in a US\$20 to \$30 million increase in annual revenue.

Hotels face similar challenges in pricing their rooms. A top hospitality provider utilized an analytics solution that automatically clusters historical booking data and makes all pricing-relevant information continually available to its pricing specialists. The solution calculates all the possible combinations until the optimum pricing result is achieved. Now hotel rooms can be priced five times faster, and pricing consistency is 100 percent guaranteed.

Optimize return on marketing spend

Richer customer data can help travel and transportation companies execute more effective marketing campaigns, advertising, promotions and offers with greater personalization and relevance. A better understanding of individual customers can also help determine how and when to best deliver promotions and offers, increasing the success of marketing across channels and lines of business.

Utilize social media analytics

Consumer-generated social media can enrich customer profiling and segmentation, help detect brand sentiments, identify key market influencers and deliver optimal customer interactions. In addition, social media can help foster a one-on-one dialogue with customers for higher levels of satisfaction, as well as insights into product and service needs. Many companies are responding directly to consumers via their mobile devices, Facebook, Twitter, etc.

Leverage mobile device proliferation

As customers increasingly rely on mobile personal electronic devices for both personal and business use, they also expect easier and more direct access to service providers. For example, when trips are disrupted it's common for travelers to immediately reach for their mobile devices hoping to make convenient and quick travel plan changes.

Travel and transportation organizations can leverage big data and mobile capabilities internally by equipping sales and service associates with access to the critical information and business processes needed to deliver optimal customer service.

For example, a number of travel and transportation companies, including airlines and hospitality providers, are equipping their service teams with mobile devices to increase the customer experience.⁴ One company has provided service associates with tablets, which they use to easily identify high-value customers, as well as those customers' preferences. They also use the tablets to identify customers requiring special assistance and to provide information relevant to the customers' experience.⁵

Capacity and pricing optimization

Travel and transportation businesses must effectively forecast demand to optimize utilization of available capacity. At the same time, vacant rooms, idle fleet, unoccupied seats or empty containers represent lost revenue.

Effective capacity and price management requires complex analysis and modeling of demand, revenue and profit scenarios with an ever-changing and seemingly ever-increasing amount of available competitive and market data. This includes capturing and integrating all available pricing data to more quickly and precisely optimize pricing strategies relative to the competition and positively impact yield and return on assets.

Ideally, outperforming the competition on price alone would solve the demand planning challenge. However, capacity planning can be affected by a number of other factors or events—including weather, service outages, property damage, etc.—that can spike or decrease capacity. For example, a severe storm impacts airlines, freight carriers, rental car companies and hotels in different ways. While it might ground planes and cause delays in freight delivery, it could cause a surge in car rentals or hotel rooms.

Big data and analytics solutions can extract insights from massive amounts of current and historical data by detecting patterns, spotting correlations and improving predictive modeling accuracy. Mining more data can help travel and transportation companies improve the accuracy of forecasting and planning models. Big data and analytics is enabling more automated rate/fare adjustment capabilities that can rapidly analyze hundreds of terabytes of historical competitive pricing data to detect patterns in order to respond more proactively to competitive and market conditions. This allows for the use of dynamic pricing analytics, optimized capacity planning and more effective yield management (see Figure 3).



Figure 3. Analytics can help travel and transportation companies gain new capacity and pricing optimization capabilities.

Dynamic pricing analytics

Big data and analytics solutions can help travel and transportation organizations predict, detect and respond to competitors' pricing actions more quickly and dynamically. This leads to smarter, automated fare/rate adjustments based on more complete market and competitor data analysis and can eliminate manual analysis and manual fare/rate adjustments. A massive amount of historical pricing data can be churned through complex analytical models and algorithms to distill actionable price information.

Analysis of demand scenarios with competitor pricing insight helps model customer buying propensity and price elasticity. This information allows a provider to more accurately price service offerings relative to the competition and could help an airline or hotel revenue manager, for example, create strategies to cater to individual customer segments. In addition, pricing models and simulations can help travel and transportation companies model the lifetime value of a customer within a given segment, as well as determine the "next best action" in various marketing offer scenarios.

Optimized capacity planning

Big data and analytics can help drive operational excellence with improved forecast accuracy and help improve return on assets, as well as optimize availability of assets, driving improved asset yield.

Real-world success: Predictive maintenance analytics

A European railway's previous monitoring systems were inefficient, with a one-day system problem resulting in 200,000 stranded passengers at a cost of almost US\$5 million. The company implemented a new system that monitors the status of physical and IT assets across the network of more than 800 train stations and rail lines providing automated diagnostics and alerts. Now, more than 50 percent of issues are recognized and resolved before they affect train operations, and the availability of the rail network has increased by 33 hours per month, saving approximately US\$2.3 million per year.

An Asian high-speed rail company implemented a holistic maintenance and supply chain solution that employs sensors and condition-based monitoring to report the condition of over 320,000 asset elements, sending real-time warnings and automatically creating work orders. Now, 99.15 percent of trains arrive or depart within 6 seconds of scheduled time.

For example, a hotel wants to fill its rooms; however, it also must ensure that the rooms are clean, appliances work, beds are comfortable and décor is appropriate. This requires ongoing maintenance. Big data and analytics can help a hotel operator determine what the optimal capacity is—which might not necessarily be 100 percent at all times. In addition, big data and analytics solutions can help a company determine the right mix of competitive pricing to optimize capacity without sacrificing profitability.

Predictive maintenance analytics

Travel and transportation organizations rely on properly functioning assets; they depend on large, expensive networks of infrastructure and equipment. Managing and maintaining these assets to achieve maximum availability is critical to increasing revenue and controlling costs. Unplanned service interruptions and outages due to equipment failures can result in lost revenue, customer dissatisfaction and safety concerns.

Predictive maintenance analytics solutions can capture equipment sensor data in real time and integrate it with data from visual inspections, manual measurements, performance videos, operational data, etc. Big data and analytics solutions can help companies utilize this varied information to improve yield on assets, improve service levels and reduce risk of unplanned service delays and outages, lower the cost of parts inventory and implement smarter maintenance planning (see Figure 4).

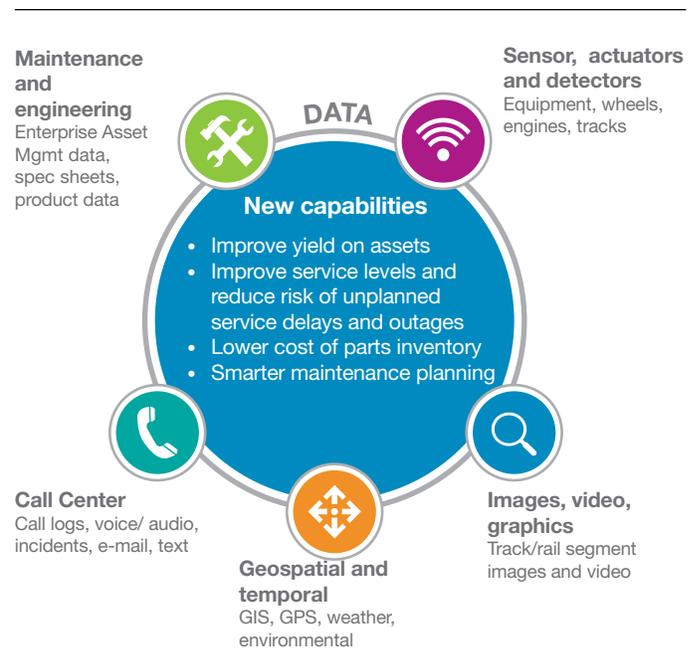


Figure 4. Analytics can help travel and transportation companies predict maintenance needs and improve asset lifetime value.

Why IBM?

IBM solutions can help travel and transportation organizations gain the leading-edge capabilities necessary for a successful data strategy. As you chart your big data journey, you can rely on IBM for:

Unlocking the value of all data: Analytics exploration, discovery and visualization.

- Identifying and exploring all available data sources—including unstructured content, numerous file systems and federated sources—can unlock the value of existing information assets and deliver new insights with more business context relevance without copying the data to a central location.

Fast data ingest and analytics performance.

- Applying analytics to very large data sets requires the ability to process analytics close to the data to unlock the value quickly while supporting increasingly complex analytical models.

Analytics on data in motion at the speed of business.

- Akin to complex event processing, applying analytics to time-sensitive streaming data is critical to attain real-time views of operating conditions as they unfold and to provide the ability to take proactive steps to ensure efficient, non-disrupted operations.

Analytics beyond traditional business intelligence and reporting.

- Managing and analyzing unstructured and semi-structured data enables analytic insights based on all the available data. Inherent limitations of traditional analytic tools prevent the ability to perform “in context” analytics, where information contained in unstructured or semi-structured formats can be effectively mined along with traditional structured data types. Powerful predictive analytics can model business scenarios for patterns and trends that are not easily detected to improve forecasting accuracy and planning.
-

Improve yield on assets

Through big data and analytics, travel and transportation companies can capture, integrate and analyze equipment sensor data to monitor component level operating conditions. By doing so, they can gain a real-time view of asset operating conditions and take appropriate actions to reduce unplanned equipment failures and outages.

In addition, analytics solutions can perform predictive modeling to assist with effective proactive maintenance and asset allocation. Big data and analytics can also help companies aggregate and use asset costs, usage and wear patterns, maintenance cycles, and revenue history to determine the lifetime value of an asset.

Improve service levels and reduce risk of unplanned service delays and outages

The use of predictive analytics to model component wear and failure patterns can help prevent unplanned service outages and accelerate service delivery with less risk.

Lower cost of parts inventory

Big data and analytics can help travel and transportation operators better manage their parts inventories so they have the right part at the right time. This allows for an optimized parts inventory level and mix based on project need versus “just in case” parts inventory.

Smarter maintenance planning

Traditional maintenance methods follow manufacturers' or regulators' recommended maintenance schedules. Using big data capabilities enables a company to prioritize maintenance based on actual operating conditions and usage patterns to proactively address potential issues before they cause a negative impact on operations.

Conclusion

Big data and analytics are no longer confined to the realm of the technology "sand box." Service providers are making progress in deploying big data- and analytics-centric solutions across business functions and capitalizing on the returned business value. Likewise, IT professionals are taking advantage of the lower data management costs and alternatives to traditional data warehouse technology offered through big data.

Travel and transportation providers can embrace big data and analytics to more accurately model and optimize demand, capacity, schedules, pricing, customer sentiment, revenue, cost and more. And IBM is uniquely positioned to help them capitalize on the power of big data to:

- Dramatically improve the customer experience
- Enhance services to increase revenue and manage capacity
- Maximize the availability of assets and infrastructure
- Improve operational efficiency

We believe those organizations that leverage big data and analytics to help drive improvements in marketing, sales and operations will be well positioned with the insights and agility necessary for competitive advantage.

For more information

To read more, please visit:

- ibm.com/bigdata
- ibm.com/analytics
- ibm.com/analytics/us/en/solutions/industry/travel.html
- ibmbigdatahub.com

To learn more, schedule an IBM Big Data and Analytics Workshop and discover how IBM and Business Partner expertise can help uncover potential value for your organization. Contact:

Kurt Wedgwood

Big Data and Analytics

Travel & Transportation Industry Leader

Wedgwood@us.ibm.com

Randall Howard

Big Data and Analytics

Travel & Transportation Industry Solutions Marketing

rhoward@us.ibm.com



© Copyright IBM Corporation 2014

IBM Corporation
Software Group
Route 100
Somers, NY 10589

Produced in the United States of America
November 2014

IBM, the IBM logo, and ibm.com are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at “Copyright and trademark information” at ibm.com/legal/copytrade.shtml

This document is current as of the initial date of publication and may be changed by IBM at any time. Not all offerings are available in every country in which IBM operates.

The performance data and client examples cited are presented for illustrative purposes only. Actual performance results may vary depending on specific configurations and operating conditions. THE INFORMATION IN THIS DOCUMENT IS PROVIDED “AS IS” WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY OR CONDITION OF NON-INFRINGEMENT. IBM products are warranted according to the terms and conditions of the agreements under which they are provided.

The client is responsible for ensuring compliance with laws and regulations applicable to it. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the client is in compliance with any law or regulation.

¹ “Leading through Connections: Insights from the Global Chief Executive Officer Study.” IBM Institute for Business Value. May 2012.
<http://www-935.ibm.com/services/us/en/c-suite/ceostudy2012/>

² Schroeck, Michael, Rebecca Shockley, Dr. Janet Smart, Professor Dolores Romero-Morales and Professor Peter Tufano. “Analytics: The real-world use of big data. How innovative organizations are extracting value from uncertain data.” IBM Institute for Business Value in collaboration with the Saïd Business School, University of Oxford. October 2012.
<http://www-935.ibm.com/services/us/gbs/thoughtleadership/ibv-big-data-at-work.html>

³ Ibid.

⁴ Kollau, Raymond. “Airport customer service agents go mobile.” Future Travel Experience. November 10, 2011. <http://www.futuretravelexperience.com/2011/11/airport-customer-service-agents-go-mobile/>; Lang, Steven. “La Quinta Inns & Suites has no reservations about its two-pronged tablet strategy.” TabTimes, accessed June 11, 2013. <http://tabtimes.com/tablet-leaders/travel/tourism/2012/10/08/la-quinta-inns-suites-has-no-reservations-about-its-two>

⁵ Booth, Darren. “Why Flight Attendants Will Stalk You With Tablets.” CNBC. September 21, 2012. <http://www.cnbc.com/id/49119031>



Please Recycle