



## Big Data Value Realization

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### Abstract

In the modern business landscape, the ability to couple and derive value from big data has become essential for organizational success. big data Value Realization has emerged as a cornerstone for success in today's competitive and data-rich business environment. This paper provides an in-depth exploration of the strategies, frameworks, and real-world use cases, and applications that empower organizations to unlock the full potential of their big data assets. It underscores the transformative impact of deriving actionable insights through advanced analytics, machine learning, and data integration, which enable businesses to navigate complex challenges and seize opportunities. By aligning big data initiatives with business objectives, organizations can drive innovation, optimize processes, and achieve measurable outcomes. The paper also addresses critical considerations such as data quality, governance, and scalability, offering a comprehensive guide to implementing big data Value Realization as a key enabler for sustainable growth and competitive differentiation.

**Keywords:** DVR, Big data, Data monetization, Value realization strategies, Data-driven decision-making, Business intelligence, Advanced analytics, Data enablement, Data governance, Insights generation, Industry applications

### Introduction

The rapid increase in data from various fields has marked the beginning of the big data era. Businesses create an enormous amount of data every day, and this volume continues to grow as the digital landscape evolves and expands. big data includes different types of information: some is organized in neat structures, some is only partly organized, and some is completely unorganized. This variety of data presents both challenges and opportunities for organizations. On one hand, handling such vast amounts of information can be difficult, requiring advanced tools and strategies. On the other hand, if organizations can effectively analyze and leverage this data, they can uncover valuable insights, improve decision-making, and gain a competitive edge in their markets.

Realizing value from big data involves extracting meaningful insights that can inform decision-making and drive strategic initiatives. Organizations that successfully implement big data strategies gain a competitive edge, improve operational efficiency, and enhance customer experiences [1].

This paper focuses on how businesses can realize the value of big data, providing strategies, frameworks, and examples to guide them in using data as a foundation for growth and success.

### Explanation

Big data Value Realization is the cornerstone of modern data-driven strategies, focusing on the transformation of raw, unstructured data into actionable insights that directly contribute to organizational success. This process goes beyond simple data analysis-it involves

leveraging advanced tools and techniques such as machine learning, predictive modeling, and data visualization to uncover hidden patterns, predict future trends, and optimize decision-making.

For instance, in the aviation industry, analyzing passenger data can help optimize flight schedules, improve resource allocation, and enhance customer experiences. The essence of big data Value Realization lies in its ability to turn vast and complex datasets into a strategic asset that drives innovation, competitive advantage, and measurable business outcomes [2].

### Key strategic points

To achieve success in big data Value Realization, organizations must focus on key strategies that integrate data initiatives into their broader business context. The following are some strategic points for achieving success.

**Alignment with business goals:** Big data initiatives must be designed to support the primary objectives of the organization. This ensures that the data collected and analyzed delivers value where it matters most. For example, a healthcare provider aiming to improve patient care can use data analytics to study health trends, helping doctors make better treatment decisions and improving patient outcomes.

**Leadership and culture:** Strong leadership is essential to develop a culture that values data-driven decision-making. Organizations that encourage their teams to use data creatively and prioritize data literacy across all levels are better positioned to realize big data's potential. For instance, Google has created a workplace



culture that encourages using data insights to solve problems, leading to innovative products and improved business performance.

**Stakeholder engagement:** Big data initiatives are more effective when stakeholders from different departments are actively involved. Engaging teams across functions ensures that data is understood, shared, and used to solve challenges collaboratively. For example, when marketing, operations, and IT teams work together on a data project, they can combine their expertise to uncover new opportunities and implement well-rounded solutions [3].

## Real-World Use Cases

Each industry uses big data in unique ways to solve problems, save money, and offer better services to customers. By analyzing large amounts of data, companies can make smarter decisions, predict future trends, and optimize their operations.

**Healthcare:** Big data helps doctors and hospitals make better decisions and improve patient care.

- A hospital uses patient data to predict which patients might get seriously ill. This allows doctors to treat them early, reducing hospital costs and improving outcomes. Additionally, data from previous patients helps create personalized treatment plans for new patients.

**Retail and e-commerce:** Retailers can understand customer needs, improve inventory management, and personalize shopping experiences.

- An online store collects data on customers' shopping habits. It then uses this information to recommend products based on what customers have bought before. Retailers can also predict what products will sell well and stock, accordingly, reducing waste.

**Finance and banking:** Banks can detect fraud, personalize services, and manage risks.

- A bank uses big data to track customer spending patterns. If a customer's account suddenly shows unusual activity, like a large international transfer, the system can flag it as potential fraud. The bank can also offer personalized financial advice based on the customer's spending habits.

**Telecommunications:** Telecom companies use big data to improve customer service and network performance.

- A mobile network provider analyzes data from calls and internet usage to find areas with poor signal. The company can then focus on improving those areas. They can also predict when a customer is likely to switch to another provider and offer them special deals to stay.

**Manufacturing:** Manufacturers can improve production efficiency, prevent machine breakdowns, and reduce waste.

- A car manufacturer uses sensors on machines to track their performance in real time. If a machine is about to break down, the system warns the staff in advance, so they can fix it before it causes delays. This helps save time and money.

**Transportation and logistics:** Big data helps companies track shipments, optimize routes, and predict maintenance needs.

- A logistics company uses GPS data to track delivery trucks. It can suggest the fastest routes to drivers, helping them avoid traffic and save fuel. The company can also predict when a truck needs maintenance, avoiding breakdowns during deliveries.

**Energy and utilities:** Utility companies can optimize energy use, predict demand, and prevent equipment failures.

- A smart grid collects data on electricity usage in homes and businesses. The energy company can predict when there will be high demand and prepare for it, ensuring there is enough supply. The company can also detect and fix faults in the grid before they cause power outages.

**Insurance:** Insurance companies can improve risk assessments, detect fraud, and offer personalized policies.

- An insurance company uses driving data from a customer's car to offer a more personalized car insurance rate. If the customer drives safely, they pay lower premiums. The company also uses data to spot fraud, such as when someone submits a claim for damage that doesn't match the accident report.

**Education:** Schools and universities can create personalized learning experiences and improve student performance.

- A school uses student data to identify which students are struggling with certain subjects. Teachers can then provide extra help to those students, improving their chances of success. Schools can also use data to track overall student progress and adapt teaching methods to be more effective.

**Government and public sector:** Governments can improve services, manage resources more efficiently, and ensure public safety.

- A city uses traffic data to identify congested areas and optimize traffic lights, reducing traffic jams. The government can also predict crime hotspots and allocate police resources, accordingly, helping keep communities safer.

**Real Estate:** Real estate companies can predict property values, find the best investment opportunities, and provide better customer service.

- A real estate firm uses market data to predict which areas will see property price increases. This helps investors choose the best places to buy homes. The firm can also recommend properties to buyers based on their preferences and past searches.

**Agriculture:** Farmers can predict crop yields, reduce waste, and improve productivity.

- A farm uses weather data and soil conditions to predict when crops will be ready for harvest. This helps the farmer avoid over-planting or under-planting, improving both yield and profits. They can also track the use of water and fertilizers to minimize waste.

**Media and entertainment:** Companies in media can understand audience preferences and improve content offerings.

- A streaming service like Netflix collects data on what users watch and how long they watch it. Using this data, it suggests movies and shows that users are likely to enjoy, improving user satisfaction. The company can also analyze trends to create content that audiences are more likely to watch.

**Travel and Hospitality:** Travel companies can personalize offers, optimize pricing, and improve customer experience.

- A travel agency uses customer data to offer personalized vacation packages. If the customer frequently books beach vacations, the company might offer special deals for tropical destinations. Hotels can also use data to adjust room prices based on demand, maximizing revenue.

**Automotive:** Car manufacturers and service providers can enhance vehicle performance and customer experience.

- A car company uses sensor data from vehicles to predict when parts will wear out. The car owner is then notified in advance, preventing breakdowns. Car companies also analyze customer preferences to design vehicles that match their needs better.

**Construction and infrastructure:** Construction companies can improve project management, safety, and resource use.

- A construction company uses data to track how long it takes for workers to complete tasks and how much material is being used. This helps them stick to project timelines and budgets. They can also use data to monitor worker safety and reduce accidents.

**Legal services:** Law firms can streamline their processes, predict case outcomes, and offer better services.

- A law firm uses big data to analyze past court cases to predict the outcome of new cases. This helps them prepare better strategies for their clients. They also use data to quickly find relevant legal documents, saving time and money for clients [4].

## Real-World Enablement Methodology

By adopting the following methodology, organizations can successfully implement big data strategies, unlocking the full potential of their data assets, ensuring business growth, and maintaining a competitive edge.

**Aligning with business goals:** Ensure that big data projects are focused on the key goals of the business. To Enable:

- Understand the main goals of the business (e.g., attracting customers, reducing costs, increasing ROI).
- Identify how big data can support these goals by turning data into useful insights.
- Set clear goals and measures (KPIs) to track how big data helps achieve these business objectives.

**Using data integration and advanced analytics:** Use tools and technology to bring data together and analyze it to uncover valuable insights. For implementation:

- Collect and merge data from different reliable sources (e.g., customer, sales, operational data).
- Apply advanced techniques like machine learning and predictive analytics to understand patterns.
- Focus on turning this data into actionable recommendations that help the business make better decisions.

**Ensuring data quality and governance:** Make sure the data is accurate, reliable, and secure so that decisions made based on it are trustworthy. To ensure:

- Set up processes to maintain clean, accurate, and consistent data.
- Implement rules and policies that control how data is managed, ensuring security and compliance with regulations.
- Regularly review and audit data sources to ensure they meet quality standards and governance rules.

**Scaling and adapting to growth:** Make sure the data infrastructure can handle increasing amounts of data and adapt as business needs change. To accomplish this:

- Invest in cloud storage and systems that can grow with the business.
- Use flexible tools that can easily adjust to new business needs or types of data.
- Plan ahead for future data needs, ensuring that the infrastructure can manage new sources and larger volumes of data.

**Engaging stakeholders and encouraging collaboration:** Involve key people from different departments in the data initiatives to ensure a shared understanding and effective use of data. To make certain:

- Set up cross-functional teams with experts from business, technology, and data analytics.
- Ensure everyone understands how big data can help solve business problems and improve decision-making.
- Encourage collaboration by sharing insights across teams to work towards common goals.

**Driving innovation and capturing opportunities:** Use big data to create new opportunities, enhance products, and stay ahead of competitors. To enable:

- Identify areas where data can drive innovation, such as improving customer experiences or developing new products.
- Use data to predict market trends and discover new growth opportunities.
- Continuously monitor industry changes to keep the business competitive by leveraging data insights.

**Achieving Measurable Results and Continuous Improvement:** Track how well big data projects are performing and continuously improve them. To accomplish this:

- Set clear goals for each project, such as increasing revenue, reducing costs, or improving efficiency.
- Regularly measure progress against these goals to ensure the initiatives are delivering value.

- Collect feedback from results and refine strategies to optimize how big data is used over time [5].

## Dependencies

Successful big data Value Realization relies on several dependencies. For instance:

**Data governance:** Strong data governance framework is a critical dependency for successful big data value realization. It involves the policies, practices, and standards that organizations use to ensure data is accurate, accessible, secure, and used responsibly. Without a strong data governance framework, the value derived from big data can be undermined by issues like poor data quality, legal non-compliance, and security breaches. It also ensures data integrity and compliance with regulations such as GDPR.

**Skilled workforce:** A skilled workforce is one of the most important factors for successfully using big data in any organization. In simple terms, a skilled workforce refers to having the right people with the right skills to collect, analyze, and interpret large amounts of data. These experts can turn raw data into useful insights that help the organization make better decisions and improve business operations. Some essential roles are Data Engineer, Data Scientists, Data Analysts, and Business Analysts.

For further understanding, imagine a retail company that wants to improve its sales. The company gathers data from customer purchases, online activity, and social media. A data scientist can use machine learning to predict which products will be in demand. A data analyst might create graphs and reports to show trends over time, such as which products are gaining popularity. A business analyst will help the team turn those insights into a marketing campaign to increase sales. Finally, a data engineer ensures that all the data is stored and organized in a way that everyone can easily access and use it.

Tools, and Technology infrastructure is the backbone of any big data initiative. It refers to the tools, systems, and platforms that allow organizations to store, process, and analyze large volumes of data efficiently. For big data Value Realization, having the right infrastructure is crucial to ensure that data can be accessed, processed, and used for making informed business decisions.

## Key components of technology infrastructure

**Data storage solutions:** Data storage refers to how data is saved and managed. For big data, organizations often use solutions that can store large and varied data types, such as structured (e.g., numbers) and unstructured (e.g., videos, social media posts).

- **Data lakes:** A data lake is a large storage system that allows businesses to store all types of data in their raw form. It can handle vast amounts of data, making it ideal for big data environments. For example, a company may use a data lake to store customer transaction data, website logs, and social media activity.
- **Cloud storage:** Cloud storage platforms like Amazon S3 or Google Cloud Storage are used to store data offsite in the cloud. This ensures scalability and easy access to data from anywhere. For instance, companies can scale up their storage as their data grows without the need for on-premises hardware.

**Data processing capabilities:** This refers to the tools and technologies that allow organizations to process and analyze data quickly, especially when dealing with large datasets.

- **Hadoop:** Hadoop is an open-source framework that allows for distributed storage and processing of large data sets across clusters of computers. It is designed to handle big data efficiently. For example, a social media company might use Hadoop to process data from millions of user interactions.
- **Apache spark:** Spark is another popular open-source tool for processing large datasets quickly. It is faster than Hadoop and is used for real-time data processing. For example, it could be used by a streaming service to process user viewing data in real-time and recommend content immediately.

**Data integration tools:** These tools allow organizations to gather and combine data from multiple sources into a single platform for analysis.

- **ETL (Extract, Transform, Load) Tools:** ETL tools like Apache NiFi or Talend help to extract data from different sources, transform it into a usable format, and load it into a central system, such as a data warehouse or data lake.
- **Data integration platforms:** Tools such as Informatica or MuleSoft integrate data from various applications and systems. For example, a retail company may use these tools to combine data from their sales, customer, and inventory management systems into one unified view.

**Data analytics platforms:** These platforms enable businesses to analyze and derive insights from big data using advanced analytics techniques, such as machine learning and predictive analytics.

- **Business Intelligence (BI) tools:** Tools like Tableau, Power BI, and QlikView allow users to visualize data and generate reports that make it easier to understand. For example, a marketing team might use Power BI to create dashboards that track campaign performance.
- **Machine learning platforms:** Platforms like Google AI, Microsoft Azure, or Amazon SageMaker provide powerful tools to build machine learning models that analyze big data for predictions and insights. For example, a bank might use machine learning to predict loan defaults based on customer behavior data.

**Data security and governance tools:** These tools help ensure that the data is secure, protected, and compliant with relevant laws and regulations.

- **Data encryption:** Tools like Symantec or McAfee encrypt sensitive data to protect it from unauthorized access. This is particularly important when dealing with customer data or financial information.
- **Data governance platforms:** Solutions like Collibra or Alation help manage and govern data across the organization, ensuring proper access, usage, and compliance with regulations such as GDPR. These platforms help ensure that data is accurate, secure, and used responsibly [6].

## Challenges and Risks

Organizations often encounter several challenges and risks when trying to unlock the full potential of big data. These challenges can



prevent them from realizing the value that big data promises and may even lead to failure if not properly addressed. The following highlighted some key challenges, must be properly addressed:

- **Legal and compliance risks:** Organizations must navigate complex legal and regulatory requirements for handling data, such as industry-specific rules like HIPAA for healthcare or PCI DSS for payment data.
- **Data privacy and security:** As privacy regulations like GDPR and PDPL become severe, companies must handle personal data carefully to avoid legal issues. They also need to protect data from security breaches and cyberattacks.
- **Integration issues:** Many organizations have trouble combining new data systems with older systems, which can create data silos. This makes it difficult to get a full picture from all available data.
- **Employee resistance:** Employees may resist using data-driven approaches, especially in companies with long-standing ways of working. Overcoming this resistance requires good change management strategies.
- **Poor data quality:** Low-quality data can cause problems with analysis. Organizations need to clean and validate data to ensure its accurate and useful.
- **Scalability problems:** As data grows, organizations need to scale their infrastructure to handle the increased load. Without proper planning, this can slow down performance and lead to system crashes.
- **Lack of skilled workers:** There is a shortage of skilled data scientists and analysts who can interpret complex data. This lack of expertise can delay or stop big data initiatives from succeeding.
- **High costs:** Implementing big data solutions can be expensive. Organizations must carefully consider whether the benefits are worth the investment in infrastructure, software, and skilled staff.
- **Complex data management:** Managing and organizing data from different sources can be complicated. Companies must put in extra effort to clean, structure, and organize data before it can be analyzed [7,8].

## Conclusion

Realizing value from big data is essential for organizations that want to stay competitive in today's data-driven world. As more industries and markets rely on data, those who effectively use it can make better decisions, drive innovation, and enhance performance. For organizations to achieve big data Value Realization, it is important to align their data-related initiatives with their overall

business goals. This ensures that data efforts are not just about collecting large amounts of data, but about using it to solve real business problems and create measurable outcomes.

One of the key factors in successfully leveraging big data is creating a culture where data literacy is a priority. This means ensuring that employees at all levels, from leadership to front-line staff, understand the importance of data and are trained to interpret and act on data insights. Additionally, adopting advanced analytics practices, such as predictive modeling and machine learning, allows organizations to gain deeper insights into their data. This helps them to anticipate trends, identify new opportunities, and optimize operations. The right technology tools and infrastructure are also essential for managing and processing large datasets efficiently.

However, the journey of big data Value Realization is not a one-time effort; it is an ongoing process. New technologies and methodologies are continuously emerging, which can change how organizations collect, store, and analyze data. To stay ahead, organizations must remain flexible and adaptable. They need to continuously assess and improve their data strategies, so they can respond quickly to new trends, technologies, and business needs.

## Conflict of Interest

Author's declare there is no conflict of interest.

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