



Benefits of Big data analytics

- **Better decision-making:** In the New Vantage Partners survey, 36.2 percent of respondents said that better decision-making was the number one goal of their big data analytics efforts. In addition, 84.1 percent had started working toward that goal, and 59.0 percent had experienced some measurable success, for an overall success rate of 69.0 percent. Analytics can give business decision-makers the data-driven insights they need to help their companies compete and grow.
- **Increased productivity:** A separate [survey from vendor Syncsort](#) found that 59.9 percent of respondents were using big data tools like Hadoop and Spark to increase business user productivity. Modern big data tools are allowing analysts to analyze more data, more quickly, which increases their personal productivity. In addition, the insights gained from those analytics often allow organizations to increase productivity more broadly throughout the company.
- **Reduce costs:** Both the Syncsort and the NewVantage surveys found that big data analytics were helping companies decrease their expenses. Nearly six out of ten (59.4 percent) respondents told Syncsort big data tools had helped them increase operational efficiency and reduce costs, and about two thirds (66.7 percent) of respondents to the NewVantage survey said they had started using big data to decrease expenses. Interestingly, however, only 13.0 percent of respondents selected cost reduction as their primary goal for big data analytics, suggesting that for many this is merely a very welcome side benefit.
- **Improved customer service:** Among respondents to the NewVantage survey, improving customer service was the second most common primary goal for big data analytics projects, and 53.4 percent of companies had experienced some success in this regard. Social media, customer relationship management (CRM) systems and other points of customer contact give today's enterprises a wealth of information about their customers, and it is only natural that they would use this data to better serve those customers.

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- **Increased revenue:** When organizations use big data to improve their decision-making and improve their customer service, increased revenue is often the natural result. In the Syncsort survey, more than half of respondents (54.7 percent) said they were using big data tools to increase revenue and accelerate growth based on better insights.
- **Increased agility:** Again, from the Syncsort report, 41.7 percent of respondents said that one of the benefits of big data was the ability to increase business/IT agility. Many organizations are using their big data to better align their IT and business efforts, and they are using their analytics to support faster and more frequent changes to their business strategies and tactics.
- **Greater innovation:** Innovation is another common benefit of big data, and the NewVantage survey found that 11.6 percent of executives are investing in analytics primarily as a means to innovate and disrupt their markets. They reason that if they can glean insights that their competitors don't have, they may be able to get out ahead of the rest of the market with new products and services.
- **Faster speed to market:** Along those same lines, executives also told NewVantage that they were using big data to achieve faster time-to-market. Only 8.8 percent said that this was their number one goal for big data, but 53.6 percent have started working toward that goal, and of those, 54.1 percent had achieved some success. This advantage of big data is also likely to result in additional benefits, such as faster growth and higher revenue.

Benefits of Big data analytics

A) Decision-Making

- Whilst data analytics have always been used to improve the quality and efficiency of decision-making processes, the advent of Big Data means that the areas of our lives in which data driven decision- making plays a role is expanding dramatically; as businesses and governments become better able to exploit new data flows. Furthermore, the real-time and predictive nature of decision-making made possible by Big Data, are increasingly allowing these decisions to be automated. As a result, Big Data is providing governments and business with unprecedented opportunities to create new insights and solutions; becoming more responsive to new opportunities and better able to act quickly - and in some cases preemptively - to deal with emerging threats.
- This ability of Big Data to speed up and improve decision-making processes can be applied across all sectors from transport to healthcare and is often cited within the literature as one of the key advantages of Big Data. Joh, for example, highlights the increased use of data driven predictive analysis by police forces to help them to forecast the times and geographical locations in which crimes are most likely to occur. This allows the force to redistribute their officers and resources according to anticipated need, and in certain cities has been highly effective in reducing crime rates [6]. Raghupathi meanwhile cites the case of healthcare, where predictive modelling driven by big data is being used to proactively identify patients who could benefit from preventative care or lifestyle changes[7].
- One area in particular where the decision-making capabilities of Big Data are having a significant impact is in the field of risk management [8]. For instance, Big Data can allow companies to map their entire data landscape to help detect sensitive information, such as 16 digit numbers - potentially credit card data - which are not being stored according to regulatory requirements and intervene accordingly. Similarly, detailed analysis of data held about suppliers and customers can help companies to identify those in financial trouble, allowing them to act quickly to minimize their exposure to any potential default

Benefits of Big data analytics

- In the last few years, with advent of big data, the information requirements of executives have changed. In addition to traditional datasets described above, there are large datasets coming from variety of sources in structured, semi-structured or unstructured forms. There are several ways in which firms can tap value from these datasets to make strategic, tactical and operational decisions. Business transaction data when mined for association rules provide key insights for decision makers about products bought together or predicting demand for certain items. Getting an understanding of patterns helps retailers such as Wal-Mart to redesign their isles and placement of products together leading to improved sales (Shaw et al., 2001). Prediction of demand for certain items, helps in improved planning ahead of major natural disasters like hurricanes (Shaw et al., 2001). Analysis of terabytes of data coming from aircraft engine provides indicators of part failures thereby improving maintenance as well as safety (Dyche, 2014).

Benefits of Big data analytics

- Efficiency and Productivity
- In an era when many governments and businesses are facing enormous pressures on their budgets, the desire to reduce waste and inefficiency has never been greater. By providing the information and analysis needed for organisations to better manage and coordinate their operations, Big Data can help to alleviate such problems, leading to the better utilization of scarce resources and a more productive workforce [10]. Within the literature such efficiency savings are most commonly discussed in relation to reductions in energy consumption [11].
- For example, a report published by Cisco notes how the city of Oslo has managed to reduce the energy consumption of street-lighting by 62 percent through the use of smart solutions driven by Big Data[12]. Increasingly, however, statistical models generated by Big Data analytics are also being utilized to identify potential efficiencies in sourcing, scheduling and routing in a wide range of sectors from agriculture to transport. For example, Newell observes how many local governments are generating large databases of scanned license plates through the use of automated license plate recognition systems (ALPR), which government agencies can then use to help improve local traffic management and ease congestion[13].
- Commonly these efficiency savings are only made possible by the often counter-intuitive insights generated by the Big Data models. For example, whilst a human analyst planning a truck route would always tend to avoid 'drive-bys' - bypassing one stop to reach a third before doubling back - Big Data insights can sometimes show such routes to be more efficient. In such cases efficiency saving of this kind would in all likelihood have gone unrecognised by a human analyst, not trained to look for such patterns[14].

Benefits of Big data analytics

- *Research, Development, and Innovation*
- Perhaps one of the most intriguing benefits of Big Data is its potential use in the research and development of new products and services. As is highlighted throughout the literature, Big Data can help businesses to gain an understanding of how others perceive their products or identify customer demand and adapt their marketing or indeed the design of their products accordingly[\[15\]](#). Analysis of social media data, for instance, can provide valuable insights into customers' sentiments towards existing products as well as discover demands for new products and services, allowing businesses to respond more quickly to changes in customer behaviour[\[16\]](#).
- In addition to market research, Big Data can also be used during the design and development stage of new products; for example by helping to test thousands of different variations of computer-aided designs in an expedient and cost-effective manner. In doing so, business and designers are able to better assess how minor changes to a products design may affect its cost and performance, thereby improving the cost-effectiveness of the production process and increasing profitability.

Benefits of Big data analytics

- *Personalisation*
- For many consumers, perhaps the most familiar application of Big Data is its ability to help tailor products and services to meet their individual preferences. This phenomena is most immediately noticeable on many online services such as Netflix; where data about users activities and preferences is collated and analysed to provide a personalised service, for example by suggesting films or television shows the user may enjoy based upon their previous viewing history[\[17\]](#). By enabling companies to generate in-depth profiles of their customers, Big Data allows businesses to move past the 'one size fits all' approach to product and services design and instead quickly and cost-effectively adapt their services to better meet customer demand.
- In addition to service personalisation, similar profiling techniques are increasingly being utilized in sectors such as healthcare. Here data about a patient's medical history, lifestyle, and even their gene expression patterns are collated, generating a detailed medical profile which can then be used to tailor treatments to meet their specific needs[\[18\]](#). Targeted care of this sort can not only help to reduce costs for example by helping to avoid over-prescriptions, but may also help to improve the effectiveness of treatments and so ultimately their outcome.

Benefits of Big data analytics

- *Transparency*
- If 'knowledge is power', then, - so say Big Data enthusiasts - advances in data analytics and the quantity of data available can give consumers and citizens the knowledge to hold governments and businesses to account, as well as make more informed choices about the products and services they use. Nevertheless, data (even lots of it) does not necessarily equal knowledge. In order for citizens and consumers to be able to fully utilize the vast quantities of data available to them, they must first have some way to make sense of it. For some, Big Data analytics provides just such a solution, allowing users to easily search, compare and analyze available data, thereby helping to challenge existing information asymmetries and make business and government more transparent[\[19\]](#).
- In the private sector, Big Data enthusiasts have claimed that Big Data holds the potential to ensure complete transparency of supply chains, enabling concerned consumers to trace the source of their products, for example to ensure that they have been sourced ethically [\[20\]](#). Furthermore, Big Data is now making accessible information which was previously unavailable to average consumers and challenging companies whose business models rely on the maintenance of information asymmetries. The real-estate industry, for example, relies heavily upon its ability to acquire and control proprietary information, such as transaction data as a competitive asset. In recent years, however, many online services have allowed consumers to effectively bypass agents, by providing alternative sources of real-estate data and enabling prospective buyers and sellers to communicate directly with each other[\[21\]](#). Therefore, providing consumers with access to large quantities of actionable data . Big Data can help to eliminate established information asymmetries, allowing them to make better and more informed decisions about the products they buy and the services they enlist.

Issues of Big data analytics

- **Need for talent:** Data scientists and big data experts are among the most highly coveted —and highly paid — workers in the IT field. The AtScale survey found that the lack of a big data skill set has been the number one big data challenge for the past three years. And in the Syncsort survey, respondents ranked skills and staff as the second biggest challenge when creating a data lake. Hiring or training staff can increase costs considerably, and the process of acquiring big data skills can take considerable time.
- **Data quality:** In the Syncsort survey, the number one disadvantage to working with big data was the need to address data quality issues. Before they can use big data for analytics efforts, data scientists and analysts need to ensure that the information they are using is accurate, relevant and in the proper format for analysis. That slows the reporting process considerably, but if enterprises don't address data quality issues, they may find that the insights generated by their analytics are worthless — or even harmful if acted upon.
- **Need for cultural change:** Many of the organizations that are utilizing big data analytics don't just want to get a little bit better at reporting, they want to use analytics to create a data-driven culture throughout the company. In fact, in the NewVantage survey, a full 98.6 percent of executives said that their firms were in the process of creating this new type of corporate culture. However, changing culture is a tall order. So far, only 32.4 percent were reporting success on this front.
- **Compliance:** Another thorny issue for big analytics efforts is complying with government regulations. Much of the information included in companies' big data stores is sensitive or personal, and that means the firm may need to ensure that they are meeting industry standards or government requirements when handling and storing the data. In the Syncsort survey, data governance, including compliance, was the third most significant barrier to working with big data. In fact, when respondents were asked to rank [big data challenges](#) on a scale from 1 (most significant) to 5 (least significant), this disadvantage of big data got more 1s than another other challenge.

Issues of Big data analytics

- **Cybersecurity risks:** Storing big data, particularly sensitive data, can make companies a more attractive target for cyberattackers. In the AtScale survey, respondents have consistently listed security as one of the top challenges of big data, and in the NewVantage report, executives ranked cybersecurity breaches as the single greatest data threat their companies face.
- **Rapid change:** Another potential drawback to big data analytics is that the technology is changing rapidly. Organizations face the very real possibility that they will invest in a particular technology only to have something much better come along a few months later. Syncsort respondents ranked this disadvantage of big data fourth among all the potential challenges they faced.
- **Hardware needs:** Another significant issue for organizations is the IT infrastructure necessary to support big data analytics initiatives. Storage space to house the data, networking bandwidth to transfer it to and from analytics systems, and compute resources to perform those analytics are all expensive to purchase and maintain. Some organizations can offset this problem by using cloud-based analytics, but that usually doesn't eliminate the infrastructure problems entirely.
- **Costs:** Many of today's big data tools rely on open source technology, which dramatically reduces software costs, but enterprises still face significant expenses related to staffing, hardware, maintenance and related services. It's not uncommon for big data analytics initiatives to run significantly over budget and to take more time to deploy than IT managers had originally anticipated.
- **Difficulty integrating legacy systems:** Most enterprises that have been around for very many years have siloed data in a variety of different applications and systems throughout their environments. Integrating all those disparate data sources and moving data where it needs to be also adds to the time and expense of working with big data.

Issues of Big data analytics

- **Privacy**

- By far the biggest concern raised by researchers in relation to Big Data is its risk to privacy. Given that by its very nature Big Data requires extensive and unprecedented access to large quantities of data; it is hardly surprising that many of the benefits outlined above in one way or another exist in tension with considerations of privacy. Although many scholars have called for a broader debate on the effects of Big Data on ethical best practice [\[23\]](#), a comprehensive exploration into the complex debates surrounding the ethical implications of Big Data go far beyond the scope of this article. Instead we will simply attempt to highlight some of the major areas of concern expressed in the literature, including its effects on established principles of privacy and the implication of Big Data on the suitability of existing regulatory frameworks governing privacy and data protection.

Visualization

- When it comes to visualizing big data, we face several problems. One of those problems is visual noise. Depending on the dataset being shown, users typically have a hard time seeing the objects that are relative to one another. When visualized, users find it difficult to separate these objects, which means we have to make sure that we only display the necessary data.
- Another problem that comes with visualizing data is information loss. Often when we try to get rid of the visual noise, we usually reduce the amount of data being shown. By doing this, some information is lost.
- With these assumptions we can then begin to look for solutions.
- To avoid visual noise, one solution is to have an expert analyze the data being processed. Having an expert study the data can help isolate the data that needs visualization. This will make it easier to visualize and organize the data in a way where audiences can easily separate and relate certain objects in the visualization. This will also ensure that necessary data is being displayed and that no information is lost in the visualization.
- Lastly, big data visualization also requires high-performance processing power. To solve this problem, a more powerful machine is needed in order to process and visualize the data quicker, but as technology advances, more solutions are being presented. One of those solutions is Artificial Intelligence (AI).
- With the integration of AI in data visualization software, many of the problems that big data visualization faces today are being solved. For example, AI can learn and suggest the best ways to visualize a dataset, and separate the data in a way where visualization can be sped up. This solves the problem of needing an expert to analyze and organize the data for visualization. AI can also provide us with predictive analysis, which can improve decision-making and can display more meaningful results.
- In this era of big data visualization, we at Global Advantage Consulting Group are hoping to solve most of the problems that data visualization is facing today. We are currently developing our own data visualization tool called Dancing Data that will allow you to not only visualize your data, but also to animate time series data. In the near future we are also looking to integrate AI into Dancing Data to provide you with features such as predictive analysis and visualization recommendations.

Dangers of Big data analytics

- **Security**

- In relation to cybersecurity Big Data can be viewed to a certain extent as a double-edged sword. On the one hand, the unique capabilities of Big Data analytics can provide organizations with new and innovative methods of enhancing their cybersecurity systems. On the other however, the sheer quantity and diversity of data emanating from a variety of sources creates its own security risks.
- 5. "Honey-Pot"
- The larger the quantities of confidential information stored by companies on their databases the more attractive those databases may appear to potential hackers.
- 6. Data Redundancy and Dispersion
- Inherent to Big Data systems is the duplication of data to many locations in order to optimize query processing. Data is dispersed across a wide range of data repositories in different servers, in different parts of the world. As a result it may be difficult for organizations to accurately locate and secure all items of personal information.

Dangers of Big data analytics

- **Digital Divides and Marginalisation**

Today data is a highly valuable commodity. The market for data in and of itself has been steadily growing in recent years with the business models of many online services now formulated around the strategy of harvesting data from users^[49]. As with the commodification of anything however, inequalities can easily emerge between the haves and have not's. Whilst the quantity of data currently generated on a daily basis is many times greater than at any other point in human history, the vast majority of this data is owned and tightly controlled by a very small number of technology companies and data brokers. Although in some instances limited access to data may be granted to university researchers or to those willing and able to pay a fee, in many cases data remains jealously guarded by data brokers, who view it as an important competitive asset. As a result these data brokers and companies risk becoming the gatekeepers of the Big Data revolution, adjudicating not only over who can benefit from Big Data, but also in what context and under what terms. For many such inconsistencies and inequalities in access to data raises serious doubts about just how widely distributed the benefits of Big Data will be. Others go even further claiming that far from helping to alleviate inequalities, the advent of Big Data risks exacerbating already significant digital divides that exist as well as creating new one

Dangers of Big data analytics

- Anti-Competitive Practices
- As a result of the reluctance of large companies to share their data, there increasingly exists a divide in access between small start-ups companies and their larger and more established competitors. Thus, new entrants to the marketplace may be at a competitive disadvantage in relation to large and well established enterprises, being as they are unable to harness the analytical power of the vast quantities of data available to large companies by virtue of their privileged market position. Since the performance of many online services are today often intimately connected with the collation and use of users data, some researchers have suggested that this inequity in access to data could lead to a reduction in competition in the online marketplace, and ultimately therefore to less innovation and choice for consumers [\[51\]](#).
- As a result researchers including Nathan Newman of New York University have called for a reassessment and reorientation of anti-trust investigations and regulatory approaches more generally to 'to focus on how control of personal data by corporations can entrench monopoly power and harm consumer welfare in an economy shaped increasingly by the power of "big data"' [\[52\]](#). Similarly a report produced by the European Data Protection Supervisor concluded that, 'The scope for abuse of market dominance and harm to the consumer through refusal of access to personal information and opaque or misleading privacy policies may justify a new concept of consumer harm for competition enforcement in digital economy' [\[53\]](#).

Dangers of Big data analytics

- Research
- From a research perspective barriers to access to data caused by proprietary control of datasets are problematic, since certain types of research could become restricted to those privileged enough to be granted access to data. Meanwhile those denied access are left not only incapable of conducting similar research projects, but also unable to test, verify or reproduce the findings of those who do. The existence of such gatekeepers may also lead to reluctance on the part of researchers to undertake research critical of the companies, upon whom they rely for access, leading to a chilling effect on the types of research conducted[\[54\]](#).

Dangers of Big data analytics

- Inequality
- Whilst bold claims are regularly made about the potential of Big Data to deliver economic development and generate new innovations, some critics remain concerned about how equally the benefits of Big Data will be distributed and the effects this could have on already established digital divides [\[55\]](#).
- Firstly, whilst the power of Big Data is already being utilized effectively by most economically developed nations, the same cannot necessarily be said for many developing countries. A combination of lower levels of connectivity, poor information infrastructure, underinvestment in information technologies and a lack of skills and trained personnel make it far more difficult for the developing world to fully reap the rewards of Big Data. As a consequence the Big Data revolution risks deepening global economic inequality as developing countries find themselves unable to compete with data rich nations whose governments can more easily exploit the vast quantities of information generated by their technically literate and connected citizens.
- Likewise, to the extent that the Big Data analytics is playing a greater role in public policy-making, the capacity of individuals to generate large quantities of data, could potentially impact upon the extent to which they can provide inputs into the policy-making process. In a country such as India for example, where there exist high levels of inequality in access to information and communication technologies and the internet, there remain large discrepancies in the quantities of data produced by individuals. As a result there is a risk that those who lack access to the means of producing data will be disenfranchised, as policy-making processes become configured to accommodate the needs and interests of a privilege minority

Dangers of Big data analytics

- **Discrimination**

- Injudicious or Discriminatory Outcomes

- Big Data presents the opportunity for governments, businesses and individuals to make better, more informed decisions at a much faster pace. Whilst this can evidently provide innumerable opportunities to increase efficiency and mitigate risk, by removing human intervention and oversight from the decision-making process Big Data analysts run the risk of becoming blind to unfair or injudicious results generated by skewed or discriminatory programming of the algorithms.
- There currently exists a large number of automated decision-making algorithms in operation across a broad range of sectors including most notably perhaps those used to assess an individual's suitability for insurance or credit. In either of these cases faults in the programming or discriminatory assessment criteria can have potentially damaging implications for the individual, who may as a result be unable to attain credit or insurance. This concern with the potentially discriminatory aspects of Big Data is prevalent throughout the literature and real life examples have been identified by researchers in a large number of major sectors in which Big Data is currently being used[\[57\]](#).
- Yu for instance, cites the case of the insurance company Progressive, which required its customers to install 'Snapsnot' - a small monitoring device - into their cars in order to receive their best rates. The device tracked and reported the customers driving habits, and offered discounts to those drivers who drove infrequently, drove smoothly, and avoided driving at night - behaviors that correlate with a lower risk of future accidents. Although this form of price differentiation provided incentives for customers to drive more carefully, it also had the unintended consequence of unfairly penalizing late-night shift workers. As Yu observes, 'for late night shift-workers, who are disproportionately poorer and from minority groups, this differential pricing provides no benefit at all. It categorizes them as similar to late-night party-goers, forcing them to carry more of the cost of the intoxicated and other irresponsible driving that happens disproportionately at night'[\[58\]](#).
- In another example, it is noted how Big Data is increasingly being used to evaluate applicants for entry-level service jobs. One method of evaluating applicants is by the length of their commute - the rationale being that employees with shorter commutes are statistically more likely to remain in the job longer. However, since most service jobs are typically located in town centers and since poorer neighborhoods tend to be those on the outskirts of town, such criteria can have the effect of unfairly disadvantaging those living in economically deprived areas. Consequently such metrics of evaluation can therefore also unintentionally act to reinforce existing social inequalities by making it more difficult for economically disadvantaged communities to work their way out of poverty

Dangers of Big data analytics

- Lack of Algorithmic Transparency.
- If data is indeed the 'oil of the 21st century'[\[60\]](#) then algorithms are very much the engines which are driving innovation and economic development. For many companies the quality of their algorithms is often a crucial factor in providing them with a market advantage over their competitor. Given their importance, the secrets behind the programming of algorithms are often closely guarded by companies, and are typically classified as trade secrets and as such are protected by intellectual property rights. Whilst companies may claim that such secrecy is necessary to encourage market competition and innovation, many scholars are becoming increasingly concerned about the lack of transparency surrounding the design of these most crucial tools.
- In particular there is a growing sentiment common amongst many researchers that there currently exists a chronic lack of accountability and transparency in terms of how Big Data algorithms are programmed and what criteria are used to determine outcomes [\[61\]](#). As Frank Pasquale observed,
- *' hidden algorithms can make (or ruin) reputations, decide the destiny of entrepreneurs, or even devastate an entire economy. Shrouded in secrecy and complexity, decisions at major Silicon Valley and Wall Street firms were long assumed to be neutral and technical. But leaks, whistleblowers, and legal disputes have shed new light on automated judgment. Self-serving and reckless behavior is surprisingly common, and easy to hide in code protected by legal and real secrecy'*[\[62\]](#).
- As such, without increased transparency in algorithmic design, instances of Big Data discrimination may go unnoticed as analyst are unable to access the information necessary to identify them.

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Thank you