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Paradigms of big data in the modern Organisations- A perspective

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Abstract
The Big Data has given the modern organisations and businesses to handle the data for the efficient functioning. The innovativeness in the delivery of products and services are ensured. The amorphous amount of data is handled and used for the leveraging of the business houses. The decision making which is crucial in the organisations is ensured through the big data. The competitiveness in the industry is ensured through the skilled human resource in the organisation. The parallel and co-existing big data techniques have been panacea and help organisations to combat the competition. The present study throws the light on the big data in the modern organisations.

Keywords: data, information, analytics.

Introduction
Big data became the most famous event in the last decade, many organizations like Google, yahoo, eBay, Facebook and twitter concern about big data since the beginning of it is shown on the business scene (Jill.D, 2013) [7]. Advances in information and communication technologies, the increasing use of electronic devices and networks, and the digitalisation of production processes mean that vast quantities of data are generated daily by economic and social activities.
This 'big data' can be transmitted, collected, aggregated and analysed to provide insights into processes and human behaviours. Big data analytics have the potential to identify efficiencies that can be made in a wide range of sectors, and to lead to innovative new products and services, greater competitiveness and economic growth. Studies suggest that companies that adopt big data analytics can increase productivity by 5%- 10% more than companies that do not, and that big data practices in Europe could add 1.9% to GDP between 2014 and 2020 (Davies, 2016) [4].
Over recent times, the concepts of "big data" and "big data analytics" have become ubiquitous— it is heard to visit a web site, open a newspaper, or read a magazine that does not refer to one or both of those phrases. Yet the technologies that are incorporated into big data—massive parallelism, huge data volumes, data distribution, high-speed networks, high performance computing, task and thread management, and data mining and analytics—are not new (Loshin, 2013) [9].

Definition of Concepts
Big Data
Big Data is often in an unstructured format and voluminous in size, meaning it comes from sources as disparate as social media posts, intelligent devices, chat rooms and data from various sources. Documents are much easier to process and analyze. The difficulty in analyzing Big Data resides in the labor-intensive costs and time constraints. To refer to massive amounts of business data from a wide variety of sources, much of which is available in real time, and much of which is uncertain or unpredictable. IBM calls these characteristics volume, variety, velocity, and veracity.
Furthermore, companies that cannot get their arms around Big Data find they cannot give it a useful purpose. Big Data's value lies in its usefulness to predict, bolster threat detection, or guide policy decisions. Developing strategic guidance about the company's future is also a great benefit (M.Suresh Babu, 2019) [10].

"The effective use of big data has the potential to transform economies, delivering a new wave of productivity growth and consumer surplus. Using big data will become a key basis of competition for existing companies, and will create new competitors who are able to attract employees that have the critical skills for a big data world." - McKinsey Global Institute, 2011

Database
A collection of related tables containing records on people, places, or things. In a database table the columns correspond to each individual element of data (called *fields*, or *attributes*), and the rows represent records of related data elements.

Data set
A collection of data (often a single "spread sheet" or data mining table). ◦Examples: Marketing survey responses, a table of historical stock prices, and a collection of measurements of dimensions of a manufactured item.

Big Data Analytics− Cleansing Data
Once the data is collected, we normally have diverse data sources with different characteristics. The most immediate step would be to make these data sources homogeneous and continue to develop our data product. However, it depends on the type of data. We should ask ourselves if it is practical to homogenize the data.
Maybe the data sources are completely different, and the information loss will be large if the sources would be homogenized. In this case, we can think of alternatives. Can one data source help me build a regression model and the other one a classification model? Is it possible to work with the heterogeneity on our advantage rather than just lose information? Taking these decisions are what make analytics interesting and challenging.
In the case of reviews, it is possible to have a language for each data source. Again, we have two choices

Homogenization
It involves translating different languages to the language where we have more data. The quality of translations services is acceptable, but if we would like to translate massive amounts of data with an API, the cost would be significant. There are software tools available for this task, but that would be costly too.

Heterogenization
Would it be possible to develop a solution for each language? As it is simple to detect the language of a corpus, we could develop a recommender for each language. This would involve more work in terms of tuning each recommender according to the amount of languages available but is definitely a viable option if we have a few languages available.

The Three Stages of Analytics Adoption
Three capability levels — Aspirational, Experienced and Transformed — were based on how respondents rated their organization's analytic prowess.

Table 1: The Three Stages of Analytics Adoption

	Aspirational	Experienced	Transformed
Motive	•Use analytics to justify actions	•Use analytics to guide actions	• Use analytics to prescribe actions
Functional proficiency	•Financial management and budgeting •Operations and production •Sales and marketing	•All Aspirational functions •Strategy/business development •Customer service •Product research/development	• All Aspirational and Experienced functions •Risk management •Customer experience •Work force planning/allocation •General management •Brand and market management
Business challenges	• Competitive differentiation through innovation •Cost efficiency (primary) •Revenue growth (secondary)	• Competitive differentiation through innovation •Revenue growth (primary) •Cost efficiency (secondary)	• Competitive differentiation through innovation •Revenue growth (primary) • Profitability acquiring/retaining customers (targeted focus)
Key obstacles	• Lack of understanding how to leverage analytics for business value •Executive sponsorship • Culture does not encourage sharing information	• Lack of understanding how to leverage analytics for business value •Skills within line of business • Ownership of data is unclear or governance is ineffective	• Lack of understanding how to leverage analytics for business value • Management bandwidth due to competing priorities •Accessibility of the data
Data management	• Limited ability to capture, aggregate, analyze or share information and insights	• Moderate ability to capture, aggregate and analyze data • Limited ability to share information and insights	• Strong ability to capture, aggregate and analyze data • Effective at sharing information and insights
Analytics in action	• Rarely use rigorous approaches to make decisions • Limited use of insights to guide future strategies or day-to-day operations	• Some use of rigorous approaches to make decisions • Growing use of insights to guide future strategies, but still limited use of insights to guide day-to-day operations	• Most use rigorous approaches to make decisions • Almost all use insights to guide future strategies, and most use insights to guide day-to-day operations

(Source-Steve LaValle, E. L. (2 0 1 1). Big Data, Analytics and the Path from Insights to Valu. MIT Sloan Management Review, 21-31).

Considerations in Big Data

While the market conditions suggest that there is a lowered barrier to entry for implementing big data solutions, it does not mean that implementing these technologies and business processes is a completely straightforward task. There is a steep learning curve for developing big data applications, especially when going the open source route, which demands an investment in time and resources to ensure the big data analytics and computing platform are ready for production. And while it is easy to test-drive some of these technologies as part of an "evaluation," one might think carefully about some key questions before investing a significant amount of resources and effort in scaling that learning curve, such as

- **Feasibility**

Is the enterprise aligned in a way that allows for new and emerging technologies to be brought into the organization, tested out, and vetted without overbearing bureaucracy? If not, what steps can be taken to create an environment that is suited to the introduction and assessment of innovative technologies?

- **Reasonability**

When evaluating the feasibility of adopting big data technologies, have you considered whether your organization faces business challenges whose resource requirements exceed the capability of the existing or planned environment? If not currently, do you anticipate that the environment will change in the near-, mediumor long-term to be more data-centric and require augmentation of the resources necessary for analysis and reporting?

- **Value**

Is there an expectation that the resulting quantifiable value that can be enabled as a result of big data warrants the resource and effort investment in development and productionalization of the technology? How would you define clear measures of value and methods for measurement?

- **Integrability**

Are there any constraints or impediments within the organization from a technical, social, or political (i.e., policy-oriented) perspective that would prevent the big data technologies from being fully integrated as part of the operational architecture? What steps need to be taken to evaluate the means by which big data can be integrated as part of the enterprise?

- **Sustainability**

While the barrier to entry may be low, the costs associated with maintenance, configuration, skills maintenance, and adjustments to the level of agility in development may not be sustainablewithin the organization. How would you plan to fund continued management and maintenance of a big data environment? In Chapter 2, we will begin to scope out the criteria for answering these questions as we explore the types of business problems that are suited to a big data solution (Loshin, 2013) [9].

Table 2: Examples of Applications Suited to Big Data Analytics

Application	Characteristic	Sample Data Sources
Energy network monitoring and optimization	Data throttling	Sensor data from smart meters and network components
	Computation throttling	
	Large data volumes	
Credit fraud detection	Data throttling	Point-of-sale data
	Computation throttling	Customer profiles
	Large data volumes	Transaction histories
	Parallelization	Predictive models
	Data variety	
Data profiling	Large data volumes Parallelization	Sources selected for downstream repurposing
Clustering and customer segmentation	Data throttling	Customer profiles
	Computation throttling	Transaction histories
	Large data volumes	Enhancement datasets
	Parallelization	
	Data variety	
Recommendation engines	Data throttling	Customer profiles
	Computation throttling	Transaction histories
	Large data volumes	Enhancement datasets
	Parallelization	Social network data
	Data variety	
Price modeling	Data throttling	Point-of-sale data
	Computation throttling	Customer profiles
	Large data volumes	Transaction histories
	Parallelization	Predictive models

(Source- Loshin, D. (2013). Big Data Analytics. 1-120)

Review of Literature

M.Suresh Babu (2019) [10] Business intelligence and analytics has emerged as an important area to generate new applications by decision makers thereby assessing the impact of data-related issues in business enterprises. This is a rapid multibillion-dollar across the globe opportunity and is expanding rapidly. Research on Business Intelligence provides an umbrella activity to identify the applications in upcoming research areas of Business Intelligence and Analytics. (M.Suresh Babu, 2019) [10].

Hiba Alsghaier (2017) [6] Organization realize operational processes benefits by cost reduction, best operations plan,

lower inventory levels, best organizational labor force and eliminate wasteful resources, also they influence improvements in operations efficiency. An organization big data analytics capabilities (like data resourcing, accessing, integrating, and delivering) and organizational factors (like big data analytics strategy) could speed up of efficient exploitation of big data analytics in processes and operations (Hiba Alsghaier, 2017) [6]

D. P. Acharjya and Kauser Ahmed P (2016) [1] explore the potential impact of big data challenges, open research issues, and various tools associated with it. As a result, this article provides a platform to explore big data at numerous stages. Additionally, it opens a new horizon for researchers to develop the solution, based on the challenges and open research issues. A huge repository of terabytes of data is generated each day from modern information systems and digital technologies such as Internet of Things and cloud computing. Analysis of these massive data requires a lot of efforts at multiple levels to extract knowledge for decision making. Therefore, big data analysis is a current area of research and development D. P. Acharjya and Kauser Ahmed P (2016) [1].

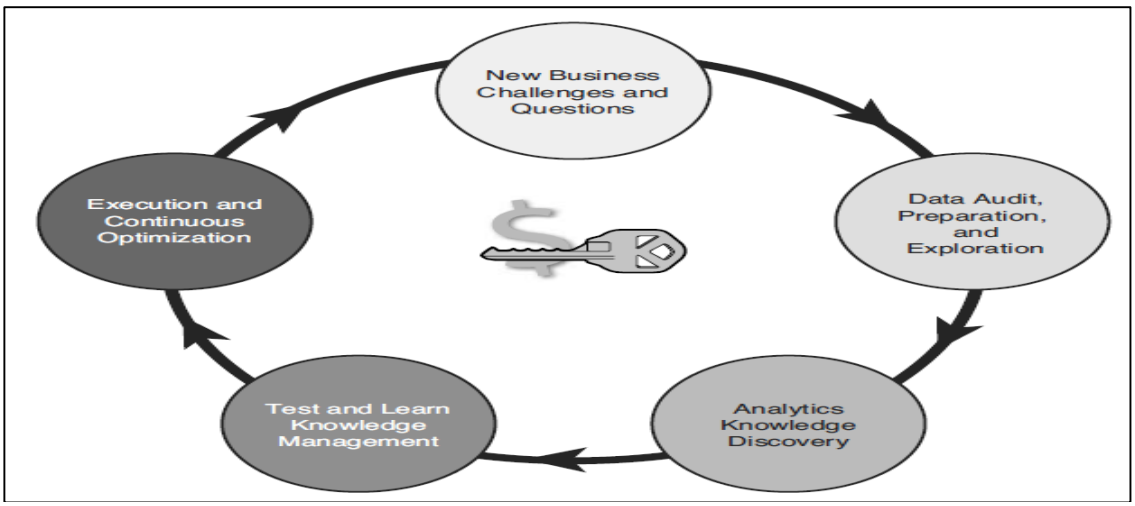
Davenport (2014) [3] Google, eBay and LinkedIn were among the first to experiment with big data. They developed proof of concept and small-scale projects to learn if their analytical models could be improved with new data sources. In many cases, the results of these experiments were positive. Today, big data analytics is no longer just an experimental tool. Many companies have begun to achieve real results with the approach, and are expanding their efforts to encompass more data and models. (Davenport, 2014) [3].

Xin James He (2014) [2] investigates the current status of big data business analytics and critical skills necessary to create business value. Business analytics refers to the skills, technologies, applications and practices for continuous iterative exploration and investigation of past business performance to provide actionable insights. Business analytics focuses on developing new insights and understanding of business performance based on data and statistical methods. Big data is used to characterize data sets that are large, diverse and rapidly-changing, as seen by ever increasing numbers of organizations. Big data require database management systems with capabilities beyond those seen in standard SQL-based systems Xin James He (2014) [2].

Hagiu aims to discuss aspects regarding the Big Data concept, the principles to build, organize and analyse huge datasets in the business environment, offering a three layer architecture, based on actual software solutions. The economic impact of the sheer amount of data produced in a last two years has increased rapidly. It is necessary to aggregate all types of data (structured and unstructured) in order to improve current transactions, to develop new business models, to provide a real image of the supply and demand and thereby, generate market advantages. So, the companies that turn to Big Data have a competitive advantage over other firms. Looking from the perspective of IT organizations, they must accommodate the storage and processing Big Data, and provide analysis tools that are easily integrated into business processes. (Hagiu)

Business analytics value chain

Rather than focusing on a single stage of the analytics value chain shown in Figure 1-2, this book takes a holistic view on the entire value chain (or value "ring" in this case) for continuous value creation. The focus is on the final business outcomes and their continued improvements using scientific test-and-learn methodology. To achieve sustainable wins over time, it is important that the process be run in a continuous fashion. Here's a brief description of the five major components:



(Source-Lin, N. (2015). Applied Business Analytics. Integrating Business Process, Big Data, and Advanced Analytics).

Fig 1: Analytics business value chain

- **Start with business questions**

All BA processes must start with a valid and high-value business question or idea. Even when the team is making a decision regarding IT, data, and analytics models, and executions, it should not be made in isolation and apart from the business considerations. Even though the original business premise might sometimes need to be modified, it should always focus on business outcomes.

- **Conduct data audit and augmentation**

While the business objective is being set, a quick data audit can help determine whether the business has the right data to accomplish the objective. If not, additional data has to be acquired or derived to augment the existing data. Sometimes the costs of data augmentation can be too prohibitive in the beginning, and a scaled back business objective can be

created first to validate the idea and value before undertaking a full-scale project.

- **Extract knowledge**

The main goal of the analytics exercises, including simple business intelligence (BI) analysis and advanced analytics modeling, is to extract useful business insights, patterns, and knowledge from the data. This is usually an iterative process. By answering the initial question, a good analytics team often generates several more questions. For example, when you see a group of customers exhibit a certain behavior, your next questions may be these: Who are they? Are they high-value customers? How long has this been the case? Is this a recent phenomenon? By peeling the onion and answering the sequence of questions, you can reach the core of the problem and uncover something that may thus far be hidden and unknown.

- **Test insights and hypotheses and knowledge management**

Once an insight on the predictors' impacts on the business outcomes is obtained, it needs to be tested for causal effects. To do this, the scientific testing protocol known as the design of experiments (DOE) should be used with suitable control groups. No insights should be taken at face value, no matter how intuitive or elegant they are. Once validated, the insights and effects must be saved in a knowledge management system for sharing and reuse.

- **Execution and optimization**

Analytics insights must also take into account how they are to be implemented. The lever settings and their respective effects can be used to help optimize the analytics efforts (Lin, 2015) [8].

Importantce of Big Data Analytics[1]

Big data analytics helps organizations harness their data and use it to identify new opportunities. That, in turn, leads to smarter business moves, more efficient operations, higher profits and happier customers. In his report *Big Data in Big Companies*, IIA Director of Research Tom Davenport interviewed more than 50 businesses to understand how they used big data. He found they got value in the following ways:

1. Cost reduction

Big data technologies such as Hadoop and cloud-based analytics bring significant cost advantages when it comes to storing large amounts of data – plus they can identify more efficient ways of doing business.

2. Faster, better decision making

With the speed of Hadoop and in-memory analytics, combined with the ability to analyze new sources of data, businesses are able to analyze information immediately – and make decisions based on what they've learned.

3. New products and services

With the ability to gauge customer needs and satisfaction through analytics comes the power to give customers what they want. Davenport points out that with big data analytics, more companies are creating new products to meet customers' needs.

Big Data in Business Environment

Business environment is interested in collecting information from unconventional data sources, in order to analyse and extract meaningful insight from this maze of data, be it security related or simply behavioural patterns of consumers. We will specify several ways by means of which the companies using Big Data could improve their business (Totty.M, 2013) [13].

1. Great software companies, like Google, Facebook and Amazon, showed their interest in processing Big Data in the Cloud environment many years ago. They are collecting huge amounts of information; analyze traditional measures like sales using comments on social media Sites and location information from mobile devices. This information is useful to figure out how improve their products, cut costs and keep customers coming back.
2. Product development for online companies – Big Data could help to capture customer preferences and use the information in designing new products. For example, Zynga Inc., the game maker, uses the collected data for customer service, quality assurance and designing the features for the next generation of games. Also, Ford Motor Co. designed a common set of components that would be on Ford cars and trucks by using algorithms that summarize more than 10,000 relevant comments.
3. Human resources - some companies are using Big Data to better handle the health care of their employees. For example, Caesars Entertainment Corp. analyzes health-insurance data for its 65,000 employees and their family members, finding information about how employees use medical services, the number of emergency-room visits and whether they choose a generic or brand-name drug.
4. Marketing – is the enterprise department made to understand the customers and their choices. Using Big Data analytics the information is better filtered and the forecasts are more accurate. An important company, InterContinental Hotels Group PLC has gathered details about the 71 million members of its Priority Club program, such as income levels and whether they prefer family-style or business-traveler accommodations.
5. Manufacturing companies, as well as retailers begin to monitor Facebook and Twitter and analyse those data from different angles, e.g. customer satisfaction. Retailers are also collecting large amounts of data by storing log files and combine that growing number of information with other data sources such as sales data in order to forecast customer behaviour (Hagiu).

Challenges in Big Data Analytics

Recent years big data has been accumulated in several domains like health care, public administration, retail, biochemistry, and other interdisciplinary scientific researches. Web-based applications encounter big data frequently, such as social computing, internet text and documents, and internet search indexing. Social computing includes social network analysis, online communities, recommender systems, reputation systems, and prediction

[1] https://www.sas.com/en_in/insights/analytics/big-data-analytics.html

markets where as internet search indexing includes ISI, IEEE Xplorer, Scopus, Thomson and the like.

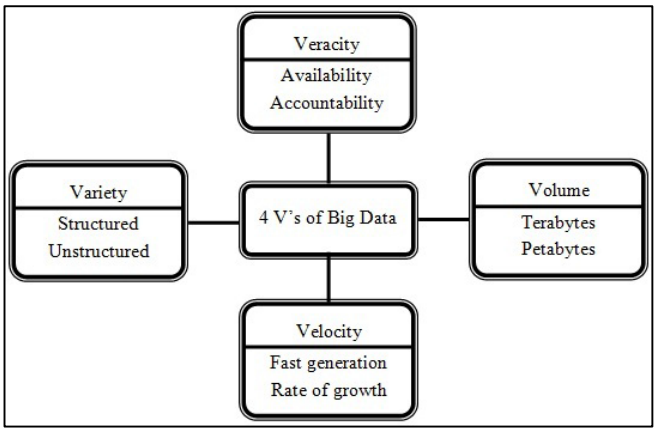


Fig 2: Characteristics of Big Data

Reuters etc. Considering this advantages of big data it provides a new opportunities in the knowledge processing tasks for the upcoming researchers. However oppotunities always follow some challenges. To handle the challenges we need to know various computational complexities, information security, and computational method, to analyze big data. For example, many statistical methods that perform well for small data size do not scale to voluminous data. Similarly, many computational techniques that perform well for small data face significant challenges in analyzing big data. Various challenges that the health sector face was being researched by much researchers (MH. Kuo, 2014) (R. Nambiar, 2013) [11, 12]. Here the challenges of big data analytics are classified into four broad categories namely data storage and analysis; knowledge discovery and computational complexities; scalability and visualization of data; and information security. We discuss these issues briefly in the following subsections D. P. Acharjya and Kauser Ahmed P (2016) [1].

Summary

Big data is the need of the businesses to leverage and offer the tangible benefits to business houses. It has elevated the understanding, choosing from the alternatives and the replacement with the automation. The big data offers the large data in the intricate form from the multiple sources. The data so drawn is used in various sources sums up to the information in the usable form. The archetype shift in the reasoned emphasis places the locus on the extrapolative and dogmatic analytics. It is resorted as an answer to data management with the volume, velocity and multiplicity nature. The mounting data is analogous and economical to the organisations. The database is not replacing but is an addition to the existing lot of the same in the industry.

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