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# Landscape of big data analytics in business- A theoretical study

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**Abstract**
Firms are increasingly relying on business insights obtained by deploying data analytics. Analytics-driven business decisions have thus taken a strategic imperative role for the competitive advantage of a firm to endure. The extent and effectiveness through which business firms can actually derive benefits by deploying big data-based practices requires deep analysis and calls for extensive research. Big data analytics have transformed research in many fields, including the business areas of marketing, accounting and finance, and supply chain management. The present research article intends to identify the scope and reach of Big Data in the present business world.

**Keywords:** Data, analytics, decisions

## Introduction
Business Intelligence that applies data analytics to generate key information to support business decision making, has been an important area for more than two decades. In the last five years, the trend of "Big Data" has emerged and become a core element of Business Intelligence research. Computer Science and management information systems are two core disciplines that drive research associated with Big Data and Business Intelligence. "Data mining", "social media" and "information system" are high frequency keywords, but "cloud computing", "data warehouse" and "knowledge management" are more emphasized after 2016 (Liang and Liu 2018) [4]. Social media has brought about a revolution and dictated a paradigm shift in the operational strategies of firms globally. It has resulted in collection of massive data from a variety of social media channels, necessitating use of this data for business intelligence purposes. Despite its importance, little research exists on the implications of the use of Big Data analytics for business intelligence purposes (Ram *et al.* 2016) [5]. Big data analytics have been embraced as a disruptive technology that will reshape business intelligence, which is a domain that relies on data analytics to gain business insights for better decision-making (Fan *et al.* 2015) [6]
As one of the most "hyped" terms in the market today, there is no consensus as to how to define big data. The term is often used synonymously with related concept such as *Business Intelligence* (BI) and *data mining*. It is true that all three terms is about analyzing data and in many cases advanced analytics. But big data concept is different from the two others when data volumes, number of transactions and the number of data sources are so big and complex that they require special methods and technologies in order to draw insight out of data (for instance, traditional data warehouse solutions may fall short when dealing with big data).
This also forms the basis for the most used definition of big data, the three V: *Volume*, *Velocity* and *Variety*.

## Volume
Large amounts of data, from datasets with sizes of terabytes to zettabyte.

## Velocity
Large amounts of data from transactions with high refresh rate resulting in data streams coming at great speed and the time to act on the basis of these data streams will often be very short. There is a shift from batch processing to real time streaming.

**Variety**

Data come from different data sources. For the first, data can come from both internal and external data source. More importantly, data can come in various format such as transaction and log data from various applications, structured data as database table, semi-structured data such as XML data, unstructured data such as text, images, video streams, audio statement, and more. There is a shift from sole structured data to increasingly more unstructured data or the combination of the two.

**Background**

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. According to some estimates, the amount of data produced worldwide is doubling every two years; it is expected to increase from 4.4 zettabytes (or 4.4 trillion gigabytes) in 2013 to 44 zettabytes in 2020. This 'big data' may be drawn from interactions on the web, online commercial transactions, e-government records, social media, mobile phone records, mobile apps, and sensors in objects linked to the Internet of Things. At the same time, information and communication technologies (ICTs) have been advancing, notably in terms of decreases in storage costs, increases in network capacity, improved analytical tools, and the availability of high performance, on-demand computing through the cloud. These advances have made it possible to store, transmit and process large amounts of data more cheaply, quickly and effectively than before.

**Meaning of big data and data analytics**

Broadly speaking, *big data* refers to data sets so large and complex that they are difficult to process using traditional ICT applications. Most definitions focus on three 'V' words. They describe big data as being large (i.e. they have 'volume'); heterogeneous (i.e. they come from different sources in a 'variety' of different forms including unstructured data such as text and emails); and collected oranalysed in near real time (i.e. they exhibit high 'velocity'). Some definitions also emphasise the need for data to be trustworthy (i.e. they must demonstrate 'veracity'). *Data analytics* refers to the techniques and processes that are applied to data, in particular big data, in order to reveal patterns and correlations. They are used to extract, from the raw data, information and knowledge that can be used in making decisions, improving productivity or developing innovations (Davies 2016) [9].

**Table 1:** Contrasting Approaches in Adopting High-Performance Capabilities

| Aspect | Typical Scenario | Big Data |
|---|---|---|
| Application development | Applications that take advantage of massive parallelism developed by specialized developers skilled in high-performance computing, performance optimization, and code tuning | A simplified application execution model encompassing a distributed file system, application programming model, distributed database, and program scheduling is packaged within adoop, an open source framework for reliable, scalable, distributed, and parallel computing |
| Platform | Uses high-cost massively parallel processing (MPP) computers, utilizing high-bandwidth networks, and massive I/O devices | Innovative methods of creating scalable and yet elastic virtualized platforms take advantage of clusters of commodity hardware components (either cycle harvesting from local resources or through cloud-based utility computing services) coupled with open source tools and technology |
| Data management | Limited to file-based or relational database management systems (RDBMS) using standard row-oriented data layouts | Alternate models for data management (often referred to as NoSQL or "Not Only SQL") provide a variety of methods for managing information to best suit specific business process needs, such as in-memory data management (for rapid access), columnar layouts to speed query response, and graph databases (for social network analytics) |
| Resources | Requires large capital investment in purchasing high-end hardware to be installed and managed in-house | The ability to deploy systems like Hadoop on virtualized platforms allows small and medium businesses to utilize cloud-based environments that, from both a cost accounting and a practical perspective, are much friendlier to the bottom line |

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

**Review of literature**

Sivarajah *et al.* (2019) [3] demonstrate the ability of big data and social media analytics within a participatory web environment to enable B2B organizations to become profitable and remain sustainable through strategic operations and marketing related business activities. The digital transformation is an accumulation of various digital advancements, such as the transformation of the web phenomenon. The participatory web that allows for active user engagement and gather intelligence has been widely recognized as a value add tool by organizations of all shapes and sizes to improve business productivity and efficiency. However, its ability to facilitate sustainable business-to-business (B2B) activities has lacked focus in the business and management literature to date.

Dong and Yang (2020) [2] drawing on the systems theory, explain how and why social media analytics create super-additive value through the synergies in functional complementarity between social media diversity for gathering big data from diverse social media channels and big data analytics for analyzing the gathered big data. Although big data analytics have been widely considered a key driver of marketing and innovation processes, whether and how big data analytics create business value has not been fully understood and empirically validated at a large scale. Taking social media analytics as an example, the researchers attempt to theoretically explain and empirically test the market performance impact of big data analytics.

Raut *et al.* (2019) [1] show that management and leadership style, state and central-government policy as the two most important predictors of big data analytics and sustainability practices. The results provide unique insights into manufacturing firms to improve their sustainable business performance from an operations management viewpoint. The study provides theoretical and practical insights into big data implementation issues in accomplishing sustainability practices in business organizations of emerging economies.

**Introducing 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 behavioral patterns of consumers. We will specify several ways by means of which the companies using Big Data could improve their business (Rosenbush & Totty, 2013) [10]:

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 socialmedia
1. 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.

**Linking analytics to business**

Instead of viewing analytics as a tool or a method, this book focuses on analytics as a process.

**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:

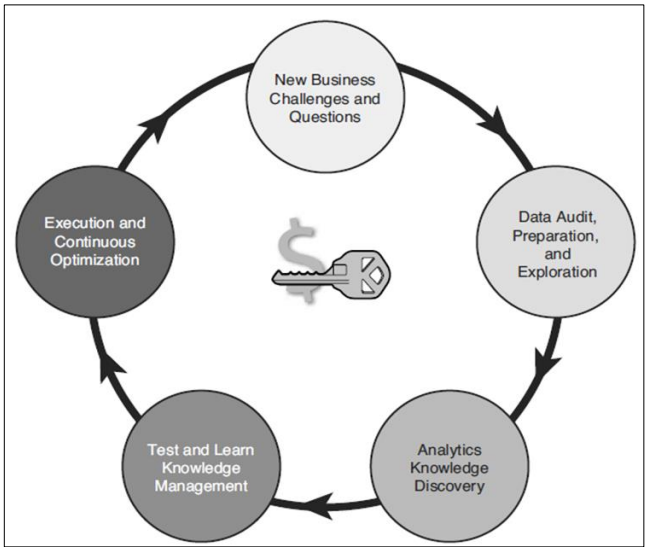


**Fig 1:** Analytics business Value Chain

**Start with business question**

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, 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. The validated insights and optimized.

**Conclusion**

Big Data has slowly changed the business landscapes providing the benefits that the organisations leverage. The Big Data Analytics has definitely become an integral part of the Big Data Value chain and the various tools are also simultaneously developed to test the analysis against workloads with query, graphic interpretation and dynamic approach. The Big Data analytics will change the way decisions are taken in the business world and also the businesses will integrate the same in the actual systems.

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