

Business Intelligence and Analytics: Challenges and Opportunities

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Abstract

The importance of data in business is very vital; because meaningful and actionable decisions can be made only with analyzing the data and these decisions will help organizations to grow further. Both the Business Intelligence and data analytics helps to analyze the data to get the insights from the data deluge. Today, Business Intelligence (BI) and Analytics terms are used interchangeably to some degree. Both the terms generally describe the practice of using Big data to make better business decisions. But are both the technologies actually the same thing? BI and Big data analytics need to be synchronized need to be used together more effectively for better decision making. Both are not the same thing, but they share a lot of the same common goals.

Today Businesses around the world are changing rapidly and the organizations have realize that it not just about customer sales records or it not just about structured data which would otherwise processed, used, analyzed and archived. The goal of BI and Big Data Analytics platform is to explore why, where, what, and how of a sales, customers, products, employees and companies. But, how organizations are coping with these expectations, what is the road ahead for BI, future challenges, opportunities and a need for analytics in BI are documented in this paper.

Keywords: Business Intelligence, Big data, Analytics, BI Challenges, BI Opportunities, Big Data Analytics

I. INTRODUCTION

The term big data is a buzzword in the industry and it occurs more frequently now than ever before. We can find that every field, every industry ranging from day-to-day life to advanced research fields which includes retail, e-commerce, finance, government, education, arts, transportation, biology and chemistry, health, etc has a big data problem [1]. Gartner, world's leading research and advisory company defined Big data with respect to three important characteristics of big data as high volume, velocity and variety of information assets that typically demands inexpensive, effective, novel types of big data processing techniques for improved insights, dynamic, and procedure computerization. [2]. These characteristics are commonly known as the —three Vs of Big Data.

The important point is to note that big data is not more about just big volumes of data. Exploring and analyzing semi structured and unstructured data is something new today. Two decades ago, we have not analyzed simple texts files, electronic mail, portable documents and spreadsheets, or videos and images. The sources around the world including the research communities claim that more than 90 percent of the data that exists today is few recent years old and it is growing very rapidly day-by-day. If that Big recent information in the world was created in the past few years, what does that say about this Big data? We have presented this and other such questions in the following sections.

The term Business Intelligence (BI) is defined in many ways but its purpose is to extract actionable information from datasets for better decision making and organization growth. The [3] has defined BI as "a systematic collection of techniques, methods, structures and processes that shapes big data into asset and actionable information for effective decision-making".

BI involves the delivery and integration of business information in an organization. Data mining or warehousing is not new, but in the last few years, companies have come to realize that BI is much more than corporate reporting from an information house in the IT section. With the advancements in visualizing information, data can be accessed and used across the organization to cut costs, streamline organizational efficiencies, refine products and services, and launch new ones. BI continues to be one of the fastest moving areas in the enterprises.

Today most of the companies have multi-regional database systems spread across the world and multiple database system vendors, with petabytes of data. These databases are storing and managing data over last 3 to 4 decades. Many organizations have built entire data warehouse platforms and analytic systems from these persistent databases. There are case where leading companies like Wal-Mart, became billion-dollar long retail chain even before the semi-structured and unstructured big data analytics comes into picture. From this we can say that it was not just data drove their business but the Data Analytics as a Service drove their businesses. Let us take another example of companies including Microsoft, Google, Amazon. The Amazon was an online e-commerce product company when they have started. But nowadays, people looking at Amazon as a leading Cloud Infrastructure, Platform and Software as a service provider. Amazon also offers Big data as a service, and it is one of the leading Cloud Service Provider in the market. This is not just the case of Amazon anymore there are other such big companies who provides rich set of services which drives their businesses successfully including Microsoft Azure, IBM Cloud, Google Cloud Platform, Salesforce and many such other companies are leading in the market.

Netflix and Amazon have built expert recommendation engines through user interactions and data collected from different sources using various open source technologies.

Companies are looking forward to BI and they should look in to it as right data to the right people at the right time into BI and Big Data Analytics. It will make companies to take the right decisions in right circumstances. The power of decision making based on the right choices of data analytics and BI is universal.

II. BI CHALLENGES AND UNDERSTANDING THE NEED FOR DATA ANALYTICS:

The [4] have highlighted the important characteristics of big data which are different than conventional analytics are:

- Volume, the size and the storage of big data.
- Velocity, the speed of data creation, data in real time.
- Variety, the data in different forms. Semistructured, Unstructured, Internal and External, Simple and Complex.
- Veracity, data quality issues.

Big data is raw or unorganized information that is the essential building block of any BI system. Big data is an assets with the potential to provide continuous discovery. Big data has primarily been considered a BI and Analytics challenge but it does not need to be generated and utilized within an organization. Typically, big data comes from one of four sources:

- PRIVATE: Data from within the company, such as proprietary data, office documents, transactional data, emails, etc that is usually the first to be gathered.
- STREAMING: Data generated through interconnected devices or through machine to machine communications that are mined as data arrives.

- **SOCIAL MEDIA:** Highly unstructured or semi-structured information derived from online social interactions, product reviews and feedback, sentiments, opinions, and critiques.
- **PUBLICLY AVAILABLE:** Information acquired from open source platforms, such as data.gov.

Data holds little value on its own no matter how well managed, processed, and governed. Value derives from the analysis of datasets and from the insights that arise during the analysis. Effective analysis involves finding meaningful patterns in the big data and relating those patterns to the business context. The [5] has defined the process of analyzing the large data containing different style of data types so as to reveal hidden insights, unseen patterns, unknown correlations, customer choices, unknown marketing strategies and other such useful information about businesses as Big data analytics.

There are four general types of analysis that organizations can employ:

A. Descriptive Analytics

This most basic form of analytics involves using historical and real-time data to find overall tendencies and learn from past behaviors. It is the building block for subsequent types of analysis. General examples of descriptive statistics include sums, averages, and percentage changes. With the help of descriptive statistics, companies can answer: What happened and why it had happened?

B. Diagnostic Analytics

Diagnostic analytics answers the question of how and why has happened or is happening?. To answer these questions and to produce insights from collected big data, some techniques are in used such as drill-down, discovery, mining and correlations to find patterns and trends. Diagnostic analytics is helpful in providing an understanding on cross-functional data, thus enabling the companies in strategy development revolving around sales, revenue, cost, profit and risk as well as performance metric.

C. Predictive Analytics

Once descriptive statistics steps are successfully completed, data analysts can combine historical data with predictive machine learning algorithms to make predictions about future events and its possible outcomes. Predictive analytics can help with planning and goal setting. Predictive analytics can answer: What will happen next? The predictions derived are only probabilities which may or may not happen but through big data analytics techniques accuracy of the those predictions can be measured.

D. Prescriptive Analytics

This type of advanced analytics pushed companies to consider predictive analytics into a business context to optimize decision making. Examples include business rules, business statistics, machine learning algorithms, and computational data modelling. Prescriptive analytics presents projected outcomes for potential actions, providing insights on how to make it happen?

In this Information Age, many organizations are doing research on their data and they are reaching to the exciting levels by leveraging the capabilities of big data analytics for finding innovative BI solutions. Organizations are following unique strategies so as to be competitive within the market and their success stories are seemingly endless.

Organizations are using the BI Tools and Techniques smartly. They are using the Big data and analytics methods to make maximum benefits which include cost efficiency, the optimum inventory levels, reduced information waste, enhanced customer communications.

According to the literature study and expert opinions, we know that Big data has a great potential and it can create growth opportunities. It is also giving rise to the opportunities for the businesses, to analyze and aggregate companies data. Numerous organizations are sitting in data downpour and data streams of administrations and items, providers and purchasers, expends and their inclinations, and considerably much more. Organizations across businesses should begin assembling their Big data and BI capacities forcefully.

The BI is a certifiable driver of competitive development and achievement however taking care of business accompanies its very own considerable amount of difficulties.

According to [6], BI functions concentrate on structured and internal data of the organization. Such style of processing hide plenty of valuable insights in external data including structure, unstructured and social media data, which ends up in partial view of the fact and biased decision making process. One of the main challenge of BI and analytics include data sources which has rich set of information and insights [7][8].

The [9] summarizes some of the key challenges of big data and analytics in view of BI as follows:

- Lack of understanding of big data
- Complex big data technologies
- Analyzing data from different data sources
- Difficult process to manage data quality
- Vulnerable information security holes
- Measuring the right indicators
- Complex process of big data to insights
- Problems of scaling and performance
- Unclear BI strategy
- Reducing the cost of producing reports
- Lack of company-wide adoption
- Creating self-service analytics

Companies can take faster and more accurate decisions as Big data has the potential to take more accurate decisions. The trend of BI, Big data and Analytics can support the rapid and more accurate decision-making approach, which is basically the purpose of “BI.” [10]

The [11] have also listed few of the challenges that the organizations or companies are facing in order to data analytics implementation despite the spectacular growth that has been witnessed with its adoption over the years in BI. They are as follows:

- Required Skill Set for Data Analyst
- Finding The Right Data
- Consolidation of Information
- Creation of Data Science Models
- Identifying Appropriate Analytics Use Cases
- Agility

- Data Security

III. WHAT BI CAN DO FOR BUSINESSES: BI OPPORTUNITIES

By investigating into big data, companies can discover patterns and knowledge ahead of their rivals, get insights and make better decisions ahead of time.

The decision maker of the companies generally trust graphical representations of data which mainly includes visualizations through dashboards and statistics for the ultimate decision making process[12]. Companies can use big data and BI smartly to take the maximum benefits from it. The [13] has also elaborated how big data can potential benefits government and public sector domains. We have also documented some of the opportunities of big data and BI as follows:

- *Help to understand customer behavior:*

The use of big data streamlines business functions in many ways. According to Datameer research report, 48% of companies use it to conduct customer analytics, 21% use it for operational analytics, 12% use it to prevent fraud and ensure privacy compliance, and 10% use it to create new product and service innovation.[14][15]

- *Improve product:*

Through product data analysis, companies can identify and address quality or inconsistency issues in their product and increase efficiency of product development.

- *Improve company efficiency:*

Big data helps shed light on where efficiencies can be improved. This can include one or more areas like overstock, slowed production, and low employee satisfaction.

- *Gain competitive advantage:*

By analyzing performance data against competitors, companies can determine where they are outperforming and underperforming in the market.

- *Improve sales:*

By leveraging sales-related data, companies can enhance their sales strategy, yielding bigger returns and anticipating future issues. Comparative analysis can identify gaps in sales, capitalizing on areas that are propelling revenue and troubleshooting in low-performing areas.

- *Improve marketing:*

Companies are utilizing BI for years to achieve a variety of gains. Some of these include: analyzing social media to determine where to focus efforts, assessing ROI to discover what motivates consumer behavior, and segmenting the market to build brand. Recent advances in audience targeting enable markets to align their strategies with customer sentiment and trends.

- *Gain user visibility:*

By having a comprehensive BI strategy in place, companies can gain visibility into every facet of the business. This is especially important within complex supply chains that involve a plethora of users and factors. This leads to enhanced reporting and informed decision making across all levels.

- *Turn big data into actionable information:*

Through analysis, big data is interpreted and enriched. When the analytics reports are generated, insights and recommendations become visible and bring the big data into the business context and helps high and low level decision takers to see what is best suitable for them. BI bridges the gap between the data analysts and the business users.

Adoption of of big data analytics in BI can be a game changer. There are use cases of such adoption in the government, public and private companies. The [16][17] have highlighted many such successful use cases of big data and analytics across industries and platforms.

As we know, BI challenges exist, and if they found, companies need to tackle them by means of every possible way. There are intelligent ways to address these problems, and companies can use them to their advantage. The appropriate BI platform solve the issues including cost, adoption, different data structures, a lack of skills, etc.

There are different types of BI Tools available that have overlapping functionality but those are differ in providing services to different user-based.

Following are some the categories of the BI Tools available in the market[8].

- *BI Platforms:* InsightSquared, Domo, Looker, Tableau, MicroStrategy, Microsoft Power BI
- *Self-service BI Software:* Sisense, Tableau Desktop, Power BI, ZOHO Reports, Qlik Sense
- *Embedded BI Software:* Domo, Looker, MicroStrategy, Sisense, IBM Cognos Analytics, Logi Analytics
- *Data Visualization Software:* SAP Lumira, Google Chart Tools, Databox, Grapher, Google Data Studio, Visme
- *Location Intelligence Software:* Esri ArcGIS, MapAnything, A Salesforce Company, ArcGIS Online, ArcGIS Pro, Alteryx, Spotio

BI and Analytics platform together is a different system. Companies have their choices to either build or buy. Companies need to consider the existing systems, its use cases, problems and opportunities as well as the experience, skill-set and competence of their employees.

The companies across the world and industries have to understand how big data and analytics strategies can make their business successful as far as strategic decision making and overall organization growth is concerned. The [18] have summaries the strategies in their work to better highlight how companies can look forward to integrate big data and analytics in BI. First, data from various sources are extracted and analyzed to generate business intelligence. Second, a simple and complex analytics techniques are applied to convert big data into actionable knowledge (intelligence). Finally, both BI and analytics are combined to support business needs with respect to each perspective of the business applications and model.

IV. CONCLUSION

The availability of open data sources, inexpensive commodity hardware, advanced analytics tools and techniques have produced a unique opportunities for both BI and Data Analytics. Integrating BI and Analytics is not that easy but companies must look forward to that so as to take insightful business decisions. The goal of the businesses for any kind of big data system or BI system is to make data meaningful and appropriate to use for almost all users of it. Big data applications and open source Hadoop system are the ways how businesses can promote data analytics in BI. It requires time,

patience, practical efforts and intelligent innovations. An open source is better and inexpensive to add, but companies need a skilled manpower with adequate experience in the field or application areas to be worked on. If companies do not have experienced employees with required skill set for big data management, companies can consider a third party big data experts who can better find the solutions for them, though it might be more expensive. To build big data platform and an integrated BI system is a challenging task but companies would like to go in that direction and this is the future ahead for companies to make better use of BI, Big Data and Analytics.

The basic concepts of Big data, Analytics and BI are documented in this paper. We have also highlighted the need of analytics in BI along with the possible challenges that companies need to face in implementation of big data strategies in BI. We have covered what BI can do for businesses to become successful in order to make better strategic decisions and in overall organizations growth through highlighting BI opportunities, BI Systems and Tools as well as through an approach of big data, analytics and BI.

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