

# Role of Business Intelligence and Analytics: Analysis of Data Driven Decision



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**Abstract**— For better decision making Business Intelligence is a vital process. The application of technologies and practices for integrating, collecting, analyzing, business information is known as Business Intelligence (BI). The data driven Support Systems (DSS) is a system that support Business Intelligence. Thus Business Intelligence gains a business advantage if the company uses a strong BI tool instead of making vital decisions pertaining to business on the basis of gut feeling. Generating fact-based data agenda via a robust computer system delivers confidence for any business decisions made. Business Intelligence customs administrations and programming to alter the data into substantial insight that prompts to association's key and strategic business choices. BI devices get to and examine informational collections and present discoveries in dashboards, graphs, outlines, maps and diagrams which gives the customers the details and knowledge about the condition of the business. Thus, the present study focuses on analyzing and describing the development of the various aspects of Business Intelligence and the related industries that use Business Intelligence for decision making.

**Keywords**— Business Intelligence, Business Analytics, Information, Communications, Technology, Analytics

## I. INTRODUCTION

To drive higher value from data at hand combined with analytics organizations are anxious to capitalize on advances in business intelligence, big data, business analytics, cloud based services and artificial intelligence—some of the trends that will reshape how organization would solve its business problems with more accurate predictive analysis of the problems that might occur in future. In this report a research has been done on some of the best practices of how companies use big data and business intelligence in different industrial sectors. (Richards *et al* 2019). It highlights the new methodologies under big data being used by those companies to spot the business problems and then use business intelligence to find out the most cost-effective ways of solving those problems. About 75% improve the operational efficiency in the organization which have long been leading objectives for using Business intelligence and Big Data. Most of the organizations used cloud-based database for effective implementation of the BI platform. This helps them in better integration of the many independent systems being used in the organization and it also helps in identifying the business problems quickly.

With time as organizations determine how to use Business intelligence and big data applications for more effective resolution of their business problems, they also want to equip their employees working in this area with the knowledge of latest analytical and visualization tools to better comprehend the results obtained by data analysis.

With the advanced analytical ability to use BI tools one can go beyond simple data consumption and draw more useful insights with the help of smart dashboards and edge analytics and do more reporting, data preparation, accurate predictive analysis and data exploration with less IT involvement. (López-Robles *et al* 2019). Most of the organizations are also helping to draw insights that are more user friendly and is easily understood by non-technical users.

One of the most difficult aspects of implementing a BI platform in an organization is that it requires multiple BI software to link all the systems in the organization. This requires key personnel who has the system integration knowledge and is able to govern and manage it properly. It requires close monitoring and requires heavy investment in the technology by the organizations. Another issue while implementing BI in any organization is that there is a lack of skilled workforce. So, highlighting the skills gaps and the necessity to train the workforce on the certain technical/behavioral competencies being of paramount importance. There organizations need to assess the requirements for training the employees in their domain and also ensuring that the training being given to those employees is helping them bridge the skill gap by monitoring their efficiency and productivity regularly. The report shows how some of the best companies are using BI to enhance their operational efficiency and what BI as a technology holds for these companies in future to come with more advanced methods of driving higher revenue, spotting business problems, gaining a competitive edge and cutting the overhead head costs to gain the maximum profit margin in its respective industry. (Howson, C., *et al* 2018). Shipping is industry is relatively new to many more advanced technologies that are already in use in other industries like airlines, logistics, IT and agrochemical industries. Thus this paper ponders on various trends in the Business Intelligence and also explains the business decisions taken by some industries like shipping, agrochemical and airline using Business Intelligence.

## II. LITERATURE REVIEW

### *Historical Background of Business Intelligence*

Business Intelligence (BI) utilizes strategies, procedures, and innovative ways that help companies to gather, store, report, and investigate business information for the sole purpose of making effective data driven decision making.

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(Larson, D., & Chang, V. 2016). BI combines expertise along with technology with useful information in order to provide meaningful facts to management as soon as possible. With the advent of advanced technologies across the globe technology is considered to be crucial in helping an organization survive. However, human intervention still plays an important role to wisely put technology to its best use. It is highly important for organizations to stay updated about the changing technological environment across different industries. Moreover, major attention should be paid towards training employees to become as innovative as possible because innovation helps an organization to take the right decisions. (Aljohani, 2017)

Every time there is a transformation in an organization in terms of the new technologies implemented, major changes are experienced in various aspects of operations. How competitive an organization is determined by the level of innovation brought about. A higher level of technological development drives an organization to foster a higher well-being of the workers and gain higher profit margins in the market. (Xuefei Deng, 2014)

Changes in technology have seriously affected associations over the globe. Right now, the web has encountered a colossal increment regarding use. (Trieu, V. H. 2017). The web significantly affects how and why individuals work. ICT affects the informed, aspiring, and gifted individuals. Since these individuals are the ones acquiring significant positions inside the companies, they assume a critical job in the accomplishment of organizations. ICT with the help of the internet stresses upon the procedure of recruitment process of employees. For instance, the utilization of ICT saves money during recruitment because it wipes out the costs that could be incurred in the preparation of information and the printing of declaration letters for available vacancies. (Xuefei Deng, 2014).

### **Airlines Industry**

#### *Management of Flight-Schedule for Reducing Cancellations*

In order to keep planes flying and reduce flight cancellation crisis in the airline industry, airlines help improve pilot utilisation. Many complex variables (which crew members are ready for action when; which vessels are located where at any given moment) are taken into account by the system developed to maximise the pilot availability with the help of BI in airlines industry. (Höpken, W. et al 2015).

#### *Accurate Decision Making by Prescriptive Maintenance*

Predictive maintenance utilises a lot of airlines industry data. Complex data such as machine learning, statistical data, data modelling and mining is taken into consideration for maintenance purpose to forecast “what could happen.” For instance, repair crews can fetch information about predictive maintenance such as amount of time a part will survive under certain specific conditions and with a fixed amount of usage. Data driven decision making can then be applied by maintenance personnel in context of whether a certain part is to be repaired or replaced altogether. (Naidu, 2018)

#### *Improved Customer Service with the help of chatbots*

Increasing the number of chatbots is a promising solution in the field of business intelligence to make the customers happier. Basic customer inquiries can be easily understood by these bots and important information can be fetched like what it is the customers are asking for. (Reshmi, S., & Balakrishnan, K. 2018). Customer service can be accessed by the customers in the airline industry round the clock. On

Time performance is being improved by leveraging the data obtained with the help of Business Intelligence. We have invested heavily in technology to capture various stages of a flight, such that our On-Time performance is recorded and reported electronically without any manual intervention. Therefore, when we report On Time and are recognized as the leader, ours is not just another tall claim but a fact rooted in data. (Zumstein, D., & Hundertmark, S. 2017).

#### *Designing Aircraft for Environmental Responsibility*

Airline companies like Virgin America are using deep data analysis to race toward new standards of aircraft design. For example, 3D-printed aircraft parts will lead to lighter planes that reduce fuel use and cut harmful carbon emissions. Winglets, which are the upwardly-bent tips on some airplane wings, are another innovation led by data. (Williams, 2018)

#### **Business Intelligence in IndiGo Airlines Operations:**

Indigo’s consistent profitability is based around a disciplined execution of the low-cost carrier model, which has proven to be the most successful airline business model globally. The core tenet of this model is to have a very efficient cost structure. Being a low-cost carrier committed to delivering low fares, it is essential that we keep a watchful eye on our costs. (Naidu, 2018)

Present day air ship, especially like current cars have the best of the present innovation, we get ongoing inflight data from all the air ship through ACARS (Aircraft Communications and Reporting Systems); we can likewise send messages up to the air ship. This information drives our airplane position revealing and furthermore supplies checking and detailing for building. At the point when the flying machine arrives there are extra advances that interface with 4G and sends all the air ship flight information observing and flight information investigation information. (Jha, 2018) This enormous information, and investigation encourages us to comprehend the flying machine following, winds, height, temperature and fuel consume for every motor each second all through the flying machine venture. Like a formulae one vehicle, this data helps tune the motors and following to get that extra 1% to success the race; or on account of an aircraft to spare that 1% in fuel. Given the expense of fuel 1% is worth 10 of a large number of dollars to our primary concern. They are utilizing information for On Time execution. We have put vigorously in innovation to catch different phases of a flight, to such an extent that our On-Time execution is recorded and announced electronically with no manual intercession. Along these lines, when we report On Time and are perceived as the pioneer, our own isn't simply one more tall case yet a reality established in information. (Jha, 2018)

#### **Agrochemical Industry**

As agribusinesses become bigger and progressively different, the developing volumes of information that must be overseen are additionally winding up increasingly mind boggling. Outside information from online networking outlets and provider arrange channels joined with sensor and machine data coming from farm equipment and in the farm, fields augment traditional sources of data. (Elahi, E. et al 2019).



Operational efficiency and forecasting can be improved with the help of Business Intelligence and which leads to better decision making. Business Intelligence helps to design frameworks that assimilates information from various disintegrated sources of information to obtain valuable bits of information. Consequently, better results are obtained with more precision and accuracy. (Celestrini, et al 2019). Data obtained for weather conditions, Research data from plant genomes, Data obtained from various social media platforms. Long lists of needed metrics are already there in the agricultural sector. But what the immediate requirement in recent times is, authentic information should be accessed from various disintegrated sources of information releasing data. Big Data technologies are likely to impact the following specific areas in agribusiness:

- Better forecasting of production of plants through seeds.
- improve yields and production with more advanced livestock and seeds.
- Distribution centres and consumers requiring faster delivery of goods.
- Data from fields and equipment utilized in real-time decisions.
- Business performance data and Integrated production for better decision making.
- Rationalized performance data across multiple geographies.
- performance analysis of supplier / distributor and improved interactions and negotiation strategies with those suppliers and distributors.

Present day agribusiness highlights more tightly connections between horticulture supplier and the cultivating network. The supplier relationship is getting to be one of a trusted advisor and furthermore an innovative work accomplice. (Aljohani, 2017) Utilization of Big Data and investigation is disturbing this field regarding better generation of helpful seeds and better cultivating practices. Higher yield and diminished help expenses are integral to driving gainfulness and better client experience for any significant agribusiness. Data related to throughput, capacity utilization, and overall equipment effectiveness, can be combined for further analysis for improved quality.

#### Shipping Industry

Quickening the Last Mile Shipping issue can be difficult to be rectified without the use of business intelligence and big data. Meaningful information is obtained in the last mile information. Consequently, logistics professionals can thereby easily identify the patterns for better and fast delivery strategies and make it more effective and last for a longer period of time. (Ibna Zaman, 2016)

Efficient Routes in the sea Better optimized routes and new strategies for delivery are obtained with Big Data analytics. Overcommitting and under committing vehicles and resources have a fine line between. (W Wang, 2010)

Many hidden areas of data can be explored by logistics companies, traffic delays, weather conditions to real-time fuel costs. (Maris Mirovik, 2018) Logistics companies can get a competitive edge they need to overcome some data based obstacles with the help of predictive analysis. “UPS drivers don’t turn left” phenomenon is one of the best examples of this data usage in Big Data. The analysis of the data by UPS drivers showed that by turning left only 10% of the time they “emit 20,000 tons less carbon dioxide, use 10 million gallons less fuel, and deliver 350,000 more packages annually.” They’ve reduced their carbon footprint

by 28.5 million mile and fleet size by over one thousand. (Maris Mirovik, 2018)

The arrival of Robots It might seem like a science fiction but data is reducing inefficiencies, increasing profitability driving a more automated supply chain, and minimizing errors. It’s shown to be providing transparency in the supply chain, a valuable ally in reducing inefficiencies in last mile delivery, automating supply chain and optimizing deliveries. Efficient business intelligence software with the help of internet of things used in progressive companies are exceeding customer expectations and optimizing costs. (Ibna Zaman, 2016)

### III. OBJECTIVE OF THE STUDY

The objective of this paper was to find out the new trends in Business Intelligence and how it is helping organisations optimize the cost and gain more profit. Business Intelligence has lately come up with the advanced use of creative dashboards that help technical users draw insights about the data at hand and do a thorough predictive analysis based on the historical data of repetitive happenings.

### IV. RESEARCH METHODOLOGY

The paper uses literature reviews to understand the most common practices of Business Intelligence in different industrial sectors for the top companies and how to incorporate some of the best practices to do away with the business problems in their companies and gain a competitive edge in the shipping industry.

Literature for this study was predominantly sourced from internet searches and use of management journal databases such as EBSCO, EMERALD, Elsevier and SCOPUS.

### V. FINDINGS

*Some of the top BI trends in the coming future are as follows.*

#### Immersive analytics will be everywhere.

Embedded analytics have been gradually creeping into more and more of our tools for the past few years, but in 2019, we’ll see analytics incorporated into pretty much all the software we use. We’ll be able to analyze the swathes of data produced by our digital worlds and the software we use and packaging it into something we can make sense of—and act on—immediately. (Dayal, U., et al 2009)

#### BI will mimic human brain

With cognitive computing, structured and unstructured data from various sources is synthesized, with the system weighing context and conflicting evidence to come up with the most appropriate answers. In doing so, it provides a way to grapple with results and answers that may be ambiguous, uncertain, open to interpretation or highly context-specific. (James, 2017)

When it comes to BI, this development is giving rise to data cognitive engines, or cognitive layers, that seek to organize unstructured data from sensors and other sources in more intelligent and useful ways. Cognitive layers help to ingest and process vast quantities of complex data in lightweight cloud platforms,

rearranging this into an environment that works for swift and effective BI.

### **Dashboards will become data applications**

We'll see the line blur between dashboards that show insights and the applications used to act on them, creating a seamless and efficient experience.

This allows you to activate an organizational process based on insights displayed in your dashboard. For example, a dashboard could show you that inventory levels are low and include a button that activates an inventory order process directly from the dashboard. Or, you could see that sales are down in a specific location and then click a button within the dashboard that lets you create and launch a new location-specific marketing campaign to boost sales in that area.

### **Edge Analytics will bring data closer to its source**

This means analytics will be performed much closer to where the data is actually created (e.g. sensors, motors, pumps or generators, healthcare devices, wearables, and smartphones), and cuts down the need to transfer data back and forth between the cloud and the data producing device. (Maris Mirovik, 2018)

### **There will be a shift to Hybrid Analytics**

Users will be empowered to work with live and cache sources for analysis, on both current and historical data. We'll see an increasing turn towards incorporating live connectors to analytic databases (i.e., Redshift, Snowflake, Google Big Query) in the process, in order to combine this data into complex and complete data models within the same dashboard.

Technological evolutions like these will mean you can embrace lightning-speed, live connection access to data in any analytic database making ad-hoc and complex queries easier and more accurate than ever (www.sisense.com, 2019)

### **Business users will talk to their data**

Natural Language Processing (NLP) & Natural Language Querying (NLQ) will help BI systems to understand the information they ingest and make it easier for users to analyze data, as well as ask questions to find what they need. This reduces time to insight and learning curve while boosting adoption.

Meanwhile, BI will talk back. Natural Language Generation (NLG) serves up insights in easier-to-understand ways, allowing nontechnical users to read and interpret complicated charts and graphs, and explain relationships between datasets. (James, 2017)

Required Skills sets for aspiring Business Intelligence team across different sectors (www.sisense.com, 2019)

The advantages to implementing a BI system are quite significant. The research demonstrates that for 43 North American and European associations were that the middle five-year rate of profitability (return for capital invested) for BI establishments was 112% for a \$2 million investment. There have been ROIs in the range of 17% to 2000% with an average ROI of 457%. Therefore, there are significant benefits to the organizations investing in business intelligence. (Dr. Charles M (Computer Engineer (EO/IR Imagery & Sensor, 2014)

According to the research, many companies are relying on outside firms to manage their BI integration. So, both the businesses, who invest in business intelligence systems and their customer receive benefits from BI. The firm which

invests benefits by operating more efficiently and offering better customer service. The customer on the other hand receives better customer service which allows the customer to operate more efficiently and possibly gain a more competitive advantage. (Gaille, 2016) BI project failures can be attributed to ineffective change management. This stems from exaggerating the simplicity with which BI is actualized and acknowledged. These exaggerations can emerge out of big enterprise resource planning (ERP) sellers. In this way, not having the faculty or mastery to scale or deal with a BI usage can be a noteworthy hindrance. Having proficient work force available to oversee BI executions by leading open-door investigations, preparation appraisals, process designing, return for money invested, and change the executives is vital to effective usage. (Gaille, 2016) Some Advantages of using Business Intelligence Are People can work on the data in real time. One can access information from anywhere as BI has also moved into mobile applications. Data analysts can change their strategies in real time to avoid any unprecedented failures as the data is managed at hand all the time. It is often scalable free of cost. It is easier to track one's KPIs. Data can be visualized more quickly. It can generate better ROIs. Better operational efficiency. Better customer service and Competitive advantage. (Dr. Charles, 2014). Some Disadvantages of using Business Intelligence are that People can perceive varying conclusions from the same data, Data security is at risk in mobile applications because of hacking, Cost is a potential issue for deploying cloud based or mobile solutions as different vendors provide their software services at different prices and transparent pricing is not provided by every vendor. Multiple BI applications are needed to get the most of your big data which requires heavy investment. BI implementations require high initial investment. Possibility of investment not paying off. Significant maintenance costs. There is an issue of requiring key personnel to manage BI implementations and maintenance. (Charles 2014)

- **Consolidating all the data and drawing insights:** All the data that was collected during research was again studied to gain in depth understanding of the real time problems and to what extent is technology being used for cutting the overhead costs for different problems in operations.
- **Aligning the gathered data with the scope of the research:** A lot of data was filtered that was not relevant for the scope research and the narrowing down on issues that were also common at There were looked at with more focus.
- **Tabulating the data:** Data collected from phone interviews, face to face interactions and by research on competitors of There were tabulated all the inputs in context the business problems that were identified were collated.

- **Constant comparative analysis:** For identifying different solutions for similar problems across different shipping companies and comparison was done on understanding what could be a more suitable solution for There as an organization.

Identifying the best BI solutions offered by different vendors from the data collected at hand: Some of the best BI solutions being offered by BI vendors were looked at that were most compatible with the architecture of the organization.

## VI. CONCLUSIONS

In order to enhance the experience of consumers and improve customer service there is a need to adopt advanced technologies. Management at top organizations can gain a lot of insights from the data collected and thereby improve the key performance indicators with the help of business Intelligence. Data mining, querying, reporting, analytical processing is some of the online activities that are incorporated in Big Intelligence. Therefore, using business intelligence can help organizations to optimize the cost incurred in operations, making effective data driven decision making, spotting hidden business problems, ways for product development, cost management and exploring areas of improvement to gain a competitive edge in the industry.

Some of the best practices that have already been adopted in airlines industry are quite new to the shipping industry but shipping industry is not very far from the airlines industry. The shipping industry is growing at an increasing rate and soon one will see the latest technologies using BI and Big Data being implemented in there for solving most of its business problems and increasing the operational efficiency. Shipping industry also includes the inland transport and better integration of the operations team both at sea and land will help in reducing a lot of problems that are caused because of manual errors. Implementation of Business Intelligence requires a skilled workforce taking on the tasks of drawing insights from the data obtained on dashboards and people who are expert in using analytical tools can help identify the problems faster by drawing more accurate and meaningful insights about the data at hand. This stresses upon the need of getting the BI team trained as per the latest technology trends in the market so that the company can help resolve the issues faster and cut down the unnecessary overhead cost incurred in operations for the shipment of containers from one place to the other. Therefore, there is a need to train people on the latest analytical/ visualization tools to help them use the BI platforms to the best of their capabilities. Moreover, a culture of data driven decision making needs to be incorporated within the organization across all levels in the BI workforce so that the people do not only rely on their gut feeling to make important business decisions. In order to make this happen they should be encouraged to understand the upstream/downstream process well in their respective industries and a better industrial knowledge will help them identify what exactly it is that they need to learn in mastering a particular tool to solve some specific business problems.

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