

# EMERGENCE OF BUSINESS ANALYTICS

## Abstract

In 2009, business analytics was regarded as a management philosophy which prescribes working on rich yet unstructured data sets to gain insights into critical problem areas and improve decision-making". Several scientists agree that business analytics is a set of capabilities. From this school of thought come several definitions. For instance, in 2007, it meant using the data extensively. It included quantitative data for testing the explanatory and predictive models to decide and act. In 2010, it was changed to using data, analysis and systematic reasoning for arriving at a particular decision. It was found that most of the firms use both quantitative and qualitative techniques." In 2011, the definition was further modified. According to that definition, business analytics relates to how companies make use of their databases, models (both explicative and predictive) and the like, and manage things based on facts to arrive at a particular decision or action. Another definition in the same year was a much comprehensive one. It suggested that business analytics refers to developing insights by applying various models such as statistical, contextual, quantitative, predictive and cognitive, among others, to plan, decide, execute, manage, measure and learn." It was also reinstated what was said in 1997 that business analytics can comprise of the following: descriptive, predictive or prescriptive. Data analytics would certainly fail if data are not of high quality. Since business analytics guides the top management to formulate strategics, the organizations using poor data are bound to taste the dust. An apt saying for this phenomenon is 'garbage in, garbage out'. Here, data quality includes the rigour with which the data are collected, the appropriateness of the source/respondent, the correct parameters and scale on which the data are collected, and inclusion of all the required variables in the questionnaire that are necessary for analysing the data and achieving the objective.

**Keywords:** Business Analytics, Challenges in Business analytics, Advantages of Business Analytics, Modern tool in business, decision making tool, emergence of business analytics.

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## I. INTRODUCTION

The evolution of business analytics can be traced back to the late 1800s when Frederick W. Taylor, father of scientific management, was working on increasing efficiency of the businesses. It was followed by the time measurement technique used by Ford to measure the time taken by different models of the assembly line in the early 1900s." As a result of the Second World War, Kerrison Predictor, which was a computerized anti-aircraft fire control system, emerged in 1940. Subsequently, Manhattan Project, computerized weather forecast and the like were the major contributors to the growth and development of business analytics. In the present century, data analytics far as comprehending the definition of business analytics is concerned including that it is

1. A movement,
2. A collection of practices and technologies,
3. A transformation process,
4. A capability set,
5. Specific activities and
6. A decisional paradigm.

The movement school of thought evolved over the years. In that, till 2008, business analytics was understood as a type of culture that encourages fact-based decision-making. In 2009, business analytics was regarded as a management philosophy which prescribes working on rich yet unstructured data sets to gain insights into critical problem areas and improve decision-making" In 2010, it was referred to as a movement that is driven by those who are technically sound and make a fact-based decision. Such decision-making requires quality data through improved data capturing, data processing, analysing software and process orientation that helps in the advancement of an organization's operations.

Advocates of the school of thought that perceives business analytics as a collection of practices and technologies have three different definitions. In 2007, it was perceived as a subset of business intelligence which uses some technologies and procedures in order to understand and analyse data and assess or predict business performance In 2009, it was conceptualized as a set of tools that are used to retrieve and analyse information and forecast consequences of the measures or actions taken.

In 2010, it was considered as a wide range of techniques and technologies that help people derive value and meaning from the data at hand." The proponents who viewed it as a transformation process had almost similar versions of the business analytics definitions. For example, from 2010 till present, it is referred to as a procedure that includes data transformation resulting in actions. It is done with thorough analysis for making decisions and solving problems.

Several scientists agree that business analytics is a set of capabilities. From this school of thought come several definitions. For instance, in 2007, it meant using the data extensively. It included quantitative data for testing the explanatory and predictive models to decide and act. In 2010, it was changed to using data, analysis and systematic reasoning for arriving at a particular decision. It was found that most of the firms use both quantitative and qualitative techniques." In 2011, the definition was further modified. According to that

definition, business analytics relates to how companies make use of their databases, models (both explicative and predictive) and the like, and manage things based on facts to arrive at a particular decision or action. Another definition in the same year was a much comprehensive one. It suggested that business analytics refers to developing insights by applying various models such as statistical, contextual, quantitative, predictive and cognitive, among others, to plan, decide, execute, manage, measure and learn." It was also reinstated what was said in 1997 that business analytics can comprise of the following: descriptive, predictive or prescriptive.

Some scientists believed in business analytics as a set of specific activities. In 2003, business analytics was defined as a set of activities comprising the accession, aggregation and analysis of a large amount of data from several different sources. Around this time, business analytics was restricted to understand historical data, or to forecast or manage business outcomes." In 2012, it was redefined as an examination and manipulation of data to encourage business actions positively.

Believers of decisional paradigm in 2009 argued that business analytics is a part of decision management that involves analysing the data logically for making informed decisions. Later on in 2011, scientists warned that decision-making through business analytics should be driven by the data and not by whims and fancies.

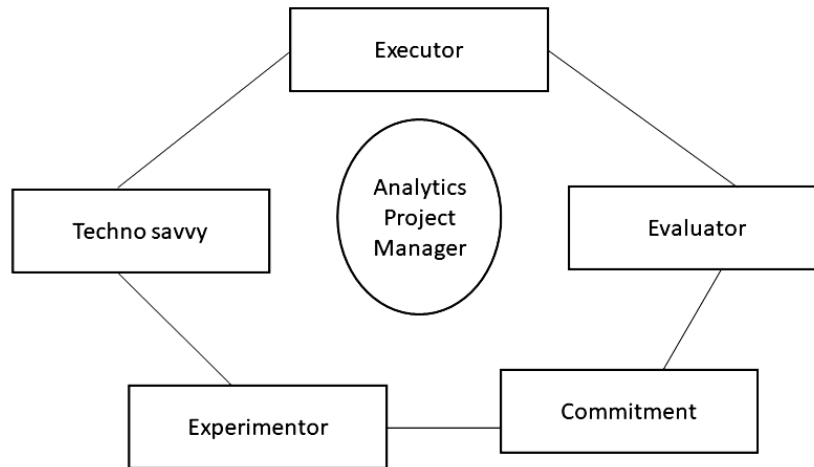
From a cross-examination of all these diverse schools of thoughts, it may be inferred that overall, business analytics is an agglomeration of three different disciplines including statistics, business intelligence/information systems and modelling and optimization. All the three have data visualization in common. The only commonality between statistics and business intelligence is data mining, while that between business intelligence and modelling and optimization is answering the question what if? The similarity between modelling and optimization and statistics is simulation and risk.

## II. MANAGING A BUSINESS ANALYTICS PROJECT

What does a business analytics project manager have in common with a traditional manager? This question has been a source of concerns to project managers for long. The answer is discussed in brief as follows:

- 1. Delivery and execution orientation (executor):** Both the managers overseeing a business analytics project and those managing a traditional one have a desire for meeting the deadlines of the project. Managers working in both types of projects have a high inclination towards achieving desired outcomes. However, unlike traditional managers who have a strong bias for planning, the business analytics project managers have a high execution bias. In other words, they are go-getters. The reasons for this are as follows: (a) there is a high amount of uncertainty involved in analytics projects which requires flexibility to adapt quickly as per the changing requirements, (b) the models or technology that would be used to analyse data may not necessarily be known as it could be new and C) the challenge to strike a balance between application responsiveness and robustness. Value in use and value of learning focus (evaluator): Gone are the days when one sticking to the original plan was considered great. Organizations are increasingly realizing that deriving value from execution and delivery is not only important but also

the need of the hour. Here, value in use' refers to a parameter that measures the extent to which an asset provides benefits to a party when used in a particular manner" It can be assessed in the form of four dimensions including social, emotional, quality and monetary values." A sample item for the three-item social dimension is: "Owning this AYZ asset makes a good impression on others'. A sample item for the four-item emotional dimension is: 'Owning this XYZ makes me feel good'.



**Figure 1.1: Competencies Needed for Analytics Project Managers**

2. **A sample item for the three-item quality dimension is:** ‘My XYZ will be around for a long time’. A sample item for the three-item monetary dimension is: Buying this XYZ has provided economical value'. The understanding is that an asset is valuable if it is beneficial. Therefore, only on the extent to which it is applied, the value of a particular analytic application or model can be ascertained (refer to Figure 1.1). As far as bias towards execution is concerned, it is believed that it is necessary because it helps managers execute ideas quickly. It prevents business analytics managers from investing a lot of time, money and effort on developing the ‘ideal plan’. A need to have fresh learning requires regular changes in the form of a loop.
3. **Gainer of commitment at work (commitment gainer):** The business analytics managers work to gain commitment of the stakeholders in the project. This is often done by engaging them in various activities as much as possible and as long as possible. The reason is that such engagement helps the company align business processes with the analytics models. Decision-makers handling such projects need to be technically, technologically and analytically sound. They need to understand the details in depth so that errors relating to misplacement of the application can be avoided.
4. **Intelligent experimentation believer and promoter (experimenter):** Analytics project managers consider experimentation as a basis for learning. Scholars in the past have reaffirmed this understanding and have provided evidence that experimentation is at the heart of doing innovations. This experimentation involves a four-step process, namely designing, building, running and analysing the experiment. Here, intelligent experiments mean that the experiments must have clear goals and objectives and measurable hypotheses and should follow standard treatment control procedures.

- 5. Emphasizing smart use of information technology (tech savvy):** Managers who work on analytics projects believe in and leverage the potential of IT. The reason is that a smart use of IT has the capability to facilitate recurring and faster analysis of raw business data. This, in turn, would improve the efficiency of experimentation. According to Erik Brynjolfsson, a pioneer in the IT globally, leading companies enhance productivity through innovation and innovation is leveraged using IT.

These companies leverage IT by simultaneously working on the four dimensions properly. These dimensions are (a) measurement, (b) experimentation, (c) sharing and (d) replication. However, analytics project managers, overall, find it difficult to coordinate with the IT department and mostly have a negative opinion about it. They opine that whenever his IT department is involved in auto- mating a process, it takes a lot of their time and efforts. It could probably be because of the inability of the 'IT personnel' in deciphering the meaning, reason and consequences of the activity that they do for the managers.

All in all, the IT personnel often do not understand the business side of their activities, which causes a huge understanding gap between them and the analytics project managers. Nevertheless, these gaps are getting bridges fast as the organizations increasingly prefer analytics project managers who can themselves automate. Also, organizations are now realizing that IT personnel need to have qualifications relating to and awareness about business management.

### III. ADVANTAGES OF BUSINESS ANALYTICS

The advantages of using business analytics are many. First, organizations are increasingly investing heavily in IT. This investment has enabled the organizations to improve their efficiency in terms of collecting, storing and analysing their data in a multifold way. Given such facility is now available with the organizations, the management wants to know what can best be extracted out of these data. Business analytics is the discipline that caters to analysing and making sense of the stored business data. Analytics helps organizations analyse the huge quantity of raw and unstructured data so that informed decisions can be taken at the strategic level. The managers who are decision- makers use interactive and dynamic dashboards, comprehensive reporting and other techniques such as modelling, simulation, forecasting and data mining to understand the business requirements and set the future course of actions.

Second, as business analytics improves the efficiency of the business processes and so forth, it adds value to the organization. Third, business analytics provides a competitive edge, a necessity in the 21st century for survival. It has become one of the most important technical priorities for an organization in general and for the chief information officer in particular. A recent study published in Harvard Business Review describes the ways through which companies have created fresh value for customers. It was found in the study that some organizations captured the entire journey of the customer by collating data from multiple sources. These organizations have generated as much as 8.5 times higher shareholder value. It was also discovered that understanding fresh information relating to customers and acting on those insights are what create the competitive advantage. Organizations are using data to minimize production cost and increase revenue. Thus, it may be concurred that business

analytics has huge strategic implications and there is a need for a lot of investments from the end of the corporate firms in this area to improve the quality of findings. Increased investments simply mean increased opportunities for research that can then benefit the organization. Unlike ERP systems that rely heavily on benefitting at the organizational level, business analytics systems rely on benefitting at the managerial level as well.

#### IV. MAKING THE BEST USE OF BUSINESS ANALYTICS

Specialists, with the best of their experience and expertise, believe that businesses can make business analytics useful if they take care of two factors-speed to insight and persuasive use. Both of these have been described below:

- 1. Speed to insight:** It is the speed with which organizations convert data into information. Here, the data has to be raw and the information has to be usable. There are certain practices that facilitate this factor. These practices can be categorized under three broad heads, namely automation, business requirements and investment in reuse. Nowadays, agile development is often applied to business analytics projects. These are popular now because organizations have realized the importance of agile development in improving the efficiency of delivery. For instance, an insurance company may move to agile development by adopting paired programming and story wall techniques.
- 2. Persuasive use:** It has been observed that almost 25% of the employees of an organization use business analytics in one form or other to complete their day-to-day work. This percentage can be increased if the practices including graphics, mobility and user engagement are adopted by the employees. For this, software that facilitates the creation of colourful dashboards and pictures can be used. These are all data visualization techniques and require a lot of creativity to put every single detail in a one-screen dashboard. It helps employees develop summarization skills, see things in an interconnected manner and link things logically.

#### V. CHALLENGES TO BUSINESS ANALYSTS

So far we have discussed only the bright side of the picture. Now let us look at the difficulties. Business analysts have to face several challenges during execution including cycle time, analytic time and expertise, communicating analysis results, data quality, data volume, model complexity and model usability. Each of these has been explained in brief below:

- 1. Cycle time:** It involves the time required for completing the processes of data collection, data analysis, result interpretation and acting on the recommendations." Managers find it difficult to reduce this cycle time because of managerial limitations such as the reporting structure. Therefore, it is advised that data analysts should be empowered to take certain decisions that are time-consuming on their own. Analytic time and expertise: Analysing data requires a lot of expertise. Without expertise, there are good chances that the analyst would waste several days on understanding different techniques and finding out the most suitable one for the given objective and data. There has to be clarity as to what is expected out of the analysis, how it has to be done and what would be its impact on business performance.

2. **Communicating the analytics results:** Most of the times, data analysis and its results are too complex to discuss with non-technical stakeholders. Therefore, attempts should be made to simplify the language in which results are presented to the level of stakeholders' understanding."
3. **Data quality:** Data analytics would certainly fail if data are not of high quality. Since business analytics guides the top management to formulate strategies, the organizations using poor data are bound to taste the dust. An apt saying for this phenomenon is 'garbage in, garbage out'. Here, data quality includes the rigour with which the data are collected, the appropriateness of the source/respondent, the correct parameters and scale on which the data are collected, and inclusion of all the required variables in the questionnaire that are necessary for analysing the data and achieving the objective.
4. **Data volume:** Even if data are of the required quality, it may not necessarily be representative of the target population. The reason could be simply that it is not enough in quantity to qualify for application of a certain statistical technique. For example, a multi-level modelling analysis requires a sample size of at least 50 at each level. Similarly, structural equation modelling requires data points to be either 10 times the number of items or at least 200, whichever is more. Compromising on the sample size would mean compromising with the quality of the results. Not to mention but as the sample size increases, the data moves towards normal distribution.
5. **Model complexity:** A statistician may include several independent variables to explain one dependent variable, thereby making the model too complex. However, an organization has its own limitations in terms of practising those recommendations. Therefore, it is advisable to keep only those variables in the model that are likely to affect the dependent variable the most. This is also in line with following the principle of parsimony, that is, keep it simple'.
6. **Model usability:** Indeed, merely analysing data and presenting findings in the report are not sufficient. There has to be a practical usage or feasible managerial implication for the organization. For example, simply because data recommends recruitment of 500 employees does not mean that a small organization has resources to practise it. Nevertheless, there are several examples in the history that indicate what ignoring business analytics could cost to a business.

In the retail industry, Walmart used Big Data analytics to better manage its supply chain and maintain an optimal level of inventory for cost-effectiveness. Unlike Walmart, where the application of business analytics was successful, in Kmart it failed. It was primarily because Kmart was not able to use business analytics properly as far as analysing and interpreting data are concerned. Similarly, in the health care industry, American Cancer Society successfully used business analytics but UK National Health Service could not. All in all, to reap the benefits of applying business analytics fully, the business needs should be properly identified and a dedicated business analytics team must be formed by identifying right people, engaging stakeholders in the process, encouraging business analytics culture and finding the most suitable statistical technique to analyse data.

## VI. CONCLUSION

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