A Business Application of the Business Intelligence and the Big Data Analytics

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비즈니스 인텔리전스와 빅데이터 분석의 비즈니스 응용

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Lately, there have been tremendous shifts in the business technology landscape. Advances in cloud technology and mobile applications have enabled businesses and IT users to interact in entirely new ways. One of the most rapidly growing technologies in this sphere is business intelligence, and associated concepts such as big data and data mining. BI is the collection of systems and products that have been implemented in various business practices, but not the information derived from the systems and products. On the other hand, big data has come to mean various things to different people. When comparing big data vs business intelligence, some people use the term big data when referring to the size of data, while others use the term in reference to specific approaches to analytics. As the volume of data grows, businesses will also ask more questions to better understand the data analytics process. As a result, the analysis team will have to keep up with the rising demands on the infrastructure that supports analytics applications brought by these additional requirements. It's also a good way to ascertain if we have built a valuable analysis system. Thus, Business Intelligence and Big Data technology can be adapted to the business' changing requirements, if they prove to be highly valuable to business environment.

1. Introduction

Business Intelligence (BI) is a technology-driven process for analyzing data and presenting actionable information to help executives, managers and other corporate end users make informed business decisions [2]. In another words, BI does data analysis for finding trends, patterns and insights. Findings based on data provide accurate views of company's processes and the results of the processes [7]. Beyond stand-

ard financial metrics, in-depth BI can show the impact of current practices on the factors such as employee performance, overall company satisfaction, conversions, media reach and a number of other factors [8].

In addition to presenting information on the present state of the organization, the utilization of BI can forecast future performance. Through the analysis of past and present data, BI systems can track trends and show how those trends will continue. BI covers more than observation [10]. Having the ability to see the qualifiable results of policy and the impact on the future of your business is a powerful decision-making tool (see <Figure 1>).
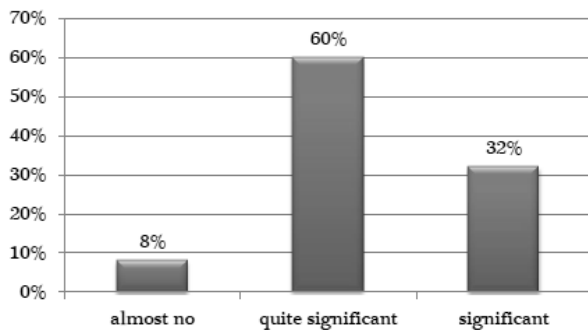
(Source : Howson, 2008).

\<Figure 1\> Impact of BI to Change the Overall Performance of the Organization

The term big data can be defined as large data sets that outgrow simple databases and data handling architectures [5]. Big data involves the process of storing, processing and visualizing data [10]. It is essential to find the right tools for creating the best environment to successfully obtain valuable insights from your data. Setting up an effective big data environment involves utilizing technologies that process, store and facilitate data analysis. Data warehouses, modeling language programs and OLAP cubes are good examples. Today, businesses often use more than one infra-structural deployment to manage various aspects of their data. Big data often provides companies with answers to the questions they did not know they wanted to ask [3, 9]. Analyzing big data sources illuminates the relationships between all facets of your business. Therefore, there is inherent usefulness to the information being collected in big data. Businesses must set relevant objectives and parameters in place to pick up valuable insights from big data.

Data mining relates to BI and big data for the process of going through large sets of data to identify relevant or pertinent information [18]. However, decision-makers need access to smaller, more specific pieces of data as well. Businesses use data mining for BI and to identify specific data that may help their companies make better leadership and management decisions. Information overload leads many data analysts to believe they may be overlooking key points that can help their companies perform better. Data mining experts sift through large data sets to identify trends and patterns. Various software packages and analytical tools can be used for data mining. The process can be automated or done manually. Data mining allows individual workers to send specific queries for information to archives and databases so that they can obtain targeted results [4].

BI is the collection of systems and products that have been implemented in various business practices, but not the information derived from the systems and products. When comparing big data vs BI, some people use the term big data when referring to the size of data, while others use the term in reference to specific approaches to analytics.

2. BI vs Big Data

Big data can provide information outside of a company's own data sources, serving as an expansive resource. Therefore, it is a component of BI, offering a comprehensive view into your processes. Big data often constitutes the information which will lead to BI insights. Big data exists within BI. This means the two differ in the amount and type of data they include. The data that is considered a part of BI is much more inclusive than what can be used for big data [16]. BI covers all data. However, Big data consists of only those large data sets. The tools involved in the processes of big data and BI differ as well. Base-level BI software has the ability to process standard data sources, but may not be equipped to manage big data. Other more advanced systems are specifically designed for big data processing. Of course, in the big data vs BI discussion, there is some overlap involved in the use of comprehensive BI systems that are made to handle large sets of data. Most BI software vendors offer tiered cost models which increase functionality depending on the price. Big data capabilities may also be offered as an add-on to a BI software system.

Big data is the most buzzing word in the business. Big Data is changing our day to day business life. Everybody thinks that Big Data is nothing but a massive amount of data. But in reality it's not a just massive amount of data, it is also about the structure of the data, processing the data with the purpose of delivering added value to the organization. In the present era, the importance of data in business is very vital; because meaningful decisions can be made only with analyzing the data and these decisions will help business to grow further. Both the BI and Big data helps to analyze the data to get the insights and to view the relevant data.

BI and Big Data need to be synchronized, need to be used together. They both are not the same thing, but they share a lot of the same common goals. A lot of the distinctions between BI and Big Data tend to be arbitrary. BI technology

includes data visualization software for designing charts and other info-graphics, as well as tools for building BI dashboards and performance scorecards that display visualized data on business metrics and key performance indicators in an easy-to-grasp way. Data visualization tools have become the standard of modern BI in recent years. A couple leading vendors defined the technology early on, but more traditional BI vendors have followed in their path [12]. Now, virtually every major BI tool incorporates features of visual data discovery.

BI programs may also incorporate forms of advanced analytics, such as data mining, predictive analytics, text mining, statistical analysis and big data analytics. In many cases, though, advanced analytics projects are conducted and managed by separate teams of data scientists, statisticians, predictive modelers and other skilled analytics professionals, while BI teams oversee more straightforward querying and analysis of business data [1].

BI data is typically stored in a data warehouse or in smaller data marts that hold subsets of a company's information. In addition, Hadoop systems are increasingly being used within BI architectures as repositories or landing pads for BI and analytics data, especially for unstructured data, log files, sensor data and other types of big data. Before it is used in BI applications, raw data from different source systems must be integrated, consolidated and cleansed using data integration and data quality tools to ensure that users are analyzing accurate and consistent information.

BI platforms are increasingly being used as front-end interfaces for big data systems [16]. Modern BI software typically offers flexible back ends, enabling them to connect to a range of data sources. This, along with simple user interfaces, makes the tools a good fit for big data architectures. Users can connect to a range of data sources, including Hadoop systems, NoSQL databases, cloud platforms and more conventional data warehouses, and can develop a unified view of their diverse data. Because the tools are typically fairly simple, using BI as a big data front end enables a broad number of potential users to get involved rather than the typical approach of highly specialized data architects being the only ones with visibility into data.

Big data analytics is the often complex process of examining large and varied data sets - or big data - to uncover information including hidden patterns, unknown correlations, market trends and customer preferences that can help organizations make informed business decisions. On a broad scale,

data analytics technologies and techniques provide a means to analyze data sets and draw conclusions about them to help organizations make informed business decisions. BI queries answer basic questions about business operations and performance.

Big data analytics is a form of advanced analytics, which involves complex applications with elements such as predictive models, statistical algorithms and what-if analysis powered by high-performance analytics systems [16]. Driven by specialized analytics systems and software, as well as high-powered computing systems, big data analytics offers various business benefits, including new revenue opportunities, more effective marketing, better customer service, improved operational efficiency and competitive advantages over rivals.

Big data analytics applications enable big data analysts, data scientists, predictive modelers, statisticians and other analytics professionals to analyze growing volumes of structured transaction data, plus other forms of data that are often left untapped by conventional BI and analytics programs. That encompasses a mix of semi-structured and unstructured data for example, internet click-stream data, web server logs, social media content, text from customer emails and survey responses, mobile phone records, and machine data captured by sensors connected to the internet of things. The term big data was first used to refer to increasing data volumes in the mid-1990s. Doug Laney, then an analyst at consultancy Meta Group Inc., expanded the notion of big data to also include increases in the variety of data being generated by organizations and the velocity at which that data was being created and updated [15]. Those three factors-volume, velocity and variety - became known as the 3Vs of big data, a concept Gartner popularized after acquiring Meta Group and hiring Laney.
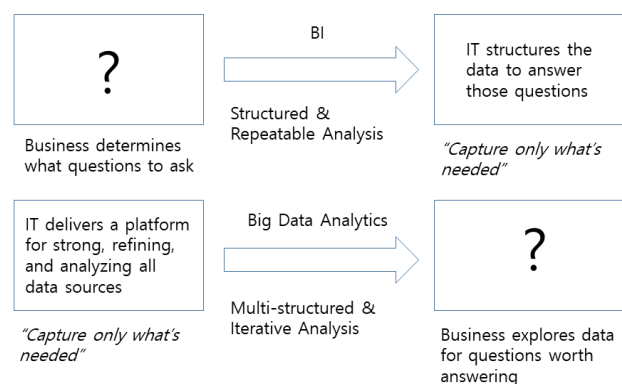
(Source : Leandro, 2017).

<Figure 2> Differences Between Big Data and BI

Big data analytics is the often complex process of examining large and varied data sets to uncover information including hidden patterns, unknown correlations, market trends and customer preferences that can help organizations make informed business decisions. With the right data science tools, a powerful insight out of the ever-growing pools of corporate data can be gained. Driven by specialized analytics systems and software, as well as high-powered computing systems, big data analytics offers various business benefits, including new revenue opportunities, more effective marketing, better customer service, improved operational efficiency and competitive advantages over rivals.

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Big data analytics applications often include data from both internal systems and external sources, such as stock market or demographic data on consumers compiled by third-party information services providers [19]. In addition, streaming analytics applications are becoming common in big data environments as users look to perform real-time analytics on data fed into, Potential pitfalls of big data analytics initiatives include a lack of internal analytics skills and the high cost of hiring experienced data scientists and data engineers to fill the gaps. Recently, the proliferation and advancement of AI and machine learning technologies have enabled vendors to produce software for big data analysis that is easier to use, particularly for the growing citizen data scientist population [16].

The amount of data that's typically involved, and its variety, can cause data management issues in areas including data quality, consistency and governance. Also, data silos can result from the use of different platforms and data stores in a big data architecture. In addition, integrating Hadoop, Spark and other big data tools into a cohesive architecture that meets an organization's big data analytics needs is a challenging proposition for many IT and analytics teams, which have to identify the right mix of technologies and then put the pieces together.

3. Business Application of Big Data

Although Big Data is a relatively new subject, it has already gathered quite a number of new catchphrases that address how the data is gathered, how it is analyzed and how it is used. Although Big Data is a relatively new subject, it has already gathered quite a number of new catch-phrases that address how the data is gathered, how it is analyzed and how it is used. Let's review a few of them. As suppliers build products and offer services designed to deal with Big Data as a whole or some segment of that larger field, they often come up with their own catch-phrase. The hope that their phrase will come to dominate the others. This allows them to claim that they originated the concept and that all other suppliers are following them.

Under the banner of "Machine Intelligence" the industry has begun to speak about "Artificial Intelligence," "Deep Learning," and "Machine Learning," These terms may be used to describe how products work with the data before the enterprise can learn from the data. It may also be used to describe how the tool finds patterns and anomalies in the data to help the enterprise's Data Scientists. By focusing on how the data is being used, the phrases such as "Predictive Analytics," "Intelligent Risk Assessment," and even "Big Data Analytics." can be emphasized. These catch phrases have been used quite heavily when Big Data techniques are deployed to improve system and application operations, network performance and data and application security. As the industry evolves, new catch phrases appear regularly. Often this means that a supplier is trying to position their products and services in a new way rather than offering large advances in the underlying technology.

In the end, when suppliers wave the Big Data banner, they usually are talking about how enterprises can examine

large to extremely large amounts of data to ferret out previously hidden patterns, the ability to leverage a wide variety of data types, and make useful correlations based upon the new understanding enabling them to take fast action. Often the distinguishing features are where and how these techniques are being deployed.

BI tools access and analyze data sets and present analytical findings in reports, summaries, dash-boards, graphs, charts and maps to provide users with detailed intelligence about the state of the business." In other words, BI is a systematic way for enterprises to ask questions and get useful responses from their information systems. In the end, BI is based upon enterprise knowledge that something is going on and its needs to track and understood what happened. To that end, enterprises build processes and systems to gather the needed data, analyze it and then report findings based upon that analysis. The enterprise knows what needs to be tracked, how to analyze that data and even how the analysis should be reported and who should be informed. BI became a big moneymaker for many suppliers. They developed tools to build and then utilize "data warehouses," and offered sophisticated tools to provide decision-makers with useful dashboard and reporting tools. Big Data is related to BI in several important ways, but is different.

Big Data, on the other hand, is thought of as dealing with huge amounts of data but it is broader in its scope particularly in exploring previous unknowns. Often, the goal is learning what questions to ask by sifting through the enterprise's own operational and machine data. Once those questions are known, BI processes can be used for additional exploration and reporting, but one of the more interesting uses of big data is to integrate analytics into the business operations as the business events are taking place. So it is not simply a way to better explain what happened. big data can impact the business results directly. Once the enterprise embarks on its journey to utilizing Big Data, decision-makers soon learn that it requires a different set of tools and expertise. At first, this area can look like it will require that the enterprise hot processes in order to get any value from the whole process. This can be time consuming and, in the end, not lead to the value that was desired at the start of the process. After this, the enterprise soon discovers that valuable insights that arrive too late are not as valuable. It learns that it needs to read the information faster. It also soon learns that doing the same thing over and over without automating the process means that any benefits might be submerged under increased

time and costs that process itself creates (see <Figure 3>).

Often, the enterprise also develops what it knew that the changes were coming and even what to do about the changes. There are times that it will realize that it took advantage of that knowledge and gained some important benefits. Big Data tools and processes have evolved enough that enterprises can now feel safe in learning how to take advantage of them. What they will soon learn is that this field has rapidly developed new tools, new methods, new ways of thinking. Many experts believe that Data Logistics are the key.
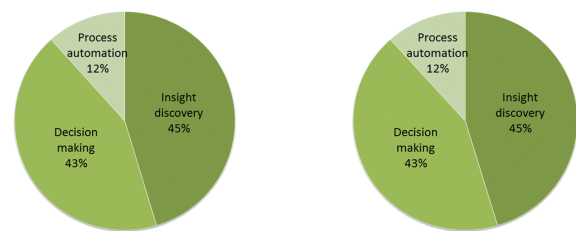
(Source : Gartner Group 2012).

<Figure 3> Getting Value from Big Data

Now that the concept of Big Data has had time to evolve, enterprise decision-makers no longer have to feel like they're on their own and that there are no maps, no established roads, and no guides. Many suppliers are now offering tools, established processes and professional services that can be put to good use. Remember to start small, gather experience and obtain actual value along the way.

4. Business Application of BI

According to CIO magazine, BI, is an umbrella term that refers to a variety of software applications used to analyze an organization's raw data. BI as a discipline is made up of several related activities, including data mining, online analytical processing, querying and reporting. Companies use BI to improve decision making, cut costs and identify new business opportunities. BI is more than just corporate reporting and more than a set of tools to coax data out of enterprise systems. CIOs use BI to identify inefficient business processes that are ripe for re-engineering. With today's BI tools, business folks can jump in and start analyzing data themselves, rather than wait for IT to run complex reports. This democratization of information access helps users back up business decisions that would otherwise be based only on gut feelings and anecdotes.

That isn't bad and pretty much sums up the cavalcade of technology that is now called decision analytics or business intelligence. Notice the definition does not conclude with the purchase and implementation of software applications. Many companies already have several tactical implementations of smaller data analysis or BI products. Most Organizations, that have taken this tactical approach don't realize the value that BI can provide with he reaction time, monitoring and mission-critical results that can be found in successful strategic implementations. Being able to monitor, measure, and even predict how the enterprise is performing against business goals helps leaders determine whether the organization is on or off track and more important why- with the ability to change direction as necessary.

Taking a strategic approach to BI puts executives in a very different place. The benefits include : Direct access to enterprise-wide information for business users to make critical decisions [6]. This increases overall company productivity and accuracy. Improvement in collaboration and overall business effectiveness. This includes better utilization of resources, consistent view of critical business data, reliable corporate metrics, and the measurement of progress against business goals [12].

5. Conclusion

The ability to reduce total cost of ownership (TCO) for IT and increase the return on investment (ROI) for software and hardware. This will also increase the amount of time that IT can spend on strategic work rather than busy work. Arriving at this level of BI maturity will take time, effort and resources. However, it took years, generations or even a century to arrive at the current state of data silos and technology.

Further, improving the ways in which data in handled can gain some fresh and valuable insights that can benefit us. So this is a departure from its early phase of optimizing existing data to collecting data from a wide variety of exogenous data sources to make more accurate predictions. Faster processing power has also enabled some processes like dynamic pricing to be improved significantly. Thus, companies are now able to conduct business forecasts without any help from outside. This has allowed them to be better prepared for the future of the business.

It's important as enterprises have to adapt quickly to the constant evolution of the business environments in the digital era. As a result, the true potential of BI and big data lies in satisfying the changing needs of the consumer in real-time. To do this efficiently, half the success lies in collection strategies and utilizing the most appropriate technologies to engage in data collection, management, and analytics. Once the right database software and analysis tools integrated into the IT infrastructure, developing right business strategies will be possible. Successful BI and big data analytics initiatives always involve efficient project management and sound strategies.

Although a companies may have a massive amount of data from multiple sources, it doesn't mean that companies must examine all of the information. It's better to strategically identify data that has the potential to lead to valuable insights. Companies will find it a lot easier if they start focusing on the right questions from the planning stage. But it's also important to note that it's all relative to your business goals. Sometimes all the data may have to be analyzed whereas another situation may only require the examination of a data subset. Targeted strategies can be implemented by segmenting data into categories. Further, segmentation is also used in the finance and insurance industry to identify abnormalities.

Probably the most important aspect of BI and big data analytics initiatives is dealing with complexity. To conduct the analysis effectively, you will need to get the users involved. Following this approach will enable the technical staff to identify necessary business rules early on. Once the rules have been defined, it can be assessed to determine how complex the solution has to be. This is also a good time to identify how many staffing hours are needed to generate valuable insights from the input data. Once business rules have been developed using a thorough approach, businesses will find it easier to adapt and revise them accordingly in the future. Communication and collaboration between the project team and the experts from each department is key to simplifying the process. To successfully carry out a BI and big data analytics initiative, it needs continuous attention and updates. This can be something like a revision of database queries and the knowledge of changing business requirements or regular maintenance.

As the volume of data grows, businesses will also ask more questions to better understand the data analytics process. As a result, the analysis team will have to keep up with the rising demands on the infrastructure that supports analytics applications brought by these additional requirements. It's also a good way to ascertain if company built

a valuable analysis system. If it can be adapted to the business' changing requirements, it will prove to be highly valuable. It's crucial that the end user is always thought of during this process. IT infrastructure, storage, and processing massive amounts of data are important, but it will be ineffective if the system isn't user-friendly. During the development and the adaptation stage, it's always good to consider the fact that different users within the organization will use BI and big data analytics applications in different ways. So the system has to be able to accommodate everyone efficiently to run a successful data initiative.

As more businesses increasingly incorporate it into their business processes, BI and big data will become crucial to work with the right data that provides real business value. There are not any shortcuts when it comes to running a successful big data analytics initiative. But it can be done and repeated effectively if best practices are continuously followed to keep the project on track. Companies can no longer just focus on the technical aspects of BI and big data as it's simply not enough.

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