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# Business Intelligence in Retail Industry and E-commerce

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**Abstract:** Business Intelligence or BI in short is becoming more and more popular with each passing year. Business Intelligence can be defined as technology, methods and applications used for the incorporation and presentation of business information. Aim of Business Intelligence is to allow easy interpretation of big data. Finding new opportunity and applying an effective strategy based on insights which can yield businesses with a competitive market advantage and long term stability, it also helps to enhance control of day-to-day business operations.

This paper will introduce Business Intelligence architecture, system components, working, Use of Business Intelligence, applications, Use of Business Intelligence in Retail Industry and E-commerce.

**Keywords:** Business Intelligence, Business Intelligence Architecture, Business Intelligence in Retail Industry and E-Commerce, Applications of BI, BI Reporting Tools.

## I. INTRODUCTION

Business Intelligence technologies provide historical, current and predictive sights of Business behaviour. Business Intelligence systems consolidate behavioural data with analytical tools to present complicated and competitive information to planners and decision makers. The goal is to enhance the timeliness and quality of inputs to the decision process.

Common task of Business Intelligence technologies include reporting, online analytical processing, analytics, data mining, text mining etc. It can handle large amount of structured and sometimes unstructured data to help identify, grow and design new strategic business opportunities. To grasp from the past and forecast the future, many companies are acquiring Business Intelligence (BI) tools and systems. [6]

## II. HOW BUSINESS INTELLIGENCE WORKS?

Business Intelligence concept is theoretically simple but sometimes harder to implement. Data from 'source systems' (usually the organisation's operational applications, databases or spreadsheets) are occasionally are extracted, processed/cleaned and keep into a data warehouse for future use (this process is known as Extract, Transform and Load, or ETL).

The 'transform' part of ETL makes sure that data from the various sources can be used smooth and continuously. For example, if one individual appears on the HR system as an employee, the research system as a project member, and the education system as a post grade research student, ETL will ensure that the individual's 3 unique identifiers are linked in a meaningful way to permit a single BI report to comprise data from all three systems. Business Intelligence then uses a different tool to fetch data from the warehouse and to show to users.

## III. ARCHITECTURE OF BUSINESS INTELLIGENCE

Following is the BI architecture which plays an important role in business intelligence projects because it affects development and implementation decisions.

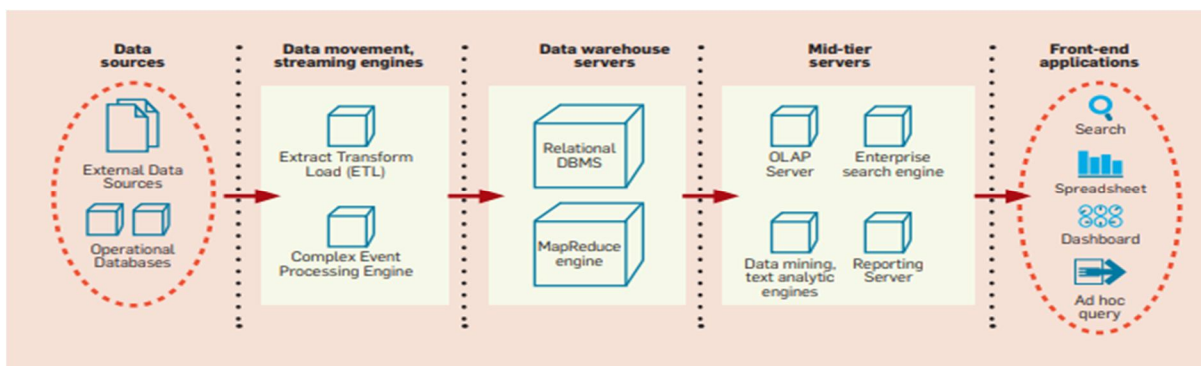


Figure 1: Business Intelligence Architecture

- 1) *OLAP (Online Analytical Processing)*: Online Analytical Processing or OLAP provides multidimensional, abstract sight of business data and is used for reporting, analysis, modelling and planning for optimizing the business. To work with data warehouses or data marts designed for sophisticated enterprise intelligence systems, OLAP techniques and tools can be used. These systems process queries required to discover trends and analyze critical factors. [6]
- 2) *Advanced Analytics*: It is referred to as data mining, forecasting or predictive analytics, this takes advantage of statistical analysis techniques to predict or provide certainty measures on facts. [6]
- 3) *Front End Applications (Portals, Scorecards, and Dashboards)*: This general group usually deliver a repository for various sections to plug into so that the aggregate tells a narrative. [6]
- 4) *Real time BI*: It permits for the real time distribution of metrics through email, messaging systems and/or interactive displays. [6]
- 5) *Data Warehouse*: The data warehouse is the significant component of business intelligence. It is subject oriented, integrated. The data warehouse supports the physical spread of data by holding the many enterprise records for integration, cleansing, aggregation and query tasks. It contains real data, not snapshots, and keeps minimum history. Data sources can be operational databases or relational databases or any other data structure that supports the line of business applications. [6]
- 6) *Data Marts*: A data mart is a group of subject areas well ordered for decision support based on the requirement of a given department. The single departments possess the hardware, software, data and programs that compose the data mart. Each department has its own explanation of what advanced decision support systems with data mining techniques and applications of algorithms. [6]

#### IV. BUSINESS INTELLIGENCE APPLICATIONS

Business Intelligence is required in almost all industries and functions. The nature of the information and speed of action may be different across businesses, but every manager today needs access to BI tools to have up-to date metrics about business performance. Following are some area of applications of Business Intelligence: -

- 1) *Customer Relationship Management [CRM]*: A business exists to serve a customer. A happy customer becomes a repeat customer. A business should understand the needs and sentiments of customers, sell more of its offerings to the existing customers. It is more hard and costly to win new customers than it is to keep existing customers.
- 2) *Health Care and Wellness*: Health Care is one of the biggest sectors in advanced economies. Medicine on base of proof is the newest shift in data- based health care management. BI helps to apply the most effective diagnoses and prescriptions for various diseases, which helps to manage public health matters, and reduce waste and fraud.
- 3) *Retail*: Retail organizations increases by meeting customer requirements with standard products, in appropriate, suitable and cost- effective manner. Retailer originates a lot of transaction and logistic data that can be utilized to answer difficulties. Understanding prominent customers shopping patterns can help retailers arrange their products, inventory, store layout which in turn would help to grow revenue and gains.
- 4) *Banking*: Banks make loans and provide credit cards to millions of customers. They are most curious to boost the standard of loans and reduce bad debts. They also want to maintain more good customers and promote more services or facilities to them. Business Intelligence helps to identify patterns of fraudulent transactions. For example: - If money is being transferred to an unrelated account for the first time, it could be fraudulent transaction.
- 5) *Insurance*: When natural disasters, such as earthquakes, strike, loss of life and property occurs. By using the best available data to model the likelihood (or risk) of such events happening, the insurer can plan for losses and manage resources and profits effectively. Patterns can be identified as to where and what kinds of fraud are more likely to occur.
- 6) *Telecommunication*: Business Intelligence in telecommunication help with fraud detection, network failure, marketing/customer profiling. There are many kinds of fraud in customer transactions. Subscription fraud occurs when a customer's opens an account with the intention of never paying for the services. Decision rules can identify chances of fraud and take effective action.

##### A. Business Intelligence Reporting Tools [BIRT]

Organizing business smartly needs various types of business intelligence tools. These tools help to establish, fetch and analyze the data as per the market level so that the decision making capability can be expand in an organization. Information about various departments kept in form of data. These data cannot be used to its most until transforming it in useful files like drafts, graphs, stats and charts etc and for this intention we require business intelligence reporting tools [BIRT].

An objective of Business Intelligence Reporting Tools is to pull data from many different sources to create a report. A single report may contain a data from multiple sources.

BIRT, Jasper Report, Pentaho, KNIME, Seal Report, Sisense, Report Server, Spago Bi etc. are some examples of BI tools.

Some of the tools are as follows

- 1) *BIRT*: BIRT begin from an open source eclipse project, and was 1st released in 2004. BIRT is an open source technology platform used to create data visualizations and reports. BIRT consists of several components. The main components include a report designer and the BIRT runtime, but BIRT also provides three extra components: a chart engine, chart designer, and viewer. These components help to develop and publish reports which are standalone. BIRT is written in Java, and is licensed under the Eclipse Public License. It's latest release, which runs on Windows, Linux, and Mac. Reports are in the form of XML (.RPTDESIGN) and compilation is not required.
- 2) *Jasper Report*: Jasper Report is used in hundreds of thousands production environments, and features both community and commercially-supported versions. Jasper Report consists of several components including the Jasper Report Library, JasperReport Studio, and Jasper Report Server. The library includes all of the core Java classes and APIs powering Jasper Report. Jasper Report is supported by excellent documentation, a wiki, and additional resources. Written in Java, Jasper Report runs on Windows, Linux, and Mac. Its latest release is from December 2015, and is licensed under AGPL. Reports are in the form of design files (.JRXML), Compile to Java Byte code (.JASPER), deploy/Run .JASPER files and Compilation is required.

#### *B. Advantages of Tools*

Following are the benefits of Business Intelligence Tools which shows that it is necessary for businesses to have BI tools to succeed in today's global markets. Business Intelligence Tools makes it easier to clarify the process, as business functioning becomes more complex and maintaining and observing business activities is enormously difficult for an organization. In a competitive business surrounding, maintenance of business operations is important, however getting continuous updates about competitors, customer tendency is equally important. For this purpose we need Business Intelligence. Large volumes of transactions are carried out by the businesses. The analysis and presentation is possible with a BI tool. A BI tool helps forecast future behaviour of, customers with greater correctness and timeliness.

#### *C. Advantages of Business Intelligence*

Business Intelligence can remove a lot of the judgement within an organization, increase co-ordination among departments and enable companies to respond rapidly to changes. BI raises the overall achievements of the company using it. The firms have recognized the importance of business intelligence some of them are as follows BI eliminates IT infrastructure costs by eliminating redundant data extraction process and duplicate data housed in independent data marts across the enterprise.[4] Business Intelligence tells In which location by which customer certain kinds of products are purchased. This data can be used so that lead over the competition can be evolved. In short it helps us to know the status of business and customer behaviour which in turn helps you plan better for your company's future. Decide what combinations of products and service lines customers probably purchase and when. [6] Business Intelligence software can give you a bigger insight into then manufacturing costs of your company and the capability to make changes to production in order to come up with larger profitability. Find money-laundering criminal activities. [6]

#### *D. Disadvantages of Business Intelligence*

Along with advantages Business Intelligence also has some of the disadvantages which are as follows: -

People can perceive dissimilar conclusions from the same data. It means unpredictability that comes from the human decision-making process. Different people will look at the data and perceive two very different results, which mean an organization must spend time to arrive at middle ground. It can be costly for basic business transactions.

Business intelligence is available for most companies today, but not every industry is well-evolved. Some are just starting to hold what BI applications can offer. Others have been managing their big data for long period of time successfully.

#### *E. Business Intelligence in Retail Industry and E-Commerce*

Retail analytics can be defined as the process of providing scientific data on inventory levels, supply chain movement, consumer demand, sales, etc. that are critical for making marketing, and procurement decisions. The analytics on demand and supply data can be utilized for managing obtaining level and also for proceeding marketing decisions. Retail analytics gives us thorough customer

understandings along with insights into the business and processes of the organization with scope and need for progress. The retail analytics industry is continuously evolving, meaning that there is accurate wrap of data that is being collected every single day- from emerging trends and sales, to changes in global market and everything in between.

Gathering, measuring, and reporting on this data is a huge task for retailers, but it's an important one. By executing a solid business intelligence system, companies can successfully store and examine this data to make sure they're developing just as quickly as the retail industry. The aim with any BI tool is to make available enlarging ability to perceive into day-to-day operations.

A BI tool can help retail brands enlarge their sales per visit by better grasping their customers' needs, and providing a better shopping experience for customers.

#### *F. Business Intelligence in E-commerce*

Let's take an example of Fiverr which is global online marketplace that exchange services for prices ranging from five dollars to thousands of dollars. For them, company data means unbelievable useful understanding which will help them gain the upper hand.

For them learning from users is considerably more valuable than studying their competitors, so they won't put out any new features until they know that it will provide their users with unmatched value.

With help of Sisense tool they merge data from Google Docs, spreadsheets, and analytics to easily track events that were taking place on their site and mobile app, which provides a fully functional BI reporting tool that delivers everything you need to create and understand reports quickly and easily, with minimum IT involvement. With easy to use drag-and-drop capabilities, even non-technical users can use Sisense Business Intelligence Software to join all their data sources into a single repository, and build insightful reports with beautiful visualizations. The most important thing that Fiverr needed a BI tool for was to track real-time user behaviour. In the e-commerce world, things move quickly.

Fiverr was gathering the data all over the place from numerous different sources, Before Sisense tool.

## V. CONCLUSION

Business Intelligence solutions need to be adaptable. As soon as business changes, organisations should tune their BI systems to new conditions. BI solutions should be able to change in size. Flexibility and open architecture allow for easy enlargement of the system. It is required in a situation when there are new informational requirements or when an amount of data to be processed remarkably increases. The business intelligence (BI) has developed over the past decade to depend progressively on real time data. The BI systems begin actions to systems based on rules and context to support several business processes. These analytical systems gain insight from the wealth of data available, delivering information that's definitive, fact based, and actionable.

In future, the capability needs of business intelligence will increase in the same way that consumer expectations increase. It is therefore imperative that companies increase at the same pace or even faster to stay competitive.

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