

Business Intelligence and its role to enhance Corporate Performance Management

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ABSTRACT

As every small or large organization requires information to promote their business by forecasting the future trends, information is now the primary tool to understand the market trends and understand their own position in the market comparison to its competitors. Business intelligence is the use of an organization's disparate data to provide meaningful information and analyses to employees, customers, suppliers, and partners for more efficient and effective decision-making.

BI applications include the activities of decision support systems, query and reporting, online analytical processing (OLAP), data warehouse (DW), statistical analysis, forecasting, and data mining.

KEYWORDS: Business Intelligence (BI), Corporate Performance Management (CPM), Data Mining, Data Warehouse, Key Performance Indicators (KPI), OLAP.

1. INTRODUCTION

Success when operating internationally means understanding how tomorrow will differ from today. From such insight comes opportunity. In recent years there have been major changes in the business world developed by most businesses and corporations worldwide. In the current globalization of business, the organizational environment of a company must adapt to the competitive market. Growth of a firm depends on its ability to update and integrate, customize and expand computer applications in a flexible and fast manner, giving users instant access to all interactive and consistent model or data.

The increasingly high needs for assuring flexibility, rapid response to actual market conditions, strong competition locally or globally, have led companies to use modern information technology to transform and set the organization and management methods of the business up-to-date. In this case, the development of Internet and web services has an impact on any enterprise, can influence the competitive system by putting in new products or services and expanding markets. This thing made it impossible to use self-applications, thus passing their integration in complex systems to meet the timely decision making. Business Intelligence plays a vital role in huge companies that have a large amount of data that can be used to help decision maker to take correct decision in correct time.

2. BUSINESS INTELLIGENCE: DIFFERENT PERSPECTIVES

Business intelligence (BI) is a huge category of applications and technologies for gathering, storing, cleanse, analyzing, and providing access to data to help enterprise users make sound business decisions on sound time. Stackowiak et al. (2007) define Business intelligence as the process of taking large amounts of data, analyzing that data, and presenting a high-level set of reports that condense the essence of that data into the basis of business actions, enabling management to make fundamental daily business decisions.

BI is defined as " information and applications available broadly to employees, consultants, customers, suppliers, and the public " (Alnoukari, 2009).

To take sound decision you have to depend on sound information in correct time. Data analysis, reporting and query tools help business user in extracting valuable information.

As developing any successful business strategy requires information and adequate knowledge about market status, the innovation of new technology and concepts like BI made it easy to access and manage all kinds of information.

Earlier before the advent of information age, it was very difficult to access any information in the absence of computing methods and so all business decisions were primarily based in intuition. But in today's modern globalize world the application of Businesses Intelligence technology becoming popular day by day in almost all kinds of businesses. Technological advancement makes it easy to obtain vast amount of data in a less time period and again computing resources make it easy to analyze data for long-term strategic decision making. However, if we look at the history of BI then can find that it is totally a recent concept developed to facilitating business decision-making.

Typically, early business applications had their own databases that supported their functions. These databases became "islands of information" in that no other systems had access to them. These islands of information increased as more and more departments were automated. Mergers and acquisitions compounded the problem since the companies integrated totally different systems, many of which were doing the same job.

As information technology evolved over the years, enterprises automated more and more of their operations. A great deal of very valuable data resided underutilized in these systems. Data found in sales, accounting, production, human resources, and many other systems could yield significant information to provide historical, current, and predictive views of business operations.

3. IMPORTANCE OF BUSINESS INTELLIGENCE

The term " business intelligence " refers to the systems and processes that help to simplify and use information in an organization to enable faster and easier decision making by providing key information to the decision makers in a timely and efficient manner.

3.1 Enables organizations to be in alignment of Key Performance Indicators

Business intelligence helps an organization to align towards its key objectives. To this end, an organization must first design its key performance indicators (KPIs) to suit its style and strategies. The KPIs need to be designed for each of the levels in the organization starting from the highest, moving towards the lowest. In order to be successful, these KPIs must be in tune with the competitive advantage of the organization, act as lead indicators that predict outcomes in the future, focus on performance rather than outcomes, and permit the combination of metrics.

3.2 Enables to take sound decision in correct time with correct manner.

The way we perceive data influences and changes our decisions; therefore it is essential that data be available in an accurate as well as easily accessible manner. Business intelligence enables easy access to data in its actual format enabling faster and fact-based decision making.

3.3 Mixes different sources of data to help in decision making.

Often decisions made in an organization impacts more than one aspect. Business or marketing decisions are based on the clients that an organization wants to concentrate on, financial decisions are based on sales and marketing prospects, hr decisions are based on employee requirements, attrition rate, and gaining new business deals. Therefore business decisions also require data and metrics from various aspects of an organization. Business intelligence provides data not only from various aspects but also in ratios and formats that enable to compare these metrics to enable effective and efficient decision-making.

3.4 Reuse different collection of data to generate aggregate data and statistics depends on users' levels.

Business intelligence refers to a system that enables the collection of different data and metrics for the purpose of efficient decision making. Therefore it establishes a system where data can be collected and distributed in an effective manner. It provides accurate data and at real-time ensuring all decisions are not only made quickly but also based on factual data.

4. OBJECTIVES OF BI SYSTEM

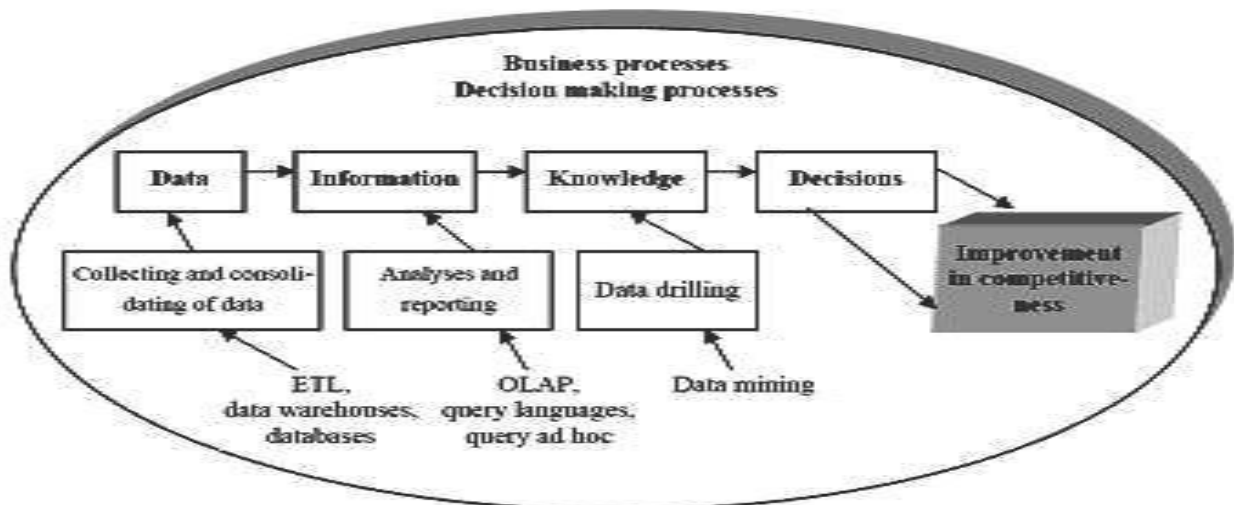


Figure (1): The role of BI systems in decision making
Source: (Olszak, & Ziemia, 2007).

Business Intelligence Solutions (BIS) lead to better business decision making through providing access to enterprise data for easy analysis against Key Performance Indicators (KPIs). This is achieved through having more information available at all levels of an enterprise and enabling each management level to be more responsive to current market trends.

Every aspect of the business can be co-ordinated efficiently and dealt with at various levels of management. (Olszak and Ziemia, 2007).

BI systems differ from legacy management systems (ie..MIS, DSS, ES, and EIS) in meeting decision makers' expectation, such as

- making decisions under time pressure.
- monitoring competition.
- possessing such information that includes different points of views analyzes huge data from different sources.

Executive Information System (EIS) is computerized system intended to provide current and appropriate information to support executive decision making for manager using a networked workstation. The emphasis is one graphical displays and an easy to use interface that present information from the corporate database.

Executive Support System (ESS) is an Executive Information system (EIS) that includes specific decision aiding/or analysis capabilities.

Expert System is a man-machine system with specialized problem-solving. The "expertise" consists of knowledge about a particular domain, understanding of problems with that domain, and "skills" at solving some of these problems.

BI differs from MIS (i.e. DSS, EIS, and ES) in; first of all, their wider thematic range, multivariate analysis, semi-structured data originating from different sources and multidimensional data presentation (Olszak and Ziemia, 2007).

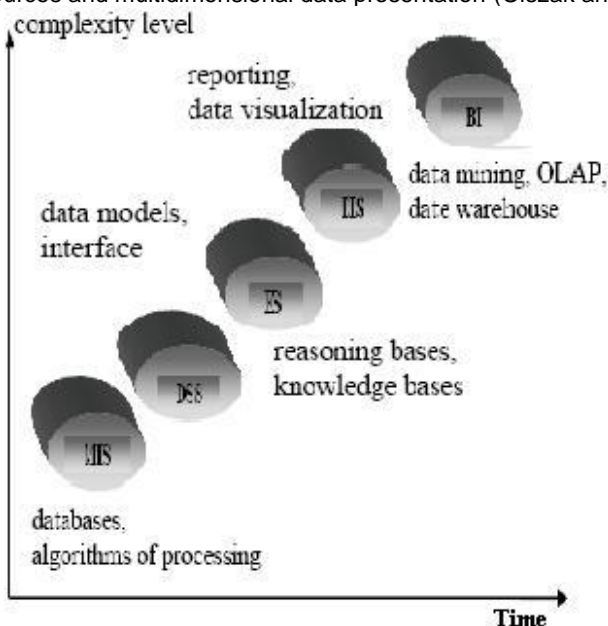


Figure (2): Development of management information systems.
Source (Olszak. & Ziemia, 2007).

It is assumed that BI may support decision making on all levels of management regardless of the level of their structuralisation (Olszak, & Ziemia, 2007). On the strategic level, BI makes it possible to set objectives precisely and to follow realisation of such established objectives. BI allows for performing different comparative reports, e.g. on historical results, profitability of particular offers, effectiveness of distribution channels along with carrying out simulations of development or forecasting future results on the basis of some assumptions.

Tasks included in BI systems are intelligent exploration, integration, aggregation and a multidimensional analysis of data originating from various information resources.

BI systems combine data from organization's different information systems. They integrate data from different environment e.g. statistics, financial and investment portals and miscellaneous databases.



Figure (3): ERP and their degree of integration compared to other enterprise information systems.
Source (Fernandes, 2010)

5. COMPONENTS OF BI SYSTEMS

Development of Business Intelligence systems type was determined by requests of dynamic multidimensional systems able to support the intelligence decisional processes and having predictable abilities (Dan Stefan, 2009).

However, businesses soon recognized the analytical value of the data that they had available in their many islands of information. In fact, as businesses automated more systems, more data became available. However, collecting this data for analysis was a challenge because of the incompatibilities among systems. Business intelligence is a broad category of software applications and technologies for gathering, storing, analyzing, and providing access to data to help managers and staff make better business decisions. BI can include decision support systems, query and reporting, online analytical processing (OLAP), statistical analysis, forecasting, and data mining.

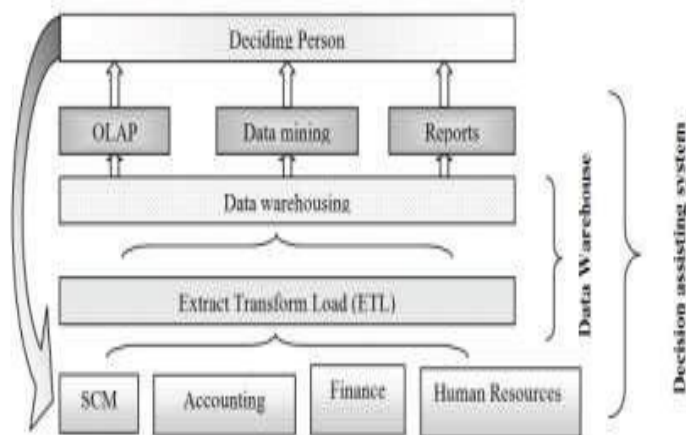


Figure (4): Business Intelligence Cycle (Dan Stefan, 2009)

These systems become more and more complex, performing multidimensional analyses of data, having statistical and predictive analyses capabilities in order to server better for decisions analyses. BI enables organization to access exact and complete information on the right moment in the right format for specific purpose.

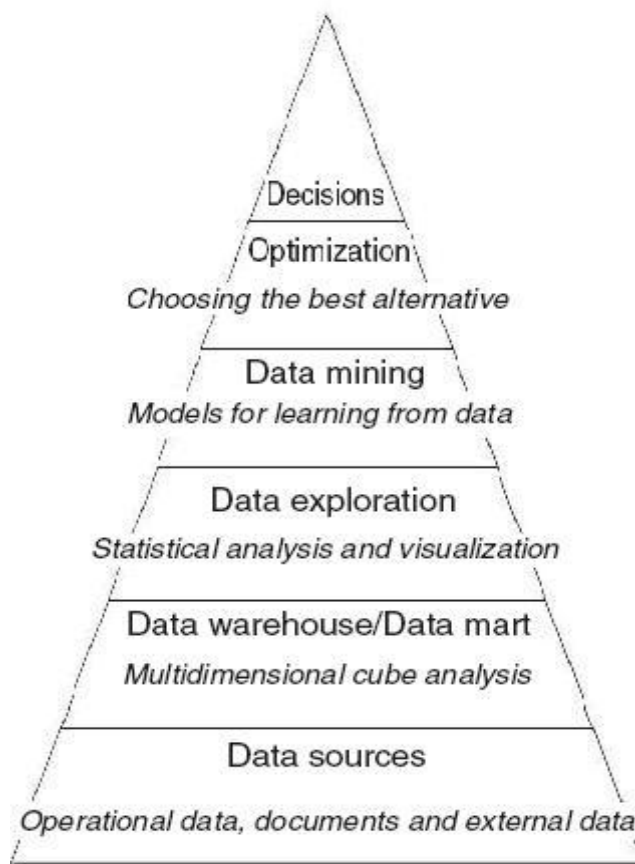


Figure (5): The main components of a business intelligence system (Vercellis, 2009)

-Data Warehouse and Data marts

A Data Warehouse as a repository storing integrated information for efficient querying and analysis. Information is extracted from heterogeneous sources as it is generated or updated.

The information is then translated into a common data model and integrated with existing data at the warehouse (Van Looche & Van Rompaey, 2005).

In data warehousing, you create stores of informational data, data that is extracted from the operational data collected from different sources and then transformed for decision making.

The first definition had been made by Bill Inman, known as the father of the data warehouse concept as, "A Data Warehouse is a subject-oriented, integrated, time-variant, and non-volatile collection of data in support of management's decision making process" (Turkmen & Cagiltay, 2007).

Data mart is a database, or collection of databases, designed to help managers make strategic decisions about their business. Whereas a data warehouse combines databases across an entire enterprise, data marts are usually smaller and focus on a particular subject or department. Some data marts, called dependent data marts, are subsets of larger data warehouses.

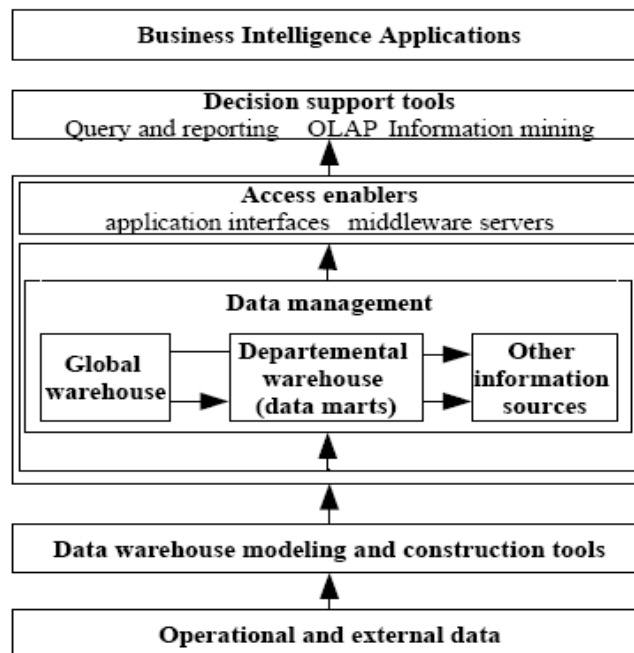


Figure (6): The typical BI Architecture (Van Looche & Van Rompaey, 2005).

Inmon and his collaborators define a data mart as "a subset of a data warehouse that has been customized to fit the needs of a department." They also emphasize that "a data mart is a subset of a data warehouse, containing a small amount of detailed data and a generous portion of summarized data." (Firestone, 2002).

DW is often characterized by the same set of recurring properties:-

-Extract, transform and Load (ETL):-

Importing data in a DW is often a complex action because of heterogeneous sources. Inconsistencies in form and type of data can be expected.

ETL (Extract, Transform and Load) is a process in data warehousing responsible for collection data from different source systems and placing it into a data warehouse. ETL involves the following tasks:

a. Extracting the data from source systems (Oracle ERP, SAP, ERP, other operational systems), data from different source systems is converted into one consolidated data warehouse format which is ready for transformation processing.

b. Transforming the data may involve the following tasks:

- applying business rules (so-called derivations, e.g., calculating new measures and dimensions),
- cleaning (e.g., mapping NULL to 0 or "Male" to "M" and "Female" to "F" etc.),
- filtering (e.g., selecting only certain columns to load),
- splitting a column into multiple columns and vice versa,
- joining together data from multiple sources (e.g., lookup, merge),
- transposing rows and columns,
- applying any kind of simple or complex data validation (e.g., if the first 3 columns in a row are empty then reject the row from processing)

c. Loading the data into a data warehouse or data repository other reporting applications.

-Dimensions:-

A DW is often designed as a star, with a large fact table as the starting point for tables representing dimensions. The dimensions are the fields of interest for analysis.

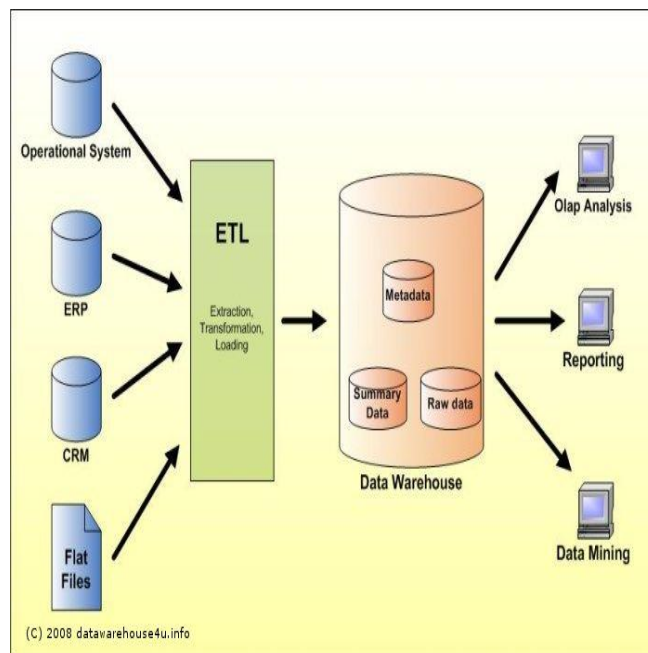


Figure (7): show the role of Data warehouse
Source: (www.datawarehouse4u.info)

- OLAP and OLTP:-

On-line Transactional Processes (OLTP) systems is the kind of databases that contain constantly changing data like sales, customers, stock, ...etc. They can be seen as snapshots of an organization at a certain point in time. (Van Looke & Van Rompaey, 2005).

OLTP (online transaction processing) is a class of program that facilitates and manages transaction-oriented applications, typically for data entry and retrieval transactions in a number of industries, including banking, airlines, mail order, supermarkets, and manufacturers.

	OLTP	OLAP
Application	Operational: ERP, CRM, legacy apps, etc	Management Information System, Decision Support System
Typical users	Staff	Managers, Executives
Horizon	Weeks, Months	Years
Data Refresh	Immediate	Periodic
Data model	Entity-relationship	Multi-dimensional
Schema	Normalized	Star
Emphasis	Update	Retrieval

Table (1): The following table summarizes the major differences between OLTP and OLAP

-Data Mining:

Data Mining often also referred to as "Knowledge Discovery in Databases" (KDD).

"Data mining is the analysis of (often large) observational data sets to find unsuspected relationships and to summarize the data in novel ways that are both understandable and useful to the data owner." (Shakamuri, 2006).

The four major phases of the cycle of Data Mining are:

1. Generate ideas and hypotheses;
2. Validate ideas based on patterns in the data;
3. Transform results into actionable segments;
4. Measure the results.

The broad classes of tasks that can be accomplished through the use of advanced data mining techniques. These classes are Classification, Clustering, Estimation, Affinity Grouping or Market Basket Analysis, Prediction and Sequential Pattern Matching or Time Series Analysis.

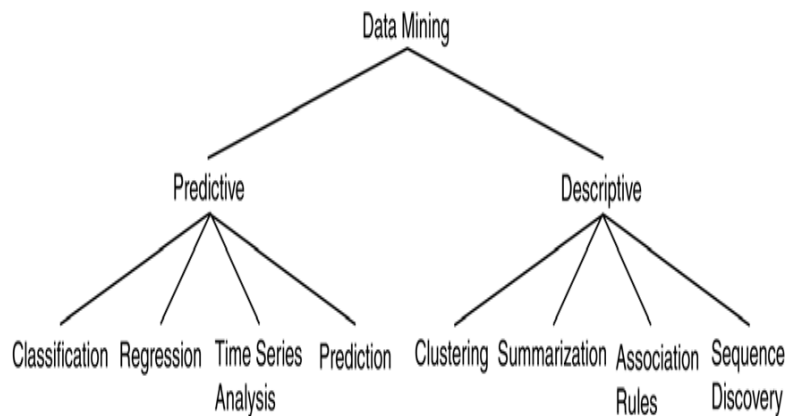


Figure (8): show the two main kinds of models in DM (Predictive and Descriptive) (Guran & Mehanna & Hussein, 2009).

6. KEY PERFORMANCE INDICATORS (KPIs)

Key Performance Indicators (KPIs) guide businesses in making decisions that affect particular business units as well as the company at large.

Key Performance Indicators, also known as KPI or Key Success Indicators (KSI), guide an organization to define and measure progress and ability to reach to organizational goals. Key Performance Indicators are quantifiable measurements. KPIs depend on the nature and specification of business.

The KPIs are mainly based on cost driven measures, while an adequate business strategy contains more aspects to create future value through investment in customers, suppliers, employees, processes, technology and innovation (Kaplan and Norton, 1996).

7. THE IMPACT OF KPIs ON CORPORATE PERFORMANCE MANAGEMENT (CPM).

In order to sustain a competitive advantage and therefore to survive as an organization, companies should be capable of continuously improving their performance. This has never been more applicable than in today's complex, dynamic and confusing business environment which requires better decisions and improved execution. Managing business performance effectively firstly requires measurement of the current performance and from that point on, the company can make decisions in order to improve its performance in those areas where needed.

Imagine an airplane's instrument panel (dashboard) consisting of instrument dials and gauges. Like pilots are able to process information from a large number of indicators to navigate their airplane, organizations need instrumentation (KPIs) about many aspects of their environment to keep track of their journey towards excellent performance.

Theoretically, using KPIs correctly can be approached from different point of views. Firstly, KPIs are directly related to the organization's strategy and directly contribute to the organization's strategic objectives. This requirement enables KPIs both on company and project level. The company's 'dashboard' consists of several KPIs.

When determining these KPIs it is of importance that there is an appropriate mix with respect to the way KPIs can be viewed in organizations. This will enable the determination of KPIs which represent different aspects of business processes.

8. CONCLUSION

The widespread use of information technology can generate tremendous amounts of data within an organization. This data contains information that is invaluable to the organization's decision makers. BI is the key to leveraging this wealth of data that accumulates in an enterprise.

With BI, non-technical users can pinpoint what drives their business activity.

They can help reduce costs, increase revenues, and improve customer satisfaction. While many of these benefits are clearly quantifiable, some of the more intangible ones, such as improved communication throughout the enterprise, improved job satisfaction of empowered users, or sharing of intellectual capital, can give your business the greatest edge over its competitors.

CPM can play an important role in controlling costs, optimising resources, and ensuring that business units are adding value. Business Intelligence (BI) has a crucial part to play in performance management, by presenting information in a timely and easily consumed fashion, and in providing the ability to reason and understand the meaning behind performance information through discovery, analysis, and ad hoc querying.

This paper represents the importance of BI, scope of BI, BI's components and the impact of KPIs on CPM. This paper also represents differences between BI, MIS, DSS, EIS and ES.

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