Abstract. In the current knowledge economy, it is now an indisputable fact that information is the key to organizations for gaining competitive advantage. Organizations know very well that the vital information for decision-making is lying in its operational databases. A large amount of data are getting accumulated in various databases scattered around the enterprise. But the key to gaining competitive advantage lies in deriving insight and intelligence out of these data. The concept of Data Warehousing and Business Intelligence is one alternative in harnessing the value and intelligence imbedded within those databases. During the last decade organizations have invested a large amount of resources in building and implementing Data Warehouse and Business Intelligence systems after realizing a positive return on investment that justified its existence.

1. Introduction

Technology has accelerated the pace of business by automating manual processes. This has dramatically reduced the length of time tasks used to take as well as facilitated communication and commerce. Society has come to expect instantaneous results. Waiting is considered a burden and in certain cases, no longer acceptable. Management needs to steer their organizations through a course of business issues that are both external and internal in nature. The ability of management to navigate a challenging course is dependent on the information that they have before them and their decision-making process.

In this age of deregulation, cost control and market demands obtaining competitive advantage by making smart decisions based on complete information is a major requirement. The executives are now looking toward information technology (IT) to give them the strategic advantage within the marketplace. Organizations make decisions and service customers based on the information at their disposal. Information has become the greatest tool of any organization to assess both the internal and external environments. It is through data warehousing and Business Intelligence that organisations can access information based on their needs.

An ODC 2002 report on the “Financial of Business Analytics” depicted that Data warehouse and Business Intelligence systems implementation can generate a median five-year return on investment of 112% with a pay back of 1.6% on average costs of 4.5 million. Out of the organisations included in this study, 54% have a ROI of 101% or more.

2. What is a Data Warehousing & Business Intelligence

Data warehousing (DW) and Business Intelligence (BI) is a management tool that enables executives to access the information they need to make informed business decisions to establish the business strategy for the future. It pulls together information from disparate sources to construct an integrated view of business activities. These systems then transform the data into a consistent, easily accessible format and distribute the data to where it is needed for decision-making. A DW/BI project should be driven by the business management, because of its inherent ability to guide management in making strategic and informed business decisions. However the responsibility of maintaining the DW/BI system lies on the IT section. A DW/BI system enables the business users to efficiently analyze vast quantities of data, uncover hidden opportunities and enhance their organizations’ competitive advantage.

DW/BI system provides the answers to questions like:

- How effective are the marketing campaigns?
- What products should be offered at what prices?
- What drives the cost structure and how can it be improved?
- Which customers generate most profit?
- Which are the most profitable products?
- What is the corporate revenue picture?

Today, DW/BI systems have reached a new level of maturity, both as a discipline and a technology market. Demand for DW/BI is stronger than ever before. For the first time in 2004, DW/BI made the list of top ten CIO priorities according to a Gartner survey. Some enterprises already have a DW/BI infrastructure in place and are now taking the lessons they’ve learned from previous efforts to remedy problem areas. At the same time, many enterprises are also moving towards the next steps in the evolution of DW/BI.

3. Data Warehouse Benefits

DW/BI technology could be viewed as having far greater value to organizations than just to support infrequent strategic decision-making. Ongoing performance assessments, tactical root cause analysis, daily customer and product updates,
sophisticated operational analysis functions (Eg. customer scoring systems and fraud detection applications) and customer/product 360 degree views are few of the applications of this technology. The technology improves operational performance and management of operations areas significantly. Organizations intending to deploy DW/BI can expect not only improved data access, efficiency and customer service, but also reduce costs.

Some of the benefits of a data warehouse are;
- Dramatically improving access to data from many databases within the organization to executives, managers and staff
- Managers and staff manage with the data they want rather than with the data they get
- Less time spent gathering data from disparate systems, and more time available to analyze and act
- Ability to quickly answer a series of questions, each of which depends upon the answer to the previous question
- Reduction in paper reporting and administration
- Easier to do general financial analysis for the organization
- Less time spent on data reconciliation and problem resolution
- Clients get quicker, more accurate answers to questions when they call
- Self-service capability offered to clients, vendor or employees with secure access to the Data Warehouse via the extranet/intranet
- No new data entry required as all data coming from a quality assured central database
- Tracking current and potential competitors
- Analyzing markets
- Developing profitable new products
- Determining likely candidates for acquisition or merger
- Monitoring technological developments, and keep abreast of a broad range of political, economic, social and legislative trends.

4. Justification of the DW and BI

Justification of a data warehouse is a difficult task because of the range and scope of business solutions that can be deployed from a data warehouse. Furthermore, the extent and complexity of the DW/BI project itself can vary widely across enterprises. For example, one company may have installed a SCM (Supply Chain Management) data warehouse while another may have an implementation that includes CRM (Customer Relationship Management) and Marketing. Further different industries implement data warehouse applications according to their specific business and operational needs (a data warehouse for an insurance organization for example, will be substantially different from one deployed by a company in the telecommunication space). The near real-time business data once cleansed and loaded into a centralized data warehouse can have a major impact on the ability of enterprise management to make informed decisions.

Cost justification of a DW/BI project is important to determine the characteristics and approval to gain an economic value from a DW/BI project. Some of the major data warehouse and business intelligence costs and benefits are listed below;

4.1 Costs

The expenses for the DW/BI system will vary widely. The cost will be dependent on the number of users, size of the database, complexity and quality of the source data, design and the architecture, the software tools employed, the need for consultants and contractors, the capabilities of the team, and how well the system is supported and maintained. It is important to perform the cost justification as accurately as possible since incorrect estimates may affect project prioritization.

4.1.1 Cost Components
- Hardware
- Software
- Network
- Internal Staff wages, support costs etc
- Consultants and Contractors
- Training (user, tools, database etc.)
- Help desk/support
- Operations and system administration
- Ongoing expenses (maintenance)

4.2 Benefits

If the right project is chosen and the implementation is designed to meet the business needs, it’s likely that the benefits of the data warehouse will significantly outweigh the costs. For a DW/BI project to be successful it must be well planned and executed and the benefits must be identified to make sure that the investment will truly pay off. However, it may be a difficult task to quantify some of the intangible benefits.

4.2.1 Tangible Benefits
- Revenue enhancement
- Cash flow acceleration (Eg. Improved inventory management)
- Analyst productivity (more time for analysis)
- Cost containment (cost savings)

4.2.2 Intangible Benefits
- Public relations, reputation, and impact on shareholders
- Competitive effectiveness
- Better and faster decisions
- Better customer service
- Employee empowerment
- Disparate business units working together
- Leading-edge image
- Faster access to data
- Improved data quality
4.3 Quantifying DW/BI Success
It may be useful to explore the following in order to quantify the success of a DW/BI project:

- The extent, the new insights and inferences drawn from information
- The extent, the new relationships established between data elements
- The extent, the new strategies initiated based upon information in the data warehouse
- The extent, the data quality has improved due to the existence of the data warehouse
- The extent, the DW/BI project contributed towards increasing the revenue
- The extent, the DW/BI project improved the decision-making process
- The extent, the project improved the organization’s understanding of data
- The extent, the reporting and information delivery processes changed
- The extent, the operational source systems made more efficient.

4.4 Financial Measures
There are a number of measures that could be used to measure the DW/BI projects. They are:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Payback Period
- ROI

However, the most commonly used financial measure is ROI.

5. Conclusion
Data Warehouse and Business Intelligence systems provide the capability to perform analysis and monitor performance of existing departments, divisions or even the enterprise. Throughout the years, by using specific modeling techniques, DW methodologies, different architectures and specialised DW/BI software technologies have provided high return on investment contributing towards the growth of organisations. Performing a detailed cost and benefit analysis on DW/BI projects could benefit by minimizing the potential risks. In the past, by implementing well designed DW/BI projects, large number of public and private organisations have gained high return on investments with relatively low pay back periods. As a result, during the last decade, the popularity of this technology has grown tremendously throughout the world.

6. References
