

A Study of the Impact of Data Warehousing and Data Mining Implementation on Marketing Effort

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Abstract

Digitization has steered the growth of data in leap and bound. Business Intelligence technologies have evolved over the years and have become essential tools in analysis of this data. Business Intelligence comprises of technologies including Data warehousing, Data Mining, Business Analytics and Big Data Analytics. Of these Data warehousing and data mining form the base of business intelligence systems implemented across the organisations. This paper discusses the factor responsible for successful implementation of these tools. In this paper a model is proposed which shows that effective implementation of these tools leads to improved information quality and better marketing efforts for an organisation. Thus, paper reviews the previous literature on business Intelligence tools and throws light on the benefits which an organisation realizes through it.

Keywords: Business Intelligence, Data warehousing, Data Mining, Marketing Efforts

Introduction

The fundamental and foremost thing that encounters the organisations in today's situation is managing of data, extracting the beneficial data and converting the extracted data into worthwhile knowledge for commercial purposes. We can all agree that in the existing economic setting, information and its precision signify an effective goal to any business organisation. An information stated by the McKinsey Global Organization (Manyika et al. 2011) predicted that by 2018, the United States alone will have a scarcity of 140,000 to 190,000 persons with deep statistical expertise, as well as a shortfall of 1.5 million data-analyst, with the knowledge to inspect data to make genuine selections. In the year 1958 article, IBM researcher Hans Peter Luhn devised the word business intelligence. He termed intelligence as: "the capability to capture the interrelationships of accessible particulars in such a way as to direct action to a preferred objective."

Business Intelligence and Data warehousing & Mining

The notion of Data Warehousing and Data Mining is becoming progressively widespread as a business information management tool where it is projected to reveal information structures that can direct decisions in situations of restricted faith.

A Gartner study of 2008 (Godbole & Roy. 2008), stated that 80% of information systems data is not structured and an increase of double the size was forecastes every quater. Decision

support systems had impacted Business Intelligence in an huge way. Business Intelligence's dominance is utmost visible in banking ,insurance and retail.

Source: Pilot software: An introduction to data mining: discovering hidden value in your data warehouse (1999)

Stage	Business Question	Enabling Technologies	Characteristics
Data Collection (1960s)	What was my average total revenue in the last five years?	Computers, tapes, disks	Retrospective, static data delivery
Data Access (1980s)	What are the unit sales in England in last March?	Relational databases, (RDBMS), Structured Query ,ODBC	Retrospective, dynamic data delivery at record level
Data Navigation (1990s)	What are the unit sales in England in last March? Drill down to Boston	Online analytical processing (OLAP), multidimensional databases, datawarehouses	Retrospective, dynamic data delivery at multiple level
Data Mining (2000)	"What's likely to happen in Boston unit sales next month? Why?"	Advanced algorithms, multiprocessor computers, massive databases	Prospective, proactive information delivery

Need/relevance of the study

While substantial business investment in data warehousing and Big Data systems is continuing to accelerate, there is a complete absence of a specific and rigorous method to measure the realised business value, if any. Limited empirical testing of the performance measure identified. Huge attentions have been given to data-warehouse implementation stage but few authors have tried to assess this stage by conducting quantitative studies theoretically grounded.

The critical success factors had a high level of generalization, making it difficult for companies to understand how a particular factor would apply to them.

Few studies tried to statistically measure the marketing related benefits that these technologies will bring to the organisations.

The previous studies have presented a cross-sectional research that measures users' perceptions at one point in time and for a given country. It is logical to assume that users' perceptions may change over time as they gain more experience using BI. Limited research in India for the studying the impact of data warehouse and Data mining on marketing efforts.

Data-warehouse

With stronger and tougher struggle, organisations are much keener in getting instantaneous and precise information to make improved choices. According to Inmon, (Inmon, 1997) data warehouse tools was defined as, "Gathering data from numerous dispersed sources to form a data warehouse. The operators can make use of appropriate analytical softwares for accumulation as well as investigation of data." The foremost aim of data warehouse is to work

on every part of analysis in essential data by exploiting data knowledge, and it will be a locus of policymaking for initiatives. The various factors for successful implementation of DW are:

S.No.	Author	Critical Success Factor
1.	(Wen, Chou, & Yen, 1997)	technical factors (user interface, hardware selection, data renewal, data loading, etc.) Project factor (users' choice)
2.	(Hwang, Ku, Yen, & Chenga, 2004)	magnitude of the bank ,Champions ,Senior management backing ,Internal needs, Degree of business competition , Assortment of vendor, Skills of project team, Direction of organizational resources, Contribution of end users ,Help from evidence consultants
3.	(Shin, 2003)	Intercept Data quality, Ability to locate data, Access authorization, Ease of use, User training, System throughput, Information utility
4.	(Wixom & Watson , 2001)	Management backing, Champion, Resources, User contribution, team assistances, source systems, Development technology.
5.	(Ramamurthy, Sen, & Sinha, 2008)	Administrative size, managerial commitment, absorptive capacity, organizational scope, organizational data environment
6.	(Xu & Hwang, 2007)	Clearly defined business needs , Top organization support ,User participation , Source data excellence , Proper development technology , Adequate IS staff & consultants • Project management (teamwork) , Practical implementation schedule.
7.	(Ang & S.H. Teo, 2000)	Identifying the processes, choosing growth options, Implementing incremental change approach, overpowering resistance, choosing project leader, providing formal training.

Data Mining

Data mining is applied in a extensive variety of uses, from following offenders to extracting facts for supermarkets, from growing free information for a industry to cross-selling, directing warranty entitlements, to creating loyalty of good clients, and clearing out bad clients (Berry and Linoff, 1997). A reliable description of data mining is – a method of mining previously unidentified, concealed, and valuable information from the records originating from databanks. Data mining has become as a acknowledged zone of research in the past. Business Intelligence is attained by means of mining. The various factors impacting the successful implementation of Data Mining applications are listed below:

1.	(Chung and Gray,1996)	Relevant prior knowledge, end-user goals, data quality characteristics like, missing values, noise in data.
2.	(Fayyad,piatetsky-shapiro,Simth,1996)	Understanding application domain, data preprocessing, data reduction and projection
3.	(Brachman,et al.1996)	Training,support,data availability, cost-benefit, volume, accessibility, change management expertise
4.	(Cabena,et al,1997)	Project management, sponsor, user group, data management, business analysis
5.	(Sim,2003)	Businessobjectives,application,quality,accessibility,technique,service,intepretation,using discovered knowledge)
6.	(Barko,Namti,2003)	Data issues, time, scope, resources, people issues, organizational issues
7.	(Lynn,2009)	System Throughput, Data Quality, Ease of Use, Information Utility, Support provided to end-user

Impact on Information Quality and Marketing efforts

To endure in such aggressive marketplace , retailers are presenting new marketing models like “relational marketing”, “one-to-one marketing”, “enterprise marketing automation”, and “database marketing” (D’Aveni, 1994). The marketing conceptions that relate to the significance of filling customer anticipations cannot be applied without embracing massive databases. This conveys the message that the requirement of implementation data warehousing by enterprises is very essential.. As an outcome, approximately 70 percent of data warehousing ventures are associated to marketing undertakings. (DeLone & McLean, 1992)

The various factors for measuring marketing performance are:

Enhanced Promotional efforts

Sales promotions can be termed as different sale incentives and several other approaches to escalate immediate sales. Promotional instruments comprise of vouchers, economy-packs, refunds, draws, etc. To increase promotion ability to be effective, a continuous assessment of the impact of the promotions should be supported and stalked from time to time.

Enhanced Consumer Profiling

To quantify enterprises capability to execute client analysis, the level of change of knowledge of customer buying design,charting of existing customers, capability to identify client requirements and desires, and knack to recognize dependable clients will be done.

The main motive to retain information on clients is to grow client contentment, which will help create growth in sales and profitability. The endeavours are made because of the acknowledgment of the need to maintain prevailing clients for a long tenure.

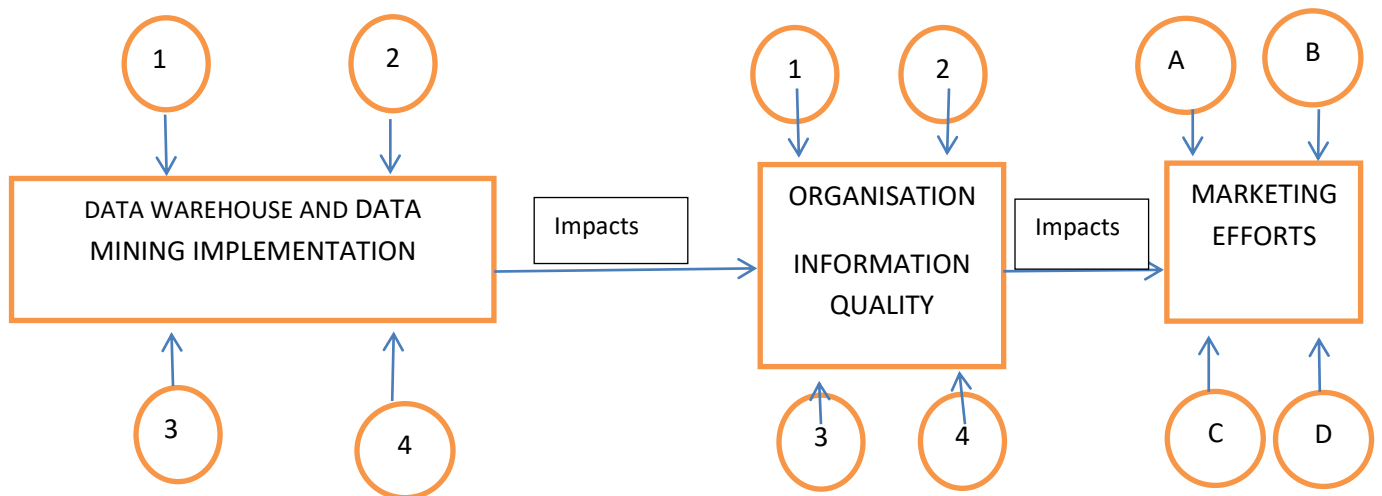
Improved Market segmentation analysis

To quantify corporates capability to execute market segmentation, the level of variation in the information of customer demographics, awareness of geographic extents of customer, awareness of socio-economic aspects of customer as well as capability to fragment the market will be studied. Retailers are ready to look into exhaustive market sections by applying data warehousing. Data warehousing permits retailers to divide and examine markets and consumers for successful marketing options.

Improved trend analysis

The accomplishment of the firms employing data warehousing, in relation to the yearly percent change in sales, return on sales, trends in sales, forecasting, cost and profits by product or market can be analyzed. It has been discovered that one of the motives for corporations to spend in information technology is to assist companies growth and understanding the trends. (Brown, Gatian & Hicks, 1995).

Proposed Research Model



Data Warehouse and Data mining Implementation

Organizational factors

Management Commitment, (D. Sammon, Finnegan, 2003)

Champion and sponsorship (Ramamurthy, Sen, & Sinha, 2008)

Business Objective and Goal Alignment (Ang Eelynn, 2009)

Business Communication, Monitoring and Feedback (Ang Eelynn, 2009)

Project related factors

Project drivers/enablers (D. Sammon, Finnegan, 2003), (W. Yeoh, Koronios, A, 2010)

Resource allocation (B. H. Wixom, Watson, H. J., 2001)

User participation/consultation (V. Farrokhi, L. Pokorahi, 2013)

Team skills/experience (Wixom and Watson,2001)

Technical factors

Applications and operating systems (Ang Eelynn, 2009)

Accessibility, complexity, scalability (Ang Eelynn, 2009)

Hardware platforms (D. Sammon, Finnegan, 2003)

Reliable back-end system (V.Farrokhi, L. Pokorahi,2013)

Technical framework (V.Farrokhi, L. Pokorahi,2013)

Data related factors

Data quality (Ang Eelynn, 2009)

Data Integration/storage/Management

Sources of data (D. Sammon, Finnegan, 2003)

Data ownership (Nemati & Barko, 2003)

Factors on Information Quality

Accuracy (Correctness, clarity, consistency) (Eppler, 2003) (Wand and Wang, 1996)

Completeness (comprehensiveness, conciseness) (Eppler, 2003)

Format (security, currency, accessibility, convenience) (Eppler, 2003) (Bailey, J.E., and Pearson,1983)

Applicability (Timeliness, Traceability, Maintainability) (Eppler, 2003)

Factors/Variables Contributing to Marketing Efforts Identified:

A. Improved Promotional efforts (sales promotion, pricing programs, measurement of promotion) (D.Skeels, 1996)

B. Improved Customer profiling (knowledge of purchasing patterns, knowledge of current customers, knowledge of customer needs, knowledge of loyal customers, performing basket analysis, merchandise planning) (Welge,2001) (D.Skeels, 1996)

C. Increased Trend Analysis (Trends in sales, forecasting, cost and profits by product or market) (Welge, 2001)

D. Better Market segmentation analysis (consumer demographics, geographic dimensions, socio-economic dimensions) (Lee, Hong , &Katerattankul, 2004)

Conclusion: With the increasing acceptance of Business Intelligence tools, the scarcity of research in this area has been a mounting interest. This research will represent an effort in determining the influence of Business Intelligence tools on marketing efforts. The framework proposed can be made useful in evaluating the marketing efforts of across various industries and verticals like telecom, banking, retail, etc. The study will try to explore the link between information quality and marketing performance of organisations. Thus, this study will have policy implications for organisations, i.e., whether data-warehouse and data-mining techniques are able to improve information quality and overall marketing efforts. The organisations will get

an understanding as to; whether it is worth investing in data-warehouse and data-mining systems.

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