Business Intelligence System-A Survey

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Abstract- In modern business, increasing standards, automation and technologies have led to ocean amounts of data. However the matter of business decision making process has become complicated. Traditional database system has been unable to meet the existing situation. A detailed look at the different organizational functions suggests that BI can play a crucial role in almost every function. It can givesurprising new and often differentinsights about customer behavior; thereby helpingthe retailers meets their ever-changing needs and desires. Onthe supply side, BI can help retailers identify their best vendorsand determine what separates them from not so good vendors.This paper reviews the literature of progress in BI system research. Relates articles appearing in the international journal and IEEE conference from 2000 to 2011 are gathered and analyzed so the following questions can be answered.(1)which approached were most popular?(2)which is the most popular BI integrated research?.

Keyword: Business Intelligence, Data mining, CRM, OLAP.

I.   INTRODUCTION

The information economy puts a premium on high quality actionable information - exactly what Business Intelligence (BI) tools like data warehousing, data mining, and OLAP can provide to the retailers. A close look at the different retail organizational functions suggests that BI can play a crucial role in almost every function. It can give new and often surprising insights about customer behavior; It can give retailers better understanding of inventory and its movement and also help improve storefront operations through better category management. Through a host of analyses and reports, BI can also improve retailers' internal organizational support functions like finance and human resource management.

As quite sensitively portrayed in the movie, the large chain superstores have nearly forced small independent retailers to close down. At the same time, these large retailers have gained considerable power in the supply chain.They are increasingly dictating terms to the retailersand inventing new ways of attracting customers.But to hold the customer's imagination for long hasremained an elusive dream. Changing tastes and preferences, increasing competition, demographic shifts, and the simple"let's try something new" attitude have all been blamed forcustomer disloyalty.Technology has played a key role in retailers' effort tocompete in this volatile market. Sophisticated retailers havequickly evolved from basic automation to embrace like CRM, business intelligence, etc. Thispaper explores the various applications of businessintelligence in the retail industry and to make a literature review of Progress in Business Intelligence Systemresearch. Business intelligencerefers to a host of technologies like data warehousing, onlineanalytical processing (OLAP), and data mining AIwhich seekto turn data into actionable information.

II.   TRENDS IN THE RETAIL INDUSTRY

Rise of superstores: Last two decades has seen the phenomenal rise of the 'Chain of superstores' in both the US and Europe. Growing consolidation and globalization in the sector has seen the bargaining power of the retailer increase in the supply chain. We believe that in order to counter saturated domestic markets and increasing competition, leading superstores would continue to expand globally. Wal-Mart acquired Britain's third largest supermarket chain ASDA, to establish itself in Europe. Similarly the grocery giant Safeway has significant presence in both the US-and UK. Customer Relationship Management as a key driver: Supply Chain Management as a key driver: Rise of Online Retailing: Some say that the Internet will completely change the face of retailing; others believe that the 'touch and feel' factor would ultimately dominate and the Net will have only a marginal impact on the shopping behavior. Probably the truth lies somewhere in between. But one thing is sure - online retailing is here to stay. Many retailers realized that and have rushed Po start their own e commerce web site. We believe that the key to success would be the effectiveness with which retailers integrate the Internet with their existing business model.

III.   BUSINESS INTELLIGENCE   SOLUTIONS

Business Intelligence (BI) refers to the ability to collectand analyze huge amount of data pertaining to the customers,vendors, markets, internal processes, and the businessenvironment. A data warehouse is the comer stone of anenterprise-wide business intelligence solution; variousanalytical (OLAP) and data mining tools are used to turndata - stored in the data warehouse - into actionableinformation. Customer Relationship Management (CRM)forms the focal point from where the vital insights gainedabout the customers - using BI tools -- are absorbed in theentire organization. BI also plays a critical role in all theother retail functions like supply chain management, storefront operations, and

channel management. This paper is anintroduction to the various BI applications in the differentfunctions in the retail organization, including supportfunctions like finance and human resources.

A. Customer Relationship Management

Smart retailers have reoriented their business around thecustomer. In the mad rush to acquire new customers, theyhave realized it is equally important to retain the existingones. Increased interaction and sophisticated analysistechniques have given retailers unprecedented access to themind of the customer; and they are using this to developone-to-one relation with the customer, design marketing andpromotion campaigns,optimize store-layout, and managee-commerce operations. For example Safeway uses its ABC loyalty card to record each customer's individualtransactions. This coupled with other relevant data has givenSafeway tremendous knowledge about customer buyingpatterns - knowledge that has significantlyhelped inaugmenting customer loyalty.Following are some of the uses of analytical CRM:

1) Customersegmentation

Customer can offer insights into how different segments respond toshifts in demographics, fashions and trends. For example itcan help classify customers in the following segments.

2) Campaign/ Promotion Effectiveness Analysis

Once acampaign is launched its effectiveness can be studied acrossdifferent media and in terms of costs and benefits; thisgreatly helps in understanding what goes into a successfulmarketing campaign.

3) Customer Lifetime Value

Not all customers are equallyprofitable. Hence it is absolutely essential to identify customerswith high lifetime value; the idea is toestablish long-termrelations with these customers.

4) Product Pricing:

Using data warehousing and data mining, retailers can develop sophisticated pricemodels for different products, which can establish price -sales relationships for the product and how changes in prices affect the sales of other products.

5) Target Marketing

Target marketingcan be based on a very simple analysis of the buying habitsof thecustomer or the customer group; but increasingly data mining tools are beingused to define specific customersegments that are likely to respond to particular types ofcampaigns.

B. Supply Chain Management &Procurement

Most of the commercial SCM applications provide only transaction-based functionality for inventory management and procurement; this is where data warehousing can provide critical information to help managers to streamline their supply chain. Increasinglyretailers are handling their inbound logistics by setting up their owndistribution networks. We believe that a vitalcriterion for success in future would be the ability to harnessworldwide distribution and logistics network forpurchasing.This global supply chain should ensure high levels ofproduct availability that,consumers want to buy.

C. Storefront Operations

The information needs of the store manager are no longerrestricted to the day to day operations. Today's consumer ismuch more sophisticated and she demands acompellingshopping experience. For thisthe store manager needs tohave anin-depth understanding of her tastes and purchasingbehavior. Datawarehousing and data mining can help themanager gain thisinsight. Following are some of the uses ofBI in storefront operations, market basket analysis, categorymanagement, out-of-stock analysis. Typically a number of variables are involved and it can get very complicated. *An*integral part of the analysis is calculating the lost revenuedue to product stock out.

IV.   INDIVIDUAL APPROACH

A. Business intelligence system

46.67 % papers discuss about individual approach thetheoretic, method, software of business intelligence system.The paper writes the definition, methodology, architecture,case study, software that used in business intelligencesystem. An Enterprise Marketing Campaign Automation (EMCA) system that can provide data for businesses to instantly assemble them for determining effective and accurate marketing campaign strategy. By generating a mailing list targeted to a specific group of buyers with reference to their buying habits can reduce marketing cost by just mailing the promotional items to the specific group of buyers. [7] The current situation of business environment and business intelligence systems (BIS) framework at first, and studies the theoretic and methods about the business intelligence system based on ontology. Based on ontology, this paper proposes an integration framework for business intelligence systems. [8]

V.   INTEGRATED APPROACH

A. Integrated between BI, Supply Chain

3.33 % papers discuss about integrated between BI andSupply Chain Management. Supply Chain Business Intelligence introduces drivingforces for its adoption and describes the supply chain BIarchitecture. The global supply chain performancemeasurement system based on the process reference model isdescribed. The main cutting-edge technologies such asservice-oriented architecture (SOA), business activitymonitoring (BAM), web portals, data mining,

and their rolein BI systems are also discussed. Finally, key BI trends andtechnologies that will influence future systems aredescribed.[9]

B.Integrated between BI, CRM System

6.67% papers discuss about integrated between BI andCustomer Relationship Management System.CRM systems and Business Intelligence provides aholistic approach to customers which includes improvementsin customer profiling, simpler detection value for customers,measuring the success of the company in satisfying itscustomers, and create a comprehensive customer relationshipmanagement.[10]A conceptual and a technological infrastructure wasproposed and integrated into a Student RelationshipManagement (SRM) system associated with BusinessIntelligence concepts and technologies used to obtainknowledge about the students and to support the decisionmaking process. [11]E-business intelligence aims to develop a tremendousspectrum of business opportunities and user's adoption of thebusiness intelligence is very important and relevantpropositions are made.[12]

C. Integrated between BI, Data Mining

5% papers discuss about integrated between BI andData Mining.A data mining methodology called Business Intelligencedriven Data Mining (BIDDM) combines knowledge-drivendata mining and method-driven data mining, and fills the gapbetween business intelligence knowledge and existent various data mining methods in e-Business [13]Business intelligence is information about a company'spast performance that is used to help predict the company'sfuture performance. It can reveal emerging trends fromwhich the company might profit. Data mining allows usersto sift through the enormous amount of informationavailable in data warehouses; it is from this sifting processthat business intelligence gems may be found. [14]

D. Integrated between BI, AI (Artificial Intelligence)

Integrated between BI and Artificial Intelligence papers discuss about3.33% papers discuss about integrated. A business intelligence application of neural networksin analyzing consumer heterogeneity in the context ofeating-out behavior in Taiwan. The data set for this studyhas been collected through a survey of 800 Taiwanese consumers. The results of our data analysis show that theneural network rule extraction algorithm is able to finddistinct consumer segments and predict the consumerswithin each segment with good accuracy. [15]On the other hand, firms should handle more accurate businessinformation to support their business intelligence (BI)system to make better business decisions. [16]

E. Integrated between BI and OLAP

3.33% papers discuss about integrated between BI andOLAP.The use of business intelligence and OLAP tools in e-learningenvironments and presents a case study of how toapply these technologies in the database of an e-learningsystem. The study shows that students spend little time withcourse courseware and prefer to use collaborative activities,such as virtual classroom and forums instead of just viewingthe learning material.[17]The importance of Intelligence Systems as well as thearchitecture of OLAP decisional interactive support systems.[18]

VI. OBSERVATION AND RECOMMENDATION

A. The most popular approach

The most popular approach is single approach Business Intelligence System with 46.67% of paper discuss it.There are many software that is used in BusinessIntelligence System research like SharePoint Server 2007,Microsoft SQL Server 2005, Microsoft business intelligencestack and BI products, and finally, describes how to deliverBI solution.

B. The most popular BI integrated research

The most popular BI integrated research is integratedbetween Business Intelligence and CRM System with 6.67% papers. Integrated between BI, Data Mining 5 % andIntegrated between BI, AI and, Data Mining 5 % .The topic that integrated with BI research that is found inthis research is Supply Chain Management,CRM system,Data Mining, Artificial Intelligence, OLAP.

Table1. Topic that integrated withBusiness Intelligence System

NO	TOPIC	PERCENTAGE
1	Business Intelligence System	46.67%
2	Integrated between BI and supply chain	3.33%
3	Integrated between BI and CRM system	6.67%
4	Integrated between BI and data mining	5.00%
5	Integrated between BI and OLAP	3.33%
6	Integrated between BI and AI	3.33%

VII.   CONCLUSION

Retailers are known for innovation. The most innovative retailers of today are those who are using business intelligence to gain sustained competitive advantage .The wisdom, gathered by analyzing huge amount of data, and should reach every corner of theorganization. This paper reviews is based on a literature on a business intelligence approaches. Relates articles appearing in the international journal and IEEE conference from 2000 to 2011 are gathered. It was found 46.67% research is in single approach Business Intelligence System, Integrated between BI and CRM System is the most popular evaluating criteria with 6.67%. Integrated between BI,AI and Data Mining 5%. . The end objective is to convert this wisdom into effective action. And for this the entire organization should be able to leverage the business intelligence network.

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