

A Study of Decision Support System (With reference to Indian Retail Industry)

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Abstract The retail sector was one of the first sectors to make significant investments in collecting and integrating customer data in data warehouses. Retailers have generally earned a significant return on their IT system investments by using business intelligence systems to analyze the data to improve business performance with a focus on reducing operating costs, without sacrificing the customer experience. The levers that a retailer can use to optimize performance include: price, promotion, markdown, assortment, space, allocation and replenishment. Data-driven decision making is the key to successful decisions regarding all of these levers.

This research paper describes the business intelligence (decision support solutions) in retail industry. The main aim of the paper is to analyze the advantages of business intelligence in retail industry and business intelligence solutions for the retail industry.

Keywords- Business intelligence, Retail industry, Business Intelligence Solutions, Customer Relationship Management, Supply Chain Management, Alternative Sales Channel

I INDIAN RETAIL INDUSTRY

The India Retail Industry is the largest among all the industries, accounting for over 10 per cent of the country's GDP and around 8 per cent of the employment. The Retail Industry in India has come forth as one of the most dynamic and fast paced industries with several players entering the market. But all of them have not yet tasted success because of the heavy initial investments that are required to break even with other companies and compete with them. The India Retail Industry is gradually inching its way towards becoming the next boom industry.

The total concept and idea of shopping has undergone an attention drawing change in terms of format and consumer buying behaviour, ushering in a revolution in shopping in India. Modern retailing has entered into the Retail market in India as is observed in the form of bustling shopping centres, multi-storied malls and the huge complexes that offer shopping, entertainment and food all under one roof.

II BUSINESS INTELLIGENCE

Business intelligence (BI) is defined as the ability for an organization to take all its capabilities and convert them into knowledge. This produces large amounts of information

which can lead to the development of new opportunities for the organization. When these opportunities have been identified and a strategy has been effectively implemented, they can provide an organization with a competitive advantage in the market, and stability in the long run.

BI technologies provide historical, current and predictive views of business operations. Common functions of business intelligence technologies are reporting, online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, benchmarking, text mining, predictive analytics and prescriptive analytics.

Business intelligence system can be called a decision support system (DSS) as it aims to support better business decision-making. The term business intelligence is sometimes used as a synonym for competitive intelligence, because they both support decision making, BI uses technologies, processes, and applications to analyze mostly internal, structured data and business processes while competitive intelligence gathers, analyzes and disseminates information with a topical focus on company competitors.

III BUSINESS INTELLIGENCE IN RETAIL

Today in every business the most challenging job is to survive in the volatile market place. The only solution to this problem is to have as much actionable information of the respective field that gives an insight to the current market trend, thereby advocating an intelligent business decision. Business Intelligence tools and software are now used in all major industries and so in the retail sector. BI tools like data warehousing, data mining, and OLAP can help in keeping an eye on different retail organizational functions and hence can play a vital role in analyzing customer behaviour that in turn assists to meet their ever-changing needs.

Business Intelligence can prove its excellence in identifying the best customers and vendors, thereby making strategies keeping in mind their preference. Analysis and report can also help retailers in better finance and human resource management. As far as customer relation management is concerned, the use of business intelligence technology

supports better understand of customer buying behaviour to drive sales and profit by reducing operational costs i.e. important for long-term survival.

Some of the primary factors necessary for adopting BI software and tools by retailers are: increase competition, more and more use of plastic money or credit card payment, and popularity of Internet as a medium of buying and selling have enhanced the flow of data that retailers need to manage and hence BI becomes pre-requisite. BI assists in everything from business planning, product, price, promotion, placement and all these can be done by efficient analysis of data and getting an insight into the customer's behaviour.

Conventional the retail industry has lagged behind as compared to other industries in implementing latest equipment, which includes the execution of BI tools. However, seeing its enhanced functionality the retailers are employing BI to comprehend the market in a better way, understand client purchasing power, trigger sales, productivity and minimizing the functional values.

Retail Industry is now paying due attention to BI platform, particularly in the areas of product, customer and functional acumen. Among the many factors some of which have compelled retailers to implement BI software are accelerated competition, to raise profit, customary credit card utilization, attractiveness of loyalty cards and radio frequency identification.

IV BUSINESS INTELLIGENCE AND KEY PERFORMERS

Retail is one of the most diverse industries in the vertical industry arena. Retail enterprises face numerous challenges; not the least of which is the challenge of sustained profit margins in a market where profit margins are traditionally small. Retailers must choose the right products to sell, select appropriate suppliers and shipping options, manage customer expectations, set appropriate pricing, anticipate and forecast stock and inventory needs and manage seasonal shifts in demand. Those are just a few of the challenges you face every day if you are a retailer.

The retail market is fickle, and market trends change rapidly. In this ever-changing environment, the retailer must have complete insight into how actual results compare to plan numbers, revenue by store, location, region, product line and other factors. The retail enterprise must carefully manage operational costs to be sure these costs are optimised. Hours of operation, resource allocation, hiring, training, facilities management and other factors impact revenue and the bottom line.

In the retail industry, Business Intelligence (BI) and Corporate Performance Management (CPM) is a delicate balance. One must understand buying behaviour, customer requirements, exact price points for products, shipping and inventory timing and changing trends. Getting the right product on the store shelves at the right time, for the right price is what retail is all about. Choosing the right location and mix of web and brick and mortar facilities is also

important. If the customer cannot find your business, they cannot consider your products.

But, the gathering and analysis of business intelligence is not as easy as it may seem. The retail industry is awash in best of breed, enterprise and legacy systems to manage everything from point of sale (POS) to resource allocation, facilities management, shipping and inventory, equipment and assets, financial results, sales and marketing campaigns, pricing, coupons and discounting and more. If the retailer is to remain competitive, executives, managers and business users must have access to the most complete information with full insight into results and critical issues and the ability to quickly analyse, present and report these results to support decisions and adapt to the changing market.

A .Advantages of Business Intelligence in Retail Industry

- **Value to business:** Practicing Business Intelligence in retail sector add value to the business by triggering sales and productivity, minimizing functional value and projecting an enhanced understanding of client purchasing power.
- **Alignment of data:** A competent BI system aligns data across unrelated systems, with future logical support like data mining to offer insights into client, dealer, merchandise, and functional data that can be utilized to raise revenues.
- **Authorize employees:** If an organization allows uncomplicated data access to the user which is easy to understand and evaluative, the employees can execute in various ways that can indirectly improve performance and back the entire business plan. Business Intelligence comprises healthy, lively business score registering, investigation, and reporting equipments so that every employee across the firm can make faster and enhanced decisions.
- **Unite people to access data competently and successfully:** The initiation of business intelligence has made decision making a lot simpler. Opinion leaders can access and evaluate data at any given point of time and place. The latest information is accessible on the users' desktop or over the internet.
- **Simplify teamwork and allocation:** Business intelligence and partnership expertise enhances managerial efficiency. Firm incorporation of BI enables the employee to share data in a security improved, administered web ambiance with the team members, clients, and associates. They even have a centralized site to supervise their KPIs, access accounts, evaluate information as well as share texts, and connect to pertinent subject matter.
- **Convey business intelligence to the entire firm:** BI backs the width of the firm's business intelligence requirements. Premeditated planning is uncomplicated when familiar equipments are used,

data supervision is easier and expansion is more lucrative.

- **Examine and increase insight:** The fully integrated Business Intelligence tools enable employees to increase insight simply by utilizing well-known and accessible tools. When data is obtained easily and people interact freely, they are better able to investigate and assess information and then make knowledgeable, astute business plans.
- **Enhance association:** Business Intelligence enhances association across the firm. Expressive approach, pre-set goals, aims, supervising performance, and then making well-versed decisions that assists the entire business plan is useful for the organization. Administrators can now initiate accountability guidelines on a policy diagram and employees can line up their goals with corporate goals.
- **Lessen training requirements:** With Business Intelligence people can interconnect with information they desire to access to. Using business tools that are common, easily accessible, and extensively backed, reduce the training costs of the firm.
- **Transport refined investigation and reporting:** Impressive scorecard practicality backed by accounts diagrams, graphs and assessments, signifies that employees can voluntarily follow key performance indicators (KPIs) aligned with key business objectives. Accepting and examining the association between KPIs and corporate goals can lead to better comprehension of daily business performance, so that the firm can act on it faster.
- Achieve enterprise-wide access and user adoption with browser-based, simple dashboards that enable swift reporting and analysis of information integrated from numerous sources
- Streamline and optimise merchandise management
- Ensure appropriate inventory and stock management
- Optimise facility and resource capacity
- Determine and manage supplier performance
- Analyse and adapt marketing and eCommerce strategies
- Perform market basket analysis
- Perform market research to support marketing, sales and targets for products, stores, and regions
- Analyse customer buying behaviour
- Enhance category management
- Compile and analyse brand and marketing research
- Perform market share analysis
- Integrate and analyse information from financial, point of sale, inventory, distributor, and customer relationship management systems with seamless integration of diverse formats and stunning reports and graphics
- Design effective marketing campaigns for specific products by identifying opportunities
- Integrate financial data to control cost of operations and optimise business performance for improved profitability
- Simplified forecasting and calculation features to pinpoint costs, pricing and profits, using a combine and recombine methodology to analyse business drivers
- Deliver information through personalised BI dashboards and charts, graphs, gauges, automated alerts and other views designed to meet the needs of the individual user and to support their role and function
- Leverage unmatched scalability to process a large volume of disparate data in a browser-based environment that will support growth of the business, and limitless locations and users.
- Engender true Business Intelligence the retail sector to support business strategy, planning, location control and analysis, quick response to market volatility, cash flow management and inventory and supplier management

V FUTURE OF BUSINESS INTELLIGENCE IN RETAIL INDUSTRY

BI is characterized by retailers that have laid strategies on how to capitalize on client satisfaction and productivity with the perfect alignment of premiere policies, responsive and well-organized service, exclusive worth, a distinguished shopping experience and a commercial structure that genuinely serves the business group. This can be accomplished by comprehending the client needs and then associating that outlook into every choice that the firm makes right from product making to promotion to allocation to preservation functions to crediting, etc.

A. Key Trends in Retail Industry

- **Rise of superstores:** Last two decades has seen the phenomenal rise of the 'Chain of superstores'. Growing consolidation and globalization in the sector has seen the bargaining power of the retailer increase in the supply chain.
- **Customer Relationship Management:** In the mad rush to acquire new customers, they have realized it is equally important to retain the existing ones. Increased interaction and sophisticated analysis techniques have given retailers unprecedented access to the mind of the customer; and they are using this to develop one-to-one relation with the customer, design marketing and promotion campaigns, optimize store-layout, and manage e-commerce operations.
- **Supply Chain Management:** Increasingly retailers are handling their inbound logistics by setting up their own distribution networks.
- **Rise of Online Retailing:** Internet has completely changed the face of retailing. Many retailers realized that and have rushed to start their own e-commerce web site. But the key to success would be the effectiveness with which retailers integrate the Internet with their existing business model.

B. Business Intelligence Solutions for the Retail Industry

Business Intelligence (BI) refers to the ability to collect and analyze huge amount of data pertaining to the customers, vendors, markets, internal processes, and the business environment. A data warehouse is the corner stone of an enterprise-wide business intelligence solution; various analytical (OLAP) and data mining tools are used to turn data - stored in the data warehouse - into actionable information.

VI CUSTOMER RELATIONSHIP MANAGEMENT

The CRM strategy should include:

(a) Operational CRM: Automating interaction with the customers and sales force, and

(b) Analytical CRM: Sophisticated analysis of the customer data generated by operational

CRM and other sources like POS transactions, web site transactions, and third-party data providers.

A typical retail organization has a huge customer base and often customer's needs are fairly differentiated. Without the means to analyze voluminous customer data, CRM strategy is bound to be a failure. Analytical CRM uses the key business intelligence tools like data warehousing, data mining, and OLAP to present a unified view of the customer. Following are some of the uses of Analytical CRM:

- **Customer Segmentation:** Customer segmentation is a vital ingredient in a retail organization's marketing recipe. It can offer insights into how different segments respond to shifts in demographics, fashions and trends. It can help classify customers in the following segments:
 - Customers who respond to new promotions
 - Customers who respond to new product launches
 - Customers who respond to discounts
 - Customers who show propensity to purchase specific products
- **Campaign/ Promotion Effectiveness Analysis:** Once a campaign is launched its effectiveness can be studied across different media and in terms of costs and benefits; this greatly helps in understanding what goes into a successful marketing campaign. Campaign/ promotion effectiveness analysis can analyse:
 - Most successful media channels in the past for various campaigns.
 - Most responded geographic locations to a particular campaign?
 - The relative costs and benefits of a campaign.
 - Segment of the customers responded to the campaign.
- **Customer Lifetime Value:** All the customers are not equally profitable. At the same time customers who are not very profitable may have the potential of being profitable in future. Hence it is absolutely essential to identify customers with high lifetime value to establish long-term relations with these customers. The basic methodology used to calculate customer lifetime value is - deduct the cost of

servicing a customer from the expected future revenue generated by the customer, add to this the net value of new customers referred by this customer, and discount the result for the duration of the relationship. Data mining tools should be used to develop customized models for calculating customer lifetime value.

- **Customer Loyalty Analysis:** To develop effective customer retention programs it is vital to analyze the reasons for customer attrition. Business Intelligence helps in understanding customer attrition with respect to various factors influencing a customer.
- **Cross Selling:** Retailers use the vast amount of customer information available with them to cross sell other products at the time of purchase. This effort is largely based on the tastes of a particular customer, which can be analyzed using BI tools based on previous purchases.
- **Product Pricing:** Pricing is one of the most crucial marketing decisions taken by retailers. Using data warehousing and data mining, retailers can develop sophisticated price models for different products, which can establish price - sales relationships for the product and how changes in prices affect the sales of other products.
- **Target Marketing:** Target marketing can be based on a very simple analysis of the buying habits of the customer or the customer group; but increasingly data mining tools are being used to define specific customer segments that are likely to respond to particular types of campaigns.

VII SUPPLY CHAIN MANAGEMENT AND PROCUREMENT

Supply chain management (SCM) promises unprecedented efficiencies in inventory control and procurement to the retailers. With cash registers equipped with bar-code scanners, retailers can now automatically manage the flow of products and transmit stock replenishment orders to the vendors. However, most of the commercial SCM applications provide only transaction-based functionality for inventory management and procurement; they lack sophisticated analytical capabilities required to provide an integrated view of the supply chain. This is where data warehousing can provide critical information to help managers streamline their supply chain. Some of the applications of BI in supply chain management and procurement are:

- **Vendor Performance Analysis:** Performance of each vendor can be analyzed on the basis of a number of factors like cost, delivery time, quality of products delivered, payment lead time, etc.
- **Inventory Control:** Both current and historic reports on key inventory indicators like inventory levels, lot size, etc. can be generated from the data warehouse.
- **Product Movement and the Supply Chain:** Analyzing the movement of specific products - using BI tools - can help in predicting when there will be need for re-order.
- **Demand Forecasting:** It is one of the key applications of data mining. Complex demand

forecasting models can be created using a number of factors like sales figures, basic economic indicators, environmental conditions, etc.

VIII STOREFRONT OPERATIONS

Today's consumer is much more sophisticated and demands a compelling shopping experience. For this the store manager needs to have an in-depth understanding of consumers' tastes and purchasing behaviour. Data warehousing and data mining can help the manager gain this insight. Following are some of the uses of BI in storefront operations:

- **Category Management:** It gives the retailer an insight into the right number of Stock keeping Units (SKUs) to stock in a particular category. The objective is to achieve maximum profitability from a category; too few SKUs would mean that the customer is not provided with adequate choice, and too many would mean that the SKUs are cannibalizing each other. It goes without saying that effective category management is vital for a retailer's survival in this market.
- **Out-Of-Stock Analysis:** This analysis probes into the various reasons resulting into an out of stock situation. Typically a number of variables are involved and it can get very complicated. An integral part of the analysis is calculating the lost revenue due to product stock out.

IX ALTERNATIVE SALES CHANNELS

The success of a retailer in future would depend on how effectively it manages multiple delivery channels like the Internet, interactive TV, catalogs, etc. A single customer is likely to interact with the retailer along multiple channels over a period of time. This calls for an integrated strategy to serve the customer well, which requires smooth flow of information across channels. To ensure smooth flow of information customer data needs to be collected from different channels in one data warehouse. Customer relationship strategy can then be built around this customer-centric data warehouse. We have already seen how Analytical CRM can provide analyses over the centralized data warehouse. In this section we will explore how data warehousing and data mining can improve the effectiveness of a channel.

- **E Business Analysis:** The Internet has emerged as a powerful alternative channel or established retailers. Their success would largely depend on how they use the Net to complement their existing channels. Web logs and Information forms filled over the web are very rich sources of data that can provide insightful information about customer's browsing behaviour, purchasing patterns, likes and dislikes, etc. This includes web log analysis (analyzing the basic traffic information over the e-commerce web site), site navigation analysis (analyzing the typical route followed by the user while navigating the web site and an analysis of the most popular pages in the web site), referrer analysis (analysis of the sites, which are very prolific in diverting traffic to the company's web

site), error analysis (analysis of the errors encountered by the user while navigating the web site), keyword Analysis (analysis of the most popular keywords used by various users in Internet search engines to reach the retailer's e-commerce web site) etc.

- **Web Housing:** This involves integration of web log data with data from other sources like the POS transactions, third party data vendors etc. Often a retailer wants to design specific campaigns for users who purchase from the e-commerce web site. In this case, segmentation and profiling can be done specifically for the .e-customers. to understand their needs and browsing behaviour. It can also be used to personalize the content of the e-commerce web site for these users.
- **Channel Profitability:** Data warehousing can help analyze channel profitability, and whether it makes sense for the retailer to continue building up expertise in that channel. The decision of continuing with a channel would also include a number of subjective factors like outlook of key enabling technologies for that channel.
- **Product Channel Affinity:** Some product categories sell particularly well on certain channels. Data warehousing can help identify hidden product-channel affinities and help the retailer design better promotion and marketing campaigns.

X HUMAN RESOURCES

Data warehousing can significantly help in aligning the HR strategy to the overall business strategy. It can present an integrated view of the workforce and help in designing retention schemes, improve productivity, and curtail costs. Some BI applications in HR are:

- **Human Resource Reports/ Analytics:** Reports and analysis can be generated to support an integrated view of the workforce. Various analyses include staff movement and performance, workforce attrition by store, workforce performance by store, compensation and attrition, and other customized analyses and reports. The HR data can be integrated with benchmark figures for the industry and various reports can be generated to measure performance vis-à-vis industry benchmarks.
- **Manpower Allocation:** This includes allocating manpower based on the demand projections. According to the seasonal variation in demand, temporary manpower can be hired to maintain service levels.
- **HR Portal:** Employers need to maintain accurate employee data, which can be viewed by the employees for information relating to compensation, benefits, retirement facilities, etc. Payroll data can be integrated with data from other human resource management applications in the HR data warehouse. This data can then be circulated within the organization through the HR portal.
- **Training and Succession Planning:** Accurate data about the skill sets of the workforce can be

maintained in the data warehouse. This can be used to design training programs and for effective succession planning.

XI FINANCE AND FIXED ASSET MANAGEMENT

The role of financial reporting has undergone a paradigm shift during the last decade. It is no longer restricted to just financial statements required by the law; increasingly it is being used to help in strategic decision making. Also, many organizations have embraced a free information architecture, whereby financial information is openly available for internal use. Many analytics described till now use financial data. Many companies, across industries, have integrated financial data in their enterprise wide data warehouse or established separate Financial Data Warehouse (FDW). Some of the uses of BI in finance are as follows:

- **Budgetary Analysis:** Data warehousing facilitates analysis of budgeted versus actual expenditure for various cost heads like promotion campaigns, energy costs, salary, etc. OLAP tools can provide drill down facility whereby the reasons for cost overruns can be analyzed in more detail. It can also be used to allocate budgets for the coming financial period.
- **Fixed Asset Return Analysis:** This is used to analyze financial viability of the fixed assets owned or leased by the company. It would typically involve measures like profitability per sq. foot of store space, total lease cost vs. profitability, etc.
- **Financial Ratio Analysis:** Various financial ratios like debt-equity, liquidity ratios, etc. can be analyzed over a period of time. The ability to drill down and join inter-related reports and analyses vendors can make ratio analysis much more intuitive.
- **Profitability Analysis:** This includes profitability of individual stores, departments, product categories, brands, and individual SKUs. A major component of profitability analysis is the costs incurred by stores/ departments and the cost of acquiring, storing and allocating shelf space to particular product categories, brands, or SKUs.

XII CONCLUSION

Retailers are known for innovation. The most innovative retailers of today are those who are using business intelligence to gain sustained competitive advantage. These retailers have also realized that BI can be used strategically only when it is implemented with utmost care and complete support from the top management. We believe that unless all the user-groups are consulted and the objectives clearly defined, BI solution cannot be a success. Also, like any other technology solution, BI cannot exist in vacuum. We strongly believe that it is just a means to an end. The wisdom, gathered by analyzing huge amount of data, should reach every corner of the retail organization. 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.

A good business intelligence solution can provide solutions for a variety of activities including sales transaction, customer data management, price management and many others important for better merchandise and market decision. The most important thing is that it provides better understanding of customer's ever-changing needs leading to quality product and customer satisfaction. So BI proved to be beneficial for retail industry that enables to conduct all day-to-day business activities more efficiently and profitably.

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