European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.7, No.19, 2015

Identification of Performance Measurement Factors Affecting Business Intelligence Success in Retailing: An Empirical Investigation

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Abstract
Business Intelligence (BI) tools are enabling retailers to achieve competitive advantage by getting new information and knowledge with the use of efficient analytical components like reporting, OLAP technologies, and data mining. Focusing on organised food and groceries retail sector, this study explores performance attributes of BI tools from the perceptions of employees and their impact on business performance. This study is part of a larger research work comprising qualitative and quantitative approaches. Based on the literature survey and personal interviews with few select retail analysts of food and grocery, twenty important performance attributes were identified. Factor analysis was performed on these attributes; six major factors were identified as - 1).Technology Effectiveness; 2). Managerial Effectiveness; 3).Customer Performance 4).Operational Performance; 5).Marketing Effectiveness and 6). Financial Performance. The main effecting attributes from the factor analysis were found to be: quality decision making, identifying customer purchasing patterns, better stock optimisation, better organisation of trade spend and improved return on investment.
Keywords: Business Intelligence, Data Warehousing, Performance measurement factors, OLAP, RFID

Technological Innovation in Retailing

Retailers are heading towards a beautiful blend of invention and customer-focused concepts by creating unique in-store experiences for customers. New technological changes are enabling retailers to use the growing wealth of individual consumer information to customise the in-store shopping experience, improve shopping convenience, provide informed and personalised service and enhance the ambience of their stores. Also, retail sector is greatly influenced by technological advancements that allow for price optimisation and reduced costs. Technology is playing a significant role in retail operations because it is helping the retailers improve in areas such as customer experience, inventory management, supply chain management and loss prevention (Chang,et.al, 2006). The retail sector is one that lives and dies on margins, with managers on a never-ending quest to increase revenue and decrease costs; technology has been an area of intense focus in retailing as a way to accomplish these (Aruba Networks, 2012).

Today, the retail industry is fuelled by increasing global competition, higher performance expectations by customers and the market, and ever evolving technologies (Lin et al.2002). In today's competitive world, every retailer faces multifarious challenges like what will the customer buy? How will the market react? According to Khesraw Mansoory (2010), technology has been significant in retail industries as a way to achieve goals. Technology is enabling creative conventional retailers to use the growing wealth of individual consumer information to customise the in-store shopping experience, improve shopping convenience, provide knowledgeable and personalised service and enhance the entertainment value and ambience of their stores (Cheryl Burke Jarvis, 1998). During the past three decades, the industry has grown significantly due to technological innovations, and by adopting supply-chain management techniques, such as Quick Response (QR), which combines technologies, modular layouts, process reengineering, total quality management, and employee involvement (Fiorito, et. al., 1998; Ko & Kincade, 1997. For the retail industry, bar codes have long been an important technology for Quick Response (QR) by helping the industry save production costs, hold inventories low, and prevent overstocking (Fiorito, et. al., 1998; Ko & Koncade, 1997). Due to increased customer base and ever increasing customer expectations together with availability of more choices, retailers are constantly facing challenges for effective decision making and to enhance their operational efficiency. The potential of RFID technology to impact business performance in areas such as customer service, merchandising strategy, distribution and supplier network, and marketing strategy was identified (Chang.et.al, 2006). Wireless technology, permitting communication between people and devices anywhere and without cables, has enabled the dramatic transformation of business processes in the past, and continues to do so (Aruba Networks, 2012). Rapid advances in wireless local area network (WLAN) technology in recent years along with widespread adoption of the technology in the consumer and enterprise space have eliminated many of these roadblocks (Aruba Networks, 2012). Traditional Point-of-Sale (POS) is the physical location where goods are sold to

customers and where a cash register was located; today, wireless LAN technology is helping retailers with fully mobile point-of-sale stations at checkout lines with handheld computers to accelerate the checkout process.

The continuous improvement in information technology (IT) is providing the retailers the ability to support massive amounts of data and the need to access, analyse and process it in real-time. Technology has become the key solution to retailers to keep up with today's diverse customer's requirements. New forms of data and analytics are driving better operations and raise the level of understanding customer behaviours. Retailers are using the IT advancements both in store virtual screens and aisles, digital signage, intelligent self-service kiosks, vending machines and dynamic menus and in the supply chain to improve customer experience and supplier relationships for channel integration. Technology has given consumers the ability to compare products and prices in real time as well and this has made them more demanding. Due to this reason, retailers are increasingly leveraging technology as a differentiator, and some of the leading retailers like Walmart and Best Price now emerged as leaders.

Business Intelligence: Retailing Context

Retailers today are challenged with rapidly changing and an increasingly complex market. With constantly varying customer buying behaviours and dealing with new customers, multi-channel business models and demand driven supply chain, retailers need to be more customer-centric than ever. Business intelligence (BI) has long offered the promise of letting companies gather, store, access, and analyse huge amounts of data so that they can make better decisions regarding customers, suppliers, employees, logistics, and infrastructure (George Lawton, 2006). Business Intelligence (BI) has been a top priority of IT executives for several years and this trend is expected to continue (Gartner Research, 2011).

BI is a concept of using information technology as a tool for achieving the competitiveness of businesses, the perception of risk that occurs in the environment within the firm, and the possibility of action (Ajeet Khurana, 2010). A BI system is a technology that provides significant business value by improving the effectiveness of managerial decision-making. In an uncertain and highly competitive business environment, the value of strategic information systems such as these is being recognised. High adoption rates and investment in BI software suggest that these systems are a principal provider of decision support in the current marketplace (Marcus et.al, 2004).

Business Intelligence (BI) tools are adopted by more and more companies in the current environment that requires companies to operate as efficiently as possible (Cecília Olexová, 2014). With rapidly changing market trends retailers have been investing on business intelligence (BI) tools to gain more data-driven business insights and to manage from point of sale (POS) to resource allocation, sales and marketing campaigns, pricing, financial results and more. Previously, BI is being used by top-tier retailers for simple financial reporting and sales analysis purposes. Today, BI is providing retail organizations of all sizes with a way to not only enhance operational efficiency and cost-effectiveness, but to achieve clear differentiation in an increasingly competitive and dynamic industry (Ajeet Khurana, 2010). Retailers operate in a dynamic environment and need to be completely swift to be innovative. For this reason, retailers are relying on BI systems to access real time data. BI system is a solution that may help retail industry to make informed, intelligent business decisions and to survive in the business world (Negash and Gray, 2008). BI is an umbrella term that is commonly used to describe the technologies, applications and processes for gathering, storing, accessing and analysing data to help users make better decisions (Watson and Wixom, 2010).

Leading retailers around the globe have been using BI and analytics to make an array of strategic decisions that includes where to place retail outlets, how many of each size or colour of an item to put in each store, and when and how much to discount. Retailers are benefiting from implementation of BI for maximisation of ROI, minimise operating costs, optimisation of product, price, promotion and placement. A contemporary organization competes in a business environment that is characterized by a massive influx of information (Schick, Frolick and Ariyachandra, 2011). A critical component for its success is the ability to take advantage of all available information (Cody, et al, 2002). According to Thompson (2004), the major benefits of BI on the basis of the results of the survey, are, faster, more accurate reporting, improved decision making, improved customer service and increased revenue.

In the early 1970s, decision-support systems were the first applications designed to support decision making. Over the years, various decision-support applications like executive information, online analytical processing (OLAP), and predictive analytics have emerged and expanded the decision-support domain. The BI applications cover analytical and planning functions of most management branches, such as marketing, purchase and sale, financial management, production management, marketing management, controlling, human resource management, etc. Although BI has been developing for over 20 years, unfortunately, many retail organizations are not able to make from it an effective tool for decision making and creating a competitive advantage (Davenport and Harris, 2007).

Components of BI are: data warehouse (DW), extract, transform and load (ETL), online analytical

processing (OLAP), reporting, data mining.

The data warehouse contains the raw material for management's decision support system. In order to build up a multi-dimensional data warehouse, data from all the sources previously described needs to be extracted, after extraction; the data needs to be transformed. Transformation includes all activities to make the data fit the multi-dimensional model that makes up the data warehouse. The prepared data can be loaded into the multi-dimensional model to the data warehouse (Daniel B, 2007).

OLAP offers superior performance in analysis of the data, used for what-if analysis, financial simulations, budgeting and target setting. OLAP is an approach to swiftly answer multi-dimensional analytical queries (Codd.et.al, 1993). As part of the broader area of BI, OLAP embraces both relational reporting and data mining (Pareek, 2007). OLAP tools enable users to interactively analyse multidimensional data from multiple perspectives. OLAP consists of three analytical operations: consolidation, drill-down and slicing and dicing (O´Brien and Marakas, 2011). Data mining is the automated process of discovering previously unknown useful patterns in structured data. Large retailers are using data mining to discover information about their customers (Ahmed, 2004)

Reporting is a broad category, and there are many options and modes of its generation, definition, design, formatting and propagation; a successful reporting platform implementation in a BI environment requires great attention to be paid from the point of view of both the business end users and IT professionals. (Cecilia Olexova, 2014).

With advancements in technology, retailers are using video feeds to identify the success of store displays, customer behaviour, shoplifting, successful placement of merchandise and the like. This information in turn, is analysed to help with inventory, purchasing and employee-performance management (Lyndsay Wise, 2009). "BI tools enables our employees to track the performance of the entire company, optimize product assortment, and make decisions that help make us more customer-responsive and competitive to increase revenue and profitability." – Metro Group (MicroStrategy, 2007)

Literature Review and Identification of Retail Performance Factors

Empirical research on business intelligence (BI) or data warehousing (DW) has been explored for different reasons like user satisfaction, to identify new business opportunities, organisational performance and like. Sang lee et al.(2004), investigates the relationship between the implementation of data warehousing on organizational performance in retailing firms and found that DW firms achieve better nonfinancial performance, including promotional performance analysis, vendor analysis, customer analysis, and market segmentation analysis, but do not achieve better financial performance. Study by Chen et al (2000) shows user satisfaction with DW and studies by Wixom and Watson, (2001) identified factors affecting DW success.

Hwang et al.(2004) shows factors influencing the adoption of DW. Other studies emerged investigating the determinants of information and systems quality in the context of DW by Nelson et al.(2005) and Yong-Tae(2006) studies the effects of DW on decision performance. Lönnqvist and Pirttimäki (2006) study the measurement of BI; and Elbashir et al (2008) studies the effects of BI on performance. Davenport (2010) studies the impact of BI on organizational decisions, costs and benefits associated with BI. Zhen and Cheryl (2007) through a survey determined that customer orientation contributes to business performance by influencing market performance and that in turn, determines financial performance; Information systems-IT capability and is a direct route to improving market performance impact of customer orientation.

Alice (2003) studies that retailers are using BI to identify cost-cutting ideas, uncover new business opportunities, roll ERP data into accessible reports, react quickly to retail demand and optimize prices; a broad range of applications for BI is helping companies rack up impressive ROI. BI systems help retailers selling fast moving consumer goods to differentiate themselves by means of customer service strategies aimed at encouraging buyer loyalty and repeat sales, such as free shipping or free returns. Greg Belkin(2006) studies that retailers have distinguished themselves as those that fully utilize the benefits BI at the enterprise level and have proven themselves adept at monitoring key KPIs, such as traditional customer performance measurements, within their enterprises.

Bernhard et.al(2012), building upon DeLoneand McLean's (1992; 2002; 2003) information systems success model, develops, tests and refine a BI quality and performance model adapted for the specific purpose, application, user group and technology of BI tools. The ultimate performance predictors in this model are user satisfaction and the impact of BI tools on managerial decision quality, both of which are determined by data quality. Cecilia Olexova (2014) identifies benefits of BI tools that are considered to be the most important by the retail chain managers. The findings shows that improved decision-making to be the most significant benefit among others benefits, stock optimisation, quality decision making, improved ability to anticipate earlier changes on the market.

The purpose of this research is to find the impact of BI on performance of retailing by identifying different factors that contribute to the success of retailers. In order to adopt a suitable research methodology,

commonly identified performance factors by several researchers from the literature survey were considered.

Research Questions

This study explored the following research questions:

1. To identify and validate the effectiveness of BI tools empirically that contributes to the success of food and groceries retailing in Indian context.
2. To classify important parameters from employee perception and to perform factor analysis to identify important factors.

Research Methodology

The research process involved the following steps. In the qualitative part of research, the first step involved literature review to identify various parameters that measure the effectiveness of BI tools in organised food and groceries retailing. The second step of research included obtaining information through personal interview from retail analysts to find out performance factors of BI systems that contribute to the success of food and groceries retail organisations. After combining various parameters following the literature survey and learning from personal interviews, thirty attributes were identified and studied. Further investigation revealed that twenty attributes which mentioned more frequently in earlier studies and those having close proximity and similarities are considered for factor analysis. Some of the factors considered for factor analysis are optimisation of stock, inventory control, and shelf space utilisation, fast check out, identification of customer purchasing patterns, return on investment (ROI), growth and productivity. The quantitative part of research considers the following steps: After identifying the twenty performance parameters, a questionnaire was prepared on a 5 point likert scale, with 1 being "strongly disagree," and 5 being "strongly agree". To ensure data validity and reliability of the survey instrument, the questionnaire was shown to few knowledgeable individuals from academics, senior retail analysts before distribution, and their comments helped us in modifying questionnaire. The questionnaire was then distributed personally to senior executives, floor managers and employees belonging to the ten retailers (mentioned in the Table 1) of different organised food and groceries retail chains, located in twin cities of Hyderabad and Secunderabad, Telangana. Employees who had direct experience in handling and analysis of BI systems were only approached to identify the perceived benefits of BI systems and requested them to indicate their level of importance for each of the construct items. The survey procedure was conducted during March-April 2015 and made sure that at least few employees represent from each retailer mentioned in the table.1.

A total of 100 questionnaires were distributed personally and 20 twenty questionnaires were sent to email addresses obtained from the websites belonging to the ten retailers and posted on survey monkey during the month of April 2015. Among 120 questionnaires, 39 responses in total were received with a 32% response rate, the respondent's role mentioned in the table 2. Factor analysis was performed on these perceived BI benefits, using principal component factor analysis with varimax rotation.

Table 1

Food and Grocery Retailers that adopted BI tools

S.No	Name of the Retailer	Approx. Number of Retail Stores	Number of Respondents (%)
1	more (Aditya Birla Group)	69	6 (15.4%)
2	fresh@heritage(Heritage Foods)	45	5 (13%)
3	Reliancefresh(Reliance Group)	39	4 (10%)
4	Spencer's (RP Goenka Group)	30	5 (13%)
5	Balaji Grand Bazar (Hyderabad based Retailer)	9	2 (5%)
6	Big Bazar(Future Group)	6	5 (13%)
7	Metro Cash & Carry (Wholesale Retailers-Indian subsidiary of Metro AG)	3	3(7.7%)
8	D Mart(Avenue Supermarts Ltd)	2	4(10%)
9	Auchan(Landmark Group)	1	2 (5%)
10	Best Price-Bharti Walmart (Wholesale Retailers-Wholly owned subsidiary of Walmart Stores Inc.)	1	3 (7.7%)
Total =10			% of respondents= 39 (100%)

Table.2

Respondents' Positions/Roles

Respondents' Positions	Number of Respondents(%)
IT – Managers	5 (14%)
Senior Managers /Executives	13 (33%)
Floor Managers	9 (23%)
Employees	12 (30%)
Total	39 (100%)

Findings from the study

Exploratory Factor Analysis (EFA) is used to determine how many factors there should be and which items to associate with those factors. EFA was performed on the initial list of 20 items to measure perceived benefits associated with BI tools. The analysis revealed six factors with eigenvalue above 1.0 and found to account for 81.93% of the total variance. Cronbach's Alfa .855 suggests that the instrument was reliable with high levels of internal consistency. The descriptive statistics with mean and standard deviation are mentioned in the table.6 in the appendix. From the communalities table.7(mentioned in the appendix), we can observe that among the twenty components, the main effecting factors are quality decision making, identifying customer purchasing patterns, better stock optimisation, effective customer segmentation, better organisation of trade spend and improved return on investment. In order to determine if the data is appropriate for factor analysis, the KMO test was performed. A KMO value of .9 is best and below .5 is unacceptable (Kaiser, 1974). The KMO value of .603 from the table .3 suggests that the sample is adequate for analysis.

Table. 3

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.603
Bartlett's Test of Sphericity	Approx. Chi-Square	660.763
	Df	190
	Sig.	.000

Performance Measurement Factors of BI tools: After six factors were extracted from conducting the exploratory factor analysis procedure, the results were interpreted by assigning labels to the factors. The underlying factors were labelled as follows and mentioned in Table.4:

Factor1- Technology Effectiveness: This includes 3 items that support retailers in the process of handling the IT systems during storage of data, retrieving it and transforming the information in order to manage the information in an effective way.

Factor 2- Managerial Effectiveness: This includes 2 items that involves back office processes and staffing requirements to empower executives with fact-based decision-making.

Factor 3- Customer Performance: This consists of 4 items to understand customer behaviour and their interactions to plan more strategically for customer acquisition and retention.

Factor 4- Operational Performance: This includes 5 items to optimize inventory, based on historical sales and other performance data such as trends in inventory levels so as to plan accordingly to ensure right product available at right time.

Factor 5- Marketing Effectiveness: This consists of 4 items as retailers must understand customer behaviour across channels to best target their marketing efforts to track the effectiveness of new advertising channels.

Factor 6- Financial Performance: This includes 2 items as retailers must work to keep costs down while building profits.

This research has contributed to the understanding of factors that impact BI tools on retailer's performance. The data from the table.4 it is observed that six factors with eigenvalue above 1.0 were found to account for 81.93% of the total variance. The results further indicates that the respondents regard technology effectiveness as the most important benefit of BI tools that contributes to technology effectiveness with 33.34% of variance followed by managerial effectiveness with 16.97% of variance, customer effectiveness with 11.28%, operational effectiveness with 8.13% of variance, marketing effectiveness with 7.78% of variance and financial performance with 5.44% of variance.

Table. 4

Factor items	Factor loadings	% of Variance
Technology Effectiveness (α=.686)		33.34
Quality decision making	.704	(33.34)
Effective information sharing	.583	
Improvement in back end services	.784	
Managerial Effectiveness (α=.689)		15.97
End user satisfaction/ Promotes wellness	.657	(49.31)
and increases moods of employees	.644	
Better employee retention		
Customer Performance (α=.840)		11.26
Identifying customer purchasing patterns	.602	(60.58)
Effective customer segmentation	.542	
Improving customer acquisition and retention	.629	
Targeting suitable programs for	.696	
profitable customers		
Operational Performance(α=.860)		8.13
Visibility into supply chain	.816	(68.72)
Better stock optimisation	.812	
Better analysis of current business practices	.794	
Better analysis of fraud detection	. 866	
Effective queue handling at POS	. 842	
Marketing Performance(α=.684)		7.76
Better organisation of trade spend for promotions	.652	(76.50)
Personalisation of sales promotions	.577	
Better sales analysis	.708	
Better pricing decisions	.627	
Financial Performance (.581)		5.44
Improved return on investment	.671	(81.93)
Reduction of operational costs	.479	

Factor Analysis of performance measurement attributes of BI tools in food and groceries retailing

The component co variance matrix shows that the six factors are not related to each further confirming the results of factor analysis, mentioned in the Table 5.

Table.5

Component Score Covariance Matrix

Component	1	2	3	4	5	6
1	1.000	.000	.000	.000	.000	.000
2	.000	1.000	.000	.000	.000	.000
3	.000	.000	1.000	.000	.000	.000
4	.000	.000	.000	1.000	.000	.000
5	.000	.000	.000	.000	1.000	.000
6	.000	.000	.000	.000	.000	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

Discussion

This study has identified the performance measurement factors from the perception of employees of BI tools in food and groceries retailing in India. These benefits are classified into the following six factors: Technology Effectiveness, Managerial Effectiveness, Customer Performance, Operational performance, and Financial

Performance. Each factor is described as follows:

1. Technology Effectiveness: Retailers receive data from various sources to analyse vast amounts of information such as from point of sales, sales transactions and point-of purchase activities, to make the best business decisions. Also, retailers need to manage thousands of SKUs across hundreds of outlets and analyse data according to time, cost centre and product. It's hard to keep track of important information and even to know which information is valuable. The processes in the IT systems include storage of data, retrieving it and transforming the information in order to manage the information in an effective way. In addition to traditional hard technologies like scanners, barcode readers, and wearable computers, recent trends point to the growing importance of customer centric software and analytical tools that provide essential business intelligence and helps retailers move the current business from mass marketing to target marketing.

The following aspects were considered for analysis: Respondents were asked to rate the impact of the BI system on the quality of technology effectiveness on the following aspects mentioned below on a five point Likert type scale (1 = strongly disagree; 5 = strongly agree).

a). Quality decision making; b).Effective information sharing and c). Improvements in back end services.

BI tools allow retailers to tap into their huge databases and deliver easy-to-comprehend insight to improve business performance. BI tools enables retailers to access this critical information whenever retailers need and then presents this information in user-friendly reports, scorecards, and dashboards and allows retailers to look at the information in different formats, offering the most intuitive and useful ways to analyse the information to get the desired results that increase profits. Retailers are using BI as the back office support to catch anomalies before they get out of hand that give financial managers instant visibility into expense patterns that would be otherwise detrimental to the bottom line. In the past decisions were based on intuition-based beliefs, or "Harrahisms". BI tools enables a more scientific, evidence-based approach to decision making and these tools are helping retailers to justify or disprove the wisdom of what would otherwise be instinctive business decisions, says Nucleus's Wettemann (Jack Doren, 2015). Accoding to Greg Belkin (2006), BI helps retailers in analysis with speed and efficiency in responding to customer demands as the top motivator, as well as the drive to become operationally efficient and manage demand across all channels. BI tools have grown in popularity with non-profits for a number of reasons, like better data integration, more flexibility, easier distribution of data and better visuals (Patrick Yurgosky, 2012).

2. Managerial Effectiveness

Retailers need to optimize the efficiency of their operations and monitor staffing needs and employee performance. The following factors were considered for analysis: Respondents were asked to rate the impact of the BI system on the quality of managerial decision making along the following aspects mentioned on a five point Likert type scale (1 = strongly disagree ; 5 = strongly agree).

a). End user satisfaction / Promotes wellness and increases moods of employees and b). Better employee retention.

With the help of BI tools retailers can spot training and performance deficiencies in stores, plan optimal labour forecasting for their most costly employee category.BI tools enable retailers to identify the hours, days, and seasons that require the most staffing, as well as measure employee performance by sales, labour hours, store, and other variables. BI tools produce sophisticated graphics like scatter plots that move with time, spark-lines that show thousands of data points, and forecasts that assume different user-inputted scenarios that display more information with customized with colours and themes.

Companies are now applying BI analytics to better monitor and manage their workforces, to comply with a growing number of workforce regulations and to better service a company's employee base to remain competitive in its industry (Curt Hall, 2015).

3. Customer Performance

Retailers need to identify good customers by turnover, number of transactions, profit, and life-time value and identify non returning customers to understand and improve specific needs of customers. The following aspects were used for analysis:

a).Identifying customer purchasing patterns; b). Effective customer segmentation;

c). Improving customer acquisition and retention, and d). Targeting suitable programs for profitable customers

Respondents were asked to rate their perception in terms of achieving the above-mentioned objectives on a five point Likert type scale (1 = strongly disagree; 5 = strongly agree).

BI systems helps retailers in the analysis of most purchased product in the past, more transactions in the past months, customers with mobile telephone numbers, customers with email addresses, Identifying promotion friendly customers helps retailers in devising and targeting most profitable customers. With comprehensive customer data, data mining technology can provide business intelligence to generate new opportunities. Brijs et al. (2004) and Wang et al. (2005) concern with the discovery of interesting association relationships, which are

above an interesting threshold, hidden in local databases. With the help of BI systems, retailers can analyse customer historical data, and identify the patterns that will help them for customer segmentation and to anticipate future shopping trends. BI systems are providing retailers crucial solution by analysing customer behavioural data by number of visits per purchases by each customer; through which stores they bought, basket metrics for each transaction, such as item count, sales amount, etc. This, in turn, will lead to more accurate merchandising and inventory management across all outlets. BI can detect various incentives to increase sales and revenue, such as faster conversion of potential into actual clients, reducing the number of outgoing customers and increase sales to existing customers; therefore, in the modern business, CRM cannot be considered separately from Business Intelligence. They constitute a unique model that enables companies forecast customer behaviour and make decisions based on these forecasts, and build long-term and profitable customer relationship (Boysen, 2010).

4. Operational Performance

Inventory control involves analysis of past performance, with planning and forecasting of future customer behaviour. This leads to more accurate initial allocations of merchandise across channels and stores.

Respondents were asked to rate their perception in terms of achieving the above-mentioned objectives on a five point Likert type scale (1 = strongly disagree; 5 = strongly agree. The following aspects were used for analysis: a).Visibility into supply chain; b).Better stock optimisation; c). Analysis of current business practices; d). Better analysis of fraud detection and e). Effective queue handling at POS

BI tools helps retailers to exploit these areas to realise its potential benefits that leads to more accurate merchandising and inventory management across all outlets. BI tools help retailers in forecasting and planning to predict customer wants, needs, and behaviours so that based on their demands, inventory can better stocked to store shelves to satisfy those demands. BI tools helps retailers to calculate Inventory levels based on quantity as well as value and display for any level of grouping by branch, category, supplier, negative stock quantities, items being sold at a loss, identify slow moving merchandise stock and to identify items that have been out of stock and the length of time they have been in such condition. Retailers need to know how well and quickly the vendors are supplying products, as well as how much wholesale items are costing the retailer. “Relationships with the suppliers can be affected greatly by the amount of information that can be gathered, and BI plays an important role in that,” (Hatch, 2002).

Retailers are improving pricing accuracy by integrating bar-code scanners and credit card authorisation with the help of POS systems. Also, POS systems help retailers in quicker and more reliable checkouts thereby reducing manpower requirement. BI tools are invaluable in predictive analytics that drive basket size, and optimize sales per square foot and reduces out-of-stocks and fresh item spoilage. POS and Market Basket Analysis (MBA) application is designed to provide retailers with information that will help buy product at a better price, keep inventory optimized, ensure proper unit sell-through, minimize costs and shrink, optimize markdowns, and drive profitable sales.

5. Marketing Performance

Marketing activities involve understanding customers better by profiling, segmenting and need insight into what’s working, and what isn’t. Based on this information, they can quickly identify underperforming stores, products, and sales representatives, and take immediate corrective action. Marketing activities include pricing products for optimal profitability, and left over stock to be handled with the utmost care.

Respondents were asked to rate their perception in terms of achieving the following aspects on a five point Likert type scale (1 = strongly disagree; 5 = strongly agree. The four aspects considered are: a). better organisation of trade spends for promotions; b). personalisation of sales promotions; c). better sales analysis and d). better pricing decisions

BI tools help retailers in understanding customers better by profiling, segmenting or by using market basket analysis (MBA). BI systems help retailers create better defined and targeted campaigns, reduce expenses while increasing response rates, revenues, and gross margins and to create more effective merchandising plans for the next season. BI systems make the pricing easy for retail organizations to perform “what if” analysis, so they can anticipate the results of specific scenarios to make better, more informed decisions.

BI systems produce sales summaries based on all parameters by branch, product group, day of week, time of day, custom time periods and produces profit summaries based on the same parameters. BI tools provides in-depth insight into who is buying, what they are buying, how they are paying, and other key characteristics, retailers can structure their marketing programs to better reach their target audience Sales performance can be examined as- sales/profit per square foot, sales/profit per employee, by analysing which stores are meeting their quotas, and which ones are not and which products are selling well, and which ones are sitting on the shelves.

BI tools help retailers use the most recent information about sales activities to ensure fewer out-of-stock and back-ordered items by securing information about inventory to consumer demand. This lets customers

find what they want when they want it, which increases the likelihood of return visits and consistent sales as well as more cross-selling and upselling opportunities (Hatch, 2002).

6. Financial Performance

Retailers are becoming ever more conscious of controllable costs. In a world of selling price deflation and constant pressure on margins the only route to increasing or even just maintaining profitability can often be effective analysis and control of these costs. According to Kaplan and Norton (1996); Slater and Olson (2000), profitability, revenue growth and market share are well established indicators of financial performance.

Respondents were asked to rate their perception in terms of achieving the following aspects on a five point Likert type scale (1 = strongly disagree; 5 = strongly agree. The following aspects considered are: a).ROI; b) Reduced operational costs.

ROI can be achieved in a number of ways, such as: Lower cost, improved productivity and increased revenue (Reinschmidt and Francoise, 2000). Costs could be lowered through better inventory management productivity, product promotions; DW provides reporting tools with a well-documented, clean and easily accessible database and this capability significantly improve productivity. Data Warehousing helps retailers in budgetary analysis, fixed asset return analysis and financial ratio analysis(Rao and Swarup, 2001). DW facilitates analysis of budgeted versus actual expenditure for various cost heads like fuel costs, labour costs, warehouse lease costs etc. OLAP tools provide drill down facility whereby the reasons for cost overruns can be analysed in more detail and is also be used to allocate budgets for the coming financial period. BI helps retailers the ability to identify and target right customers to reduce marketing spending and increases the chance of a high return on investment (ROI), (Techtarget, 2015)

Limitations and Future Research

It is important to understand some limitations associated with this study. One of the limitations of this study was the small, non-probability sample of convenience as few employees are knowledgeable who are aware of the actual benefits derived from BI systems. As a result, a limited number of employees were available for the study that has knowledge in BI tools. Another limitation is that this study included only those factors identified based on the perceptions of employees participated in the survey. Future replications might benefit from collecting the data from different regions and different retail setups as this research was confined within the specific domain of BI in food and groceries retailing, specific to a region. Further research may be extended to other areas like customer satisfaction from BI tools to gain insights from customers and may be extended to similar retail sectors belonging to different retail setups for analysis.

Conclusion

The exploratory factor analysis provides very interesting results by identifying the factors that actually have an impact on the organisational success of BI tools in food and groceries retailing. BI tools have number of innovative uses in retailing and are helping retailers to improve operational processes, improve the customer buying experience; giving better visibility for management into store operations, thereby improving the customer loyalty. Retailers who view these trends as opportunities versus threats have the ability to set their business apart from others by strengthening their customer relationships, better leveraging data and supporting their workforces. BI systems are supporting the retailers in figuring out how to maximize profitability and increase customer satisfaction with the right combination of quality products at right time. Retailers are able to predict how to best serve their customers' ever-changing needs and desires with the help of analytics and are now providing friendly and efficient service by creating unique value to the customer with a differentiated shopping experience by building a business model that truly serves their customers. Today retailers are relying upon BI systems to conduct day-to-day business that helps them conduct the business more efficiently and profitably, with the ability to integrate structured, unstructured, video and geographic type data; BI systems benefit retailers as largely as they want in order to get a full picture of their businesses (Mitchell Dubin, 2015).

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Appendix

Table.6 Descriptive Statistics

Factor items	Mean	Std. Deviation
Technology Effectiveness (α=.686)		
Quality decision making	4.26	.594
Effective information sharing	3.82	.506
Improvement in back end services	3.79	1.150
Managerial Effectiveness (α=.684)		
End user satisfaction/ Promotes wellness and increases moods of employees	4.15	.670
Better employee retention	4.10	.839
Customer Performance α=.840)		
Identifying customer purchasing patterns	4.36	.485
Effective customer segmentation	3.89	.787
Improving customer acquisition and retention	4.20	.695
Targeting suitable programs for customers	4.10	.598
Operational Performance (α=.860)		
Better stock optimisation	5.56	7.982
Visibility into supply chain	3.82	.756
Better analysis of current business practices	4.13	.800
Better analysis of fraud detection	3.28	.793
Effective queue handling at POS	3.54	.789
Marketing Performance (α=.684)		
Better organisation of trade spend for promotions	4.44	.680
Personalisation of sales promotions	3.76	1.012
Better sales analysis	4.10	.680
Better pricing decisions	4.00	.561
Financial Performance (α=.581)		
Improved return on investment	3.89	.820
Reduction of operational costs	4.33	.529

Table.7
Communalities

	Initial	Extraction
Quality decision making	1.000	.898
Effective information sharing	1.000	.791
Improvement in back end services	1.000	.768
End user satisfaction	1.000	.660
Better employee retention	1.000	.799
Identifying customer purchasing patterns	1.000	.889
Effective customer segmentation	1.000	.850
Improving customer acquisition & retention	1.000	.757
Targeting suitable programs for customers	1.000	.789
Better stock optimisation	1.000	.867
Visibility into supply chain	1.000	.659
Better analysis of current business practices	1.000	.772
Better analysis of fraud detection	1.000	.730
Effective queue handling at POS	1.000	.673
Better organisation of trade spend	1.000	.854
Personalisation of sales promotions	1.000	.847
Better sales analysis	1.000	.823
Better pricing decisions	1.000	.841
Improved return on investment	1.000	.854
Reduction of operational costs	1.000	.557

Extraction Method: Principal Component Analysis.

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