Behavioural Business Intelligence Framework Based on Online Buying Behaviour in Indian Context: A Knowledge Management Approach

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Abstract

Behavioral Business Intelligence focuses on the people, their behaviors, the environment and constraints that influence their behaviors. The aim of Behavioral Business Intelligence is to know what people do and why they do it. It is based on data and knowledge about people, their demographic and psychographic characteristics. This phenomenon gives the decision makers power in evaluating the success of their strategic decisions. There is a growing popularity of Internet as a medium of online buying worldwide including India. Although there has been a widespread growth in online buying, the rate of diffusion and adoption of the online buying amongst consumers is still relatively low in India.

In view of above problem an empirical study of online buying behavior was undertaken. Based on literature review, four predominant psychographic parameters namely attitude, motivation, personality and trust were studied with respect to online buying. The online buying decision process models based on all the four parameters were designed after statistical analysis. These models were integrated with business intelligence, knowledge management and data mining to design Behavioral Business Intelligence framework with a cohesive view of online buyer behavior.

**Keywords** Behavioural business intelligence, online buyer behavior, decision support system, attitude, motivation, personality, trust
1. Introduction

The number of individuals buying products and services online continues to increase in India but managing the dynamics of this behavior has often been a research question. What leads a buyer to shop online is a matter that has evoked a lot of interest. Although online buying behavior has been researched extensively, the findings from research are loose, fragmented and disintegrated. Similarly, present Business Intelligence (BI) models do not provide adequate attention theories and models of data mining for knowledge development in business. Information such as demographics, buying patterns, product preferences etc. are used and useful deductions are made such as determining a suitable product mix or estimated demand of a product to decide on inventory level. Although such information can be invaluable to decision makers, it only provides part of the picture. These BI approaches do not provide insight into why and what the buyers are doing while they are online. To find out the answers of mentioned questions, a study was conducted to explore the impact of psychographic and demographic parameters on online buyer behavior. The factors selected for the empirical study were attitude, motivation, personality and trust. A critical study of the factors that lead (a) to the development of attitudes (b) to motivate the user for online buying (c)to identify the personality traits of potential and existing online buyers (d) to identify the factors which generate trust in online buying system, can help online retailers to formulate strategies for future growth and success. The study was done on behavioral preferences of online buyers of websites like indiatimes.com, ebay.in. The study was concluded with the idea of integrating BI, knowledge management and data mining performed on behavioral parameters and designing a framework for Behavioral Business Intelligence (BBI).

2. Discussion

2.1. Basic Determinants of Attitude Formation for Online Buyer

It is important to understand the predominant factors which influence attitude of Indian buyers participating in the online buying system. Attitudes may be defined as a person's relatively enduring evaluation that develops positive and negative feelings and tendencies toward an object, be it a person, product or idea. They have a cognitive, affective and co-native component, and buyer behavior is a sum of these. One of the most widely researched and well accepted models in the study of attitudes has been Fishbein's basic behavioral model. According to Fishbein, people form attitudes toward objects on the basis of their beliefs about the objects.
The general framework for buyer’s intentions to shop online is based on technology acceptance model (TAM) (Davis et al., 1989), which lays emphasis on the perceived ease of use and perceived usefulness. Buyers’ attitude toward online shopping depends on the buyers’ perceptions of functional and utilitarian dimensions (Ruyter et al., 2001; Monsuwé et al., 2004) or their perceptions of emotional and hedonic dimensions (Menon and Kahn, 2002; Childers et al., 2001).

2.2. What Motivates Internet User to Buy Online

Buyers’ needs such as browsing and searching for products, ease and convenience, obtaining information about firms, products and brands, comparing product features and prices, shopping 24/7, having fun and excitement, maintaining anonymity while shopping for certain products, are all fulfilled effectively and efficiently in online shopping than conventional shopping. In fact, the benefits that buyers derive out of the online shopping experience are twofold, viz., functional and utilitarian dimensions, like “ease of use” and “usefulness”, or emotional and hedonic dimensions like “enjoyment” (Childers et al., 2001; Mathwick et al., 2001; Menon and Kahn, 2002). With convenience, price, product variety and product access as major motives in the context of online shopping, the functional aspects of shopping motivation have been stressed upon (Wolfinbarger and Gilly, 2001). Suki et al., 2001, speaks of user’s motivation and concerns for shopping online and mentions motivating factors like accessibility, reliability, convenience, distribution, socialization, search ability and availability. Swaminathan et al., 1999, refer to the convenience factor, i.e., being able to shop 24/7 from one’s home as the most compelling motivation. While Lee et al., 2007 propose an e-Com adoption Model that include “perceived ease of use, perceived usefulness, perceived risk with products and services, and perceived risk in the context of online transaction”.

Rajamma et al, 2007, described key dimensions that drive the shopping process are first, “merchandise motivation” where availability, quality and variety of merchandise are the guiding forces; second, “assurance motivation”, which comprises dimensions like “confidentiality and shopping security”; third, “convenience and hassle reduction motivation”; fourth, “enjoyment motivation”; fifth, “pragmatic motivation”, which comprises elements like “attractive prices, convenience of shopping and ability to do comparative shopping” (Burke, 2002; Evanschitzky et al., 2004); and sixth, “responsiveness”, that includes elements such as “delivery at home, time delivery and ability to contact the seller”.


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2.3. Personality Traits in Online Buying

In the context of online buying, the buyers’ relevant personality traits were identified as “expertise” (Ratchford et. al., 2001), “self – efficacy” (Bandura, 1994; Marakas et. al., 1998; Eastin and LaRose, 2000), and “need for interaction” (Dabholkar, 1996; Dabholkar and Bagozzi, 2002).

In online shopping, the human interaction with a service employee or salesperson is replaced by help – buttons and search features. Therefore, buyers with a high “need for interaction” will avoid shopping on the Internet, whereas buyers with a low “need for interaction” would be more inclined towards online buying (Monsuwe et. al., 2004).

Frequent online shoppers are characterized by the desire to socialize, minimize inconvenience, and maximize value. Ranaweera et. al. (2008), found the buyer’s personality characteristics were having significant moderating effects on online purchase intentions. Cunningham et. al. (2005), empirically established that performance, physical, social, and financial risk are related to perceived risk at certain stages of the buyer buying process. Kuhlmeier and Knight (2005) stated that a positive relationship between buyer usage and experience of the Internet and the likelihood of making online purchases, and further indicated that the perceived risk of buying online has a negative effect on buyers' purchase likelihood.

2.4. Basic Determinant of Trust Formation in Online Buying

While the customers of today, driven by functional and hedonic motives, like to surf the internet and search products and services, they often find themselves in a sense of discomfort, apprehension and scepticism when it comes to the actual physical and monetary exchange. The basic underlying issue here is the lack of trust, especially with regard to financial and personal information. The lack of trust in online security and policy, reliability of a company and web site technology play a major role in buyers buying intentions. With the lack of physical interactivity between the buyer and the seller in the system, it is imperative today that organizations re-orient themselves towards creation and adoption of newer approaches for building and maintaining trust and manage relationships with online buyers.

Trust is a feeling of mutual acceptance between two parties; it develops out of continuous physical interaction and leads to long-term acceptance and commitment. So the important issue that needs to be addressed is “trust”, amongst the seller-buyer, the lack of which often acts as an impediment in the trial and adoption of the virtual market concept (Lee and Turban 2001; Monsuwe’ et al., 2004). As has been
remarked by Ang and Lee (2000), “if the web site does not lead the buyer to believe that the merchant is trustworthy, no purchase decision will result”. It is also widely agreed that if online trust can be understood, developed and maintained by the marketer, it would act as a precursor to online buying and the number of online buyers would increase considerably (Wang and Emurian, 2005). Online buying and selling necessitate customer trust (Lee and Turban, 2001; McCole and Palmer, 2001). Online trust is an important determinant for the success of online transactions (McKnight and Chervany, 2001; Balasubramanian et al., 2003; Koufaris et al., 2002). Trust has also been defined in terms of “interdependence between two or more parties”, (Lewicki et. al. 1998); “willingness to rely on an exchange partner in whom the buyer has confidence” (Moorman et al., 1992, Morgan and Hunt 1994).

2.5. Business Intelligence

Business Intelligence (BI) systems are typically used to monitor business conditions, track Key performance indicators (KPIs), aid as decision support systems, perform data mining and do predictive analysis. Traditionally BI systems operate on structured data gathered in a data warehouse. These systems usually use data such as transactional data, billing data, and usage history and call records for applications such as churn prediction. Customer lifetime value modelling, campaign management, customer wallet estimation and data mining.

In the paper Business Intelligence from Voice of Customer (L. Venkata Subramaniam, Tanveer A. Faruquie, Shajith Ikbal, Shantanu Godbole, Mukesh K. Mohania, 2009 ) an attempt is made to study the structured and unstructured data to obtain Voice of Customer (VoC). Information is obtained through interaction of customer with enterprise namely, conversation with call-centre agents, email, and sms. Hai Wang proposed a business intelligence model of knowledge development through data mining (DM) in the research paper “A knowledge management approach to data mining process for business intelligence.” The paper has proposed a model of knowledge sharing system that facilitates collaboration between business insiders and data miners. Li Niu, Jie Lu, Eng Che, and Guangquan Zhan proposed a cognitive business intelligence system (CBIS) in their research on An Exploratory Cognitive Business Intelligence System in 2007. The CBIS is a web-based decision-making system with situations as its input and decisions as output with the attempt to achieve a higher degree of human-computer interaction and make computers to cognitively support humans in decision-making processes.

Harold M. Campbell created a business intelligence model through
knowledge management (KM) in his paper “The role of organizational knowledge management strategies in the quest for business intelligence.” The specific objectives and themes of this paper are on four components of KM and BI, namely:

1) Innovation - finding and nurturing new ideas, bringing people together in 'virtual' development teams, creating forums for brainstorming and collaboration
2) Responsiveness - giving people access to the information they need, when they need it, so that they can solve customer problems more quickly, make better decisions faster, and respond more quickly to changing market conditions
3) Productivity - capturing and sharing best practices and other re-usable knowledge assets to shorten cycle times and minimize duplication of efforts
4) Competency - developing the skills and expertise of employees through on-the-job, and online training, and distance learning.

3. Methodology

The study undertaken is descriptive, diagnostic, and causal in nature. It is aimed at identifying the critical attitude, motivation, personality, and trust parameters in buyers of indiatimes.com and ebay.in.

The final questionnaire that was developed to capture quantitative data then administered to a cross section of respondents and the responses were subjected to analysis through quantitative techniques for analysis of data. The sample was heterogeneous and comprised educated middle and upper class people who were aware of online retail shopping. A total of 260 questionnaires were found to be complete and valid for analysis. The questionnaire was comprised of two parts; the first part comprised of questions on basic demographic information about the user and the second part measured the users’ attitude, motivation, personality and trust that are critical to encourage them to buy online in India.

The responses were subjected to various empirical analyses using 10.0 version of SPSS. For analytical purposes, descriptive statistics were used through measures of central tendency and dispersion. The online buyers were asked to rate the parameter based statements on a scale of 1 to 5, based on their level of agreement or disagreement to each statement. The sum total produced a consolidated score. The means and standard deviations were calculated construct wise.

4. Analysis

The analysis was qualitative in nature. It was observed that the Indian consumer rates reliability and trust as the most important aspects of an online retail store. This was followed by information, continuous improvement, post sales service and security. Performance was important but correlated to the above
mentioned constructs. When it came to interaction with either sales personnel or product, consumers preferred traditional retailing to online retailing as there is very less interaction in the later case. Most customers felt that an aesthetically well arranged site would improve their mood and motivates them to browse through the site. When it came to gender differences male respondents had more awareness as compared to their female counterparts. Also men preferred online retailing because of convenience where they could buy sitting at home but women preferred to shop by going out as they felt it is fun and relaxing.

Online retailers should engage in trust building activities as consumers’ rate reliability of the provider as the most important aspect of a sale. According to the respondents who had already tried online shopping most of them were apprehensive as there was a possibility of a credit card fraud or leakage of personal information. So the online providers must provide a security promise to customers so their apprehensions are eliminated.

Internet retailers should “customize” content delivery and site navigation to individual consumers. Also consumers felt that online stores should adapt new technology to facilitate ease of use.

The factor analysis on parameters of attitude had grouped the items into eleven constructs with 41 items. The mean scores for the various constructs ranged between 3.5563 and 4.5575, with ‘access to foreign goods’ is a variable that scored the least and ‘reliability and trust’, scoring the highest. It revealed that in India access to foreign goods was not a factor that would develop a positive attitude towards online shopping but the reliability and trust with the online buying system.

The factor analysis on motivation parameters had grouped the items into 9 constructs with 38 items. The mean scores for various constructs ranged between 3.2873 and 3.6023, with ‘Economic Motivation’ having the least score and ‘Situation and Hassle Reducing Motivation’ had the highest score. This points out that the hassle free mechanism of online buying process played an important role in motivating people to go for online buying.

The factor analysis on personality traits had grouped the items into 4 personality traits with 14 items. The mean scores for various constructs ranged between 3.3200 and 3.5546, with ‘Risk -Taking Personality’ traits having the least score and ‘Technology Savvy Personality’ traits the highest score. Buyers felt hesitant and were concerned for sharing the private information with the website.

The factor analysis on trust parameters had grouped the items into 4 constructs with 11 items. The mean scores for various constructs ranged between 3.3049 and 3.4068, with ‘Data Privacy and Safety’ having the least score and ‘Perceived
Image of Website’ the highest score. research showed that in India, the online data privacy and safety factors in terms of sharing personal and confidential information, disclosing the credit / debit card number, care taken by the website to stop leakage of confidential data were still not favourable enough to encourage people to go for online buying. While these were the factors that needed improvement, consumers’ trust in online buying was favourably exposed towards the image or reputation of the website.

Having calculated the descriptive statistics, the linear relationships were established among the various constructs using correlation analysis so as to measure the strength and direction of linear relationship between them. Each construct was correlated with its individual measuring items to establish the linear relation between them. Also, the various constructs were correlated with each other to establish the strength of association between them.

A series of multiple regressions was conducted to test the hypotheses in order to assess the causal relationships between the various parameters of consumer / user groups and their impact on the online buying in India. The procedure used for these analyses involved a study of the p value, which indicated whether or not the regression model explained a significant portion of the variance of the dependent variable and the independent variable.

5. Interlinking of Buyers’ Behavior, Business Intelligence, Knowledge Management and Data Mining

The study revealed that attitude based parameters which impact online buyers performance were information provided, interaction, post sales service, reliability, convenience, customization, security, and aesthetics. Online retailers need to understand the basic issues related to formation of positive attitude of online buyers and how it influences the online buying process.

Based on the analysis of data, convenience based pragmatic Motivation, time and efforts based pragmatic motivation, search and information based pragmatic motivation, product based motivation, economic motivation, service excellence motivation, situation and hassle reducing motivation, demographic Motivation, and social and exogenous motivation had a significant influence on online buyers’ motivation.

The study identified personality traits of online buyers as – (1) extroversion and introversion, (2) risk – taking, (3) excitement and pleasure seeking, and (4) technology savvy.

Online trust played a key role in creating satisfied and expected outcomes in online transactions. The study determined that Security of Online Transaction, Data Privacy and Safety, Guarantee Return
Policies generate trust in online buying system.

Typical BI technologies include business rule modelling, data profiling, data warehousing and online analytical processing, and Data Mining (DM) (Loshin, 2003). The central theme of BI is to fully utilize structured data to help organizations gain competitive advantages.

Knowledge Management (KM) is concerned with unstructured information (Marwick, 2001) with human subjective knowledge, not data or objective information (Davenport and Seely, 2006). KM deals with unstructured information and tacit knowledge which BI fails to address (Marwick, 2001).

DM is useful for business decision making when the problem is well defined. There is over-emphasis on “knowledge discovery” in the DM field and de-emphasis on the role of user interaction with DM technologies in developing knowledge through learning. There is a lack of attention on theories and models of DM for knowledge development in business.

The process of DM is a KM process because it involves human knowledge (Brachman et al., 1996). This view of DM naturally connects BI with KM.

The proposed “BBI Framework for Decision Support in Online Retailing in Indian Context” is an attempt to fill the limitation of traditional data mining. DM would be conducted based on the attitude, motivation, personality, and trust parameters suggested after empirical study. The integration of such parameters for online buying with data exploration and query makes DM relevant to BBI. The knowledge work done by theses behavioral parameters can be generally described in the perspective of unstructured decision making.
Decision Making for Competitive Advantage

Business Intelligence

Data | Data Queries | Online Analytical Processing

Attitude Parameters for Data Exploration
Motivation Parameters for Data Exploration
Personality Parameters for Data Exploration
Trust Parameters for Data Exploration

Data Warehouse

Data Integration from Multiple Sources

BBI Framework
6. Conclusion

The proposed BBI framework overcomes shortfalls of BI as it is based on the people, their behaviors, as well as the environment that influence their behaviors with respect to online buying in Indian context. The empirical study of online buyer behavior helps retailers improve their marketing strategies by understanding issues such as how buyers’ motivation, attitude, personality and trust impact their decision making in online buying. Decision makers and online retailers can use the information for competitive advantage.

References


