

Research Agenda: Behavioural Business Intelligence Framework for Decision Support in Online Retailing in Indian Context

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Abstract- The topic of Behavioural Business Intelligence (BBI) for decision support in online retail sector has been examined under various contexts over the years (Rina Fitriana, et al., 2011). Although researchers from a variety of business disciplines have made significant progress over the past few years, the scope of these studies is rather broad, the studies appear relatively fragmented and no unifying theoretical model is found in this research area. In view of this, we provide review of the literature and propose a research framework for designing BBI which is essentially based on online buying behaviour of Indian buyer. The proposed research is based on four key building blocks (motivation, attitude, personality and trust) so as to analyze the online buyer behaviour in a systematic way. This proposed framework provides us with a cohesive view of online buyer behaviour which is a backbone of BBI decision support system in online retail sector. We conclude our paper with a research agenda for the designing Behavioural Business Intelligence Framework for decision support in online retail sector in Indian Context.

Index Terms- Behavioural Business intelligence, decision support systems, knowledge management, online buyer behavior.

I. INTRODUCTION

There is a growing popularity of Internet as a medium of information search, communication link, and online buying worldwide including India. Although there has been a widespread change in the mindset of Indian buyers by way of switching over to online buying from the traditional physical shopping (Joines et al., 2003; and Jayawardhena, 2004), the rate of diffusion and adoption of the online buying amongst buyers is still relatively low. Various business intelligence approaches are currently used by decision makers like spreadsheets and databases, online transaction processing, online analytical processing, data mining to assist with strategic planning in online retail (L. Venkata Subramaniam et al., 2009). Information such as demographics, buying patterns, product preferences etc. may be used and useful deductions can be 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 buyers are doing and what they are doing (Luan Ou and Hong Peng, 2006).

Greater understanding of the 'why' is essential in predicting the future and gaining insights in order to reduce inefficiencies, costs

and risks, and improve future decisions related to online buying (www.IntelligentSoftware.com.au, Behavioural Business Intelligence: the next generation of predictive analysis). The proposed research agenda not only provide us with a cohesive view of online buyer Behaviour of Indian buyer based on empirical study but also proposes a comprehensive Behavioural Business Intelligence (BBI) framework for online retailer.

The paper is organized as follows. Section 1 outlines the research done in the field of online buyer behaviour. Section 2 analyzes some business intelligence models developed in recent past. Section 3 outlines the relationship between business intelligence, knowledge management and data mining, as these approaches will be used to design BBI framework. Section 4 concludes the paper by considering the future research agenda.

II. ON LINE BUYER BEHAVIOUR

It has been found in literature survey that there is lot of study done on developing a business intelligence model based on buyer behaviour but most of it is fragmented and does not provide a comprehensive approach on online buying behaviour of Indian buyer.

Online buyer behaviour has become an emerging research area with an increasing number of publications per year. The research articles appear in a variety of journals and conference proceedings in the fields of information systems, marketing, management, and psychology. A review of these articles indicates that researchers mostly draw theories from classical buyer behaviour research, such as behavioural learning, personality research, information processing, and attitude models (Fishbein 1980). Moreover, a close examination of the literature in this area reveals that most of the components of buyer behaviour theory have been applied to the study of online buyer behaviour. However, the application is not as straightforward as simply borrowing the components and applying them. There are still significant differences between offline and online buyer behaviour that warrant a distinguishing conceptualization. For example, L.R. Vijayarathy (2001) integrated the web specific factors (online shopping aid) into the theory of reasoned action (TRA) to better explain buyer online shopping behavior. Song and Zahedi (2001) built on the model of the theory of planned behaviour (TPB) and examined the effects of website design on the adoption of Internet shopping.

III. BUSINESS INTELLIGENCE MODELS

Business Intelligence systems are used widely across many industries such as retail, finance, insurance and telecom. 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 (S. Rosset, et al., 2002), (B. Raskutti and A. Herschtal, 2005), campaign management (S. Rosset, et al., 2001), customer wallet estimation and data mining (R. Agrawal and T. Imielinski, 93).

In the paper Business Intelligence from Voice of Customer (L. Venkata Subramaniam et al., 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. A combination of unstructured and structured data such as, educational qualification, age group, and employment details provide access to business variables and up to date dynamic requirements of the customers. It indicates trends that are difficult to derive from a larger population of customers through any other means. For example, some of the variables reacted in unstructured data are problem/interest in a certain product, expression of dissatisfaction with the business provided, and some unexplored category of people showing certain interest/problem. This gives the BIVoC system the ability to derive business insights that are richer, more valuable and crucial to the enterprises than the traditional business intelligence systems which utilize only structured information. The study demonstrate the effectiveness of Business Intelligence Voice of Customer (BIVoC) system through one of our real-life engagements where the problem is to determine how to improve agent productivity in a call centre scenario. Voice of Customer (VoC), refers to customer communications, such as conversational voice recordings, emails, text messages, chat transcripts, and agent notes. Most of the VoC is collected through contact centres.

Such rich analysis is not possible without achieving the combined all-round view of buyer behaviour. This technique also imposes several technical challenges relating to speech recognition, entity annotation, linking text to structured records, mining patterns and rules of interest, and visualizing results and relating them to business insights.

Hai Wang proposed a business intelligence model of knowledge development through DM in the research paper "A knowledge management approach to data mining process for business intelligence." This model adds a crucial business insider centered knowledge development cycle to the conventional virtuous cycle of Data Mining (DM). The involvement of collaboration between knowledge workers can make DM more relevant to BI. The paper has proposed a model of knowledge sharing system that facilitates collaboration between business insiders and data miners. Through an illustrative case study, the paper has demonstrated the usefulness of the model of knowledge sharing

system for DM in the dynamic transformation of explicit knowledge and tacit knowledge for KM.

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. When a situation is presented to the system, the decision process starts from the executive's initial Situation awareness (SA) about the situation. The initial (SA) can be obtained in different means, e.g. business meeting. The executive's SA is input into the system and represented as computer information objects. After the CBIS receives the executive's SA input, it retrieves case base and mental model base which closely related to the SA. Cases and mental models are the representation of the past business management experience. Retrieved cases, mental models and SA are integrated and parsed into the information needs. The information needs are used to retrieve data warehouse for the seeking of situation data. Situation data is visualized and presented to the executive. The executive perceives information from situation representation and understand it through combing her/his past experience. The executive's cognitive process will eventually produce updated SA richer than the initial SA input. At the end of each interaction cycle (starting from initial SA input and ending at updated SA), the executive will have deeper understanding of the current situation and is more likely to make a good decision. The interaction cycle continues if the executive resubmits her/his SA to the system for richer SA and better decision. Otherwise the executive makes the decision and the interaction loop ends. In the real settings, several factors affect whether a new interaction cycle starts, such as permitted decision time, the executive's confidence, and stakeholders' opinions.

With the attempt to achieve a higher degree of human-computer interaction and make computers to cognitively support humans in decision-making processes; this research does not explore the various psychographic parameters of online buyer rather it is based on past cases.

Harold M. Campbell created a business intelligence model through knowledge management in his paper "The role of organizational knowledge management strategies in the quest for business intelligence."

There are three strategic value propositions which are included in the above model which organization may use. These are:

- 1) The need to manage their staff member as assets, who add meaning to information;
- 2) The need to set up structures that allow staff members to gather and distribute information, but most importantly to convert that information into bottom-line income;
- 3) The need to be in touch with, and responsive to, the needs of the customers of the organizations; they are the best, and final, arbiters of an organizations' actions. These value propositions are encapsulated in a model for creating BI through KM. 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.

Andreas Seufert and Josef Schiefer suggested an architecture for enhanced Business Intelligence that aims to increase the value of Business Intelligence by reducing action time and interlinking business processes into decision making in the paper *Enhanced Business Intelligence - Supporting Business Processes with Real-Time Business Analytics*. The central piece of the Business Integration infrastructure is a Sense & Respond (S&R) system that communicates events via hubs with the internal and external business environment.

Andreas Seufert and Josef Schiefer (2009) propose architecture for real-time analytics with the aim of reducing the action time and thereby increasing the value of Business Intelligence. The information integration infrastructure is responsible for managing the data for business intelligence purposes and offers data analysis to decision makers and to IT systems. Traditional Business Intelligence aims to support strategic decision makers and therefore uses analytical applications that are periodically fed with data from the data warehouse. These analytical applications are generally completely disconnected from operational IT systems. Decisions are executed by communicating them as a command or suggestion to humans. On the other hand, the enhanced Business Intelligence includes analytical services which are continuously fed with data from the operational environment (e.g. via the ODS) and can be directly invoked by other systems. The object of analytical services is to provide continuous data analysis that is able to also cope with current changes in the business environment.

IV. BUSINESS INTELLIGENCE, KNOWLEDGE MANAGEMENT AND DATA MINING

BI is a collection of applications and technologies of gathering, accessing, and analyzing a large amount of data for the organization to make effective business decisions (Cook and Cook, 2000; Williams and Williams, 2006). 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.

DM is a bond between BI and KM. Owing to its strength, DM is known as a powerful BI tool for knowledge discovery (Chen and Liu, 2005). 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 done 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 these behavioural parameters can be generally described in the perspective of unstructured decision making. BI is a collection of applications and technologies of gathering, accessing, and analyzing a large amount of data for the organization to make effective business decisions (Cook and Cook, 2000; Williams and Williams, 2006). 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.

V. CONCLUSION

A The proposed BBI framework is an attempt to overcome shortfalls of BI as it is based on the people, their behaviours, as well as the environment that influence their behaviours with respect to online buying in Indian context.

The empirical study of online buyer behaviour is an endeavour for e-retailers to improve their marketing strategies by understanding issues such as the how buyers' motivation, attitude, personality and trust impact their decision making in online buying.

The objective of the study is to explore the impact of attitude, motivation, personality and trust towards online buying decisions and design a framework for business intelligence. Decision makers and online retailers can use the information for competitive advantage.

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