VALUE CREATION OF BUSINESS INTELLIGENCE & ANALYTICS IN RETAILING

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Abstract:

Retailers have made BI&A (Business Intelligence & Analytics) investments in recent years that have enhanced the customer experience, driving increased sales and profits as a result. However, there are few studies on value creation by BI&A in the retailing industry. This qualitative study attempts to understand how and why BI&A creates values to both firms and their customers. The data collected of twenty-five retailers referred from Dow Jones' Factiva and other databases. Our research findings suggest that four main retail activities (store management, transaction management, consumer retention, and operations management) are involved in BI&A adoption. The key mechanisms of BI&A's value creation are relating to efficiently using existing assets, streamlining operational process, and self-sustaining work environment.

Keywords: Business analytics, Business intelligence, Retail, Value creation

Track: Retailing & Omni-Channel Management

1. Introduction of Paper

Retail is becoming an increasingly data rich environment as more of the businesses go digital, creating many more data capture opportunities (Chen, Sain & Guo, 2012; Chakraborty et al., 2016). The challenge for retailers is to capture the right data, the process at the right speed and take appropriate action (Kohavi et al, 2004; Hübner et al., 2016; Grewal et al., 2017). Given Business intelligence and analytics (BI&A) refers to the technologies, systems, practices, and applications that analyze critical business data to help an enterprise better understand its business and market, BI&A systems have become an important strategic investment for retailers (Lee & Lee, 2015; Ramanathan et al., 2017; Business Wire, 2018; OpenPR, 2018).

The research has investigated the evolution of BI&A (Chen et al,, 2012), the attributes of BI&A (Lahrmann et.al 2011), the impact of BI&A adoption on firm performance (Piccoli & Watson, 2008; Olszak, 2015; Torres et al., 2018), and the key successful factors of BI&A implementation (Ariyachandra & Watson, 2006; Yeoh & Koronios, 2010; Popovič et al., 2012; Corcoran & Scott, 2016). While these findings suggest that BI&A can create values for both firms and their customers, the deep study on the question of how and why these values are created remains limited, in particular in retailing area (Wixom et al., 2013; Côrte-Real et al., 2014). To fill the gap, this study adopts the retail business model as the analytical framework to observe retailers' BI&A activities. Based on systematically analyzing twenty-five retail firms' BI&A activities, our study identifies four main retail activities in which BI&A is involved. For each activity, we explain how BI&A proceeded from data capture, data analysis to its concrete applications; furthermore, we suggest the mechanisms by which BI&A can create values to both firms and their customers through building the linkage between BI&A activities and their consequences. Our study, therefore, provides insights and guidance for retailers, as for how successfully adopting BI&A systems in their diversified activities can maximize value creation.

2. Retail business model: an analytical framework

In this paper, we define retail business model as a brief representation of a firm's underlying core logic for creating value for its stakeholders (Sorescu et al., 2011; Teece, 2010). The business model represents the firm's distinctive logic for value creation and appropriation (Chesbrough & Rosenbloom, 2002; Teece, 2010; Zott & Amit, 2010). A properly crafted business model helps to make key assumptions about cause-and effect relationships and to maintain the internal uniformity of strategic choices (Casadesus-Masanell & Ricart, 2010). The strategic choices are related to the structure of the value chain (Zott & Amit, 2010), the choices

of customer (Morris, Schindehutte, & Allen, 2005) and value proposition to these customers (Morris et al., 2005; Teece, 2010). These consequences describe the firm can actually create and deliver value to customers and to itself (Sorescu et al., 2011; Teece, 2010).

3. Methodology

To evaluate the research questions we used a multi-case inductive study approach, based on a comparative analysis of 25 companies (Table 1). We utilized Dow Jones's Factiva to collect data based on keywords "business analytics" and "business intelligence". We also collected data from sample firms' websites. In our research, we followed the procedure recommended by Eisenhardt (1989) and Yin (1994).

4. Results

We present the retailers' main activities in which BI&A is involved. For each activity, we provide the details to explain how BI&A is analyzed from three dimensions: data capture, data analysis and applications; then we discuss the mechanism by which BI&A can create values to firms and/or to customers. Table 2 shows the main concerned retailers activities: store management, transaction management, consumer retention, and operations management.

4.1 Store management

Store management involves effective organization of a retail store through varied use of analytics and crowd control techniques. The store can be a physical or online space. The data generated by store operations in real time utilized by developing analytics models to optimise the store and staff performance. The data collected is in the form of text and video.

The methods utilized to explain the data are Deep Learning, Store Optimization, Geo-spatial Analytics and RIFD. The best way to start here is people counting in retail stores and creating heat maps that show the traffic in a shop during opening hours. Location analytics can also map how customers move through a store. Utilizing a combination of IoT (Internet of Things) -enabled product and shelf sensors, cameras and RFID devices, retailers can track which sections of the store receive the most traffic in general over different hours of the day and week. With this data, workforce planning and an optimised workforce schedule can be created on a daily basis. This results in effective customer service.

Overall, we identified two main mechanisms by which BI&A can create value for retailers to apply it in their store management. Firstly, leveraging the existing assets. For example, the software combines data from retailers' existing EPOS (Electronic point-of-sale) with heat mapping and people counting analytics captured with on-board Wisenet Open Platform cameras, to indicate the reasons why a store is performing better or worse than others

in a chain did. Secondly, value can be created with better allocation of resources. With accurate real-time data, retailers can also estimate in-store traffic, enhance staff management; evaluate the effectiveness of promotions and marketing events.

4.2 Transaction management

Finance and payments are the vital part of any retail operation. Secure transactions and efficient handling of data are the key attributes of this department. The data is in the form of text and involves proper scrutiny. This also involves proper management of a database to chronicle every single entry. Retailers like Ikea, Nordstorm, Macy's etc employ extensive utilization of BI&A applications with respect to finance and payments. Concerning the use of data in transaction management is all in textual form.

The methods utilized primarily are machine learning, data optimization, Predictive technology, cloud computing and RFID. There is various POS software available in the market including Square, Vend etc. Equipped with inventory management, reporting and analytics, as well as integrated payment processing, Square can also handle email-marketing efforts. Vend serves as retailers' centralized data repository for easier record keeping. With built-in inventory management, POS software can offer valuable data on the availability of different products, their location and any movement between locations.

Overall, we identified five main mechanisms by which BI&A can create value for retailers to apply it in their transaction management. They are increased brand recognition, accelerating sales and optimize business performance, centralizing the customer data, customizable payment solutions, and the mPOS terminal market growth. For example, through an online business analytics dashboard, a software suite like Unified Payments Insights focuses on big data to give merchants the chance to compare current revenue, social media activity, and online reputation. The platform allows businesses to see what customers are saying about them on websites such as Yelp and TripAdvisor. It also manages customers from acquisition to retention, monitor the competition with alerts and feedback, manage social media activity, and analyze business performance. In addition, such software offers its merchants fully integrated an omni-channel gift and loyalty platform. This enables small-to-medium size businesses to centralize their customer data spanning in-store, online, social and mobile channels.

4.3 Customer retention

Customer retention refers to the ability of a company or product to retain its customers over some specified period. High customer retention means customers of the product or business tend to return to, continue to buy or in some other way not defect to another product

or business, or to non-use entirely. The data collected about customers in an online or physical retail store is in text, audio and video format. For example, Netflix facilitated the creation of a recommendation algorithm that crunched vast quantities of data to match customers' movie preferences with older movies they were likely to enjoy.

Implementation of AR/VR technologies has enhanced the shopping experience of consumers. According to a report by Zebra Technologies Corporation, over eighty percent of retailers in the Middle East use store inventory to fulfil digital orders, while seventy-eight percent of logistics companies expect to provide same-day delivery by 2023. The technological advancement and the development of the advanced machine learning & deep learning algorithms are also the major driving forces for customer retention in the retail industry.

Overall, we identified three mechanisms to create BI&A value with respect to the retail industry. Firstly, personalization of product and services. Driven by the increasing adoption of the technology, the goal is to provide enhanced customer experience and offer a personalized shopping experience. Secondly, Process Optimization also assists in the growth customer experience techniques. A re-designed store environment so that staff always keeps the customer in mind. Indeed, all work activities that contribute directly to optimization of customer satisfaction. Thirdly, it creates programmatic advertising, which promises to make the ad buying system more efficient, and therefore cheaper, by removing humans from the process wherever possible.

4.4 Operations management

Operations management is a field of management, which emphasizes on managing the day-to-day operations of retailers. These retailers possess a huge amount of data, which needs to be analysed for proper functioning of business. There is also an increasing demand for supply chain oriented analytics to cope up with the lack of inventory space. The retailers need to reduce costs and optimize operations, which have started to reshape the retail industry ecosystem. The data collected from supplier as well as consumer side is textual and video in nature.

The data analysis with respect to operations management is conducted with the help of Predictive technology, Machine Learning, Process Optimization and Business Management. A product like business management software operates like a focal point to bring all the departments in a retail firm together. This creates cohesion and builds a self-sustaining work environment. BI&A adoption puts an emphasis on the importance of project management. This involves information about status of a certain project, updates on inventory or customer trend analysis etc. Retail chains use this project management to connect every store and maintain

benchmark for quality control. This data enables retail firms to make informed buying decisions and plan strategy for future growth.

Overall, we have identified eight mechanisms how a retailer creates value in operations management. They are developing Omni-channel sales network, creating a self-sustaining work environment, maintaining benchmark for quality control, making informed buying decisions and plan strategy for future growth, reducing operating costs, better utilization of assets, improving user experience, and prioritizing work, survey progress and identifying problem areas. For example, Centric's Slicer is a business intelligence tool that works with live data across Centric PLM; the 6.2 update enhances user interface and makes it virtually training-free to speed user adoption. 6.2 Slicer boasts more powerful, faster analytic capabilities, deeper data tree analyses and color coding options to help users prioritize work, survey progress and identify problem areas. This is very essential in case of logistics as it involves massive amount of data and structured workflow.

5. Conclusion

Retailers are implementing technologically advanced and intelligent solutions to attract new customers, retain old customers, and improve profit margins. The buying experience of consumers' has been freed of the burden of distance or time multiplying manifold the ease of access. This constant demand for better products and services has led to immense adoption of BI&A in the retail industry. In this study, secondary data was collected from twenty-five retailers around the globe using online database and company websites. We have analyzed the utilization of BI&A with respect to four kinds of retailers' activities, which are – store management, transaction management, customer retention and operations management. Primarily we codified the type of data collected (text/video/audio), data analysis methods (RFID, Cloud Computing, Process Optimization, etc.) and the applications (POS software, cameras, etc.). After that, we analyzed the mechanism to create value within four types of retailers' activities. We identified the value creation through various examples from retailers and BI&A resource providers. BI&A made tasks within retailers' activities more efficient to limit asset wastage. The streamlining and coordination of processes also enabled self-sustaining work environment. There was also an important component of centralizing all forms of data. It also involved the correlation between benchmarking of quality standards and value creation.

As we found earlier in this study, there are few studies on value creation by BI&A in the retailing industry (Wixom et al., 2013; Côrte-Real et al., 2014). Existing studies more focus on the role of Big Data and AI in retail industry, which is essential but not enough to assist mid-

size and small retailers to adopt BI&A (Sagiroglu & Sinanc, 2013; Jagadish et al., 2014). Our study bridges that gap by studying varied mechanisms of value creation in the retailers' activities. Moreover, other studies investigated BI&A with respective to operational level; we incorporated a more holistic approach and articulation of retailers' activities.

The managerial implication of this study was not to accomplish statistical validation, but rather to determine patterns for theory building. It was also to gain an enhanced understanding of operational priority for retailers (new and existing adopters). We gave examples from twenty-five global retailers to suggest a benchmark to be followed while implementing BI&A. We suggested best practices for activities while retailers are introducing BI&A or enhancing an existing system. Driven by the increasing adoption of BI&A, the goal is to provide enhanced customer experience and offer a personalized shopping experience. In case of operations management, there are innovations designed to boost user productivity and improve user experience. With accurate real-time data, retailers can also efficiently manage varied number of stores. BI&A enables small-to-medium size businesses to centralize their customer data spanning in-store, online, social and mobile channels. Overall, the study also noted down the benefits of adopting BI&A through mentioning more mechanisms for value creation.

There is a reasonable assumption that the insights gained from this study will guide future research studies to develop a more formal theory. The main limitation is that this is a qualitative study incorporating only secondary data and subjective in nature. Future studies can employ quantitative methods to collect primary data. Those methods can analyze the impact of BI&A from both consumer and business perspective. They can also involve interview or focus group based experimental studies. Future studies can also study the value creation ecosystem within the retailing industry. We can understand how respective activities interact with each other with the utilization of BI&A and create multi-faceted relationship with consumers and suppliers.

6. Reference

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Table 1 Sample retail firms' profile and information details

Firm	Country of origin	Year founded	Primary industry sector	Total Revenue in 2017(Currency: USD, in billions)	% Online Revenue/Total Revenue	Number of employees
Amazon	USA	1994	Internet and Direct Marketing Retail	177.86	100%	575,700
Flipkart	INDIA	2007	Internet and Direct Marketing Retail	2.72	100%	30,000
Walmart	USA	1962	Store & Internet Retail	500.34	3%	2, 300,000
Marks & Spencer	UK	1884	Store & Internet Retail	13.83	Negligible	84,999
Coles Supermarkets	AUSTRALIA	1914	Store & Internet Retail	23.75	3%	100,000
Woolworths	AUSTRALIA	1924	Store & Internet Retail	40.06	3%	111,000
Lidl	GERMANY	1973	Discount Store Retail	84.99	None	315,000
Carrefour	FRANCE	1958	Store & Internet Retail	89.80	Negligible	384,151
Future Retail	INDIA	1987	Store & Internet Retail	2.52	12%	35,050
Nordstrom	USA	1901	Store & Internet Retail	15.13	38%	72,500
Inditex	SPAIN	1975	Store & Internet Retail	28.80	10%	162,450
Trader Joe's	USA	1958	Store Retail	13.55	None	38,000
Costco	USA	1976	Store & Internet Retail	129.00	4%	253,000
Apple	USA	1976	Store & Internet Retail	265.00	17%	123,000
Starbucks	USA	1971	Store Retail	22.38	None	238,000
Kroger	USA	1883	Store Retail	122.60	None	452,000
NIKE	USA	1964	Store & Internet Retail	34.35	6%	74,400
Macy's	USA	1858	Store Retail	21.81	None	130,000
Target USA	USA	1902	Store Retail	71.88	None	345,000
Office Depot	USA	1986	Store & Internet Retail	10.24	60%	38,000
Ikea	SWEDEN	1943	Store & Internet Retail	43.21	5%	194,000
H&M	SWEDEN	1947	Store & Internet Retail	25.52	7%	168,000
Landmark	UAE	1973	Store Retail	6.00	None	55,000
Lulu Hypermarket	UAE	2000	Store Retail	6.30	None	43,000
Alibaba	CHINA		Internet and Direct Marketing Retail	39.89	100%	66,421

Table 2 Retailers' main applications of BI&A and their mechanisms of value creation

Retailers' activities	Data Capture	Data Analysis	Application	Mechanisms to create values
Store management	Text and Video	Deep learning; Store optimization ; Geospatial analytics; RFID	Checkout line; product recommendation; and personalized mobile site	1. Leveraging the existing assets. 2. Better allocation of resources.
Transaction management	Text	Machine learning; Data Optimization; Cloud Computing; Predictive technology; RFID	Various POS hardware and software	1. Increased brand recognition. 2. Accelerating sales and optimize business performance 3. Centralizing the customer data 4. Customizable payment solutions 5. The mPOS terminal market growth.
Customer retention	Video, Audio and Text	Process Optimization, AI & Machine Learning	AR/VR technologies ; location based technologies	1. Informing consumers about their product offerings enabling them to take wiser decisions. 2. Enhancing the shopping experience of consumers. 3. Programmatic advertising
Operations management	Text & Video	Project management; Connected device data ; Cloud technology; Predictive technology; Machine Learning; Process Optimization	Business Management applications; Cameras	1. Developing omni-channel sales network. 2. Creating a self sustaining work environment 3. Maintaining benchmark for quality control 4. Making informed buying decisions and planning strategy for future growth 5. Reducing operating costs. 6. Better utilization of assets. 7. Improving user experience 8. Prioritizing work, survey progress and identifying problem areas.