

## **HARNESSING BIG DATA FOR GROWTH IN RETAIL INDUSTRY**

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### Abstract

Big data has now become the latest trend today which led to cultural shift the way organisations and retailers link themselves to their customers, retrieve the data and do analysis, make plans and strategies. The today's customer is aware, empowered and has multiple expectations from the retailers and e-tailers. In the time of e-commerce and digitalization, the customers use data and technology for their shopping experiences. As the technology adoption and the multi-channel shopping experiences has become the inherent part of life of customers, it has become a major challenge for both the retailers and the e-tailers to keep up customer loyalty by understanding their expectations. Customers are varied in nature with respect to their demographics, tastes, preferences, likings, interests, purchasing power, behaviour etc. Analysing the customer needs, expectations, interests and behaviour; and mapping these factors to the products and offerings, discounts;

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making plans and marketing strategies are the major issues for the retailers today. The big data analytics used in retail sector called 'retail analytics' helps to get the solutions of these problems. The retail operations, today, are standing on the data driven platform and are digitally controlled; data can be collected from various sources such as e-commerce transactions, social networking conversations, etc. It is prime time for both retailers and e-tailers to proper utilize analytics to understand the data available and to strategize further for future growth. It is right time to recognize the significance of big data, its uses, role and impact on the new business requirements and leveraging the same for transformation of the business processes, organizations and the whole industry. The present study focuses on the business opportunities for retailers using big data and retail analytics; and how its application lead towards the growth in retail industry. This paper discusses the role big data and retail analytics play in decision making; and various strategic areas which can lead to the multi-fold increase in the sales revenue. The study also discusses various opportunities and challenges present in the retail analytics. The present paper is exploratory in nature and uses secondary sources for data collection. The present study will make the retailers to understand various facets of big data in retail to enhance operational efficiency, customer engagement and satisfaction, customer loyalty, product expansion and innovation, logistics and supply chain management. The present study will help in understanding the retailer that the big data bridges the technological divide between a traditional store and the level of integration consumers' desire.

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## **1. Introduction**

In today's era, big data is not only confined to the area of technology, it is being used as an agent of convergence for businesses, organizations, strategies, decision making and so on. It has evolved as a change in the way retailers' link with the customers in today's time. The retailers all over the world have been leveraging the big data to transform their processes and operations and leading towards the growth of their businesses. In today's competitive era, customers are empowered, have attitudes and expectations formed by their experiences across the commercial world. Today's customers use data and technology to boost and ease out their shopping experiences. As customer adoption of technology is on the boom and multi-channel shopping has become the trend today, data has become most critical component for decision making for the retailers. For example, a customer may start searching for a product on a mobile app, purchases it online and picks up the same at a store. Managing and coordinating the multi (omni) channel shopping by the customer needs totally new data handling expertise and competencies by the retailer. This depends upon whether the retailer can integrate, understand and manage this vast pool of data which is coming at a continuous pace. As the retail market is getting highly competitive day by day, nothing is more critical than the ability to optimize the business processes and simultaneously trying to satisfy the expectations of the customers. Channelizing and managing the whole data with the purpose of working for the customer as well as generating higher profits is very significant for survival. (PwC & RAI, 2017) Retailers have been taking a business-driven and realistic approach to big data. The retailers have been working with the approach of identifying the business needs first, and then customise the infrastructural requirements, data and information sources and data analytics to grab the potential business opportunity. To strive in a highly consumer-empowered economy, it has been made increasingly clear that retailers should use their data and information to gain a complete understanding of customers, products, markets, competitors, employees, distribution locations, etc. (Mercier, Richards, & Shockley, 2012)

## **2. Objectives and methodology**

In the age of frequent changes in needs and likings of customers, retailers must know the imperatives required to understand the change whether it is adoption of technology, studying consumer behaviour, observing the past trends or predicting the future. This paper is has the

objective of making the retailer understand the role and significance of big data analytics for strategic decision making. For this purpose, this paper highlights various data collection methods and data sources for data analytics which can be used for decision making, also focuses on various types / categories of analytics and framework a retailer can use for decision making. The present study also has an objective of finding out various opportunities and challenges that the retailers are facing in retail analytics. The present study has exploratory research design and uses secondary sources of data collection.

### **3. Big data and analytics**

Big Data is the huge data set that can be analysed to reveal meaningful patterns and trends. The analytics is interpreting and communicating these meaningful patterns with the application of statistics to quantify the performance. (Intel, 2014) Organizations apply analytics known as business analytics to data in order to improve the business performance. (Beller & Alan, 2009) It focuses on developing new insights and understanding of business performance based on data and statistical analysis, including explanatory and predictive modelling (Schmueli & Otto, 2011) and fact-based management to drive decision making.

### **4. Data collection and data sources for big data analytics**

Retailers should understand the types of data they want to collect, sources of the data and how the data to be used for decision making. With the help of analytical tools and techniques, they can get customer loyalty by creating a personalized shopping experience catering to their needs. Data collection can be done in two ways: online and offline. With the help of details that the retailers collect from their customers, retailers attract the customers by sending birthday offers, special discount on their special occasions, email campaigns etc. Data generated from the various digital touch points such as websites and mobile apps have been providing insights into the customer behaviour. (PwC & RAI, 2017) Mobile applications have been playing a crucial role in changing the consumer behaviour and shopping patterns. Big data analytics helps retailers both online and offline to reach the new customer, new markets and retaining the existing one. Previously, analytics was done by forecasting the consumer behaviour by investigating the sales for the last periods (months or years). It requires lot of data storage space for mining the data. Nowadays, business analytics tools helps the retailers to take decision depends on customer

interaction. They can analyse the customer type and modify the sales according to their interest at time when customer is considering the product. It reduces storage space to an extent as data analytics is applied in real time.

Retailers collect data from multiple sources such as POS, credit cards, location, internet, e-mails, mobile and social media etc. POS (Point of Sale) terminal is just like a cash register and it collects details such as types of items sold, price of the items, total sale for the day, sales by item category, customer data. This can be used in retail analytics for identifying the best customer and most selling items. Video Cameras are also used to monitor the number of people visiting the store, their searching and navigation patterns and buying habits. This is very helpful in analysing the data. Use of Wi-Fi and RFID tags enable better understanding of the customer behaviour and products. These techniques help in developing new and improved marketing strategies in the retail business. With the help of internet cookies, data can be tracked based on the pattern of shopping by the customer in online stores. Retailers send the newsletters and products to the customers in which they have shown interest. By collecting the data, from social media like Twitter, Facebook and mobile applications about the user's review, retailers can study the behavioural pattern of their customer. These social media activities are the large provider of big data.

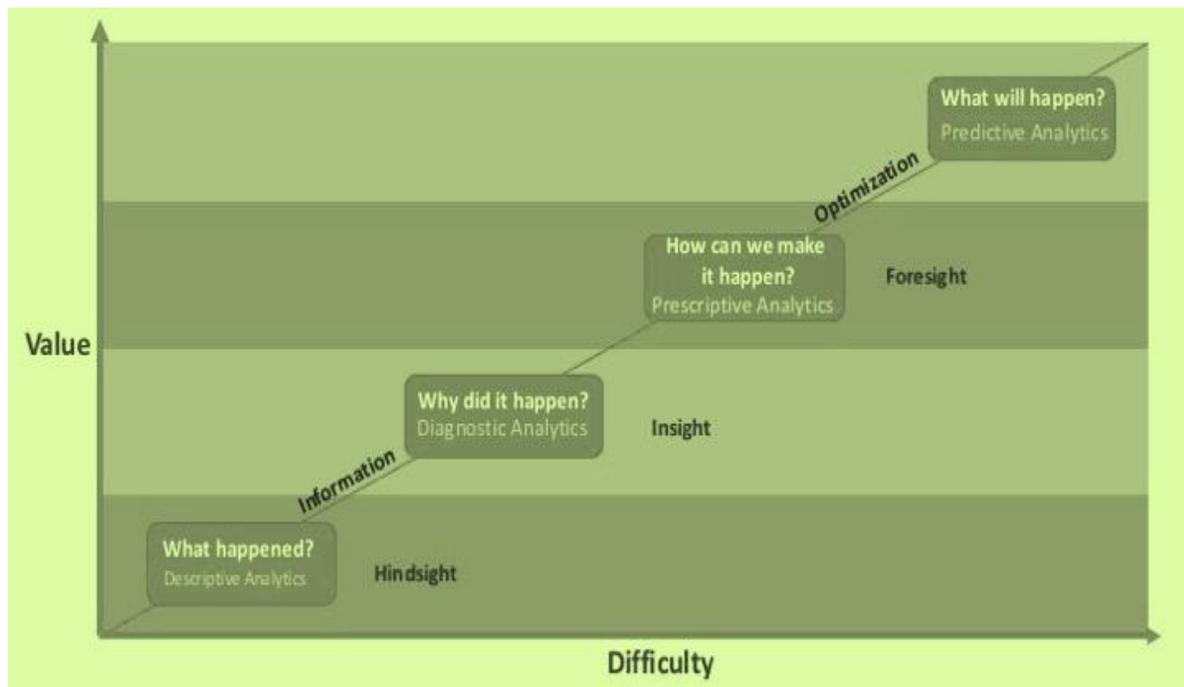
### **5. Use of analytics in retail**

In this hyper-connected, information-driven age, data and analytics have been playing a major role in strategy formation for the sustainable and profitable businesses. Advancement in technology and change in consumer behaviour have reshaped the retail business operating model and the value proposition. (PwC & RAI, 2017) With extensive increase in retail channels and rapidly increasing demand for social media, consumers are able to compare the products and services in terms of specifications, quality and price regardless of the fact that they shop online or in retail stores. With access to the data and information, consumers easily interact with retail channels through internet and social media platforms and empower themselves in influencing other customers to make a shift from one brand or another through online review, comments and tweets.

For the big retail players, data analytics is used more these days at all stages of the retail processes such as keeping track of popular products and services which are emerging in the market, forecasts of sales and prediction of future demand of products and offers. Identifying those customers who will be interested in a particular product or service based on their past purchases and finding out the most suitable manner to handle those using different marketing strategies and predicting what to sell next is what data analytics deals with. (Deepesh, 2017)

## 6. Types of analytics

Every business wants to expand operational efficiency and want to obtain more detailed customer insights for further strategy making. Retail analytics is one such area which allows the retailers / businesses to discover, interpret, and communicate meaningful patterns in data. In order to understand what retail analytics can do, a retailer must understand the different types of analytics which can be categorised in hindsight, insight and foresight and optimization (Burgess, 2017).



**Figure 1** Types of Retail Analytics, Source: [www.livetyles.nyc](http://www.livetyles.nyc)

- **Descriptive analytics:** Descriptive analytics categorised as hindsight reveals the hidden part of the information. It gives the summary in terms of transactional history, inventory

changes, promotional success etc. This type of analytics describes the reason of happening. Retailers apply descriptive analytics to analyse the direct mail campaigns to find out the response rates, the cost per lead and the conversion rates. This has now become a new practice with the introduction of big data. Retailers who use website tracking data can easily find out how many users visited a particular website, the pages that they have seen, exact time that they spend on the website, various links they have clicked etc. Descriptive analytics is considered at the bottom in the value chain (Wen, 2016) for retailer as its findings summarize the past. However, its utility and importance should not be undervalued as future trend can only be generated when past records are properly studied.

- **Diagnostic analytics:** This is categorised as insight and also looks at the past performance but it adds context to the data to determine trends or causative relationships between the variables and the outcomes. Diagnostic analytics provides insight as to ‘why’ outcomes bring about result as they appeared. For example, why promotional campaigns succeeded or failed, why a particular product was popular at a particular time, at a particular place. Diagnostic analytics needs a highly technical understanding the data and the analytic techniques.
- **Predictive analytics:** Predictive analytics categorised as foresight enables the retailers to anticipate the trends and behaviour of the consumers based on the past relationships between the variables discovered by the diagnostic analytics. This form of retail analytics uses various statistical techniques, on the data in order to forecast the trend lines and patterns. Predictive analytics is expected to become a driving force for retail industry as it helps in setting future trend considering the future consumer behaviour and get an edge over competitors.
- **Prescriptive analytics:** Prescriptive analytics is considered to be the last phase of retail analytics. It goes beyond the calculations of predictive analytics to suggest steps to maximize KPIs (Key Performance Indicators) performance leading to increased profit margins. Prescriptive analytics allows the retailers to take additional steps in anticipation of the changes in consumer sentiments, demand, supply shocks etc. (Deepesh, 2017) For example, cinema halls, airlines and cruise ships make changes to their ticket prices after anticipating changes in service demand. Recommendations are suggested in real-time – hourly or per day basis. Prescriptive analytics are not only restricted to store operations; logistics managers can

accelerate inventory consignments to meet anticipated inventory scarcity, and social media managers can customise the customer outreach using the data and information determined by the predictive analytics.

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These four types of retail analytics are being embraced by retailers in search of the competitive edge in data-driven customer insights and operational efficiency offered by Big Data analytics. This is becoming less an option and more of a requirement. In the new omni-channel retail environment, retailers must hold and outshine consumers' digital expectations or risk obsolescence.

## 7. Strategic areas in data analytics for retailers

- **Price Optimization:** Data analytics is playing a vital role in determining the prices of products and services in retail industry. It performs different algorithms for tracking demand, inventory levels, activities of competitors, thus helps the retailers for facing the market challenges. Price optimization (markdown optimization) also determines when the prices of the products and services are to be dropped in order to increase the demand and leads to increase in the revenue level. (Ernst&Young, 2014)

- **Future Performance Prediction:** Future performance prediction is another key area of data analytics as customer interactions has a huge impact on the business growth. Top business organizations have revealed the best way to have cause-and-effect relationship between key performance indicators and strategic shift indicators by using a test-and-learn approach which is done by comparing the performance of a test group to the performance of a well-matched control group.

- **Assist small-scale retailers:** Small Scale Retailers are benefitted with the retail analytics by obtaining assistance from the service platforms. Start-up companies have been using social analytics for creating awareness of products and services on social media.

- **Demand Prediction:** By gathering seasonal, demographical, occasions led data and economic indicators provide the behavioural pattern of the customers buying trends. This helps the retailers to predict the demand across the target market.

- **Forecasting Trends:** Now-a-days, the retailers use advanced tools at to have an understanding of the current market trends. Algorithms which make predict trends use purchase data to find what needs to be next promoted by the marketing department and what is not to be promoted.
- **Identifying Customers:** Data analytics also help in identifying customer interest for purchasing certain product. With the recommendation of search engine technology, companies like Amazon can ship the order according to the customer's needs efficiently. They can even decide upon how to draw the attention of the customers on a certain product and promotion.
- **Bringing Discount Efficiency:** Majority of shoppers have confessed that they actually use a coupon code while shopping. Promotional deals like coupons and cash back definitely bring customers rush but it may not be effective strategy to have sustainability in getting the long-term customer loyalty. The retailers can do analysis on the historical data and come out with predictive modelling for finding out the impact of such offers on long-term basis. For example, study can be conducted on the performance of the company, revenue level and consumer behaviour in no discounts period and compare the same with study conducted at the time of discount period in order to have a better understanding of the effectiveness of discounts and offers. Retailer can re-strategize using the comparative analysis and bring out the decisions which will boost the revenue level.
- **Reducing Churn Rate:** Customer loyalty is the biggest asset for any brand because the cost of getting new customers is multi-fold than retaining the older one. Using the big data analytics retailers can actually know the customers who are likely to churn out. New strategies can be built to retain them by offering special schemes, discounts and offers based on their likings and interests. (Deepesh, 2017)

## 8. Retail analytics framework:

Retail analysis can be used for better understanding and in attainment of deeper insights into the entire gamut of retail operations like procurement, supply chain, sales and marketing and

customer management. Based on the experience, retail analytics framework can be used to structure the following areas (PwC & RAI, 2017):

- **Merchandising:** The main areas of this analytics include assortment planning, product placement, space allocation and product adjacency. Retailers can use this analytics for placing right product at the right place at the right time. This analytics holds the key to optimize assortment. It plays a significant impact on retailer's profitability.
- **Marketing:** This analytics helps in promotions, pricing, personalisation and campaigns. Customer demands are changing day by day. Retailers should keep up with the changing customer needs and should provide improved customer service. It combines the data from POS, loyalty cards, customer relationship management and performing the analytics for optimizing marketing decisions. Main areas of consideration are pricing and promotion analytics. Different approaches can be used for price analytics such as price setting, pricing structure, cross/upsell, promotional pricing, profit leakage and markdown.
- **Supply Chain Analytics:** It includes Logistics, inventory, supplier performance and demand forecasting. Retail profitability has direct impact on logistics efficiency for maximizing the demand fulfilment. By adopting forward looking and analytics based approach, retailers can get the idea of current inventory replenishment strategy and impact of other strategies. This enables the retailer to take the decision about better supply and demand in order to reduce excess inventory and improve customer experience.
- **Store Operations Analytics:** Performance of the retail operations relies primarily on effectiveness of the store staff, cost earned to maintain them, reduction of pilferage from store, managing optimal level of inventory at right time and improvement of staff performance. Data generated by store operations helps in developing optimized model to improve store and staff performance. Models can forecast the demand based on seasonality, campaign dates, festive events and marriage periods and identify their impact on store staff requirement. Location analytics can map how the customers move through a store.

## 9. Opportunities in retail analytics

Huge data is generated everyday in terms of variety, velocity, volume and value. The retailers all across the globe have been getting an increase in their operating margin using big data analytics. This has generated a need for a technical expert in this area whose task is to retrieve information from huge volume of big data (structured or unstructured) which will help retailers to take strategic actions and plans to increase sales revenue and reducing the cost at the same time.

The retail analytics help retailers to create customised offers through online behaviour analysis using web analytics. It can help develop personalised offers on mobile apps based on location, liking, occupation, gender etc. The retailers can come out with targeted campaigns that use analytics for customer segmentation, identifying the best channels and achieving the optimum return on investment.

Customer experiences and feedback can also be analysed by applying sentiment analysis on call centre records, social media streams, product reviews and related blogs etc. Strategies can be formed using predictive analytics for multi-level reward programs and personalized recommendations based on online data purchase preference, mobile apps, offline buying etc.

Detailed market basket analysis can be conducted which may result in quick growth of sales revenue. (Intel, 2014) Video data analysis is to identify the shopping trends of the customers and cross selling opportunities. Various trends can be identified using the big data analytics i.e. seasonal or holiday trends, economic forecasts, traffic and weather reports etc.

The retailer throughout the world can have optimum level of efficiency in all the departments by applying big data analytics and strategize the decisions. The retail analytics has played a very important role in bringing numerous operational modifications over the years in retail industry. Therefore, the adoption of these analytics solutions has been mounting speedily making further retailers work untiringly in order to enrich supply chain operations, improving the marketing campaigns and raising the satisfaction level of customers also achieves a high rate of success in retailing.

## 10. Challenges

As huge volume of data is required, ensuring data quality through integration and combination from different sources and deciding upon the subset of data needed is difficult. Optimizing data analytics in the retail industry is a challenging task as the factors like privacy and security of data play a substantial role. Companies are collecting the data from various sources such as third party or through various tools like webcam, POS, mobile devices etc.; however, they generally fail in implementing the strategies using that data. So the expertise is required to come out with relevant information for decision making. Retailers spend huge amount on promotion but it never guarantee that it will get converted into sale. Predicting consumer buying behaviour and habits is a very big challenge for retailers as fashion and trends are changing at a very fast pace due advanced technologies and different consumer tastes makes it difficult for the retailers to analyse these changing trends. (Dezyre, 2015) Value of the Big data can be realized only when it solves the important business challenges which requires access to variety of data, strong analytics capabilities that include both software tools and the requisite skills to use them.

## 11. Common practices of big data analytics in retail industry

There are numerous cases in India and across the globe which shows that big data analytics has been highly practiced for further decision making. Analytics has widely in use different sectors such as banking, insurance, Telecom etc. Retailers such as Shopper's Stop, Titan, Reliance retail, Spencer's, Future group, Cafe Coffee day, Tanishq, Planet M, Arvind mills, Gitanjali group, and E-commerce such as Naukri, Bharat matrimony, e-bay, rediff, TOI (online), Net carrots etc. widely use big data analytics in following different purposes.

- **Connecting with Customers:** Consumer behaviour and consumer sentiments can be studied using the big data analytics, which may help the retailers improve the way retailers interplay with customers in the stores, through mail or through other marketing channels. Big data connects transaction data, online consumer behaviour, in-store shopping patterns and trends, product preferences etc.
- **Increasing Customer Base:** Many retail giant such as Walmart, Target etc. use big data analytics to strategize and look out for different ways for attracting the new customers,

satisfying the old customer and increase the loyalty of their customer base. (Gupta & Kumar, 2014)

- **Measuring brand Sentiment:** This analysis is based on studying the behavioural pattern towards the brand using sources such as Pinterest, Twitter and Facebook. These results are helping the retailers such as Walmart, Target and others develop strategies for the product development, advertising and marketing programs.
- **Creating Customized Promotions:** Using big data analytics custom offers can be created based on the browsing history of customers and other data sources. These promotions can be further used for localized marketing, pushing coupons and lucrative offers to the customers based on their location. They can even drive the e-commerce sales using real-time offers through online advertising or social media.
- **Improving Store Layout:** Customer movements can be tracked by the sensor data such as RFID or QR codes. These are used to track in store traffic, flow of traffic in store and shopping habits which helps in changing the store layout.
- **Optimizing E-Commerce:** Optimizing e-commerce sites can be achieved by clickstream data and behaviour monitoring over web. Linking and share by the people on social media websites and their purchase history also makes an impact on the optimization of Ecommerce Web sites. The clickstream data can be analysed with the help of Big Data.
- **Sending reminders to Customers:** After using big data analytics, the US second largest drugstore chain CVS came to know that one-third of customers stopped taking their prescribed medicines after a month and 50% of the customers stopped taking the same after a year. The company solved this matter by starting an automated program of sending texts, emails and phone calls to remind people so that they could get their prescriptions refilled.

## 12. Conclusion

Mobile technologies, cyber security and data analytics are important areas of investment for retailers. These can help them in significantly improving their operational efficiency and deliver a better customer experience. (Brynjolfsson, Hu, & Rahman, 2013) Retailers are adopting different innovative ideas and operating models, including partnering with online marketplaces or setting up their own online stores in order to get maximum benefits from e-commerce and stores. Retailers can reduce shrinkage by identifying patterns in shoplifting in their stores, such

as location of store, time of the day, type of shoplifting, employees on duty and products stolen. Based on this, they can undertake initiatives such as providing training to employees, increasing coverage of radio frequency identification (RFID) tags, installing cameras in certain areas and ensuring tighter observation based on specific intelligence generated from analytics. An analytics based approach can support retailers effectively undertake the voyage of finding faith, description, forecast, optimisation, empowerment and entrenching of intelligence in their existing process and operation workflows. Retailers now use the business acumens created from analytics to effectively bring together physical and digital store operations under one umbrella to bring operational efficiency and profitable growth. They can set up a flexible data infrastructure that is capable to build a 'single view of a customer' and give real-time operations. As a result, retailers would be definitely able to successfully spot opportunities and potential, quickly assess ideas also test and learn from these experiences. This way they will innovate continuously and understand and embrace upcoming business models. Data and analytics would work as a core to enable capability and help them to exploit the latest technologies to give better digital experiences to their customers and integrate digital channels and operations into the fabric of their businesses. The retailers should come up with mobile technology as the next big area in marketing analytics and incorporate it in their strategy. The retailers who capitalize the trends patterns of data and information can better connect their customers and win the loyalty game.

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