

# *Understanding Importance of Artificial Intelligence from the view of Retail Industry*

Prof. Dhruv Brahmhatt  
Faculty of Management  
GLS University  
Ahmedabad, India  
dhruv.brahmbhatt@glsuniversity.ac.in

Prof. Jaineel Shah  
Faculty of Management  
GLS University  
Ahmedabad, India  
jaineel.shah@glsuniversity.ac.in

## **Abstract**

The retail and consumer goods industry faces substantial challenges, endangered by a demand for personalisation, an unoptimized business process constrained by human error and an inability to fully anticipate customer demands. These problems leave consumers unfulfilled in the search for an experience that reflects their continually developing desires. Then you have technology, like Artificial Intelligence which presents both a challenge and the key solution to facing these challenges. This paper identifies the key importance of the Artificial Intelligence and understand the significance of the Technology to enhance the growth of Retail Industry. Various expert gives their varied view on the application of Artificial Intelligence in business applications and concluded the positive effect of it. Artificial Intelligence can be considered for Automated Checkout, Sales Forecasting, Optimising Energy Usage, Churn Rate Minimisation and IoT Instore analysis for the enhancement in to the retail industry. Overall Artificial Intelligence is the future for the Retail Sector.

**Keywords:** Artificial Intelligence, Retail Industry, Consumer Behaviour, Business Intelligence

## **I. Introduction**

Generally, artificial intelligence (AI) involves technology groups such as machine learning, natural language processing, perception, and reasoning since it is difficult to define [1]. Even though the field's application and philosophies have undergone investigation for more than sixty-five years, modern improvements, associated society excitement, and uses ensured its return to focus. The effect of the previous artificial intelligence systems is apparent, introducing both opportunities and challenges, which enables the addition of future AI advances into the economic and social environments. It is seeming that most people today view AI as a robotics concept but it essentially includes broader technology ranges that are used widely [2]. From search engines to

speech recognition, to learning/gaming structures and object detection, AI application has the possible to intensify in the human daily lives. The application is already experiencing use in the world of business as companies seek to study the needs of the consumers, as well as, other fields including healthcare and crime investigation.

## **A. Artificial Intelligence Systems: An Overview**

**Neural Network Technique:** The knowledge-based system, which uses contextual knowledge about events and their relations to other concepts in the application domain, can improve the quality of event processing and decision making. This system is used by the stock market and to forecast demand of a product.

**Robotic Technology:** Robot is built with AI system. All AI methods are used to make a robot that include artificial neural network, knowledge-based system and all possible decision-making systems. Robot technology is a growing driver with exponential development and is therefore of high relevance to a broad range of branches and application domains.

**Knowledge-Based System:** A knowledge-based system is a computer program that motives and uses information to solve multifaceted problems. Conventionally, computers solved complex problems using algorithms created by programmers. With knowledge-based systems, human knowledge is captured and embedded explicitly within a program in a symbolic **format**.

## **B. Snapshot of Artificial Intelligence Today**

AI has been estimated to boost global GDP by \$15.7 trillion by 2030, which is more than the current output of China and India combined. [3] Of this increase, \$6.6 trillion is calculated to come from growth in productivity, while \$9.1 trillion will originate from consumption effects. The potential impact of AI is undeniable. Even when questioning business managers

around the world, 72% were influenced that AI would be the business asset of the future. [4] The key to future success lies in constant innovation.

To remain competitive, it is essential to optimise your efficiency by increasing execution speed, reducing costs and minimising human error. One technology that thrives on these elements is Robotic Process Automation, which will be the second technology discussed in this paper. Price Waterhouse and Coopers & Lybrand (PwC) estimates that up to 45% of all work activities can be automated and that this automation would save \$2 trillion in global workforce costs. [5] Both AI and Robotic Process Automation, and indeed the combination of both technologies, show great potential for helping retailers and producers to overcome the challenges they are currently facing.

## **II. Data Methodology**

This study is based on secondary data obtained from various research papers, articles, magazines and web content from the Internet. The research on the applicability of AI in Retail Industry has almost been exclusively undertaken by researchers. Most of these authors are experts in one or more areas of retail and marketing, but they lack educational background and experience in AI. Many have come to AI research with a general background in information systems. Others simply identify the need for AI applications in the task domain they study and have educated themselves in AI for performing the research. The term AI stands for many processes, models and techniques derived from the osmosis of statistics, machine learning, databases and visualization. Several of these methods have been applied for examining the financial data, operational data, product data etc. Popular decision-making methods that will be mentioned in this study are neural networks and knowledge-based system.

## **III. Artificial Intelligence and Consumer Behaviour**

The rise of the concept of artificial intelligence received great consideration occupying the society's awareness. In recent times, it is receiving massive debates and some of the global consumers are quickly accepting its idea due to the frequent experience. Many of the consumers collaborated with the notions of AI through reading them in media channels or having personal knowledges. Through this, the consumers gain self-assurance in the matter, especially if it leaves a positive impression. Additionally, many of these people have become very interested about the use, avenues, and

ideas of artificial intelligence [6]. It is true that AI plays a significant role in the background, monitoring consumer feelings on the internet and social media. These social listening kits, driven by AI engines confirm that consumers easily find their preferences [7]. Accordingly, these consumers often receive pop-up advertisements from the applicable websites to find the products they need. It is also able to permit the consumers to save their data on an online domain without many procedures such that it becomes relaxed to navigate the internet the next time one uses it. With the increasing know how of AI, consumers fear the artificial intelligence capabilities and potential related with taking over all aspects of life. The tension resulting from accepting aspects of artificial intelligence relates to its puzzling nature. To prove this, Grewal et al conducted a survey and out of the sixty-six percent of the international consumers, eighteen percent claimed to know much about it while forty-eight percent knew a little. The remaining thirty-four percent self-confessed to knowing nothing about the topic. Even with these results, it is true that a huge percentage of consumers think that they are well-informed as far as artificial intelligence is concerned but, most of them could not even identify with its simplest abilities such as problem solving and learning. Another study found out that only thirty-four percent of the participating consumers had an idea of AI experience in their daily activities. In real sense, eighty-four percent of them cooperated with this technology via Chabot, search engines, intelligent assistants, online shopping recommendations, Facebook suggested news, and email spam filters. The statistics are not impressive making it necessary for the consumers to undergo education on artificial intelligence so that they can make suitable conclusions on the matter. It is noteworthy that most of the well-informed consumers view artificial intelligence in a positive light [8]. They feel it will save time, offer relevant and improved information access, and allow the engagement in risky tasks [1]. Consumers also see that AI will bring about lower prices, companionship, and simplify decisions regarding purchases. They claim that this phenomenon can offer answers to the complicated issues the world is facing in the 21st Century. These concerns include international health, climate change, prevalence of terminal illnesses, and socio-economic development. Others also believe that artificial intelligence can help carry sanity on matters of privacy, cyber security, fraud, individual financial security, and gender equality. These problems have strengthened in the modern times making it necessary to come up with long-lasting solutions to ensure the wellbeing of every human. Despite this, the same consumers also have worries concerning the intelligence given to machines [9]. They

point out that improved progress in machine learning is likely to harm employees through taking their responsibilities. Most of the employers will find the machines to be more effective making the workforce experience a digital replacement, especially in office associate travel manager, and tutor careers. Subsequently, all consumers are always looking for convenience and a sense of liveness. The presence of artificial intelligence in the world is permitting people to live their dreams since they can get their duties done from the ease of their homes. Looking at aspects of shopping, the consumers can conduct a long and wide research on the resources they need and even compare prices and assessments to allow them to buy the most suitable product for them, enabling consumer intelligence [10]. Artificial intelligence search engines including Google necessitate the process; making is possible for consumers to shop online. Additionally, their shopping experience is even made easier because customers can conduct online payments and wait to receive their goods at home or at any other places [6]. As noted by Shinn, this is made possible because machines record and process instructions and provide the relevant information.

#### **IV. Artificial Intelligence and Retail Industry**

AI influences the international business situation greatly providing important benefits to both the sellers and buyers in retail. The technology knocks into the retail domain's information pool related with advertising, think-product development, process development, consumer experiences and online search among others. Since retailers embraced market research for many years, AI allows them to reengineer complex data into rationalizes and easier experiences for customers and retailers alike. Its machine learning and analytical instruments often offer relief to the buyer efforts. The AI allows retails to gain sharper forecasting tools that ensure the making of sharper business decisions. Algorithms strengthen the ability to view business implications and translating results like higher revenue and lower costs through new product development, customer service, product inventory, and staffing. Customer service is a significant aspect of any retailing industry since it regulates consumer brand loyalty and retaining. Platforms such as Facebook, Twitter, allow retailers to save operation costs linked to customer service through incorporating chatbots via Facebook Messenger, twitter chats etc. Artificial intelligence replaces the conventional customer service agent answering questions by sending links, images, and texts and only uses human respondents if the issue is more complicated. Retailers also acknowledge that managing the adequate availability of

product is tasking because it experiences pressures from weather, future and economic events. If product inventory is mismanaged, it might initiate customer frustration and lose of sales. Due to this, retailers are now using AI to minimize the improbability of stock level maintenance through variables such as marketplace and consumer demand, and supply chain supervision. Further, AI assists retailer in recruiting the appropriate candidates for hire by assessing the employee's attribute and performance history, which reduces hiring costs and attrition. They can also use the platform to engage more with applicants, offer personalized feedback, updates, and oncoming suggestions.

#### **V. Artificial Intelligence and its Applications in Retail Industry**

Advances in AI will impact all industries and business functions over the coming years. The ultimate commercial potential lies in being able to do things that have never been done before, rather than simply automating or quickening existing capabilities. Gains are shared by businesses, through better competence, and by society, in terms of the ability to offer improved products and services (from personal assistants on mobile phones to healthcare diagnoses and even improved cyber security) AI to be necessary - a view reinforced by high volume surveys that we have commissioned. More than 60% of the 2,500 consumers and business decision-makers we surveyed in the US believed that AI could help provide solutions for many of the most important issues facing modern society, ranging from clean energy to the fight against cancer and disease. [3] In this segment we will look at how AI can help today to take the Indian retail and consumer goods industry to the next level.

##### **A. Automated Checkout**

Automated checkout is made possible by machine learning algorithms, more definitely computer vision machine learning algorithms. Within the computer vision domain, computers are teaching themselves to identify patterns and products in images. In most cases, the retailer decides to implement a supplementary application (with personalized QR codes) that consumers should use when entering a store. Consequently, the machine learning algorithms know which customer to charge later, when he/she leaves the store. Thanks to camera footage & algorithms, the technology can recognise when an item is picked up and identify the item and when the consumer leaves the store with the item. Even if a consumer ultimately decides to leave an item behind on a random shelf, the machine learning algorithms will be able to see and identify this action and

remove this item from the customer's digital shopping cart.

## **B. Sales Forecasting**

Predicting your future sales based on big data analysis. A precise sales forecast leads to stock optimisation, a important reduction in food disposal and increased profitability. Forecasting is based on a machine learning model. An intelligent agent sets up variables that effect the sales of a product, ranging from factors such as price and promotions all the way through to the effects of the weather. Over time, through big data analysis, the intelligent agent will be able to accurately estimate the impact that each influencing factor will have on sales, allowing you to foresee how your sales will perform.

## **C. Optimising Energy Usage**

An intelligent system tasked with monitoring and optimising energy consumption, allowing businesses to radically reduce their energy consumption. The technology used to optimise a business's energy consumption is known as reinforcement learning. Reinforcement learning stems from the machine learning domain and is self-learning algorithm that learns by trial and error based on a reward and punishment system. The intelligent agent will learn to determine a successful strategy that leads to the greatest long-term reward. [12] In this case, for example, the intelligent agent will use the data received (from the various machines, temperature, etc.) and learn what is the optimal set of parameters (e.g. machine-, temperature settings) to optimise a business's energy consumption.

## **D. Churn Rate Minimisation**

Keeping existing customers is five times inexpensive than the cost of gaining new ones, [13] which is why the aim with this technology is to minimise churn rate by recognizing customers at high risk of leaving a service and to identify the factors influencing a customer's decision. Machine learning algorithms are applied to predict a customer's churn probability and help to find patterns in existing data related with the predicted churn rate. Retailers can then use this knowledge to address their at-risk customers.

## **E. Online Search Recommendation**

Online search recommendation is the act of predicting what a user is searching for. If you think about one of your most popular online platforms they will always try to predict which video, friend, product, etc. you are attentive in and recommend it to you. There are

two major types of recommendation engines, namely content-based and collaborative filtering recommendation engines. A content-based recommendation engine analyses the content of the product as well as the content of the customer/profile and matches the two Collaborative filtering recommendation engines take the entire customer database into account and can consequently determine which type of customer is visiting their website. There are two types of collaborative filtering, these being consumer-based and product-based. In consumer based collaborative filtering, the tastes and preferences of many users will be recorded. Your profile will be linked with users sharing similar interests and recommendations will be given based on what similar profiles like. Product-based collaborative filtering develops an understanding of how products relate to one other, then analysis the products your shoppers interact with and personalises catalogue.

## **F. IoT Instore analysis**

IoT devices create a personalised experience by learning what types of consumers are in its proximity, or in this case, in the store. This type of product includes three modules, namely data assembly, machine learning consumer output (more marketing-based). From a data-gathering perspective, information is collected from IoT devices such as beacons and sensors, or through digital input such as RFid, Wi-Fi and mobile applications. Consequently, machine learning algorithms predict what this customer like and/or is looking for. Connected devices are then able to react based on machine learning output, enabling these devices to display personalised output. A connected television could, for example, start displaying advertisements for baby products after learning that there are a high number of young mothers in the vicinity.

In a smart store, mall traffic can be analysed across several retailers so we understand the entire shopping ride. In the past, we had to run expensive survey projects to understand if store connections were being responsive to customer service needs and then enact elaborate staff training programs. Now, within smart stores, we will be able to use video or Wi-Fi foot-traffic monitoring to see if customers dwell over a product area. Then, in real time, direct an associate to help that customer or analyse that information later to adjust store layouts for more efficient customer visits. In addition, by monitoring store traffic and customer demand in real time, we can modify the current in-store shopping experience. That gives us the opportunity to implement rich digital marketing inside the store or announce events to customers via their mobile devices.

## VI. Artificial Intelligence: It's Importance in Business and Its Applications

AI technology has been applied to many decision-making theories and concepts related to business and assurance problems. However, the application has been largely sparse and mostly at the theoretical level. Some expert systems and procedures have been in use at public accounting firms, such as ADAPT [14], Deloitte Touche's Audit Planning Advisor, Pricewaterhouse's Planet, Arthur Andersen's WinProcess and KPMG's KRisk [15] [16] [17]. Most of these systems address risk assessment [17], and not all applications of AI to audit problems have been successful in the long run. In 1995, Arthur Andersen reportedly have developed a system to help in assessing the litigation risk associated with audit clients [18]. History suggests that it was not ultimately beneficial. Conversely, AI has mostly been applied successfully only to the more, structured, programmable and repetitive tasks in which gathering human expertise is not extremely difficult. See, for example, the extensive literature on expert systems for audit tasks that dates to the mid-1980s [19] [20] [21] [22] [23] [24]. There are a lot of countries working on the development of accounting using AI. In a developed country like the US, advanced systems are used for stock market analysis, analysis of demand for products, etc. The few companies that were using AI indicated to be using the technology in the fields of risk analysis, data management and tax compliance. Robot Processing Automation, on the other hand, was mainly used in the fields of invoicing and accounting, but also stretched to fields such as data processing, supply and quality management. People might not realise it, but AI and Robot Processing Automation are potential technology for today. Business leaders and potential disruptors are planning various ways of implementing these game-changing technologies soon, and so should us. The areas where AI is vastly used in developed and developing countries.

## VII. Conclusion

The present discussion reveals that AI has a positive effect on retail industry and has led to some very useful systems that have found their way into the heart of business activity. The neural networks, genetic algorithms, knowledge-based system, and data-mining are powerful tools for successfully running a business, though it is difficult for the business to obtain the general relevance from AI perspective. Retail Industry should keep a track of to what extent AI can go, because there are many potential benefits of AI to current and new businesses which are subject to future research.

AI is helping retail industry to be automated so that the businesses can be run smoothly. The developed countries are making huge progress using the AI system. Hence, it is strongly recommended that developing countries also need to cultivate AI, mostly the neural network, knowledge-based systems, data mining techniques, and expert system, to be successful in business. Though AI is really a great tool for retail intelligence, we need to be careful as AI is not creative (though lately this is open to debate); it is limited in the use of previous data, cannot make use of a very wide context of experiences, and does not use common sense, i.e., lacks the human touch. Human qualities are sometimes ignored and AI can malfunction and do the reverse of what it is programmed to do. Further, there is no filtering of information. This type of technology can be misused to cause mass profit or loss in the business. Moreover, it requires an expert to handle an AI system-guided retail software.

AI have an enormous influence on the way we live our lives. From allowing hyper-personalization to saving huge amounts of time on routine tasks, these new tools are fundamentally shift the way we interact with technology in our day-to-day lives. As AI becomes normalized, industry leaders must be cognizant of the ways the technology is implemented so that consumers from all ends of the spectrum can benefit. This means optimizing data storage and transfers at the backend to create fluid experiences.

## VIII. References

- [1] Kaplan J (2017) Artificial Intelligence: Think Again. *Communications of the ACM* 60: 36-38.
- [2] Greenberg, Paul (2017) Separating AI Reality from AI Hype: Artificial Intelligence Is about to Go Mainstream, so Let's Talk about What It Is, and Isn't. *CRM Magazine* 2: 4.
- [3] PwC: Sizing the prize, what's the real value of AI for your business and how can you capitalise (2017)
- [4] PwC: A revolutionary partnership: *How AI is pushing man and machine closer together* (2017)
- [5] PwC: *Organize your future with robotic process automation* (2016)
- [6] Shinn S (2017) The Inhuman Touch: Educators Teach the Nuances of Artificial Intelligence. *Bized* 16: 75-79.

- [7] Grewal D (2017) The Future of Retailing. *Journal of Retailing* 93: 1-6.
- [8] Kristin L (2017) Artificial Intelligence, Automation, and the Economy. *Chinese American Forum*, 32: 22-23.
- [9] Saran C (2017) Retailers Buy into Ai to Sell Customer Experience Computer, *Weekly* 21: 19.
- [10] Michael G (2015) The Future of Artificial Intelligence: Benevolent or Malevolent? *Skeptic (Altadena, CA)* 1: 57.
- [11] PwC: A revolutionary partnership: How AI is pushing man and machine closer together (2017)
- [12] Retail Wire: A.I.'s advancing role in fuelling the retail supply chain (2017)
- [13] DeepMind: *Deep reinforcement learning* (2017)
- [14] Gillett P R (1993), "Automated Dynamic Audit Programme Tailoring: An Expert System Approach", *Auditing: A Journal of Practice and Theory*, Vol. 19, No. 1, pp. 145-155.
- [15] Brown C E and Murphy D S (1991), "The Use of Auditing Expert Systems in Public Accounting", *Journal of Information Systems*, Fall, pp. 63-72.
- [16] Bell T B, Bedard J C, Johnstone K M and Smith E F (2002), "KRisk: A Computerized Decision Aid for Client Acceptance and Continuance Risk Assessments", *Auditing: A Journal of Practice and Theory*, Vol. 21, No. 2, pp. 97-113
- [17] Zhao Zhenwei *et al.* (2004), "Burning Velocities and a High Temperature Skeletal Kinetic Model for  $n$ -Decane", available at [https://www.princeton.edu/combust/research/publications/n-Decane Flames and Kinetics](https://www.princeton.edu/combust/research/publications/n-Decane%20Flames%20and%20Kinetics) (Zhao et al Combust Sci Tech, In Press 2004).pdf
- [18] Berton L (1995), "Big Accounting Firms Weed Out Risky Clients", *The Wall Street Journal*, June 26, pp. B1 and B6.
- [19] Abdolmohammadi M J (1987), "Decision Support and Expert Systems in Auditing: A Review and Research Directions", *Accounting and Business Research*, Spring, pp. 173-185.
- [20] Gal G and Steinbart P (1987), "Artificial Intelligence and Research in Accounting Information Systems: Opportunities and Issues", *Journal of Information Systems*, Fall, pp. 54-62.
- [21] Messier W and Hansen J (1987), "Expert Systems in Auditing: The State-of-the-Art, Auditing", *A Journal of Theory and Practice*, Vol. 7, No. 1, pp. 94-105.
- [22] Brown C E and Murphy D S (1990), "The Use of Auditing Expert Systems in Public Accounting", *Journal of Information Systems*, Fall, pp. 63-72.
- [23] Delisio Jeff *et al.* (1993), "Planet: An Expert System for Audit Risk Assessment and Planning", Fifth International Conference on Intelligent Systems in Accounting, Finance and Management, available at [http://www.it.iitb.ac.in/palwencha/mtb/PHW\\_Tr30.pdf](http://www.it.iitb.ac.in/palwencha/mtb/PHW_Tr30.pdf).
- [24] Brown C E and Coakley J R (2000), "Artificial Neural Networks in Accounting and Finance: Modeling Issues", *International Journal of Intelligent Systems in Accounting, Finance and Management*, Vol. 9, pp. 119-144.