

Artificial Intelligence in Online Retail in Brazil

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### Abstract

The objective of this review is to see how online retail thrive through reliance on artificial intelligence (AI). Numerous businesses have already adopted AI to improve operational efficiency, resulting in increased revenues. This paper will focus on the research of online retailers in Brazil. With a market of over 200 million population (IBGE, 2022) and one of the world's largest economies (WB, 2022), this country makes a good subject for e-commerce study. The market competition, current trends, and consumer culture will be highlighted in this review, as well as the factors that highly influenced the active growth of online retail in Brazil. The topic of how different AI solutions benefit online retailers will be covered. Although AI has many advantages, there are also some limitations in which human intervention is still necessary. Despite this, the benefits of AI can still outweigh the drawbacks and remains a top alternative for growing e-commerce businesses. Due to the volume of data being maintained, it is crucial to organize how these data are stored so that users may easily access them.

*Keywords:* Artificial Intelligence, Brazil, Retail, E-commerce, Online Retail

### Artificial Intelligence in Online Retail in Brazil

According to the International Trade Administration (2023), e-commerce in Brazil increased by 31% from H1 2020 to H2 2021. This growth was attributed to the pandemic, where people tend to buy online rather than go to a physical store. Brazilians are making use of government-funded digital wallets and gaining access to online retailers for the first time. Since more individuals are becoming aware of the various online platforms where things are easily accessible and could be at a much lower price, online purchases are anticipated to rise. But how are the top online retailers managing this growth? With the threat of cyber security, storing big data could be a challenge. In this digital era, artificial intelligence plays a vital role in managing this huge volume of data. Furthermore, one of the most beneficial things that AI can do in online retail is create algorithms. Solutions like this can assist businesses with proper market segmentation to effectively sell their products. AI could have some limitations, but will the advantages outweigh the disadvantages?

### Overview of AI

The phrase "artificial intelligence" was originally used by John McCarthy in 1956, who defined it as the science and engineering of creating intelligent machines, particularly intelligent computer programs. It is similar to utilizing computers to understand human intellect but not limited to biological observations. In his 1950 book "Computing Machines and Intelligence," mathematician Alan Turing opened the door to artificial intelligence (AI) and provided a formal model of computing based on the question "Can machines think?". The "Imitation Game" test, also referred to as the Turing test, was the next suggestion he made to ascertain whether robots are capable of thinking. Since then, there have been major advancements in the field of AI, but no computer has yet been able to pass the Turing test (Turing, 1950).

According to the Emerging Information and Technologies Conference (EITC), AI, often known as weak AI, has the essential advantage of replicating human intelligence to carry out tasks swiftly and effectively. Strong AI, on the other hand, is another AI objective that aims to match or surpass human intelligence. A few examples of the numerous real-world applications of AI that have evolved because of substantial breakthroughs in AI technology over the past few years include natural language processing, computer vision, robotics, and expert systems.

**AI can evolve into 3 broad stages according to EITC:**

- 1.) *Weak or narrow AI*: Narrow or weak AI, also known as AI, that is tailored to a single task or set of tasks is also referred to as task-specific AI and can do better than humans. These artificial intelligence systems can translate languages, recognize images, and recognize speech after being trained with a lot of data. Virtual assistants like Siri and Alexa, spam filters, and recommendation systems are all examples of narrow AI.
- 2.) *Strong or general AI*: This is the type of AI that is conceptual or theoretical now. General AI will eventually allow machines to make conscious decisions and have all of the cognitive capacities of a human being. These machines can be programmed to work without human input. Although it is not yet a reality, without being explicitly programmed for each task, general AI would be able to reason, plan, and solve problems in a wide range of domains as it would be self-aware and would acquire information and abilities through experience.
- 3.) *Artificial Super Intelligence*: It is a concept or belief that AI would eventually replace human intelligence. This AI system performs better than human intelligence in every way and has the ability to learn for itself, making it much wiser than people. Superintelligence created by machines is theoretical and not yet a reality.

**Based on functionality, AI can be categorized into 4 types according to EITC:**

- 1.) *Reactive AI*- This type of AI relies on a predetermined set of rules and is used for simple decision-making. Because it lacks its own memory and is made up of machines that only use the data that is currently accessible and consider the current circumstances, it is the most fundamental kind of AI. Reactive AI systems can't use the data to make inferences about the optimal course of action. They can only do a small number of specified tasks.
- 2.) *Limited Memory*- This type of AI is related to data. It is the most widely used type where knowledge is derived from previously learned historical information combined with pre-programmed instructions. Ex – Self-driving cars use limited memory technology which relies on a combination of data such as driving environment, detecting patterns, speed, direction, etc.
- 3.) *Theory of Mind*- It refers to machine behavior, human-like thinking, feelings, and activities, among other things. We are yet to reach this type of AI and is the next level of AI in the innovation stage. Theory of Mind AI will learn more about the people and things it interacts with by learning about their needs, thoughts, feelings, and beliefs.
- 4.) *Self-Awareness*- It is kind of an extension of the “Theory of mind AI” in which AI would be self-aware or achieve consciousness. Machines would be self-aware with consciousness similar to that of a human being. It can recognize, replicate, and comprehend all situations, as well as think about and comprehend them.

**Applications of AI in Retail**

Artificial Intelligence has use cases in multiple industries. Retail being space where businesses directly interact with their end-users, AI could play a crucial role in augmenting the retail experience. A study by McKinsey & Company shows that AI has the potential to create annual value of around \$600 billion in the retail sector as shown in *Fig. 1*.

Companies have actively started incorporating AI in their organizations. Over a quarter of the top 250 worldwide retailers are integrating AI into their operations, according to a 2018 Capgemini report. (Capgemini, 2023) The McKinsey Global Institute predicts that by 2024, retail and CPG will have invested more than \$8 billion in artificial intelligence, continuing the current trend. (McKinsey, 2023)

In the retail sector, Artificial Intelligence has applications ranging from reshaping warehouses to targeted marketing campaigns. Some of the common low hanging use cases are as follows:

*1.) Recommendation engines* - AI can be applied to tailor product recommendations and cater to the preferences of each customer. Due to the enormous amount of digital data that may be collected in real time, e-commerce would benefit greatly from this kind of solution. Additionally, Intel asserts to have AI solutions that gather information on the different customer kinds and their buying patterns so that merchandising may make better decisions about product promotions (Intel, 2023).

*2.) Price optimization*- Retailers can improve sales and profits while providing consumers a responsive shopping experience by utilizing price optimization and dynamic pricing solutions. Using AI, pricing techniques can also be tailored depending on specific customer behavior, such as previous purchases and shopping preferences. AI can automate pricing choices, saving time and effort by eliminating the need to manually alter rates. Retailers may also be able to react to market changes more quickly and adjust prices for optimal profit.

*3.) Chatbots*-AI chatbots can be used by businesses to increase customer engagement with the brands and to listen to respond to customers in a quick and personalized way. These bots use AI

and machine learning to converse with customers, answer common questions, and direct them to helpful answers and outcomes (Marotta, D., 2022).

4.) *Stock Optimization by Demand Prediction*- To prevent retailers from having too much or too little stock, predictive analytics employing contemporary AI approaches can assist in ordering the proper amount of goods (Intel, 2023). By holding goods that will sell the most at that given time, store managers will be able to manage warehouses optimally.

5.) *Consumer classification using NLP & Computer vision*- Businesses can get a more thorough understanding of their customers by merging Ai technologies like Natural Language Processing and Computer vision techniques, which can be utilized to customize marketing campaigns and raise overall customer happiness. To divide clients into several personas, NLP could be used to evaluate text data from a variety of sources. Similar to this, real-time consumer classification using computer vision might be done by processing visual data.

AI platforms are a clear win for retail and CPG: they can provide a platform for organizations to optimize four key pillars crucial to delivering a next-level retail experience. (Dataiku, 2023). However, Capgemini has claimed that, only 1% of AI initiatives reach full-scale deployment in the retail sector. (Capgemini, 2023) Given the clear advantages in each use case, it is compelling for retail organization to implement AI solutions to have a competitive edge in the market.

### **Benefits and Drawbacks of AI in Retail**

#### **Benefits of AI (Rojewska, 2022):**

1.) *Improved efficiencies of supply chain*: Robots can assist with picking and packing orders, and AI can assist logistics drivers in finding the best delivery routes, freeing up staff members for other crucial duties.

2.) *Improved customer satisfaction:* Various enhancements can be made, such as quicker checkouts with automated systems, more individualized discounts, and chatbots that provide 24/7 customer service.

3.) *Optimized product location on website for online retail stores:* A quick analysis of historical data on elements like consumer preferences, product location, sales season, and weather conditions using AI model could recommend the ideal location for product display on the store's website.

4.) *Personalization resulting in increased sales:* The store can send more individualized offers and boost sales by studying customer behavior. Depending on what a customer has looked at or purchased, when they typically shop, or the promotions they are most likely to purchase, the store owner can even customize recommendations.

5.) *Reduced costs:* AI may reduce costs in a variety of ways, with advertising and marketing costs as examples. This is accomplished by helping the business owner concentrate their marketing efforts on clients who are most likely to purchase their products or by encouraging them to buy inventory that is already available.

6.) *Optimized and data-driven decisions:* Businesses can make informed decisions and better plan their future actions by looking at data about previous advertising campaigns, promotions, and customer preferences. They do this to reduce campaign effectiveness and eliminate speculation. Better budgeting and the avoidance of ill-advised investments are also made possible by data.

7.) *Robust security:* Businesses can analyze and spot unusual data movements in real-time using cutting-edge technologies built on artificial intelligence, then immediately flag risks.

**Examples of AI Benefits** (Hair, J., Ortinau, D., Harrison, D.E, Celsi, M., Bush, R., 2021):



- 1.) To help with inventory management and to find unhappy customers, Walmart is creating an advanced analytics lab that makes use of AI.
- 2.) Home Depot engages with customers across all channels by utilizing marketing research and more than 1.7 trillion data points each week.

**Drawbacks of AI** (Seidler, 2018):

- 1.) *High costs*: Initial setup of hardware and software required to build AI models incur huge costs to the company. Rapid evolving technology demands to stay on the latest available technologies which necessitates heavy financial investments.
- 2.) *Quality of data to train AI model*: For businesses looking to benefit from AI at scale, data is frequently siloed, inconsistent, and of low quality. To obtain better results, personnels need to spend more time in sourcing and cleaning the data.
- 3.) *Skilled personnel to deploy AI solutions*: A lack of technical staff with the knowledge, skills, and training required to deploy and manage AI solutions often leads to increased company expenses and even outsourcing to other companies.

**The Retail Sector**

Retailing is the sale of various products in relatively small quantities to consumers who want to use the product in question. The sale products are not for sale but for actual consumption by the buyer. (MBN, 2019). Retailers rely on the ecosystem to deliver the products they wish to market to potential target buyers. To store and ensure that they have products to sell, it is necessary to establish a connection with the companies that operate in this retail chain. (Farfan, 2022). The retail supply chain consists of four major players: manufacturers, wholesalers, retailers, and end users. Wholesalers are directly related to manufacturing and retailers are related to wholesalers.

Consumers today demand excellent customer service and a convenient buying journey.

Customers may now shop online using their smartphones or tablets. They might also be at a physical shop on the high street. It is crucial to recognize that your brands are aggressively priced and of high quality as individuals continue to spend money in the retail industry.

### **Online shopping**

Shopping from the comfort of home gives consumers more choice and convenience. Shop for the best prices and find the products you need without leaving your chair. This allows retailers to easily track consumer behavior and preferences. We can use this information to adjust future marketing and sales strategies to better meet customer needs and increase conversions.

## **Retail Ecosystem in Brazil**

### **Consumer Profile**

With majority being below the age of 35, Brazil is one of the youngest countries in the world. Brazil has a population of close to a 215 million with 50.9% of them being women. The population is mostly urban and concentrated towards the south of the country, with Sao Paolo and Rio de Janeiro being the most densely populated cities (Santander, 2022). Brazil is the only nation in Latin America where Portuguese is an official language, but Brazilian culture is a mix of African and Native American cultures. Due to this, businesses must overcome several linguistic and cultural obstacles to connect with their target market. Statistics showed that 57% of Brazilian consumers prefer to buy products provided in their own language and 70% of them opt for native-language support (Densmer, 2020).

### **Consumer Behavior**

According to Santander, Brazil has the largest E-commerce market in Latin America. The country saw huge changes in its spending habits pre and post covid. Post covid the interest in

luxury goods declined slightly, as the population focused more on saving more. Consumers will search extensively for shops that offer better deals on brands or wait until a sale before purchasing, to maximize savings. Customers are loyal to a brand if the product or service quality are at par with the price they pay. Brand loyalty is heavily influenced by online reviews and social media presence. Consumer decision making is heavily influenced by Brand popularity and reputation. Consumers prefer to pay in installments and a third of them will not purchase products from a particular shop if payment via installation is not an option. This mode of payment strengthens customer purchasing powers and boosts the average transaction value per customer.

### **E-commerce Scenario in Brazil**

The eCommerce industry includes the digital channel-based sale of tangible commodities to individual end users (B2C). This definition covers purchases made via mobile devices, such as smartphones and tablets, as well as desktop computers, including notebooks and laptops (Statista, 2023). Since the pandemic, eCommerce revenue has steadily increased, and it is anticipated to expand at a rate of 14.53% per year to reach US\$44.85 billion in 2023 as shown in *Fig. 2* (Statista, 2023). E-commerce grew during the Pandemic. Due to social isolation, internet purchases increased 47% in the first half of 2020, driven mostly by a 39% increase in orders from the prior year (Schneider, 2020). With an evolution of 110% and 88.7%, respectively, the two biggest sectors are hobby and bookstores and drugstores. These increases are linked to new behaviors developed because of the pandemic (Vilela, 2021).

### **Brick and Mortar Business**

The pandemic and lockdowns put the traditional business under dire stress. The growth of ecommerce added to that. The traditional Brazilian market found ways to adapt to changing

times. Brick-and-mortar business came up with innovative strategies, like letting the consumer purchase a product online but, pick it up in person before finalizing the purchase. Thus, giving the consumer a chance to get to know the product before finalizing the purchase. This also removes the responsibility of delivering products from the seller (Bezerra, A.C.F., dos Santos, D.R., Matsuzaki, I.C.C.S., & da Nóbrega, J.S.W., 2022)

### **Conclusion**

In conclusion, many online businesses have already embraced artificial intelligence to eliminate challenges in their day-to-day transactions. Big data can be overwhelming, but with the help of AI, retailers can run their stores smoothly. Such benefits include inventory management, customer service, marketing, cyber security, and data analytics. However, modernization always comes with a cost. Despite the challenges, companies continue to invest in AI since the advantages always outweigh the disadvantages. With the increasing number of online users, it is important to manage the flow of information in a fast, systematic, reliable, and secure way. The pandemic paved the way for consumers to experience online retail for the first time, as in the case of Brazil. The ecommerce in Brazil is expected to grow at approximately 15% annually, being hobby and drugstore as the main contributors. Like any other nation, Brazil has started to embrace online shopping due its convenience and efficiency. With the increased projections of online spending, AI will be most likely to evolve to better improve shoppers' experience.

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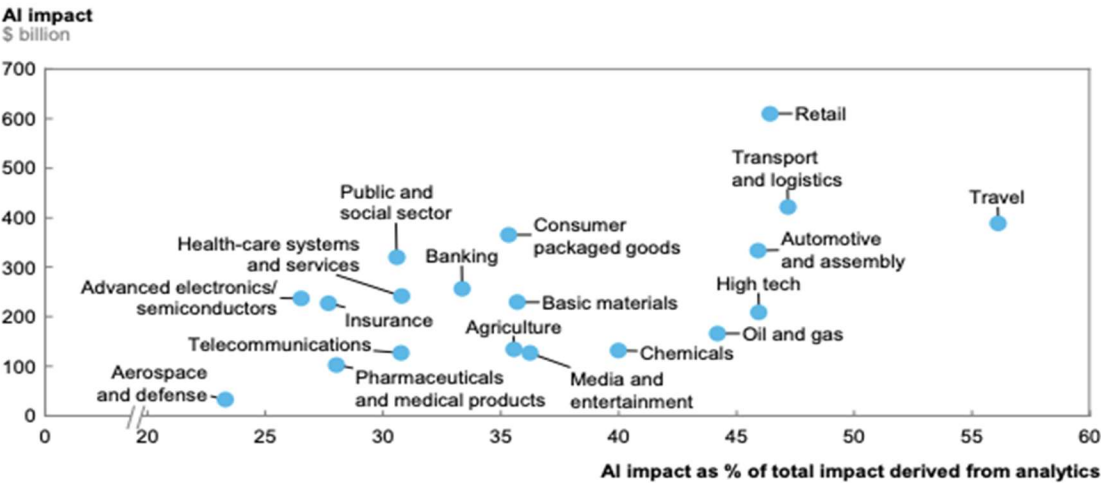
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AI Impact:

AI has the potential to create annual value across sectors totaling \$3.5 trillion to \$5.8 trillion, or 40 percent of the overall potential impact from all analytics techniques



The potential value of AI by sector

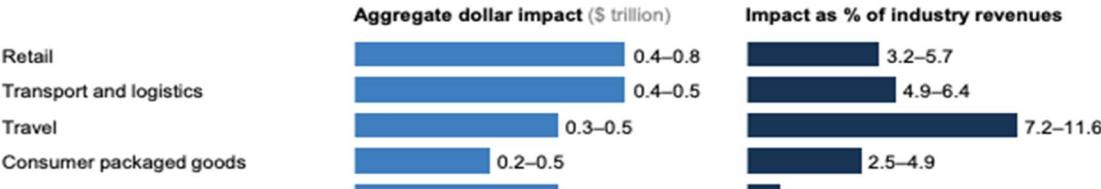


Figure 1. Potential Impact of AI in each sector (McKinsey, 2023)



Brazil Online Consumer Spending:

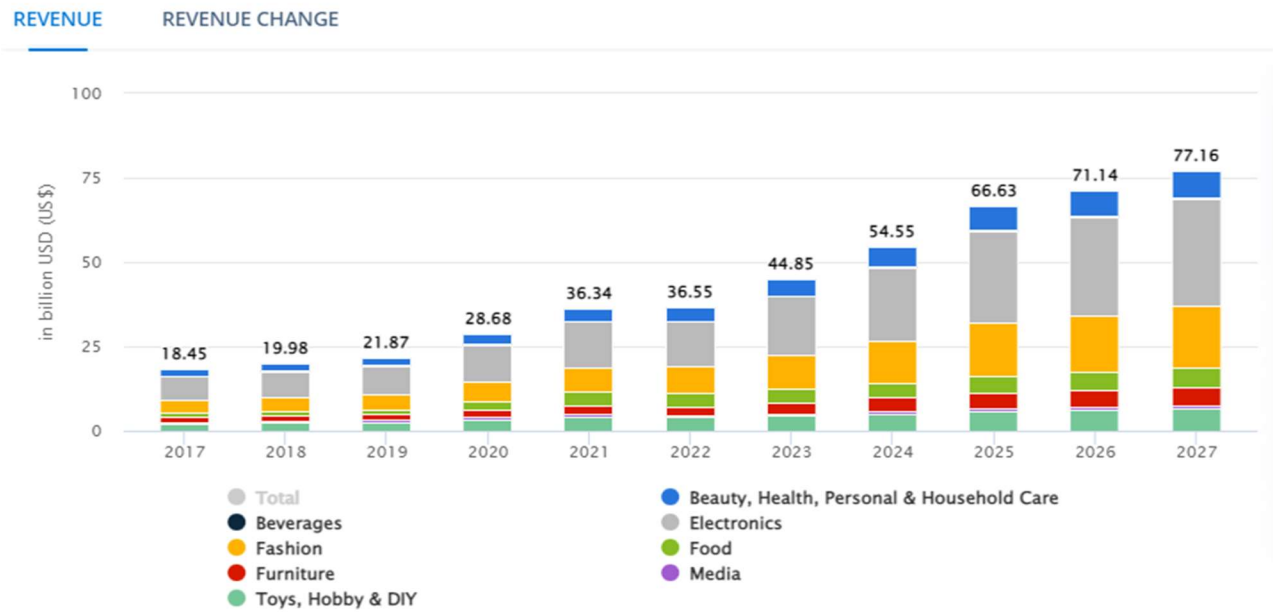


Figure 2. E-commerce in Brazil (Statista, 2023)