# International Journal of Research Publication and Reviews

# A Review on Leveraging Artificial Intelligence to Enhance Business Engagement in Ecommerce

*Diptikanta Panigrahi[1], Meher Karuna,PhD[2]*

[1,2]*Institute of Public Enterprise, Survey No. 1266, Shamirpet (V&M), Medchal, Hyderabad, Telangana 500101, India*

## ABSTRACT

The proliferation of mobile and internet technologies has led to a massive shift of retail consumers' preferences from physically walking a distance to the nearest or favorite traditional brick-and-mortar store for shopping, to ordering every item one needs from the comfort of their home. Whereas this has greatly convenience the consumers, retailers have been left to grapple with the neck-to-neck competition for this emerging market that comes with certain initial costs for business that sometimes threaten the very survival being fought for. Also, this new market comes with a package of challenges such as internet delays, that hinder progress. As such, many ecommercebusinesses have come up with business engagement strategies that are centered around artificial intelligence (AI) to enhance their productivity and efficiency. Multiple studies have been conducted on the impacts of AI on the operational efficacy of ecommerce business which points to a positive outcome. This paper describes the implications of artificial intelligence (AI) in ecommerce business in various aspects and holds that AI is indeed an indispensable component for enhancing business engagement in eCommerce. As such, it uses a systematic review of pertinent literature to validate this position. The requisite procedural aspects of conducting systematic review were followed to the latter to ensure no data bias.

Keywords: internet technology, retail industry, eCommerce, brick-and-mortar store sales, Artificial Intelligence (AI), machine learning, neural networks, enterprise resource planning (ERP), Virtual assistance, recommender system, contextual analysis.

## 1. Introduction

Over the past three decades, the world economy has experienced unprecedented levels of digitization which has behooved operational and managerial shift in businessesfrom traditional management methods to technologically mediated management approachfor the purpose of ensuring survival and perpetuity. This massive technological advancement has been especially heralded by the advent of internet technologies that havebrought about the proliferation of internet-enabled mobile devices that allow users online access to connectionsthrough which they can easily request and get shopping services at their convenience. Whereas the economic implications of this easy internet access connection are sectoral-extensive, the retail industry has borne the lion's share of itin the form of a quantum leap ofcustomers' preferencestowards prioritization of convenience and reliability over everything else when it comes to shopping. In response, and largely for maintaining a competitive advantage in the market, most retail businesses have adopted, either extensively or progressively, the online retailing approach (eCommerce) in tandem with the offline brick-and-mortar store sales.

By definition, eCommerce, also known as Electronic commerce or online retailing, refers to "any type of business, or profitable transaction which involves the transmission of information transversely over the internet" [1],[17], [18], [24],[25],[26]. It allows the customers to electronically exchange goods and services without the obstacles of time or distance. According to Mishra and Mukherjee [1], eCommerce has grown rapidly over the past five years to become among the most promising aspect of the internet in terms of potential and is expected to continue at the same rate or higher in the next few years. This means that retailers have no other choice but to jump on the bandwagon, otherwise they risk being put out of business due to obsolescence.

## 2. Literature Review

The weight of evidence from recent studies [2], [3] suggests that there are multiple benefits equally accrued by the businesses when they retail online such as easy access to new markets, low cost of business, and data insights from customer information. Nonetheless, the online platforms also come with their challenges such as difficulties in the computation of sales tax, high technical costs in the form of expensive technical infrastructure, and cultural obstacles especially when the market is expansive [3]. These challenges alongside others pose a real threat to the management efficiency and productivity of the retailbusinesses. Multiple solutions to some of these challenges have been suggested through various experimental studies, however, the most underscored and research solution is the application of artificial intelligence to the eCommerce infrastructure. Figure 1 demonstrates the various aspects where AI can be used to enhance the overall ecommerce experience and customer engagement.

Artificial Intelligence (AI) is in vogue in the technological world as one of the most potent next-generation technologies that would further help to address some of the obstinate economic, social, and political challenges faced in society. AI can be simply defined as a complex software system that performs certain tasks akin to the human brain [4] [19],[20],[21],[22],[23]. These tasks range from creative decision-making, information analysis, speech recognition, etc. By mimicking the human thought process, sometimes even doing better, AI has become a significant area of interest both to investors and the academics who seek to assess and understand its underlying mechanics as well as the accuracy in meeting its goals.

Various studies have been conducted on the viability of AI technology in resolving the bottlenecks in the eCommerce system to guarantee efficiency and productivity in business management. Additionally, the success of eCommerce is heavily hinged on effective communication between the customers and retailers without the drawbacks of internet delays for reliability and convenience purposes. That is, without proper technological infrastructure for maximum network capacity on the retailers' e-retailing platforms, the customers' experience is negatively impacted which may result in shrunk market share [8]. Some studies [5] suggest the integration of AI in the infrastructure to under curb these shortcomings and enhance business engagement on the eCommerce platforms.



**Figure 1. Implications of AI in ecommerce**

In this paper, we critically and systematically review the literature on the use of artificial intelligence in enhancing business engagement in eCommerce business. A detailed overview of what constitutes artificial intelligence and its various use in eCommerce is given. We find from a preliminary review that AI is almost ubiquitous in the eCommerce industry. However, it is not quite distinctivehow AI technologyspecificallyenhances business engagementin an ecommerce business. This paper seeks to contribute in this respect.Essentially, this paperholds, as many other studies do, that AI is an indispensable tool for enhancingbusiness engagement inan eCommerce.

## 2.1  Artificial Intelligence

Using the intelligent ability of AI to predict outcomes reliably and accurately, the established eCommerce titan corporations such as Alibaba Holding Group Limited and Amazon Inc. have continued to record astronomical turnovers in the past years that have picked the interests of various academics to want to establish the driving component of that AI success [37].According to Mohapatra [6], the underlying component of AI that has propelled the success of these two giants, as well as upcoming eCommerce retails, is its ability to identify and predict patterns of customer purchasebehavior.

### 2.1.1          Subfields of Artificial Intelligence

AI's forecasting behavior has chiefly been made possible by its various subfields, each with its characteristics. These subfields include machine learning, neural networks, and deep learning, cognitive computing, natural language processing, computer vision. Machine learning refers to an algorithm that learns from data and upgrades automatically, notably historical data for an update over time [4]. The neural network is an artificial intelligence component that connects to the neural of the human brain through synapsis and sends signals from one neuron of the brain to other neurons [4]. Deep learning is a subset of machine learning algorithms that analyses data with a particular logical structure through neural networks that are structure into multiple layers [4].Computer Vision in artificial intelligence came into significant existence around late 1960's and early 1970's. Computer vision generally used to deal with fields like pattern recognition, machine learning, computer graphics, 3D reconstructions, virtual reality, and augmented reality [55].These subfields can be used either in combination or alone to provide the eCommerce user with the benefits of a smooth experience, help in product search, and sales assistance. The accruing benefits to the retailer include customer segmentation, demand forecasting, customer behavior analysis, sales assistance, and predictive analysis.
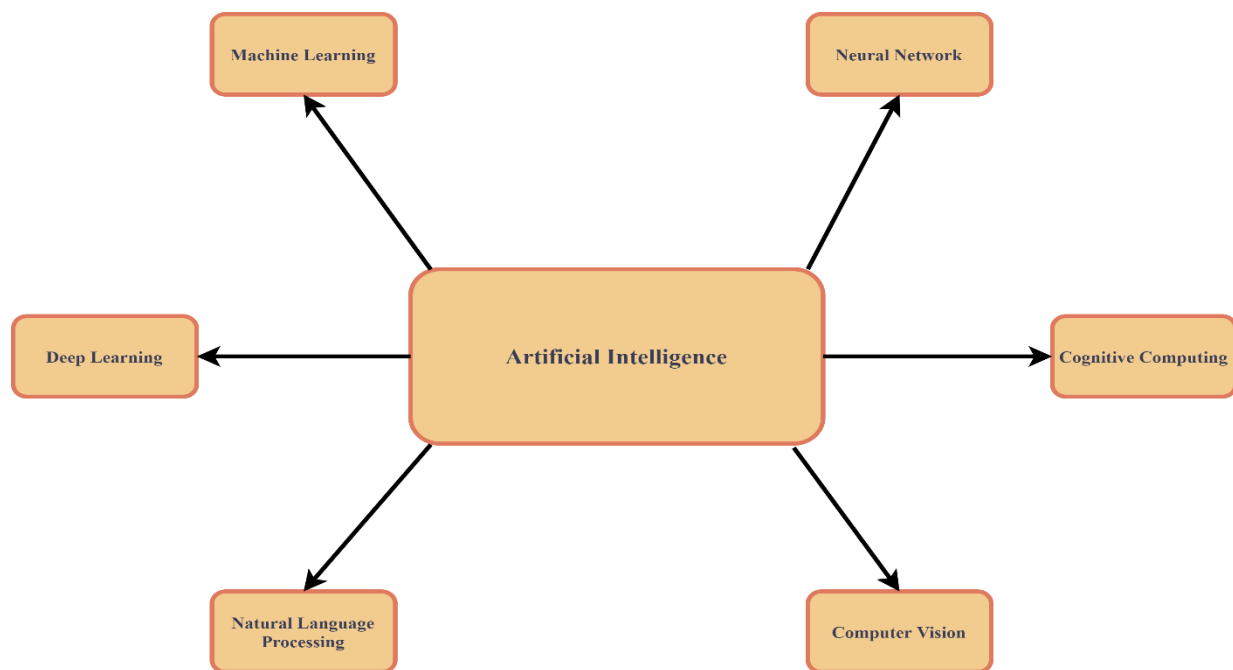


**Figure 2. Subfields of Artificial Intelligence**

### 2.1.2          Artificial Intelligence in Enterprise Resource Planning (ERP)

One of the most significant technology in businessto be ever invented is Enterprise Resource Planning (ERP). According to Haider [4], ERP is software used by companies to integrate and manage the significant components of their businesses such as finance, sales, inventory, marketing, and human resource. The chief benefit of using an ERP software system is improving efficiency in operations and reduction of costs [35], [39]. This is because the integration and automation eliminate any process redundancywhile allowing for the synchronicity of work in the whole company which helps to improve the work rate [4].

Despite all the multiple advantages that ERP software offers to a company, the system has a major pitfall that may prove costly to the business sometimes. This major con is that the success of implementing the system is hinged on the level of expertise of the employees [8]. This implies that the company has to either hire a system administrator to maintain the software or spend some funds on training the company's employees on how to maintain it.

According to Haider [4], this drawback can be solved through the integration of AI in the ERP software system. Ideally, a standard ERP software system comprises five components namely customerservice, sales automation, inventory management, financial management, and advanced analytics [4]. Leveraging AI to enhance ERP's customer service makes the software functions intelligently and perform a deep analysis of the human brain functionalities [4],[34],[38]. This is achievable through the integration of chatbots into the ERP system which implies the manager has the liberty to do other things as the AI handles the customers.

With respect to sales automation, AI-enabled ERP systems can help in market and customer behavior analysis and automate the whole marketing strategy [4]. Also, AI can be integrated into the ERP to improve the process of inventory management. Inventory management entails the planning, handling, and storing of an adequate inventory level with optimized cost to meet a consumer's demand [4].

Concerning financial management, AI is deployed in the ERP system notably for increased work rate and minimization of error [4]. Thus, an AI that can automatically create invoices and pay them can help the business to save on extra hiring costs and save on time.

Finally, advanced analytics is especially used in supply chain management and production for accurate analysis and forecast [4]. Integrating AI into the ERP system will most definitely improve data analysis and prediction.

The aforementioned is what constitutes artificial intelligence and its use in a business context in general. It is evident from the literature that AI essentially boosts the performance and efficiency capacity of business operations to improve their productivity. These same AI operational processes apply to eCommerce for performance improvement in the business. Some of the major impacts of artificial intelligence in the field of ecommerce business can be found form the business outcomes stated below.

### 2.1.3  Worldwide E-Commerce Sales Growth Due to Pandemic

Global online sales reached $4.29 trillion in 2020, boosted by approx. $3.46 trillion from 2019 due to this pandemic. The year-on-year growth from 2018 to 2019 was 17.9% that converted to 24.1% in the next year. The total retail sales in 2020 were $21.11 trillion while 20.2% of it is the online retail sales [48].
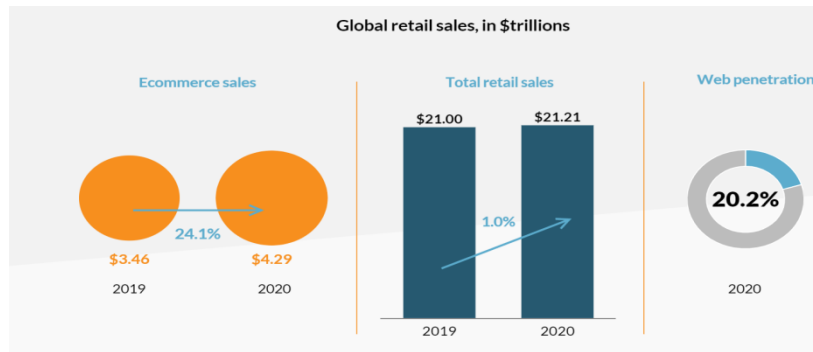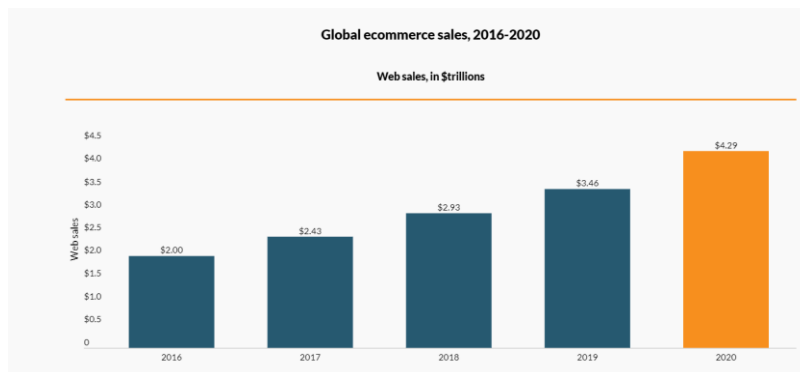


**Figure 3: Global retail sales,Source: [48]**



**Figure 4: International e-commerce sales, Source: [48]**

It is estimated that global e-commerce sales would reach &5 trillion in 2022. In 2024, revenue will reachit will reach $6 trillion [50].

## Retail Ecommerce Sales Worldwide, 2019-2024
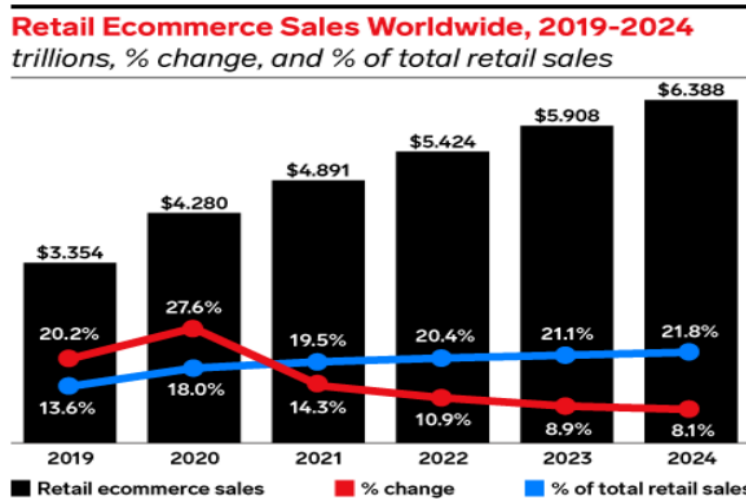### trillions, % change, and % of total retail sales

**Figure5: Forecast of online retail sales, Source: [50]**

It can be stated that most of the people have never purchased online, for example in the United Kingdom 15% of people, 9% of US consumers and 8% of Japanese purchasers stated that they never purchased online before [49].  US consumers have spent $78 billion in 2020, march and 2021, the e-commerce sales increased by 39%. Which is $199 billion alone in the US. According to Adobe, the e-commerce spending in the US will reach $930 billion and in 2022, the sales will reach $1 trillion. In the United Kingdom, e-commerce sales increased by 27% and in Japan, the sales increased by 24% in 2021 [49]. More than half of the population in these countries have depicted that they believe in online shopping and like to save money through online grocery shopping. Thus, it can be said that the e-commerce future globally is bright and is expected to earn more of the share of retail sales in the coming years [49].

However, in spite of such a boom in the business, global businesses are not seen much interested in applying Artificial intelligence in e-commerce companies. There are almost 4 to 5 million e-commerce companies are there worldwide excluding China. In the US, as per 583,000 businesses, only a few uses AI in business. For example, Touchscreens are used by only 5.9% company while 1% is testing, machine learning is used by only 2.8% of companies, voice recognition is used by 2.5% of companies and Robotics is used by only 1.3% of companies [53].
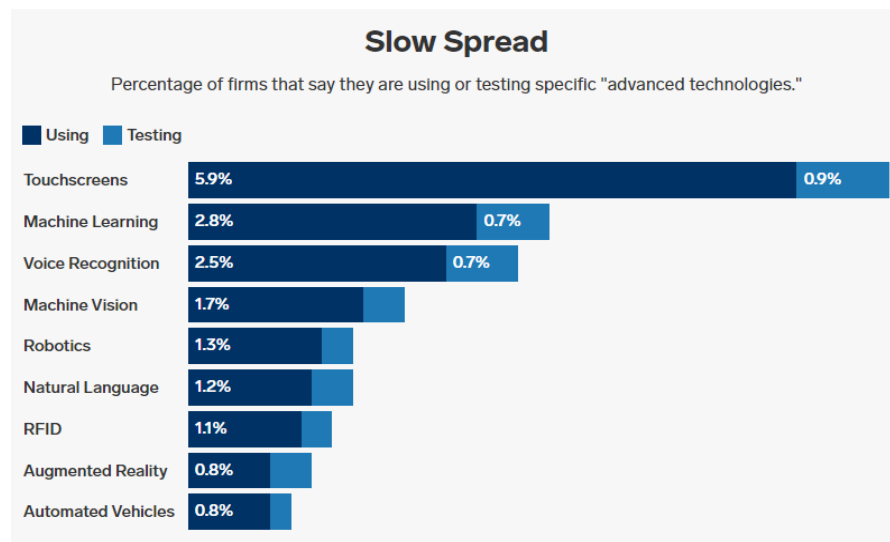
## Slow Spread
### Percentage of firms that say they are using or testing specific "advanced technologies."

**Figure6: AI application rate, Source: [53]**

Only 24.8% of companies with more than 25 employees have invested in anyone form of Artificial intelligence, while 7.7% forms  with more than 10 employees have invested in AI forms. In the US, only 8.9% of companies use AI. As per the McKinsey survey, 3% of business firms were planning to pilot some AI forms in 2018, while as per the PwC survey, only 20% of companies were planning to apply AI forms in 2019 [53]. According to TechRepublic, only 29% companies of US regularly use AI. In accordance with 500 surveyed business firms, 52%of companies have depicted that AI improved workflows, 51% of companies stated that large database analysis is easily done through AI, 48% of the organization stated that customer experience is enhanced and

company security detection and monitoring is improved in 47% of companies [52]. 24% of worldwide e-commerce companies started using chatbots in 2020, 9% implemented that earlier, and 39% of e-commerce still do not use chatbots [51].
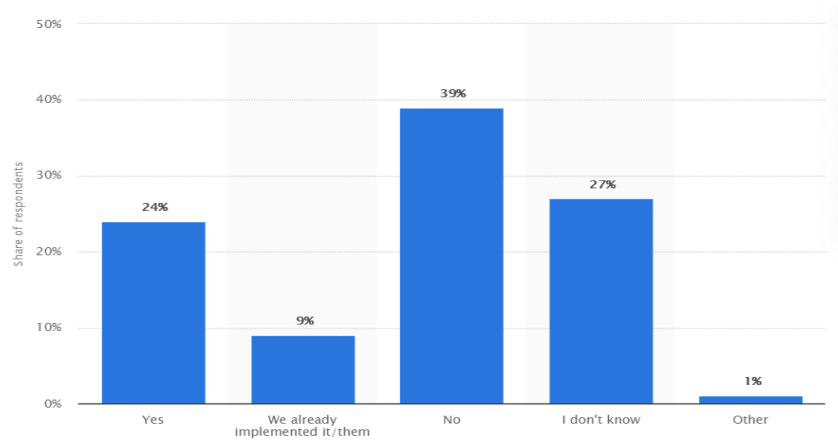


**Figure7: Effectiveness of AI in future as per people, Source: [51]**

As per Statista survey in 2019, the worldwide e-commerce companies' decision-makers have depicted, in future, in case of personalization, site search, marketing, pricing, fraud prevention, delivery, product assortments, order management and in other cases AI will help the companies. 73% of the decision-makers have depicted AI will help most in business personalization, while 58% stated that AI will help in site search and 48% believe AI will help in marketing and so on.
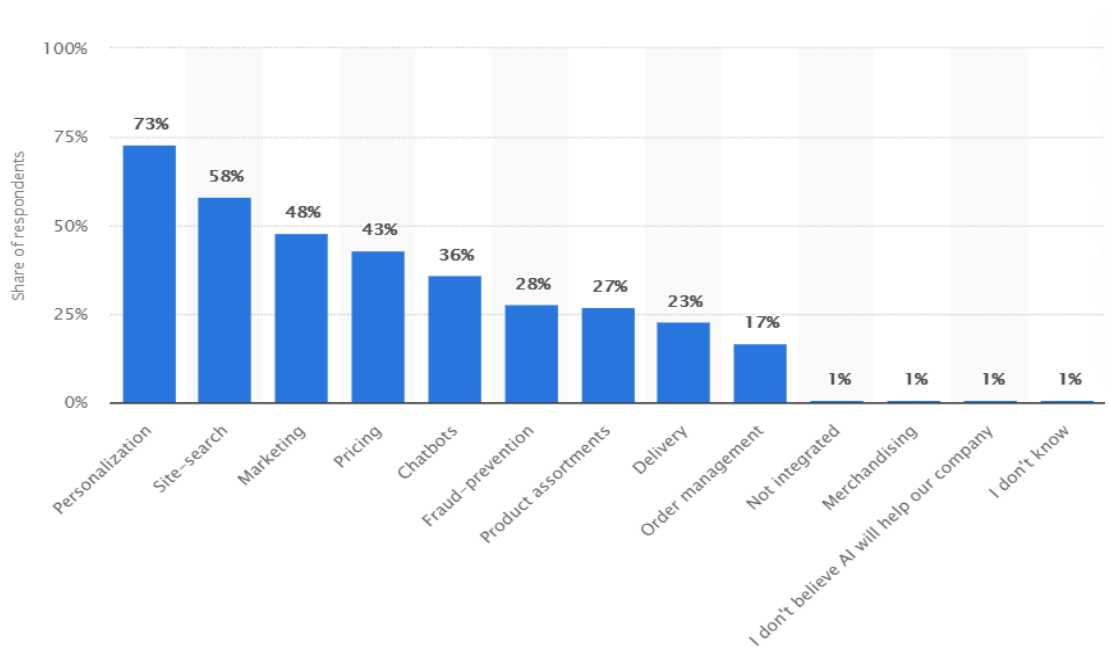


**Figure8: Future of AI, Source: [51]**

Some of the worldwide ecommerce giants include Alibaba, Amazon, JD.com, eBay, ASOS, Rakuten apply AI. Alexa is Amazon's popular AI product, JD.com, partnered with Siasun Robot & Automation Co Ltd, to apply Robotics to improve warehouse operations. Alibaba also applies AI assistants Tmall Genie and Ali Assistant to enhance the competitive edge, and eBay uses AI to maintain and enhance consumer interest in the company [42].

Some of the arguments arise on the implications of artificial intelligence in ecommerce business.

H1: Leveraging artificial intelligence enhance business engagement in eCommerce.

H2: Areas where AI can be implemented to enhance the user experience and engagement.

To validate this assertion, the above central research questions are formulated. The researcher develops a research protocol based on this research question and aim. A literature search and appraisal of the identified studies are conducted based on the protocol. The research then extracts the pertinent data, analyzes, and interprets the results. The hypothesis has been justified in the section 3 with the support of various studies and research.

## 3. Leveraging AI In E-Commerce To Ensure Maximized Profit And Sustained Business Growth By Implementing Various Practical Techniques And Tools.

There are various tools and techniques currently used by ecommerce industries which are majorly using various artificial intelligence algorithms to enhance their features which are more efficient and faster than the traditional tools. Ecommerce businesses use artificial intelligence in product recommendations, cross selling, and upselling, chatbot services for customer real time support, analyzing customer comments and in providing personalized services.  A great example is chatbot service, which helps customers in real time by using natural language processing techniques and analyzing voice and text to provide a response to their queries about the product and service. With the help AI, businesses are able to analyze various customer touchpoints upon their digital journey and gather most valuable insights of their customers to enhance their product and services and also enhance their engagement strategy. Here we discussed some major techniques and tools which leverage the power of artificial intelligence e.g. machine learning, NLP etc. in ecommerce business to prove our hypothetical arguments mentioned earlier.
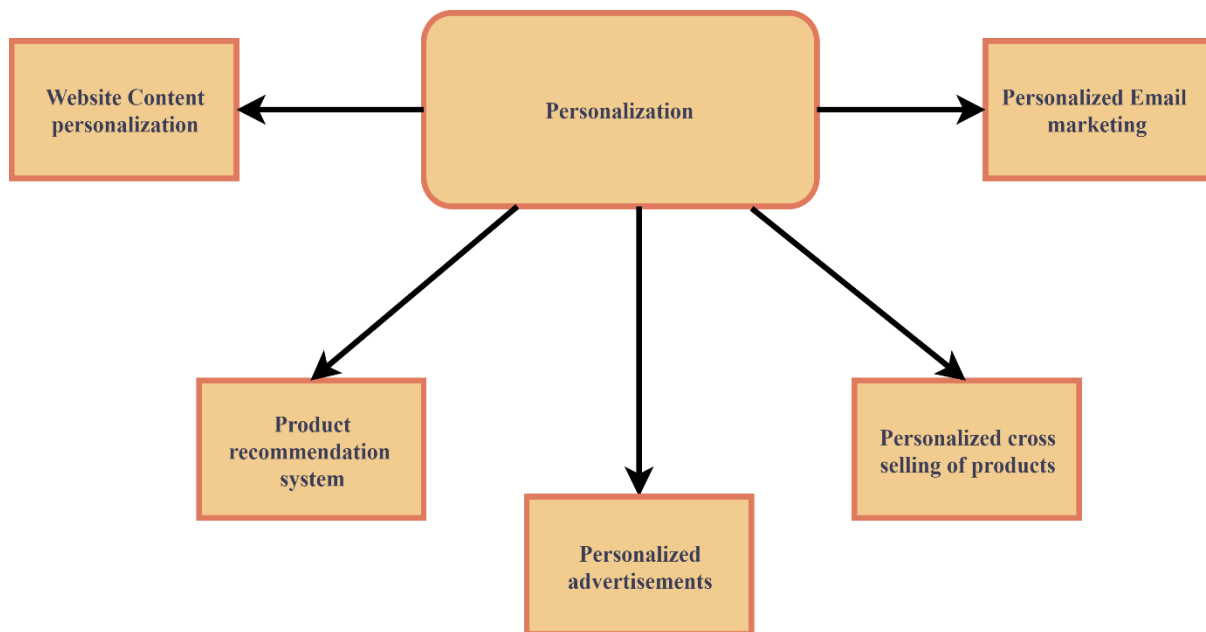
### 3.1  Personalization



**Figure 9. Personalization through AI**

As per Soni, Vishal Dineshkuma, in the case of marketing outreach and tactics, there is always the chance of improvement. The more the products are personalized, the more the company is personal with the customers, the better the customer commitment and brand loyalty. E-commerce uses Big Data through which data are collected from various channels, previous activities, transaction histories and others in order to reckon consumer purchasing habits [44]. AI does not only showcase personalized products, but also it gauges customer behavior and identify checks out sophisticated predictions regarding what a shopper really is demanding. Even AI can be also used to reckon the future purchasing trends also maps out customized sales approach on the basis of current and future shopping behavior trends. On the other hand, Song, Xia, Shiqi Yang, Ziqing Huang, and Tao Huang argued that with the help of personalization, e-commerce companies assure their customers to get the best experience and convenience just like offline shopping in the online shopping platforms. With the help of facial recognition or predictive tools, AI tracks the specific customers' preferences and brand loyalties, and according to that AI suggests only preferred products [45]. As per Statista, 90% of US shoppers are more attracted to customer-centric personalized advertisements.  Smart

Insights tell that 63% of customers are shoppers who do not shop from companies that do not have personalized tactics. even, Accenture surveys depict that, 83% of consumers are ready to share data to get a convenient, personalized online shopping experience [43].

## 3.2 Chatbots

As per the opinion of Deepansha, Nirmal Kumarb, and Ritik Kumarc, the main thing about online shopping is that the shops or e-commerce websites provide 24*7 customer service, this was possible because of Chatbots. Chatbots are basically software applications that use AI to perform chat or conversations with the customers in the form of texts or speech to assists them while they visit the websites. A few years before, chatbots are only used to provide standard customer replies. However, with the help of AI, it is possible now to guide the potential customers towards their buying decision by assisting them with replies as per their preferences and needs. International e-commerce companies such as Amazon, eBay, Alibaba, and others use AI chatbots [46].

## 3.3 Customer Relationship Management

Conversely, Shyna and Vishal stated that AI also shares a large volume of data helps to observe shoppers buying patterns, trends, choices and other factors that to detect their buying decision so that long term relationship can be sustained with the customers and secure engagement can be assured [47].

## 3.4 Product Content Management

As AI collects all consumer data, experience and design future buying trends, thus according to that AI makes sure every product is designed, and customers are satisfied with the products. Product content management takes care of workflow activities from manufacturing to logistics [45].

## 3.5 Detection Of Fake Reviews

As per the illustration of Shyna and Vishal,90% of online shoppers say that positive online reviews accelerate their buying decisions towards buying while negative reviews resist them to buy that predict. Amazon Apple AI machine learning systems assures to only boost the verified consumer purchases. It also boosts the reviews that are suggested considerate by other purchasers [47].

## 3.6 Customer Churn Prediction

Customer churn is a significant issue in recent times for the ecommerce businesses. Higher levels of competitions as well ascompetitors, and innovative marketing models and enhanced services are makingthe cost of customer acquisition much higher. [54] In such a fast set up, service providers have understood the significance of retaining the existing customers. It is therefore essential for the service providers to prevent churn- a phenomenon which describes that customer wishes to quit the service of the company. This customer churn can be predicted through machine learning algorithm and the essential steps can be taken to minimize the customer churn.
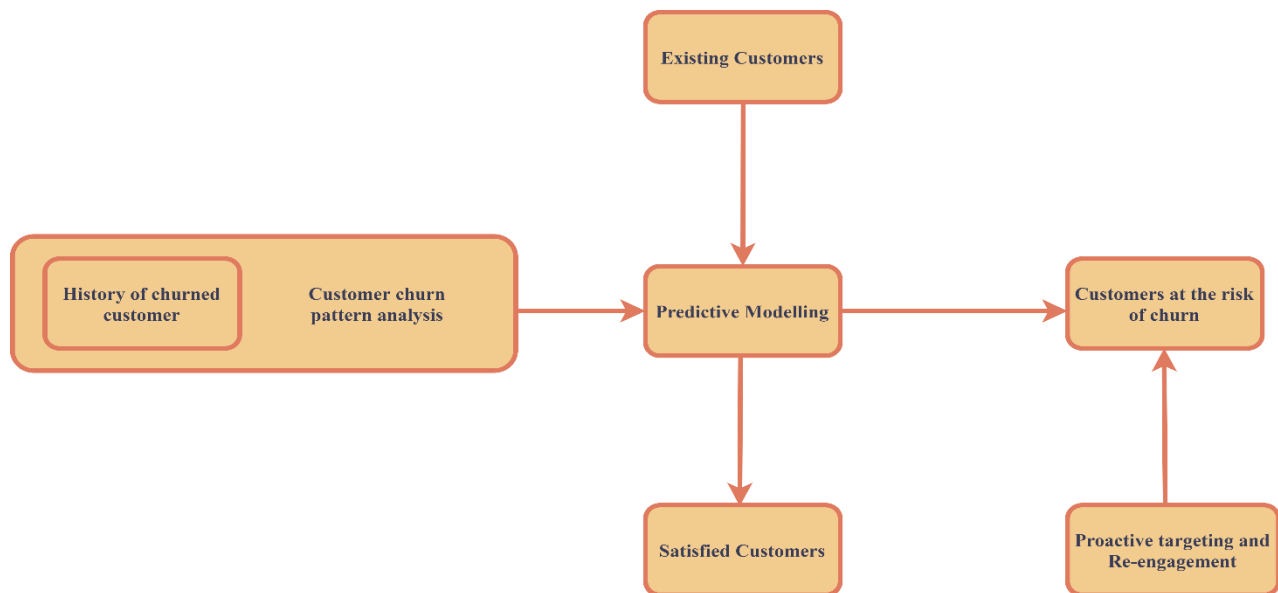


**Figure 10. Predicting customer churn with machine learning**

## 3.7 Ai Tools Being Used Various Business Areas

However, the other benefits of AI in e-commerce include forecasting future sales, provides the best services at reasonable economic costs, achieving the sales target through boosting customer satisfaction and also it helps in marketing (customer-centric advertisements) and others [45].

The Table 1 represents the most advanced and recent business tools which is based upon the artificial intelligence techniques and being used by organizations in various areas of business like Marketing, customer relationship management, sales, customer support, business intelligence and analytics

and market research areas. These tools are leverage the power of AI and especially machine learning to enhance the business process and help in creating a great customer experience.

**Table 1: AI tools used in different business areas**

| Business Areas | Top AI powered Tools |
| --- | --- |
| Customer relationship | Adobe Sensei, IBM Watson, Microsoft Cognitive Services and Dynamics, Oracle AI, Salesforce Einstein, SAP Leonardo, Sugar CRM, Zoho CRM |
| Customer Support | DigitalGenius, Intercom, Freshdesk, Zohodesk, Zendesk Support Suite, Salesforce Essentials, Hiver, ClaraBridge, ActionIQ, Brain |
| Market Research | Gauge.io, FocusVision, Bloomfire, Market Logic Software, Behaviorally (Formerly PRS), Qualtrics, Brandwatch, Mattermark, Tracxn, Enigma |
| Sales | Bigtincan, Chorus.ai, Exceed.ai, Gong.io, Highspot, Hire Smarter, Kiite, ScaleX.ai, Seismic, Tact.ai |
| Marketing | IBM Watson, BuzzSumo, Optmyzr, Stackla, Albert, Sensai, Narrative Science |
| Business Intelligence & Analytics | OmniSci, MS Power BI, AnswerRocket, Salesforce Einstein Analytics, DataRobot, SAP HANA, Qlik, Domo, AtScale, ThoughtSpot, Looker |

## 4. Ai In E-Commerce Posing As The Harbinger Of Next-Generation Customer Experience

Considering the technological innovation and development the AI inclusion in the e-commerce industry will be increased in future. It is estimated that at the end of 2021, about 90% of customer interactions will be taken care of without human actions. All the e-commerce giants such as Amazon, eBay, JD.COM, Alibaba and others are making efficient use of AI in their business. As e-commerce collects and analyses the consumer purchasing information and from that based on what and when the shopping behavior postulated, thus as per that information sets the warehouse, production, logistics, pricing get optimized. In the case of Amazon Dash Button helps to manage everyday purchases with an automated reordering system [41]. On the contrary, AI can also act as a recommendation system designed on the basis of the machine learning algorithm. With the help of the machine learning algorithm, the key details of consumers' searches are analyzed and then based on calculations done to suggest proper personalized shopping products In the same page. This helps customers to find their suitable product easily. AI made the recommendation system a human-computer interaction behavior-based system that is used by worldwide retailers [46]. However, based on this recommendation system, the AI-related E-com platform is changing so fast and innovating that AI does not only derive insights from the happened interactions but also propose recommendations. According to Accenture, 91% of customers are more inspired to shop from brands that show personalized recommendations and offer relevant to their choices [42]. Though the biggest contribution of AI is the customer experience. Personalized predictions make every customer realize that every e-commerce platform is tailored for them, resulting in accelerate purchasing designing, AI is making the searching and purchasing smoother respecting each customer's time. Even this helps companies to estimate the future brand loyalty and profitability rate from every customer and personalize their inventories and automate the delivery process [47]. As per Forbes' estimation, 71% of people get frustrated when they find that the shopping experience provided by the e-commerce website is not personalized.  Even 70% of respondents get irritated with irrelevant mails, messages, and others [42].

## 5. Discussion and Conclusion

Business engagement is fundamentally a complete set of value-added approaches that are designed to promote and bolster economic success through viable solutions to the challenges facing a business. eCommerce is predicated upon the efficacy of internet services. Therefore, without efficiency on the internet, eCommerce businesses would collapse. Since every technological system is susceptible to bottlenecks at any given time, whether technical or due to human causes, a proper set of strategies that seeks to mitigate any threats while ensuring the efficacy of the system is requisite.

From the systematic review of literature, artificial intelligence is the go-to solution for the majority of the performance challenges faced by most eCommerce platforms. This because it primarily provides accurate, efficient analysis and effective utilization of customer data that helps in the efficacious managerial decision-making process and customer satisfaction and retention, respectively.

However, whereas it is the crux of the business engagement methods for improving performance and productivity in the eCommerce business, its functionality is largely supplementary or complementary to the already laid down infrastructure and processes for performance enhancement. An example of such enhancement is the adoption of Enterprise Resource Planning (ERP). ERPis an application used to manage complex business functions such as supply chains, finance, etc. to make the business more efficient and profitable through the integration of these functions into one platform [4].

An eCommerce that already has ERP as its performance-enhancement system can add artificial intelligence components to it to improve its efficacy even more.However, it is not the versatility and flexibility of AI that makes it the priority choice in business engagement strategies in most eCommerce. Rather, it is the technology's effectiveness in meeting the client's needs while reducing the cost of business.

Cost is the primary concern of every business, therefore, having a technological solution that addresses the problem effectively while maintaining a relatively low cost for business outrightly qualifies it to be the first choice. For this reason, Artificial intelligence is in vogue as the indispensable component in business engagement strategies for eCommerce businesses.

## 6. Future Studies

More research needs to be conducted to establish the other equally integral components of business engagement strategies used in ensuring the high performance of eCommerce companies. There are so many other areas where artificial intelligence can be leveraged to enhance the customer experience through better business engagement. In fact the various areas of Digital marketing strategies required to enhance the ecommerce engagement and sales can be improved by imposing various machine learning techniques.

## Acknowledgements

## REFERENCES

[1] Mishra, Niharika, and Sushanta Mukherjee. "Effect of Artificial Intelligence on Customer Relationship Management of Amazon in Bangalore." *International Journal of Management* 10, no. 4 (2019).

[2] Bagaria, MsShaily, and Niyat Shetty. "Artificial Intelligence And Its Implication For Customer Services." *Psychology and Education Journal* 57, no. 9 (2020): 6561-6573.

[3] Schrotenboer, D. W. "The Impact of Artificial Intelligence along the Customer Journey: A Systematic Literature Review." Bachelor's thesis, University of Twente, 2019.

[4] Haider, Lutful. "Artificial Intelligence in ERP." (2021).

[5] Oana, Oprişan, Tileagă Cosmin, and NițuClaudiu Valentin. "Artificial Intelligence-a new field of computer science which any business should consider." *Ovidius University Annals, Economic Sciences Series* 17, no. 1 (2017): 356-360.

[6] Mohapatra, Sanjay. 2019. "Critical Review Of Literature And Development Of A Framework For Application Of Artificial Intelligence In Business". International Journal Of Enterprise Network Management 10 (2): 176. doi:10.1504/ijenm.2019.100546.

[7] Maiwald, Julia. "The influence of artificial intelligence marketing on customer satisfaction in online retail." (2019).

[8] Isaac, R. Augustian, Prakhar Chaturvedi, Pradip Gareja, and Rohan Grover. "Secured E-Banking System using Artificial Intelligence."*International Journal of Emerging Technologies in Engineering Research (IJETER)* Volume 6, Issue 10, October (2018).

[9] Lingam, Yashoda Kiran. "The role of Artificial Intelligence (AI) in making accurate stock decisions in E-commerce industry." *Int. J. Adv. Res. Ideas Innov. Technol* 4 (2018): 2281-2286.

[10] Rana, Priya J., and JwalantBaria. "A survey on fraud detection techniques in ecommerce." *International Journal of Computer Applications* 113, no. 14 (2015).

[11] Buccino, Gaetano, LuanaSerino, and Stefania Mele. *Assessing Performance and Customer Satisfaction with Artificial Intelligence: a Case Study*. No. 1615. EasyChair, 2019.

[12] Anh, Tran. "Artificial intelligence in e-commerce: Case Amazon." (2019).

[13] SHAH, AAKASH, NIRAV PANCHAL, DHARMIL

SHAH, and PREM SHAH. "Object Detection Using Deep Learning and Artificial Intelligence in E-Commerce." (2019).

[14] Verma, Venus Kaur1 Vasvi Khullar2 Neha. "Review of Artificial Intelligence with Retailing Sector." *Journal of Computer Science Research* 02, no. 01, January 2020.

[15] La Russa, Gaetano, Niko Myller, and ErkkiSutinen. "Robo-eLC: a learning appliance for ecommerce." In *Proceedings. of IADIS International Conference on Applied Computing*, pp. 371-378. 2004.

[16] Huang, George Q., Rene de Koster, and Yugang Yu. "Online-to-offline ecommerce operations management (EOM)." (2020): 101920.

[17] Thakor, Shailendra D. "Effect of Artificial Intelligence (AI) on retail business." *International Journal of Research in all Subjects in Multi Languages* Vol. 7, Issue: 2, February: 2019.

[18] Schweyer, Allan. "Predictive analytics and artificial intelligence in people management." *Incentive Research Foundation* (2018): 1-18.

[19] Gupta, Pankaj, and Bharat Bhushan Sagar. "Usability Of An E-Commerce Website Using Information Mining and Artificial Intelligence." In *ICITKM*, pp. 59-64. 2017.

[20] Leon, Simone, and Alexander Nikov. "Intelligent emotion-oriented eCommerce systems." *Journal Recent Advances In Artificial Intelligence. Knowledge Engineering and Data Bases* (2008): 202-207.

[21] Deb, Suman Kumar, Ruchi Jain, and Varsha Deb. "Artificial Intelligence—Creating Automated Insights for Customer Relationship Management." In *2018 8th International Conference on Cloud Computing, Data Science & Engineering (Confluence)*, pp. 758-764. IEEE, 2018.

[22] Varshney, Shivi, RajvardhanJigyasu, Amandeep Sharma, and Lini Mathew. "Review of various Artificial Intelligence Techniques and its applications." In *IOP Conference Series: Materials Science and Engineering*, vol. 594, no. 1, p. 012023. IOP Publishing, 2019.

[23] Yadav, Jyoti, and Bhawna Mallick. "Web Mining: Characteristics and application in ecommerce." *Intl. J. of IJECSE* 1, no. 4 (2011).

[24] Rao, N. Thirupathi, and Debnath Bhattacharyya. "Applications of Artificial Intelligence and ML in Business." I*nternational Journal of Business Policy and Strategy Management* Vol.6, No.1 (2019), pp.13-22. http://dx.doi.org/10.21742/ijbpms.2019.6.1.03 (2019).

[25] Schweyer, Allan. "Predictive analytics and artificial intelligence in people management." *Incentive Research Foundation* (2018): 1-18.

[26] Schmutz, Peter, Silvia Heinz, Yolanda Métrailler, and Klaus Opwis. "Cognitive load in eCommerce applications—measurement and effects on user satisfaction." *Advances in Human-Computer Interaction* 2009 (2009).doi:10.1155/2009/121494

[27] Kolodin, Denis, Oksana Telychko, Viktor Rekun, MaxymTkalych, and Vladyslav Yamkovyi. "Artificial Intelligence in E-Commerce: Legal Aspects." In *III International Scientific Congress Society of Ambient Intelligence 2020 (ISC-SAI 2020)*, pp. 96-102. Atlantis Press, 2020.

[28] Leon, Simone, and Alexander Nikov. "Emotion-oriented eCommerce systems." (2010).

[29] Vadivel, R., and K. Baskaran. "Three Dimensional Database: Artificial Intelligence to eCommerce Web service Agents." *International Journal of Computer Science and Security (IJCSS)* 5, no. 2 (2011): 181.

[30] Geru, Marius, Angela Eliza Micu, AlexandruCapatina, and Adrian Micu. "Using Artificial Intelligence on Social Media's User Generated Content for Disruptive Marketing Strategies in eCommerce." *Economics and Applied Informatics* 24, no. 3 (2018): 5-11.

[31] Kumar, Tapan, and Monica Trakru. "The Colossal Impact of Artificial Intelligence. E-Commerce: Statistics and Facts." *Int. Res. J. Eng. Technol.(IRJET)* 6 (2020): 570-572.

[32] Girdher, Shaffy. "Role of Artificial Intelligence in Transforming E-commerce Sector." *RESEARCH REVIEW International Journal of Multidisciplinary* 4, no. 06 (2019): 282-284.

[33] Soni, Vishal Dineshkumar. "Emerging Roles of Artificial Intelligence in ecommerce." *International Journal of trend in scientific research and development* 4, no. 5 (2020): 223-225.

[34] Prasad, Bhanu. "Intelligent Techniques for E-commerce." *J. Electron. Commerce Res.* 4, no. 2 (2003): 65-71.

[35] Huang, George Q., René de Koster, and Yugang Yu. 2020. "Editorial: Online-To-Offline Ecommerce Operations Management (EOM)". Transportation Research Part E: Logistics And Transportation Review 138: 101920. doi:10.1016/j.tre.2020.101920.

[36] Kumar, V., Bharath Rajan, Rajkumar Venkatesan, and Jim Lecinski. 2019. "Understanding The Role Of Artificial Intelligence In Personalized Engagement Marketing". California Management Review 61 (4): 135-155. doi:10.1177/0008125619859317.

[37] Zeeshan, Mohd, and Komal Saxena. "Explorative Study of Artificial Intelligence in Digital Marketing." In *International conference on Computer Networks, Big data and IoT*, pp. 968-978. Springer, Cham, 2019.

[38] Mehta, Shaanvi, and Meera Mehta. "How Artificial Intelligence and Deep Learning led to a Breakthrough in Marketing and Consumer Behaviour: A Review." (2008).

[39] Özkiziltan, Didem, and Anke Hassel. "Artificial Intelligence at Work: An Overview of the Literature." *Available at SSRN 3796746* (2021).

[40] Nissen, Anika, and Caspar Krampe. "Why he buys it and she doesn't–Exploring self-reported and neural gender differences in the perception of eCommerce websites." *Computers in Human Behavior* 121 (2021): 106809.

[41] Online, DQINDIA. 2021. "How Artificial Intelligence In Ecommerce Can Be A Harbinger Of Next-Gen Customer Experience?". DATAQUEST. https://www.dqindia.com/artificial-intelligence-ecommerce-can-harbinger-next-gen-customer-experience/.

[42] Marr, Bernard. 2021. "The 10 Best Examples Of How Companies Use Artificial Intelligence In Practice". *Forbes*. https://www.forbes.com/sites/bernardmarr/2019/12/09/the-10-best-examples-of-how-companies-use-artificial-intelligence-in-practice/?sh=4cf7cee57978.

[43] Morgan, Blake. 2021. "50 Stats Showing The Power Of Personalization". *Forbes*. https://www.forbes.com/sites/blakemorgan/2020/02/18/50-stats-showing-the-power-of-personalization/?sh=49a4d1f12a94.

[44] Soni, Vishal Dineshkumar. "Emerging Roles of Artificial Intelligence in ecommerce." *International Journal of trend in scientific research and development* 4, no. 5 (2020): 223-225.

[45] Song, Xia, Shiqi Yang, Ziqing Huang, and Tao Huang. "The Application of Artificial Intelligence in Electronic Commerce." In *Journal of Physics: Conference Series*, vol. 1302, no. 3, p. 032030. IOP Publishing, 2019.

[46] Deepansha, Nirmal Kumarb, and Ritik Kumarc. "The Application of Artificial Intelligence in Electronic Commerce." *Turkish Journal of Computer and Mathematics Education Vol* 12, no. 12 (2021): 1679-1682.

[47] Shyna, K., and M. Vishal. "A Study On Artificial Intelligence E-Commerce." *International Journal of Advances in Engineering & Scientific Research* 4, no. 4 (2017): 62-68.

[48] Digital Commerce 360". 2021. "Global Online Sales Reach Nearly $4.29 Trillion In 2020 . *Digital Commerce 360*. https://www.digitalcommerce360.com/article/global-ecommerce-sales/.

[49] Verdon, Joan. 2021. "Global E-Commerce Sales To Hit $4.2 Trillion As Online Surge Continues, Adobe Reports". *Forbes*. https://www.forbes.com/sites/joanverdon/2021/04/27/global-ecommerce-sales-to-hit-42-trillion-as-online-surge-continues-adobe-reports/?sh=4dfc439550fd.

[50] Gruenwedel, Erik. 2021. "Report: Global E-Commerce Reached $4 Trillion In 2020 – Media Play News". *Mediaplaynews.Com*. https://www.mediaplaynews.com/report-global-e-commerce-reached-4-trillion-in-2020/.

[51] Statista, 2021. "E-Commerce Companies Believing AI Will Help Business 2019 | Statista". 2021. *Statista*. https://www.statista.com/statistics/1175063/ai-help-business-ecommerce-companies-worldwide/.

[52] Bayern, Macy, 2019. "Only 29% Of Companies Regularly Use AI", *Techrepublic*. https://www.techrepublic.com/article/only-29-of-companies-regularly-use-ai/.

[53] Knight, Will. 2021. "AI Is All The Rage. So Why Aren'T More Businesses Using It?". *Wired*. https://www.wired.com/story/ai-why-not-more-businesses-use/.

[54] Saran Kumar A., Chandrakala D. 2016. "A Survey on Customer Churn Prediction using Machine Learning Techniques." *International Journal of Computer Applications* (0975 – 8887) Volume 154 – No.10, November 2016

[55] Kakani, V., Nguyen, V. H., Kumar, B. P., Kim, H., &Pasupuleti, V. R. "A critical review on computer vision and artificial intelligence in food industry". Journal of Agriculture and Food Research,(2020),  2, 100033.