E-COMMERCE- FROM PUSH/IMPULSIVE TO INTELLIGENT

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Traditionally, businesses pushed their products on consumers and consumers shopped out of impulse, rather than need.

Electronic commerce (E-commerce), a subclass of electronic business, involves buying and selling of goods/services over the internet. E-commerce has drastically changed the way consumers shop and businesses sell. Internet improves productivity for the organizations which use it by helping businesses overcome restrictions on reach, communication with customers, timing, etc. Still, the traditional online shopping requires lots of effort from both sellers (marketing, generation of leads etc.), and consumers (collecting/interpreting available information, making purchase decision etc.).

Artificial Intelligence (AI), a general purpose technology (like electricity, and steam engine) aimed at creating systems which mimic human intelligence, can be leveraged to create business models for E-commerce which are innovative, personalized, interactive, quick as well as secure and at the same time, optimize buying experience of consumers.

As per a report titled "*India's Digital Leap–The Multi Trillion Dollar Opportunity*", published by Morgan Stanley in October 2017, India had 60 million online shoppers in 2016, which is expected to rise by over 50% by 2026. The report further mentions that nearly 430 million Indians have Internet access and smart phone penetration is expected to reach 700 million by 2020. At the same time, data costs are plummeting due to steep competition amongst India's telecom companies. These figures represent the opportunity that awaits E-commerce sector in India where AI can play the role of a key differentiator.

The national report on "*E-commerce development in India*" (2017) published by United Nations Industrial Development Organization, mentions that only 25% of the internet users in

India buy or sell goods and services online and this number is expected to grow in the coming years. This indicates the huge growth potential of the Indian E-commerce sector. (*The below graph represents online shoppers as a percentage of internet users in India).

Online Shoppers as percentage of total internet users*

Year	Percentage
2013	9%
2015	11%
2018	25%
2020	36%
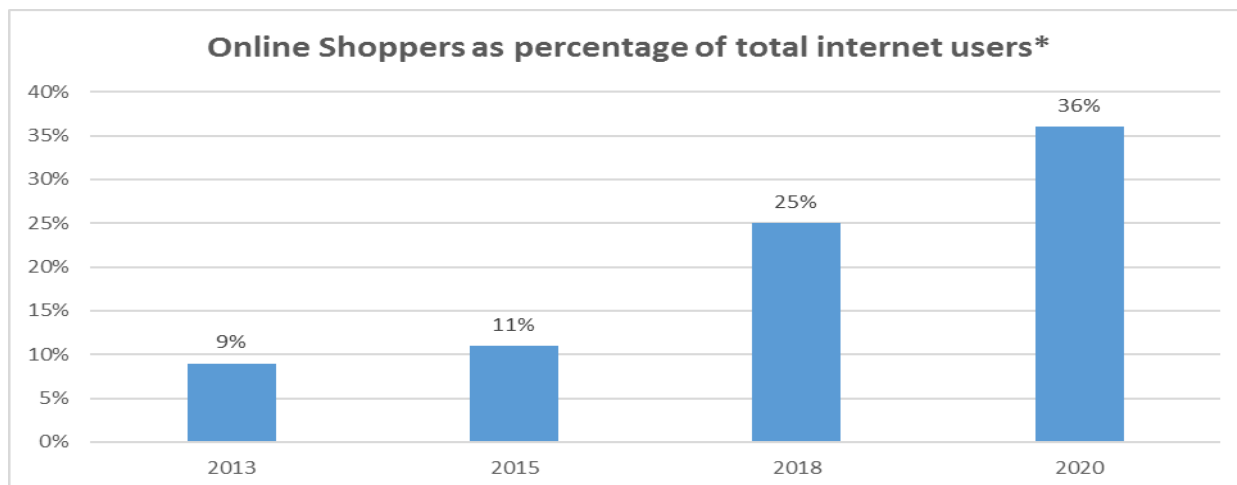
AI TECHNIQUES FOR E-COMMERCE

One of the basic aims of AI in E-commerce is to build systems that mimic human behavior so that the system appears more natural to its users. Following aspects of AI can be used for designing and developing E-commerce systems:

Data Mining(DM)- using technology to identify useful and meaningful patterns in data

Natural Language Processing(NLP)- process used to assign meaning to human sentences

Speech Recognition- conversion of spoken words to data sets that can be processed by NLP

Image Recognition- recognizing pictures/objects like humans

Machine Learning(ML)- science of self-learning algorithms

Depending on the nature of transaction and parties involved, E-commerce systems can be broadly categorized into:

- Business-to-Business(B2B)
- Business-to-Consumer(B2C)
- Consumer-to-Consumer(C2C)

Application of AI to E-commerce systems:

B2B systems	B2C systems	C2C systems
- Real time interaction across supply chain entities - Optimize production, inventory and delivery operations - Use ML to identify counterfeit products	- Use DM to recommend products for customers - Image recognition for faster and accurate search results - Combine DM, ML and NLP for data aggregation to build targeted understanding of preferences - Machine based customer grievance redressal systems using ML and NLP - Automated lead generation and marketing - Use ML to optimize payment methods, detect fraud, determine trends to optimize production, and personalize customer interactions	- Automated product valuation utilizing data and market trends - Use DM to place products in profitable markets

Use cases:

- Predictive technology is used to guide businesses to focus on improving production, inventory, and delivery operations.

- Product recommendation basis similarity of interests, wherein similar interests of various customers help decide recommendation for a new customer, who shares such interests.

- Image recognition can be used to provide faster and more accurate results.

- Machine learning can be used to
    - understand success/failure patters to optimize payments methods.
    - detect genuineness of a customer claim (like return claims) by analyzing past activities.
    - reduce instance of return on purchase/cash on delivery frauds basis past behavior.
    - analyze sales data to determine the latest trends/most preferred products to increase production.
    - making marketing prediction for each customer (probable next purchase, preferred price threshold, likely time for purchase, or preferred channel). These data points can be used to design most optimum marketing campaigns in a short span of time, eradicate human error, provide the most optimum route for targeting customers and help scale marketing to millions with precision.

- enable companies to personalize customer interaction by changing website interface with each customer, serve tailored content, alter content depending on demand etc. and eliminating irritants like bulk generic emails/messages thus enabling companies to reach the right customer through the right channel at the right time.

- Machine learning combined with NLP capabilities, can enable search engines to learn from each interaction thus displaying accurate search results, providing relevant auto-complete suggestion, and displaying add on items basis each search.

- Customer service using chatbots (computer program designed to simulate conversation with humans online) enables answering customer queries 24*7, understanding real time needs and delivering specific guidance.

- Voice powered online assistants are used for real time interaction, providing a human touch to online shopping.

- Review characteristics like rating to detect fake reviews in order to fight astroturfing (practice of creating or disseminating a false or deceptive review that a reasonable customer would believe to be trusted and neutral).

- Customer specific bundling of products and dynamic pricing based on analysis of customer behavior.

- Use of wearables to gather information about customer taste since wearables have greater access to customer lives than other channels.

- Smart agents** are used as buyer agents for price discovery, customer education, seller search, deals recommendation, alert automation etc.

(**A smart agent is a software agent that functions autonomously and continuously to perform activities in a flexible and intelligent manner, without human intervention. Smart agents are used for negotiation amongst other smart agents forming a part of the same environment.)

Approaches used for product recommendation/selection:

- Similarity of interests: wherein similar interests of various customers help decide recommendation for a new customer.
- Knowledge based approaches:
  a) 'case' based approach (wherein each product is treated as a unique 'case' and knowledge of past experience with such 'case' is used for product recommendation for new customers);
  b) 'goal' based approach (wherein the end 'goal' is the key determining factor- considering that a customer purchases toothpaste, the recommendations will consist of toothbrush or dental floss or tongue cleaner, as the end goal is oral hygiene);
  c) a combination of 'case' and 'goal' based approach.
- Learning from failures or passive observation: this involves learning customer preferences by observing customer selections/rejections.

These systems improve their performance over time by using past knowledge.

AI, INTERNET OF THINGS AND E-COMMERCE

The term Internet of Things (IoT) refers to integration of 'Things' through sensors and connectivity, enabling communication amongst them. IoT offers multiple opportunities for the e-commerce industry including:

- Better stock management- since the number of things entering and leaving the warehouses is large at any given point in time, tracking each product may be very difficult. The IoT sensors and RFID (Radio-frequency identification) tags may be used for stock management using real time flow of information. This will enable automatic monitoring and tracking of shipments. This can play an important role in e-commerce, saving both time and human effort.

- Better marketing and promotion- using the data generated and collected during the interaction of various devices in an IoT framework, companies can better understand the need of their customers and therefore use targeted promotion.

- Handling complaint process- imagine a scenario where the device is able to communicate its deficiencies to the manufacturer, enabling faster replacement and eliminating/minimizing customer efforts towards the same. This could revolutionize the way customers are serviced.

Artificial intelligence techniques play pivotal role in enabling the above. Some of the techniques being used are:

- Data Mining: Since devices in an IoT framework generate huge amount of data, data mining is used to manage this data through selection (selection of wanted data from the huge volume generated), cleaning (repeated data or junk data is removed) and transformation (transforming of cleaned data into a standard format which can be read across workstations and sending it out to the network), as well as to reduce the storage space.

- Voice recognition: to enable control of device as well as to enhance customer experience.

- Machine learning: to find patterns, correlations and anomalies in the data generated by IoT which will enable better decision making and help improve various facet of our daily lives.

AI AND LAW

With growing penetration of AI in our lives, it becomes important to understand the existing legal framework.

Legal Personality- Indian law does not recognize AI entity as a legal person. The rationale for the same could be lack of soul, intention, feelings and free will. This raises concerns under various laws:

- Indian Contract law requires parties to the contract to be legal persons. Thus, AI cannot enter into enforceable contracts. Even if legal personality is granted to AI, it will be difficult for the enforcement agencies to understand the codes used in these contracts created by AI.
- It is predicted that robots will replace a majority of human workforce in future but the existing labor laws are not equipped to handle such matters.
- Under the intellectual property laws, for a work to qualify for copyright protection, it must be 'creative' and copyright is granted to the author of such work. Considering a situation where AI creates fashion products customized for individual customers, and the results would not be the direct outcome of the coding, it will be difficult to determine the author of such creative work since AI worked autonomously (no one caused the work to be created). Similarly, under the Patents and the Design law, the inventor and the author, respectively, is always assumed to be a natural person.
- Income tax law in India only taxes an individual/entity that qualifies as a 'person' under the Income Tax Act. In the absence of a legal personality, income which is earned by AI/use of AI and realized by programmer or user of AI, will be taxed in the hands of such programmer or user, respectively.

Privacy concerns- With the advancement in data mining, humans are becoming predictable and thus easy to exploit. Targeted marketing shows how personal information can be exploited for financial gain. Information Technology Act/Rules lay down the criteria for collection of

sensitive personal information (SPI), obtaining consent, data usage and penalty for breach. However, the traditional understanding of what constitutes SPI itself has undergone drastic changes, necessitating a comprehensive, technology neutral law which can address concerns raised by growing technology.

Assigning liability-

Tort of negligence would require establishing that:

- AI owed a duty to take care;
- duty was towards the plaintiff; and
- damage was caused to the plaintiff due to breach of such duty by AI.

Even though machines have been traditionally treated as consumer products and thus strict product liability has been assigned to the manufacturers, using the same approach for AI will have direct impact on the technological advancements since this will lead to huge financial implications. Even if a mandatory insurance scheme is put in place, the ultimate burden would fall on the consumers in form of increased cost of technology. Recently, in *Thomas E. Jones et al.*, v *W+M Engineering et al., (*NY Slip Op 05398 [31 AD3d 1103] July 7, 2006 Appellate Division) where plaintiff was injured by gantry loading system created by the defendant, court observed that as regards negligence and strict product liability, the defendants were successful in establishing that the system, as originally designed and installed, conformed to specifications and safety requirements specified by the purchasing entity. The court while dismissing the claim of the plaintiff, mentioned that with respect to duty to warn, there is no duty to warn against an open and obvious danger.

Under the civil liability regime, damages are the key element for assigning liability. Since AI lacks a legal personality and thus, does not have rights and duties, it will be difficult to enforce claims against it.

Criminal law requires a*ctus reas* and *mens rea,* for liability to be established. Gabriel Hallevy in his book "*Liability for Crimes Involving Artificial Intelligence Systems"* (2015) discusses the following theories on how AI can be brought under criminal law:

- innocent agent theory (lack of *mens rea)-* where programmer/user will be liable;

- natural/probable consequence theory- where programmer/user will be liable for their negligent mental state where they ought to have known the consequence of negligence;

- direct liability approach- where autonomous AI entity will be liable for its own act/omission.

As present, AI entity is not held responsible in its own capacity due to the lack of a legal personality. This rule will require reconsideration since autonomous, and highly intelligent machines are making their way in our daily lives. It becomes important to assign liability in order to provide legal remedy/compensation to victims of AI.

Even if AI is held responsible, it will be difficult to determine the appropriate punishment. Capital punishment and imprisonment would serve no purpose for such non-living beings. Since AI does not own property, monetary penalties cannot be imposed. Using AI for community service could be one form of punishment, provided the AI can be programmed for desired activities.

Though granting citizenship to autonomous AI entities (like 'Sophia' in Saudi Arabia) would not be the right course of action considering the political rights attached with citizenship in India, yet granting it a legal person status, like corporations, with limited rights including right to enter into contracts, sue, be sued, and own property can be a move in the right direction.

CONCLUSION

A recent survey conducted by Finnish AI-based solutions specialist Zyfra[1] placed India at 13th position, with US at 1st position, followed by China, in terms of development of AI technologies for industrial internet of things (ranking is based on a study that examined the number and quality of scientific publications on the subject). Further, NITI aayog's #AIforAll, an approach focused on how India can leverage the transformative technologies to ensure social and inclusive growth, and the fact that there are more than two hundred[2] AI based startups in India, go on to highlight that AI is here to stay and will soon be an integral part of our lives.

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[1]https://www.business-standard.com/article/current-affairs/india-among-top-15-countries-in-artificial-intelligence-research-report-118101601182_1.html
[2]https://economictimes.indiatimes.com/small-biz/startups/newsbuzz/ai-startups-blossom-in-india-need-big-dollars-to-grow/articleshow/65730218.cms

After analyzing the various aspects of AI, its application to E-commerce and existing law, one can conclude that AI will lead to multiple benefits like increased transactions, customer retention, loyalty, and satisfaction. Even though the idea of AI taking control over our lives seems far-fetched, issues like loss of control over AI systems, misuse, etc. seem likely. Here, development of ethical standards for AI coding can play an important role. Such standards should lay down minimum requirements about- "what is regarded as ethical behavior and what is not", to help researchers and developers in this field understand and anticipate the possible ethical issues. Moreover, any autonomous decision making should not lead to violation of basic human rights. Thus, the data supplied to or used by AI systems also becomes a critical factor. Considering an AI system where the data supplied to the system is racially biased, such system, learning from such biased data, will produce discriminatory results. These situations can be avoided if such factors are kept in mind while laying down the ethical standards. As with any technological advancement, the legal framework will need to ensure a balance of interest, transparency and accountability in this sphere as well.