International Journal of Research in Engineering, Science and Management
Volume 4, Issue 2, February 2021
https://www.ijresm.com | ISSN (Online): 2581-5792

A Study of Artificial Intelligence and E-Commerce Ecosystem – A Customer's Perspective

Ramanjeet Singh*
Mittal School of Business, Lovely Professional University, Jalandhar, India

***Abstract*: The e-commerce ecosystem has been growing at an exponential rate and even in times of a global pandemic and nationwide lockdowns the e-commerce ecosystem evolved and adapted the same. In India, the e-commerce ecosystem has become a crucial element for the Indian economy as well as Indian digital users in a rather short span of time. The market is currently dominated by Amazon India followed up closely by Flipkart (Walmart-Flipkart) and the most recent introduction of JioMart, a major contributor to this exponential growth of the sector was the utilization of "Data" i.e. a data-driven ecosystem. The Artificial Intelligence/Machine Learning systems have played a critical role in the exploration of the vast data generated by customer 1 MB to 1.7MB per sec in a day, and thus the e-commerce industry implemented the AI/ML driven systems and formulated an ecosystem where both the operator and the user are in tandem where the operator funnels in the services and commodities and the user funnels in the data. But a major challenge for the same is cyber threats/cybersecurity, the extensive usage of AI/ML systems have made the e-commerce ecosystem a lucrative victim of data thefts, privacy invasion, data manipulation, and frauds and it is not limited to the parties having malicious intent but even the e-commerce operators are implementing more and more rigorous approaches for data accumulation that invades far deeper into the "privacy bubble of the customer".**

Thus elements designed to deliver positive value to customers within the e-commerce ecosystem and even though the AI/ML systems have proven their hierarchy of benefits within this industry, yet in a significant share of customer are delivering the negative value of such systems as each customer has its own bubble threshold whether its social data, financial data or demographical data each customer is as unique as his/her digital signature. This has become more concerning especially after the NSA-Snowden declassification and since that customers have created a far more offensive privacy bubble and this approach of rigorous data collection, profiling, and sharing by the e-commerce operators within the e-commerce ecosystem has created a dilemma of data security vs. data growth.

***Keywords*: Artificial Intelligence, Machine Learning, E-Commerce, Big Data, Data Privacy, Security.**

1. Introduction

Artificial Intelligence or in simple terminology Machine Learning is a code block that runs algorithms to ensure the What, When, and How of data processing in response to an input. E-Commerce, on the other hand, has become the exponential growth sector in the past decade and is now dominated by e-comm giants around the globe such as (Amazon, Flipkart, and most recently addition JioMart). But in recent times things have seen a new factor of impact i.e. artificial intelligence on e-commerce platforms. Artificial Intelligence systems have become a crucial factor in each aspect of the e-commerce business process i.e. from supervising complex logistics to the automation of customer query handling systems, artificial intelligence has become one with the e-commerce industry. Though there is a hierarchy of benefits attached to these artificial intelligence-based automation systems, there are several downfalls and negative impacts that have become a severe factor for the organizations implementing such systems and also for the users that are observed by such artificial intelligence systems. The artificial intelligence systems in the current denotation of time can be broadly seen as a two-sided coin that has positive factors with vast potential but on the other hand, has negative factors that can diminish these potential factors. The E-commerce industry has seen a high degree of digitization and automation simultaneously, and both these aspects have allowed the industry as a whole to increase productivity, performance, and persistence. Focusing on the micro-levels of the E-commerce industry we can observe the highest rate of adoption by leaders such as Amazon, Walmart, Flipkart (Walmart-Flipkart), eBay, and even at small scale levels we can observe the same pattern of adaption but at a much smaller rate and scale by regionalized (Indian) E-commerce platforms such Bewakoof, Grofers, Liscious, etc. through such systems have proven to be a valuable addition parameter for E-commerce industry and e-commerce customers there are several negative implications that not only limits the reach if such systems but also tends to convert the positive areas of value addition into the negative return. Factors such as customer privacy and data thefts have seen a spike in recent dates and such Artificial Intelligence/Machine Learning systems have been at the center of courtrooms, major data thefts from platforms such as Amazon, Flipkart and non-authorized data sharing between E-commerce operators and third party entities (banks, lenders, and creditors) have weakened the

*Corresponding author: sramanjeet140@gmail.com

overall trust of customers in such systems and have created a negative feedback loop as even though developments are done to ratify such systems the overall perceptions remains unchanged in customer bases.

A. Positive Inference

The artificial intelligence or machine learning-based systems have brought immense value to the E-commerce users /customers and even to the E-commerce industry, they have optimized the e-commerce experience and have tailored the e-commerce ecosystem to enhance customers experience as well as purchase frequency.

1) Customer Oriented Positive Implications

The benefits of artificial intelligence systems or machine learning systems aren't only limited to corporate value benefits but also reciprocates the same pattern of value generation towards the customer end. In a crux, these benefits can be observed at a macro scale in the current E-commerce ecosystem and as E-commerce entities diversify more and more towards artificial intelligence the final value that is delivered to the customer can now be delivered with higher efficiency, effectiveness, and elasticity. Customer-oriented positive implications are not limited to final delivery but rather flows through the whole customer decision-making process that is from the beginning of the purchase to end purchase decisions, some of the primary positive implications that are oriented towards the customer are as follows:

a. Automated purchase handling systems
b. Automated product recommendation systems
c. Artificial assistant
d. High degree of personalization
e. Effective visual immersiveness
f. Automated data tracking

B. Negative Inference

Though artificial intelligence or machine learning systems have been recognized for the high degree of value that is delivered by them at both ends (i.e. corporate and customer). Such systems have their own limitations or fallbacks that resonate with E-commerce customers. In the current E-commerce ecosystem, there are several downfalls or limitations that constraints the degree of implementation of such artificial intelligence systems. Apart from their own limitations, artificial intelligence systems have a high degree of reliance over the data flow, and policies or regulations that govern the flow of data at global or regional scales can limit the effectiveness, efficiency, and elasticity of such artificial intelligence-based systems.

1) Customer Oriented Negative Implications

In the current ecosystem of E-commerce, artificial intelligence or machine learning has become a crucial component in dimensions such as customer behavior analysis, customer review analysis, purchase suggestion systems, etc. Such a level of the analytical processes requires a huge share of customer data, and may even use personal data of the customer to deliver a high degree of accuracy. This creates its own downfall as it tends to violate the ethical concerns of the customer and can lead to privacy invasion which can face a backlash due as it may be perceived as data theft from the customer. The negative factors of artificial intelligence or machine learning system that affects the customers can be broadly classified under two distinct sections that are:

a. Privacy Invasion and Data Theft

As such a system tends to utilize a high share of customer data ranging from customer past purchases to social media behavior patterns and trends to create social profiling to create a better suggestion system. It tends to breach the customer's privacy bubble and such systems have faced a severe backlash by digital communities for their Trojan roles as data mining tools or even as data spying tools.

b. Ethical Breach and Digital Regulations

The share and nature of customer data these artificial intelligence systems or machine learning systems can range from generalized data to much more volatile personalized data. This though allows delivering the customer a better virtual experience such systems on other hand breaches the ethical concerns of customers and creates a backlash as the data collected may be perceived by the customer as volatile and of significant value.

2. Literature Review

Vinesh Dinesh Kumar Soni, conducted a study on how Artificial Intelligence has become a critical component of the E-commerce industry. The study highlighted the various aspects and scopes where Artificial Intelligence is embedded in the E-commerce industry from aspects such as Customer Relationship Management (CRM) to the automation of Marketing elements. The paper highlighted the diversified roles that artificial intelligence can undertake in an organization, business processes such as sales, customer relationship management, product content management and etc can be automated by artificial intelligence systems. The paper also highlighted the exponential future growth of Artificial Intelligence in the E-Commerce industry with a predictive rate of 90% embedment of Artificial Intelligence by 2021 in the e-commerce industry, backed by E-commerce giants such as Amazon, Flipkart, eBay and etc.

Georgia Isaac et al. (2018), conducted research on how Artificial Intelligence is being optimized to fit and forth come to the E-commerce industry. The paper defined the objectives of three distinct computer languages and their implementation as a whole in an Artificial Intelligence system that acts as a mediator between the customer and the seller on an e-commerce platform. The paper provides an Artificial Intelligence system that is based upon Cookies functionality and Utilizes the Use Case research methodology to ensure the highest range of accuracy as a customer product recommendation system. To ensure flexibility and cross-platform operability an adaptive Artificial Intelligence system is designed that runs on the functional block of Web2py Python Model View Controller to create a Use Case System that utilizes a series of algorithms and predefined markers to analyze, classify and implement optimum response action. Under this research, it was concluded that adaptive Artificial Intelligence Systems are the most viable candidate as adaptive customer recommendation systems as

such artificial intelligence systems ensure that each party on either side of the business process is affected equally by such Artificial Intelligence-based automation systems.

Thomas Davenport et al. (2019), conduct research on the three major elements of Artificial Intelligence are Task Types, Levels of Integration, and Artificial Intelligence embedment. To context, each of these three identified elements was concatenated as one to overview a broader prospect for the future of Artificial Intelligence systems in an e-commerce entity on levels such as marketing, strategy formulation, behavior predictor, and consumer pattern analysis. This research provides us with a framework that defines the various levels of artificial intelligence automation as well as provides a detailed insight into various levels of automation systems with respect to its reach capability as well as limitations. Following the continuum, the conducted research also highlighted the various barriers such as policy, adaption, and response that can lead to a non-optimized Artificial Intelligence systems but in the same also highlighted the future agenda of Artificial Intelligence as a business process facilitator if not only same as a human manager but as same as a human consultant. The prime area of highlights with future perspectives was strategy formulation functioning, Sales prediction system, Scenario manager, and several more with the response of adaptive framework.

Neha Nandal et al. (2020), conducted a study on the aspect of Sentiment Analysis of Amazon's Review, this study highlighted how Amazon's review can be analyzed and distinctly differentiated into two different aspects of Polarity and Subjectivity. The primary element that was highlighted was the accuracy of Artificial Intelligence-based algorithms that are pre-defined in software such as R and Python to undertake the Sentiment Analysis. The study highlighted how such Artificial Intelligence-based sentiment analysis can be further tuned down to act as backed support in consumer behavior pattern analysis as well as a consumer-oriented decision-making system. The research provides a detailed flowchart defining the information processing process by Artificial Intelligence/ Machine Learning systems, the methodology used in the research follows the parameters of Bi-polar classification and utilizes the Matlab library (Python) to develop a graphical representation of bi-polarity of review context. The study also highlighted secondary usage of such an Artificial Intelligence algorithm to create a better review system by automating the filtering process as such an Artificial Intelligence system is pre-capable to extract reviews that are fake, sarcastic, denial, or following the same pattern.

T. Keerthana et al. (2020), conducted research on how Flipkart uses a machine learning-based recommendation system that uses user profile information to create a recommendation matrix or collaborative recommendation on defined parameters of interest that coincide between users. In simple terms, the machine learning-based system tracks user's patterns such as browsing, wishlist, a past purchase, and review and creates a matching index with patterns similar to user's. The paper provides us with a proposed detailed framework that can be utilized to mitigate the current flaws in artificial intelligence-based recommendation systems, the methodology of filtering is utilized for higher accuracy, and filtering parameters are defined on the basis of memory, model, item, and user. Apart from that the research also highlighted how Flipkart's recommendation system is one of the most optimized recommendation systems that use a series of collaborative filters such as Item, User, and cookies to create a recommendation matrix with a high rate of accuracy, thus making it a viable potential in future operations of Flipkart.

Andrej Miklosik et al. (2019), conducted research on awareness of machine learning-based analytical tools available for digital marketing analysis. Under the research, it was observed that the majority of e-commerce platform owners especially at the MSME level had no relevant information on such analytical tools and their branches of Big Data and Artificial Intelligence. This highlighted the gap between the predictive use of such tools and their actual degree of usage, the research also highlighted the accuracy and reliability of machine learning statistical tools and how such tools will allow to create a better competitiveness index for the e-commerce platform with secondary continuum benefits of cost reduction, reach widening, content delivery and etc. Apart from the beneficial hierarchy of machine learning the research also highlighted non-beneficial or hurdle factors that prevent such e-commerce platforms to implement machine learning tools the factors were the cost of implementation, accuracy in delivery, reliability under complex variables, and etc.

Shaheen Thobani (2018), conducted research on how machine learning can improve e-commerce sales, the research highlighted the various scopes of machine learning in the e-commerce ecosystem ranging from minor automation of routine tasks processes to undertaking supervision of complex information systems that are responsible for handling elements such as customer reviews, product details, financial flows, strategic formulations and following business process. The research highlighted the framework of machine learning canvas a software repository with predefined machine learning algorithms that provide a root view into business process automation, opposite the same the research also highlighted the various challenges and questions that may arise with the passage of time while implementing the machine learning. Some of the primary highlighted aspects were user privacy invasion, the flow of data, variety of data, static vs dynamic factors, reliability under extremes of market conditions, with primary dominance of cost of running such systems at such a wide scale or VLSI (very large scale integration).

Brilian P. Amiruddin et al. (2020), Conducted research on how artificial intelligence-based automation has become an indispensable resource for the logistics industry and how significant has been its effects on a logistics-dependent industry of E-Commerce. The research defined how Artificial Intelligence-based systems have taken over the traditional E.D.I (electronic data interchange) mediums and now provide a much smoother and efficient interexchange system, this is crucial elements in the E-commerce as the nature of products in a wide-scale fast-moving, and latencies such as mismatch of address, packaging, and other routine logistics operations can lead to

concurrent losses. In the hue of the same, the research also highlighted the interdependence of logistics and e-commerce on automation with leading automation such as WCS (Warehouse Control System). In a crux, the research highlighted the concrete relationship between logistics and e-commerce and how both are being optimized to the fullest by the implementation of artificial intelligence-based automation.

Erik Brynjolfsson et al. (2017) Conducted a study, how AI can do for an organization. AI is poised to have a transformational impact, on the scale of earlier general-purpose technologies. Although it is already in use in thousands of companies around the world, biggest opportunities have not yet been tapped. The effects of AI will be magnified in the coming decade, as manufacturing, retailing, transportation, finance, health care, law, advertising, insurance, entertainment, education, and virtually every other industry transform their core processes and business models to take advantage of machine learning. The study talks about how AI can be beneficial for the organization and how it can give a bad impact.

M. I. Jordan et al (2015) conducted research on Machine learning that how to build computers that improve automatically through experience. One of today's most rapidly growing technical fields, lying at the intersection of computer science and statistics, and at the core of artificial intelligence and data science. Recent progress in machine learning has been driven both by the development of new learning algorithms and theory and by the ongoing explosion in the availability of online data and low-cost computation. The adoption of data-intensive machine-learning methods can be found throughout science, technology, and commerce, leading to more evidence-based decision-making across many walks of life, including health care, manufacturing, education, financial modeling, policing, and marketing.

Perras JR. (2019) conducted study on the present invention which provides a system of automated data-driven tools that are integrated to provide an orderly and efficient set of concrete, specific and useful plans to help companies attain organizational and operational excellence. A system is disclosed which includes a set of e-performance metric development tools, a set of best people tools for force planning and analysis, with a companion set of eLearning tools to provide strategic employee development assistance and a set of journey management tools to assist in self-measurement, metric comparisons, and plans development. An exemplary preferred embodiment is described which teaches a new and unique workforce transformation system to illustrate a concrete specific implementation result.

George Q Huang et al. (2015), Logistics has been the bottleneck in e-commerce, creating problems such as slow and/or wrong deliveries, lost packages, damaged goods, and incorrect packing. Automation extends capacities and capabilities as justified by the vast volume of online orders. An automated storage and retrieval system (ASRS) can deliver high efficiency but may be limited in flexibility when it comes to dealing with order disparities in size, shape, weight, volume, and mechanical properties. The ASRS may not offer adequate scalability to adapt to growth and cope with increased seasonal demands, or deal with facility breakdowns and carry out technical maintenance. Robotics promises to strike a balance between efficiency, scalability, and flexibility. There are lots of advantages and disadvantages of using automation in Logistic, this study talks of all the aspects and reaches a conclusion.

Bahman Zohurib et al. Conducted a study on how artificial intelligence systems provide historical, current, and predictive views of business operations, most often using data that has been gathered into a data warehouse or a data mart and occasionally working from operational data. Self-service Business intelligence gives end-users the ability to do more with their data without necessarily having technical skills. These solutions are usually created to be flexible and easy-to-use so that end-users can analyze data, make decisions, plan, and forecast on their own. In summary, Artificial Intelligence enables us to put our data in a perspective that will work for us rather than overwhelming us with its sheer volume.

The Wuhan University of Technology, this study focuses on how AI changes the basic logic of enterprise value creation to enhance customer value and enterprise competitiveness. It may include changes in the element of multiple business models and may also include changes in the relationship among elements or dynamics mechanisms. The strengthening of customer relationships is one of the benefits of innovation. Machine learning and big data mining methods can provide more accurate customer relationship management for commercial banks. Artificial intelligence creates a diversified source of income for the business and also helps the e-commerce industry to generate more and more profit.

3. Research Objective

The research was conducted with the following main objectives in context:

a. To explore the impact of Artificial Intelligence systems/Machine Learning systems in the E-commerce customers in the E-commerce ecosystem.
b. To review customer knowledge with respect to digital safety and privacy practices in the digital ecosystem.
c. The overall objective of the study is to assess the impact of Artificial intelligence/Machine Learning systems on e-commerce customers in the e-commerce ecosystem, with a sub-focus on
    i. To identify the negative implications of Artificial Intelligence/Machine Learning systems in e-commerce customers.
    ii. To judge the e-commerce ecosystem's developmental gains and repercussions
d. To question the future scope of Artificial Intelligence/Machine Learning in the Digital E-commerce Ecosystem.

4. Research Methodology

A. Research Design

The research followed a descriptive type of research which mainly involved analyzing secondary data of selected online companies which totally depend on the AI system to gain or

regain their customer. Descriptive research as suggested by the name, is simply defined as that type of research that is conducted to describe the business or market characteristics trying to answer questions who, what, when, where, and how when attempting to address a research problem.

B. Data Collection Method

The research used secondary data which was collected from the designed questionnaire to administer the various facts and figures about the AI feature and it also shows the perception of the customer which indicates how customers get influenced while purchasing the product or any services.

C. Methodology

We had directed this investigation by two stages, the writing survey, and a subjective substance examination research strategy. To start with, on the writing survey, the logical writing from the web was looked at and accumulated, the logical writing would be utilized as material contentions in this paper, and we looked through it from confided in sources. We utilized trusted and legitimate diaries web crawlers destinations, for example, Google Scholar, Science Direct, and IEEE Explore to get the applicable logical writing for the examination subject that too from the other confided in distributors. For example, we looked through writing to get the solid meaning of mechanization and internet business. The last advance, after we got the applied establishment from the writing survey about the exploration theme, we began the subsequent stage which was a subjective substance investigation research strategy, from the meaning of subjective substance examination is a procedure for contemplating the implying that was remembered for the body of an announcement.

5. Scope of the Study

The study is aimed to provide a clearer understanding of how Artificial Intelligence systems/Machine Learning systems are diversifying the E-commerce industry at both macro and micro levels. The research is done only in the context of recognized E-commerce entities and their customer base as to provide a macro view on the evolution of Artificial Intelligence in E-Commerce, its current level of implementation, and its future scope followed by its limitations and constraints.

A. Significance of Research

Though quite a good number of researchers have conducted in relation to the topic being proposed. The papers have primarily focused upon the uni-polar effects of Artificial Intelligence/Machine Learning on the E-commerce Industry, with a prime focus on highlighting the benefits of such artificial intelligence and machine learning systems for the E-commerce customer under E-commerce ecosystems. This study would therefore emphasize finding the negative factors of Artificial Intelligence/Machine Learning system and determining an equilibrium relationship between Artificial Intelligence and E-Commerce customers and in the continuum, it would also highlight whether the impact of Artificial Intelligence/Machine Learning in future scope will increase or will suffer diminishing returns.

B. Variables Identified

There were two distinct sets of variables that were identified under this research of Artificial Intelligence/Machine Learning in the E-Commerce Industry, the sets were dependent variables and independent variables.

1) Dependent Variables

- E-Commerce Customers/Users

2) Independent Variables

i. User Participation Index
ii. Policy Regulation Barriers
iii. Privacy Violations Threshold
iv. Digital Safety Awareness Level
v. Digital Signature Sharing
vi. Data Sharing Awareness

6. Problem Statement and Research Gap

The Artificial Intelligence/Machine Learning systems have emerged as a single point solution for every dynamic and static issue in the e-commerce ecosystem, but on the other hand, these systems have also been highlighted for their negative impacts. Though several research journals have been aimed towards highlighting the benefit hierarchy of artificial intelligence /machine learning systems in the e-commerce ecosystem across the globe a very few have been aimed towards highlighting the negative repercussion of such a system. With that research gap in the main perspective, this study aims to highlight the negative effects of such artificial intelligence/machine learning-based system on e-commerce customers in the e-commerce ecosystem and how such systems, though have added value to the whole e-commerce ecosystems but have also created a range of critical flaws in the digital e-commerce ecosystem for the e-commerce customers.

A. Problem Description

Artificial Intelligence or Machine Learning systems have developed into critical yet hazardous tools for e-commerce enterprise the whole process of implementation, functioning, and development is now governed by factors such as transparency to users, data collection and sharing, regulations, and legal acts that forbid such systems. Though it has been observed and proven that such systems are highly capable of creating a highly flexible, standardized, and yet personalized environment for each e-commerce customer, the silver lining of data theft and privacy violations have rendered such systems virtually limited from its reach. The rise of digital e-commerce ecosystem has presented a potential factor for growth and as well as a factor of a threat to customers as the digital integration is now adapted at VLSI (very large scale integration) interconnection of e-commerce platforms with users platforms such as:

a. Banking platforms
b. Social platforms
c. Medical platforms (Specific areas)

And many others have on one hand created a matrix for evolution and development for Artificial Intelligence and

Machine Learning systems but on the other hand have created a paradox of safety and violations in e-commerce customers as the VLSI on one scale allows a central approach but on the other hand, it also creates a potential single breach point to each customer information.

7. Findings

The digital population of India is on an ever rising pathway, and as of research conducted by Statista, there are more than 700 million active users of smartphones in India and is expected to grow by an average of 7.2% with each successive year. This reflects that as the number of smartphones is increasing successively the same pattern can be observed in the E-commerce ecosystem as well especially in the case of Amazon India, its customer base has grown by 4x since 2015 and the Indian E-commerce market is expected to denote 20% of Amazon's global growth (Financial Express). Thus to simplify and extract micro-level elements we took a sample size of 516 individuals with distinct demographics from the overall population of 700 million. The data collected reflects the consumer behavior in the E-commerce ecosystem in India and as well as their perception of the rising influence of artificial intelligence/machine learning in the e-commerce ecosystem.

A. Which E-commerce operator is Leading the Ecosystem? Who Will Lead the Future?

From the sample responses it was observed that a high proportion of individuals were utilizing the services of Amazon i.e. around 84.9% of the sample population were engaged with Amazon (Amazon India, Prime Video, Amazon Business, etc.) and 12.6% were engaged with Flipkart (refer to figure 1)

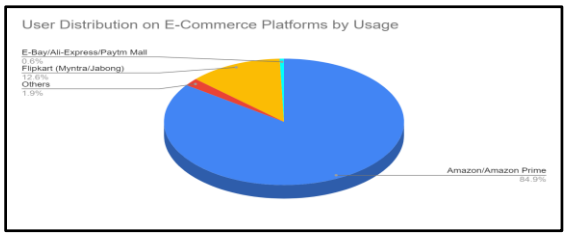

Fig. 1. User Distribution Per Chosen E-Commerce Platforms
Source: Survey Data
Legend:
Blue="Amazon/Prime",Teal="Flipkart(Myntra/Jabong),Yellow="Others",Red ="eBay/AliExpress etc".

This consumer behavior can be pegged with Amazon's innovation first approach, Amazon has been a leader in adopting and innovating AI/ML based consumer technologies and the positive response can also be observed from the consumer end as well. Apart from that when the sample population was approached to identify which current market player will lead the future of AI/ML in the Indian E-Commerce ecosystem approx. 90% of individuals opted for Amazon as the option (refer to figure 2).

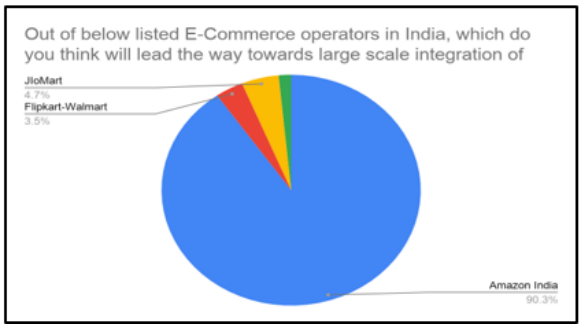

Fig. 2. Customer's perception of which E-Commerce operator will lead large scale integration of artificial intelligence/machine learning systems.
Source: Survey Data
Legends: Blue=" Amazon", Yellow=" JioMart", Red=" Flipkart/Walmart", Green=" Others"

This highlights both Amazon's market penetration success rate and its market value standing as well, this response pattern can be pegged to Amazon's extensive usage of AI/ML based systems for instance: The Amazon Product Recommendation System, Amazon Alexa, Amazon Fire Stick, and the list progresses onwards. From this, we can observe that the consumers have well adapted the A.I/M.L systems in their general day-to-day hierarchy and Amazon and other E-commerce operators are farming the benefits of same and as the number of digital devices multiplies by several folds each year the same ranges of benefits will continue to progress upwards and will facilitate in the creation of highly flexible and personalized A.I/M.L systems but this comes at a cost to be specific an array of costs that both an organization and user has to bear simultaneously in the E-commerce ecosystem.

B. Drawbacks of Artificial Intelligence/Machine Learning Systems in the E-Commerce Ecosystem

The E-commerce industry is a data drive industry i.e. each and every aspect and its action is governed by the data, the data may be originated from the user end or the operator end but in the end, it is the prime governing factor. The very same implies for the AI/ML systems in the E-commerce ecosystem, that are formulated by data, driven by data, and produce data themselves.

Table 1
Pivot for customers who have linked social account/banking account either both or one facing a situation of data theft

Data theft faced by customers		**Faced a situation of data theft or non-consensual data usage**		
Social Account Linked	**Bank Account Linked**	**No**	**Yes**	**Grand Total**
No	No	71	40	111
	Yes	68	54	122
No Total		139	94	233
Yes	No	49	63	112
	Yes	78	93	171
Yes Total		127	156	283
Grand Total		**266**	**250**	**516**

Source: Survey Data

Though this makes them highly accurate and facilitates them with the ability to predict the patterns and conjunctions, it also makes them vulnerable and hostile if any control algorithm is

misused it can cause a series of fallbacks for both the user as well as the operator itself. In our observation we identified the same pattern of benefits and repercussion in the customer's social and banking account interlinking with the E-commerce platform and the number of individuals that have faced a situation of Data Theft or non-consensual usage of data.

From the above table, we can observe that approx. half of the sample population 50% have interlinked either two or more than two accounts with their e-commerce profile, this can be stated as several e-commerce platforms require sign-in which is generally done via a social platform. Though the primary reason is to create a purchase profile in tandem with an individual's social media behavioral pattern and banking interlinking is done for ease of payments and in the current scenario of credit scoring as well (Flipkart Post-pay and Amazon Pay-Later services).

Though this interlinking allows the customer to have a better and much more personalized experience, it also makes them vulnerable to data thefts as well as non-consensual usage of sensitive data, from the above table we can observe that approx. half of the sample population have suffered from the same data theft which was directly or partially related to e-commerce application and such data theft pose a fatal flaw in the A.I/M.L systems as they are one point entry and exit systems unauthorized access of such sensitive information can trigger a meltdown and several points of the scale. This becomes a more crucial factor to counter with for e-commerce operators as, as per the data published by the "National Consumer Forum" e-commerce frauds and data thefts have jumped by nearly 500% in the timeframe from 2016 to 2019, and a major share of such data theft targeted customers banking data as well digital signature data that later lead to identity theft, monetary theft and etc.

C. How much is the customer willing to share?

A major challenge for the artificial intelligence/machine learning systems implemented in the e-commerce ecosystem is that such systems have to keep the customer at the epicenter and work around the same as the source generation point is the customer itself. This poses its own flaws and drawbacks as a major share of customers' sensitive data must be exposed to such systems in exchange for such systems to run with accuracy and efficiency, but this is leading to a new disruption that is "privacy bubble invasion". That is such systems are trying to mine out each and every bit/byte of data that a consumer generates without counting in the factor that whether the customer is willing or not, we approached our sample population to determine how many customers are willing to share how much share of their personal data and for the same responses were divided into eight distinct options that are as follows:

a. Social Data, Banking Data, and Personal Data
b. Social Data and Banking Data
c. Banking Data and Social Data
d. Banking Data and Personal Data
e. Only Social Data
f. Only Personal Data
g. Only Banking Data
h. N.O.T.A (None of The Above)

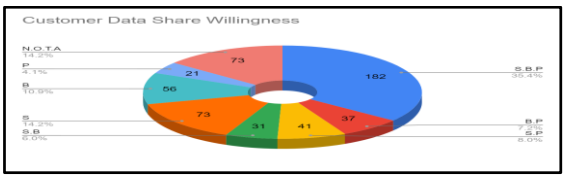

Fig. 3. Customer's data sharing willingness (Which Data is Customer Ready to Share with E-Commerce Platforms)
Source: Survey Data

Table 2
Customer data sharing willingness

Parameters	No. of Individuals
S.B.P	182
B.P	37
S.P	41
S.B	31
S	73
B	56
P	21
N.O.T.A	73
Total	514
Legends	
S: Social Data	
B: Banking Data	
P: Personal Data	
NOTA: None of The Above	

Source: Survey Data

From the above table, we can observe that a significant share of a population that is around 73 individuals show no willingness into sharing their social data, banking data, and personal data at all (refer to figure 3 for more information). Though we can observe that around 183 individuals are willing to share that 360 degrees of data but on condensing the responses we can observe that a major share is limiting their exposure from providing such data inputs. This highlights the highly criticized flaw of AI/ML systems in the e-commerce industry their data dependence makes them both a reliable option and as well as a potential breach factor that can lead to cybercrime, for this we need to understand that data theft is not only stealing data from the source and deleting but a cybercrime involves several layers of such attacks that can bypass the security measure and end up crippling the whole system. This is a major threat especially when the information stored holds monetary and social value and can be altered and remolded for malicious purposes, a major example of current times where the AI/ML systems were compromised and lead to an unauthorized publication of data that was of national security nature was the "*Solar-Flare Attack*" where a central system which was responsible for supply and logistics was compromised (a very same nature of systems are being utilized in the E-commerce ecosystem as well) and lead to poisoning of the complementary and dependent system across the digital grid. What makes such breaches fatal is that such unauthorized access can bypass the complex security mesh and in many cases are undetected and untraceable as the number of nodes and branches are infinite especially when a system has branched over a wide span for example Amazon Alex, Flipkart Recommendation System, etc.

Such cybercrimes are the primary reason which demotivates the customers to provide full-fledge access of their information and in many cases, customer is limiting the quantity and quality of their shared data either by utilizing self-measures or by utilizing third party control software such as Glass Wire, Brave, Nord and etc.

D. Security Perception vs. Data Control Perception (Customer's Viewpoint)

As the artificial intelligence/machine learning systems in the e-commerce ecosystem are highly reliant upon the customers' data, this makes the customer highly sensitive to data sharing, data security, and data control. And from observing the responses of the sample population on the parameters of security and control we extracted that both are interdependent on each other and have an influence over customer's data sharing, security, and control. The Chi-Square. test of both the variables also depicts the same and states that both are interdependent i.e. security perception of a customer influences their perception for customers having the ultimate authority over data.

Table 3
Chi-Square. test between customer's data security perception and customer's data control perception

Pearson's Chi-squared Test
Data: Security_and_Control_$`Security Perception` and Security_and_Control_$`Data Control Perception`
X-squared = 5.5085, df = 6, p-value = **0.4804**

(Refer table 3, for more information), a better understanding of the same can be observed from the below-provided pivot table providing segregation of customers in E-Commerce ecosystem on the perception of Data Security and Data Control.

Table 4
Customer data security perception and data control perception in relation to e-commerce ecosystem

Security Perception	**Data-Control Perception**	**Count of Security Perception**	**Count of Data Control Perception**
Maybe	Maybe	43	43
	No	48	48
	Yes	65	65
Maybe Total		156	156
No	Maybe	42	42
	No	51	51
	Yes	74	74
	Yes.	1	1
No Total		168	168
Yes	Maybe	63	63
	No	48	48
	Yes	81	81
Yes Total		192	192
Grand Total		**516**	**516**

8. Data Protection and Legal Regulations

The Data Protection and Legal regulation in the e-commerce ecosystem are still under its pre-adolescent given that the sector only became widely popular after 2015 only and a major share of its popularity is supported by demonetization and digitization. The legal regulatory framework is still seen a premature approach as several loopholes are present and are actively exploited and the framework has a high inheritance from the *Indian IT (Information Technology) Act 2000 and Indian IT (Information Technology) Act 2008*, though this makes data protection and regulation as a part of the judicial system and provided the government of India a significant control over the data grid the approach is highly directed towards "*National Security*" rather than individuals personal data security and organizational data security. Given the recent development in the data security and regulation legislation, one of the major developments was "*SPDI Rules 2011*" i.e. Reasonable Security Practices and Procedures and Sensitive Personal Data or Information and "*Personal Data Protection Bill 2019*". Under both these regulatory branches, there are numerous sub-sections that define a structured framework for ethical usage of personal data, security framework, and handling of violations of data security and protection elements and they also define a crucial aspect of what falls under personal data/secured data. As per SPDI Rules 2011, any data that falls under the below-given elements will be treated as personal data/secured data and any violation/breach will be subject to the judicial outcome under the IT Act 2000, IT Act 2008, and Data Protection Bill 2019, the element of SPDI Rules 2011 are:

a. Data consisting of passwords
b. Data consisting of medical records/sexual orientation
c. Data consisting of financial/banking data
d. Biometric information
e. Any data that falls under a contract between concerned parties
f. Any data that is shared by a controller/processor

These regulations are designed to provide a widened approach to data security and regulation in the Indian ecosystem, but as the E-commerce ecosystem is rapidly growing in the economy a specific bill is required that has a specific approach, frameworks, and dispute resolving methods.

A. E-Commerce Policy of India

Following the current market scenario and from the response of the survey population, we can establish that E-Commerce has become a critical component of the Indian economy and the amount of data generated is exponentially skyrocketing as of a study conducted by Domo Inc an average individual will generate around 1MB to 1.7MB of data each second throughout the day that is 130GB of data per individual per day and this is irrespective of their location, nationality, socio-culture, and demographics. Thus it is crucial to regulate this data but given its velocity, variation, and volume it is highly complex as the number of factors involved are not standardized and fluctuate to extreme positives and negative. In the context of India, this control is assumed to be implemented by the E-Commerce Policy which has been drafted by inheriting the framework of *DPIIT i.e. Department for Promotion of Industry and Internal Trade.*

Though the E-Commerce Policy of India is still under the drafting process and to ensure that each factor of influence is condensed under the draft policy, a major threat of this policy

will be and is observed on the major e-commerce operators such as Amazon and Flipkart in the Indian ecosystem, as the e-commerce industry is a data-dependent and data-driven industry. The policy is not only aimed to shield the e-commerce user from cyber-thefts and malpractices but also aims for the creation of a level playfield for each e-commerce operator by eliminating elements such as monopolistic influences, data manipulation, and user biases. To condense what the E-commerce policy of India (Draft) is implementing we can condense it under four variables that are:

a. Customer Privacy/ Privacy Bubble.
b. Algorithms (Control Structure and Flow).
c. Data Flow and Sharing (What to Collect, What Can be Shared, To Whom To Share).
d. Data Classification (Personal Data/Non-Personal Data and National Security Data).
e. Hence this policy will allow the government of India to play a key role in the data drive ecosystem of the e-commerce industry of India and thus create more transparent and standardized flow channels and regulatory compliance means. Apart from the above-defined data-driven regulations the E-commerce policy also facilitates the government of India to create a more secure digital ecosphere especially taking into consideration the rapid increase in e-commerce related frauds. Thus the draft E-commerce policy of India is an unconventional approach by the Indian government to regulate the data flow and data security of the E-commerce ecosystem and is a way to condense all the preceding Acts and regulations such as the Income Tax Act, Consumer Protection Act, IT Act, Foreign Exchange Management Act, Competition Act, Payment, And Settlement Systems Act, Companies Act and laws related to the GST under one common head that is derived and implemented to E-commerce ecosystem in specific.

9. Future Scope and Conclusion

The prime perspective of this study is to highlight the impact of such technological elements within the artificial intelligence/machine learning systems that are designed to deliver a positive value to the organization as well as customers but in many cases ends up as a depreciating element due to non-compliance of socio-cultural and socio-economic factors. This study highlighted how consumers in the e-commerce ecosystem of India perceives the AI/ML systems and what are the critical elements of data security and sharing that a consumer believes to hold esteem value, in context this study also highlights the dominance of Amazon in the Indian E-commerce ecosphere and the customer value that is both promised and delivered by the Amazon India. This also highlights the ecological changes that have been gradually turning over the e-commerce ecosystem and in a true sense is actually terraforming the whole ecosystem from an analog grid to a digital grid, a grid that follows a meshed interconnection of devices, human capital and the organization itself from handling the mundane business process to handling customer personalization and profiling this digital grid of AI/ML systems have emerged as the most critical component of the e-commerce ecosystem in a significantly short time span in comparison to other technological advances in the past. The future of these AI/ML systems will follow a more regulated pathway rather than a free entry-exit, given that such systems though designed to aid both customer and organization can also be manipulated and programmed to undertake malpractices such as data theft, data manipulation, and data leak (Solar Flare Attack 2020). Thus a compliance framework will assist the e-commerce operators and innovators to create much more secured and shielded AI/ML systems that will create an ecosphere where both standardization and personalization will be achieved at the very same point of factor.

Appendix

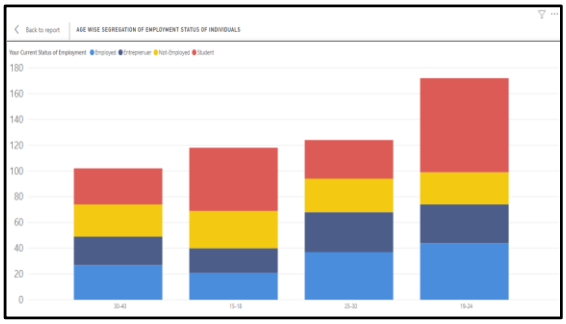

Fig. 4. Age and Employment segregation of sample population
Source: Survey Data
Legend: Red= Student, Yellow=Not-Employed, Indigo = Entrepreneur, Blue= Employed

Table 5
Pivot for Age and Employment Segregation of Sample Population

Current Status of Employment	Age group	Count of Age vs. Employment
Employed	15-18	21
	19-24	44
	25-30	37
	30-40	27
Employed Total		129
Entrepreneur	15-18	19
	19-24	30
	25-30	31
	30-40	22
Entrepreneur Total		102
Not-Employed	15-18	29
	19-24	25
	25-30	26
	30-40	25
Not-Employed Total		105
Student	15-18	49
	19-24	73
	25-30	30
	30-40	28
Student Total		180
Grand Total		**516**

Source: Survey Data

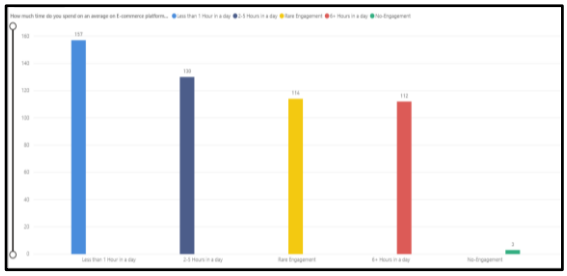

Fig. 5. Average time spent by user on various e-commerce platforms

Source: Survey Data

Legends: Blue=" Less Than 1 Hour a Day", Indigo ="3-5 Hours in a day", Yellow=" Rare Engagement", Red="6+ Hours in a Day", Green=" No-Engagement".

Table 6
pivot table for user overall experience with e-commerce platforms

Experience Rating	Percentage Share of Total	Number Per Factor
	0.00%	0
1	17.83%	92
2	25.58%	132
3	20.16%	104
4	21.12%	109
5	15.31%	79
Grand Total	***100.00%***	***516***

Source: Survey Data

Likert Scale Rating Parameters:

1=" Strongly Positive"

2=" Positive"

3=" Neutral"

4=" Negative"

5=" Strongly Negative"

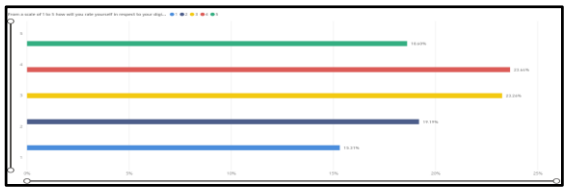

Fig. 6. Digital/Cyber Security awareness self-perception of users in e-commerce ecosystem

Source: Survey Data

Legends: Green="5", Red="4", Yellow="3" Indigo="2", Blue="1"

Likert Scale Rating: 1 to 5 where 1=" High Awareness", 2=" Moderate Awareness", 3=" Neutral Awareness", 4=" Poor Awareness", 5=" No-Awareness".

References

[1] Md Haris Uddin Sharif, Ripon Datta, Mounicasri Valavala (2019), Identifying Risks and Security Measures for E-Commerce Organizations, International Journal of Engineering Applied Sciences and Technology. Vol. 4, Issue 5.

[2] Georgia Issac, Sofia Meacham, Hamed Hamzeh, Angelos Stefanidis (2018), An Adaptive E-Commerce Application using Web Framework Technology and Machine Learning.

[3] Thomas Davenport, Abhijit Guha, Dhruv Grewal, Timna Bressgott (2019), How Artificial Intelligence Will Change the Future of Marketing, Journal of The Academy of Marketing Science, 48, 24–42, 2020.

[4] Neha Nandal, Rohit Tanwar, Jyoti Pruthi (2020), Machine Learning Based Aspect Level Sentiment Analysis for Amazon Products, Korean Spatial Information Society, 28, 601–607(2020)

[5] Sheshadri Chatterjee, Soumya Kanti Ghosh, Ranjan Chaudhuri, Sumana Chaudhuri (2020), Adoption of AI-integrated CRM system by Indian industry: from security and privacy perspective, Emerald Publishing, volume 23, Issue 1.

[6] T. Keerthana, T. Bhavani, N. Suma Priya, V. Sai Prathyusha, K. Santhi Sri (2020), Flipkart Product Recommendation System, Journal of Engineering Science. Vol. 11, Issue 4, April 2020.

[7] Andrej Miklosik, Martin Kuchta, Nina Evans, Stefan Zak (2019), Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing, IEEE Access.

[8] Lim Sanny, Michael Gerardo (2020), Analysis of Privacy Perception Through Shopping Behaviour in Indonesian E-Commerce, Humanities and Social Science Reviews, Vol. 8, No. 2, 2020, pp. 36-42.

[9] Shaheen Thobani (2018), Improving E-Commerce Sales Using Machine Learning, Massachusetts Institute of Technology.

[10] Brilian P. Amiruddin, Denisse R. Romdhony (2020), A Study On Application of Automation Technology in Logistics and its Effect On E-Commerce.

[11] Varun M. Deshpande and Mydhili K. Nair (2019), Digital Privacy and Data Security in Cloud-Based Services: A Call for Action, Springer Nature Singapore Pte Ltd.

[12] Saleema Amershi, Dan Weld*†, Mihaela Vorvoreanu, Adam Fourney, Besmira Nushi, Penny Collisson, Jina Suh, Shamsi Iqbal, Paul N. Bennett, Kori Inkpen, Jaime Teevan, Ruth Kikin-Gil, and Eric Horvitz (2019), Guidelines for Human-AI Interaction, CHI 2019.

[13] Sheshadri Chatterjee (2020), AI strategy of India: policy framework, adoption challenges and actions for government, Emerald Publishing, Volume 14, Issue 5.

[14] Steven Muzatko, Gaurav Bansal (2020), Consumer Skepticism as it Relates to E Commerce Data Breaches and Company Efforts to Enhance Trust, Association for Information Systems, MWAIS 2020 Proceedings. 22.

[15] D. Majumdar and H.K. Chattopadhyay (2020), Emergence of AI and its implication towards data privacy: From Indian legal perspective, International Journal of Law Management and Humanities, Volume 3, Issue 4, 2020

[16] Ksenia Dobreva (2018), Global E-Commerce Trends and Statistics, Amasty Ltd.

[17] Kshetri, Nir (2018) 5-G in E-commerce Activities, IEEE IT Professional, IEEE IT Professional, 20(4), 73-77.

[18] Juan-Pedro Cabrera-Sánchez, Iviane Ramos-de-Luna, Elena Carvajal-Trujillo, Ángel F. Villarejo-Ramos (2020), Online Recommendation Systems: Factors Influencing Use in E-Commerce, Multidisciplinary Digital Publishing Institute, Sustainability, 2020.

[19] Swami Vaithianathasamy, Signifyd (2019), AI vs AI: fraudsters turn defensive technology into an attack tool, Computer Fraud and Security.

[20] Bayleigh Reeves (2020), What Consumers Don What Consumers Don't Know The Now They're Giving A Giving Away (Data and y (Data and Privacy Concerns), University of Arkansas.

[21] Chafika Benzaïd and Tarik Taleb (2020), in empowering intelligent, adaptive and autonAI for Beyond 5G Networks: A Cyber-Security Defense or Offense Enabler?.

[22] Mukesh Saini (2018), Cybersecurity Risk Compliance in India, National Journal of Cyber Security Law, NJCSL (2018) 65-68.

[23] Dongpo Zhang (2018), Big Data Security and Privacy Protection, Atlantis Press.

[24] Ananda Dwitha Yuniar Jurusan Sosiologi, Alan Sigit Fibrianto Jurusan Sosiologi (2018), Big Data Dilemma: Technology Advance versus Privacy Violation, Advances in Social Science, Education and Humanities Research, volume 320

[25] Ivan-Damir Anica, Vatroslav Škareb, Ivana Kursan Milaković (2019), The determinants and effects of online privacy concerns in the context of ecommerce.

[26] Luis-Alberto Casado-Aranda, Juan Sa´nchez-Ferna´ndez, and Francisco J. Montoro-Rı´os (2018), How Consumers Process Online Privacy, Financial, and Performance Risks: An FMRI Study, Cyber psychology, Behaviour, and Social Networking, 2018.

[27] Kim Hartmann, Christoph Steup (2020), Hacking the AI - the Next Generation of Hijacked Systems, International Conference on Cyber Conflict, 2020 12th International Conference on Cyber Conflict 20/20 Vision: The Next Decade.

[28] Dr. Chandrika Subramaniyan (2019), Why India must amend its Information Technology Act in the age of Artificial Intelligence, IEEE India Info, IEEE India Info. Vol. 14, No. 4, Oct. – Dec. 2019.

[29] S. S. Tirumala, Maheswara Rao Valluri, G. A. Babu (2019), A survey on cybersecurity awareness concerns, practices and conceptual measures, International Conference on Computer Communication and Informatics.

[30] Sandeep Soni, Amazon, Flipkart, other e-retailers' GMV to grow 4X by 2025 as small towns drive e-commerce ahead, Financial Express.

[31] Sandeeep Soni, E-commerce fraud: Whopping nearly 500% jump in online shopping fraud cases in just 3 years, Financial Express.