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Predicting Customer Satisfaction of Online Shoppers Using AI – A Theoretic Framework

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Abstract: In the digital age, cloud and mobile applications have emerged as crucial channels for businesses to interact with their customers and digitalize purchasing patterns. As they transition to digital transformation, convenience stores have created mobile applications to interact with and collect customer data. Mobile application user experience research is essential since it paves the way for a successful digital transformation. This study aims to examine consumer perceptions of mobile applications or online reviews used by convenience stores. In order to empirically assess online evaluations for mobile apps, this study recommended using a model of the quality of mobile apps as the theoretical groundwork. Numerous internet customer reviews provide vital strategic advantages for organization and service design. This study proposes a framework for studying online shoppers' customer feedback and how it affects the business overall.

Keywords: Online experience, Customer Satisfaction, AI framework, Mobile app, NLP

I. INTRODUCTION

Businesses are attempting to gain a competitive advantage as the global growth of electronic commerce (e-commerce) accelerates by utilizing e-commerce to engage with customers (Demangeot and Broderick, 2007). Today, online shopping is a rapidly growing trend. Many individuals shop online to buy goods and services, research items, or simply pass the time. As a result, the relationship between marketers and their clients is being increasingly influenced by online purchasing environments (Koo et al. 2008). That is, consumer purchases are mostly based on how a thing appears in cyberspace, such as images, pictures, quality information, and videos, rather than on true experiences (Brennan et al., 2008; Constantinides, 2004). According to a ClickZ Stats survey cited in Kotler and Armstrong, the global Internet user population is expected to reach 1.8 billion by 2010. This is due to the Internet's status as a truly global phenomenon. Because of its large and diverse user base, individuals with a wide range of views and objectives have been using the Web to search and place expenditures on goods and services. As a result, marketing planning requires a critical grasp of how different online shopping environments affect consumer response.

The primary challenge with online purchasing is establishing and sustaining client pleasure. A service-focused strategy is critical for surviving in a highly competitive internet market. A company must deliver great customer service to its customers in order to attract repeat business and customer loyalty (Gounaris et al., 2010). High service quality is required for high levels of client satisfaction, which typically results in positive behavioral intentions (Brady and Robertson, 2001). The key to e-commerce success is a website that contains high-quality systems, information, and electronic services (Sharma and Lijuan, 2015).

The world has revolutionized with the advancement in technology across all sectors. The revolution has included the automation of various transactions, which include the business revolutions to incorporate online shopping. Business success account for customer satisfaction and increased referrals and returns to the same enterprise (Alkhayyat & Ahmed, 2022). Artificial intelligence (AI), which uses human intelligence and behavior, can help quantify and predict the Customer Satisfaction of online shoppers through various aspects, as detailed below.

Machine learning facilitates solutions to various aspects such as web search, image recognition, and self-drive alongside natural language processing. The utilization of machine learning helps predict customer satisfaction and future behavior regarding a particular product on a website or application. The company, through the utilization of AI, monitors customer behavior, such as whatever the customer frequently looks for, the likely demand alongside the product they have bought, and reasons for the individual decision-making in purchasing a product (Bhagat, 2022).
For instance, the predictability of an individual buying a duvet and a bedsheet depends on customer satisfaction on the specific e-commerce platform (Ansari 2022). The data generated helps develop a unique perspective on each of the assigned customers through the various recommendations, allowing more personalization depending on the client's transaction behavior (Dash & Sharma, 2022). Machine learning helps determine digital satisfaction and happiness based on the customer's return to the platform to buy more products.

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II. AI AND ITS BENEFITS FOR CUSTOMER ANALYTICS

Artificial intelligence (AI) personalization helps improve engagement and increase customer conversions within online transactions. The utilization of this technique may help in the prediction of digital customer satisfaction. For instance, this aspect involves collecting the various data available on the particular e-commerce platform to determine the satisfaction level, such as browser history, the interactions with the website, and the mobile alongside the entails and social media platform (Mila Kundu, 2022). Personalization also offers the display recommendation for each user within a site or the application, onto which we can trace customer satisfaction. This strategy helps in sorting the likely interested items for viewing, predicting the customer satisfaction among the online shoppers upon clicking on the suggested items. The users' engagement level with the complimentary products recommended through AI and reduced cart abandonment will help predict the happiness of online shoppers.

The use of algorithms forms a fundamental aspect through which machines can learn individually, helping predict online shoppers' customer satisfaction. The algorithms employed in artificial intelligence have different classifications, which can offer solutions to predicting customer satisfaction. For instance, Naïve Bayes employs the Bayes theorem, which updates the fed data into posterior probability essential in predicting the input classification depending on the available classes (Sarker, 2021). The classes can match the customer satisfaction levels depending on the online shoppers' behavior, predicting customer behavior. Besides, the attribute value of any given class will correlate to the independence of the existing attributes. The regression algorithms can also form a mode of predicting the customer satisfaction of online shoppers based on the input data fed into the system (Parihar & Yadav, 2022). For instance, linear regression helps implement linear relationships through the data points and predict the new norms of the customer, which correlate to the customer behavior of the individual. Depending on the regression line, the customer's behavior will help predict the happiness level.

Table 1. A table showing the algorithms employed in the prediction of happiness level.

Native Bayes	**Regression algorithms**	**Clustered algorithms**
It employs Bayes theorem.	Depending on the regression line	They utilize data segregation and organization.
Updates fed data into posterior probability to help predict happiness level.	Implements linear relationships through data points for the prediction of new norms	It arranges transactions segregated and organized to implement scale data sets for predicting behavioral patterns.

The algorithms can also help in the prediction of the customer's level of happiness based on the behavior of the recommended products. Various retailers recommend various products to customers using the algorithms, increasing conversions within their e-commerce sites. Customers, in retaliation, tend to purchase a product based on other customer purchases alongside their recommendation, especially on highly-priced products (Sarker, 2021). One can assign algorithm data points on the assigned product within the inventory alongside the customer-perceived feedback from the happy customers and terminating with the unhappy. The patterns within the data help determine the happiness level among the customers of the particular products. A logistic regression algorithm can help predict customer satisfaction among online shoppers. As designed for binary classification, this method helps analyze the variables and predict the definite outcome. The mode can help predict the customer lifetime values alongside the various products value essential in determining the satisfaction level (Sarker, 2021). The multivariate regression also offers a mode of the determination of customer satisfaction by incorporation onto the product recommendation engines. It determines customers' behavior proportional to the satisfaction level depending on their brand, quality, and reviews against the various products (Blessing & Natter, 2019). Multiple regression algorithm tools can also help determine satisfaction through behavioral analysis.\

Clustered algorithms can help predict the customer satisfaction level among online shoppers. Clustering entails the segregation and organization of the data depending on group members' shared similarities, which is fundamental for unsupervised learning. The model arranges the transactions' database on the transactions' fraudulent properties (VLN & Deeplakshmi, 2021). The clustered algorithms have more simple modes to implement and scale data sets. K- Means of clustering helps analyze similar data points together and bind within a cluster (Parihar & Yadav, 2022). They calculate centroid data grouping, which evaluates the distance of the data from the centroid cluster. The analysis of the search engines helps identify the various articles shared on the search engine with negative attributes assigned to the particular online trading platform.

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The use of image recognition also offers a new mode through which we can predict the happiness levels of online shoppers. Retailers can employ image recognition technology based on previous experiences, providing alternative modes for brands and manufacturers to communicate with customers (Nomura et al., 2019). Image recognition technology leverages digital signage and customized pop-ups to the customers according to the photos from social media and websites exemplified by the google image search. The online shoppers' behavior and interaction mode on the pop-up images and the redirects and purchasing power will determine the happiness of the online shopper.

III. NLP IN EXPLORING CUSTOMER BEHAVIOR

A voice-like image search provides a platform where we can use AI to determine customer satisfaction. Natural language processing (NLP) has characterized the standard form of communication in which one does not need the accessibility of a phone and laptop to perform a specific function in the laptop or phone (Haponik, 2021). The incorporation of AI can help determine the happiness level on the online shopping platform through analysis of the voice searches using NLP, which figures out the information customer is referring to concerning the product (Bhagat, 2022). Technology advancement has prompted various individuals the activation of assistants in homes without screens, which helps capture voice data. Voice search can help analyze customer questions and relate to the product (Dash, 2021). The mode can also help match the various images and URLs shared by online shoppers on social media platforms, as it can help monitor various counterfeits likely to distort the images of online products. This intelligent mode helps analyze the products broadly, gaining considerable feedback on satisfaction and consequent happiness levels.

IV. CHATBOTS

Chatbots constitute a form of online customer care service that provides instant customer feedback on interaction with the site. Artificial intelligence incorporation with Chatbots can help determine customer happiness levels using online shopping platforms. The Chatbots collect considerable data based on customer feedback, which can help determine customer satisfaction with the online shopping mode embraced. The interaction levels on the Chatbot can also act as happiness level determination and the frequent number of questions asked by the various online shoppers (Nicolescu & Tudorache, 2022). Chatbot's attachment to the shopping carts can also determine the customer's happiness level. Some moderately unhappy customers will likely leave most products in the cart. In addition, the quantities and shipping terms attached to the Chatbot can also help determine the happiness level. Happy customers will order more products as determined by the Chatbot (Nicolescu & Tudorache, 2022). Chatbot uses the gathered data for conversion before using deep learning analysis, extracting vital concepts exemplified by images and item names in determining the most preferred products from the online shopping platform. The bots embedded in the Chatbots extract the data from text, user data, and the esteemed customers' buying behavior in providing relevant interpretation.

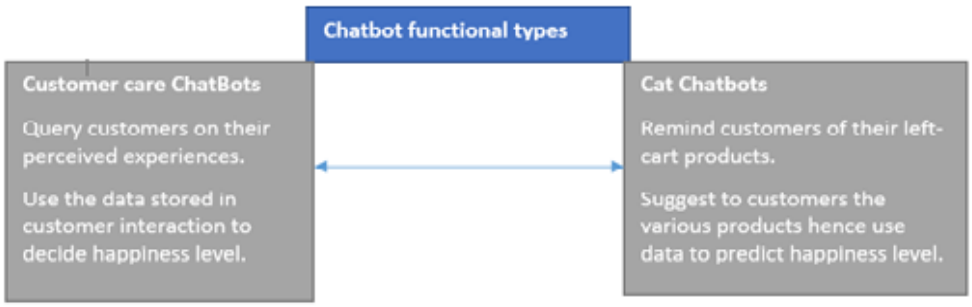

Fig 1. Types of functional Chatbots.

Chatbots also offer a mode in which we can predict the happiness level of the customer in the online purchase through the incorporation of Chatbots on the carts, which can predict the satisfaction level by reminding customers of the existence of an incomplete order in the cart. The Chatbot can inquire about the customer's reason for the incomplete purchases and offer various options from which the customer can purchase in the online purchase platform (Nicolescu & Tudorache, 2022). Interaction between the client and Chatbot can also predict why the client left the products in the cart and the probability of future purchases. The increased customer leaving products on the cart could help predict the product's declining happiness level.

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V. GEOGRAPHIC ANALYSIS

Localization can help determine the level of customer satisfaction based on their happiness in a different location. The localization entails the online shopping platform utilizing the data on the esteemed customer location through which the artificial intelligence can collect on the locality of customer preferences and their behavior (Abdirad & Krishnan, 2020). The localization analyzes the visitor data, which helps determine the data and ads alongside other content, which can skew the customer to make purchases on certain products hence essential in determining the happiness level. Since the AI tracks data for different locations, it can help determine the customer's happiness level depending on their interaction with the products in the ads and the other content (Abdirad & Krishnan, 2020). The localization AI also displays the correct time for display of the various products that determine the happiness level as it tracks the trends over considerable time.

AI can also offer a new mode of determination of the happiness level among the customer by analyzing online shopping site interaction. Increased customer interaction with the online shopping platform and the consequent purchase from the platform may signify an increased happiness level among the customers (Zaki et al., 2021). The change in the search engine results for frequent clients could demonstrate a changing happiness level as customers shift their purchasing behavior to competitors. The increased search for the correct company results could demonstrate increased customer coverage and happiness level from the company hence the customer obtaining a better correct search result. Since the AI and machine keep a memory of the user search and preference, it can measure the satisfaction level depending on the number of searches (Mohammed et al., 2022). Besides, the consumer's behavior after failure to obtain relevant results on the platform can act as a source of data on the customer's happiness on the particular shopping site achievable using Artificial intelligence.

AI through the customer satisfaction score can also help determine the customer happiness level in online customer interaction. This mode entails asking the customer to rate a particular product on the platform. It further incorporates the tabular regression model, which considers one row within tabular data as the data point with various columns identified as features (Abdirad & Krishnan, 2020). The remaining features account for the input features, which help the score prediction through AI automation. The image regression alternative model entails the various patterns and objects within the images. Computer vision comprises the various layers using the first and last to combine the patterns to identify the objects. The text regression models, as incorporated in the analysis of the customer happiness level, incorporate words in the determination of sentences for the prediction of the customer using AI.

VI. CUSTOMER ANALYTICS AND SHOPPING BEHAVIOR

Consumer perceived value offers a mode of prediction of client satisfaction among online shoppers by evaluating the perceived differences between the consumers' payment and shopping process (Sharma, 2022). Multi-dimensional perceived value survey can help determine the impact of the various consumption scenarios on consumer wishes compared to the one-dimensional structure. The perceived acceptance model incorporation in the information system can determine the happiness level depending on the acceptance and usage of the products from the particular online platform (Ansari, 2021). The online transactions led to the incorporation of new modes for the customers, which demanded an upgrade, and the challenges demanded the customer training on challenges encountered; hence the interaction can act as a source of determination of satisfaction level.

The AI can determine product usage depending on the perceived usefulness in which individuals will use a product from certain online shops, irrespective of the technology employed (Dash & Sharma, 2022). This mode implicates an improved satisfaction level among the online shopper hence shopping the particular products irrespective of the online platform upgrade. The perceived ease of use (PEOU) can also help determine the AI results in the implication of the customers using online shopping (Yin & Qiu, 2021).

The AI will determine the online shoppers' behavior in correlation to the satisfaction level by migrating to the products that use the latest product and platforms employing the most straightforward technology. Besides, human behavior records using AI on the platform help analyze the happiness level depending on clients' browsing. Since the COVID-19 pandemic, consumer behavior has changed dramatically. More people began working from home and avoiding indoor venues such as shopping malls and restaurants. Because of these changes in consumer behavior, e-commerce has continued to grow, and many brands have shifted their business strategies in order to remain competitive. See below graph which depicts the estimated retail sales (Brewster 2022).

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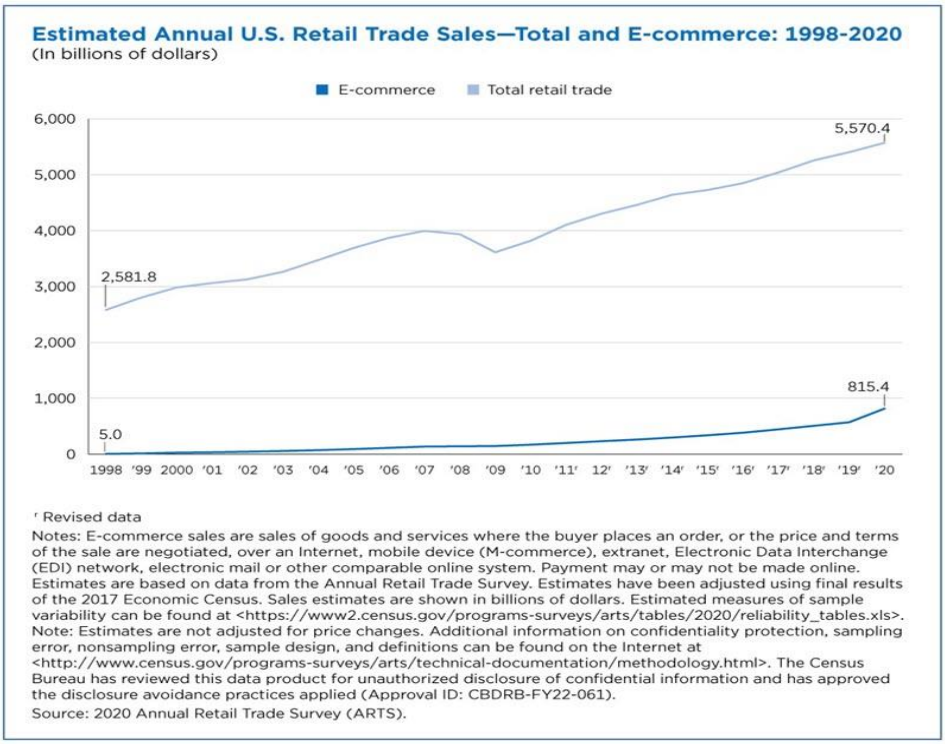

Fig 2. Estimated Annual U.S. Retail Trade Sales

Adopted from: Annual Retail Trade Survey Shows Impact of Online Shopping on Retail Sales During COVID-19 Pandemic. United States Census Bureau. Retrieved January 15, 2023, from https://www.census.gov/library/stories/2022/04/ecommerce-sales-surged-during-pandemic.html by Mayumi Brewster.

AI can help predict online shoppers' satisfaction levels through self-service. The self-service offers a platform where AI helps customers solve various problems, complete purchases, and navigate the website without human intervention, as it occurred during the Covid-19 pandemic when shops shifted online to curb virus spread. The AI records analytics of the interaction and the customers' ability to solve the perceived problem (Dash & Ansari, 2022). Self-servicing AI determines the customer's happiness by analyzing the interaction and the successful completion of the customer encounter with a similar scenario, especially for new customers, which determines the satisfaction level.

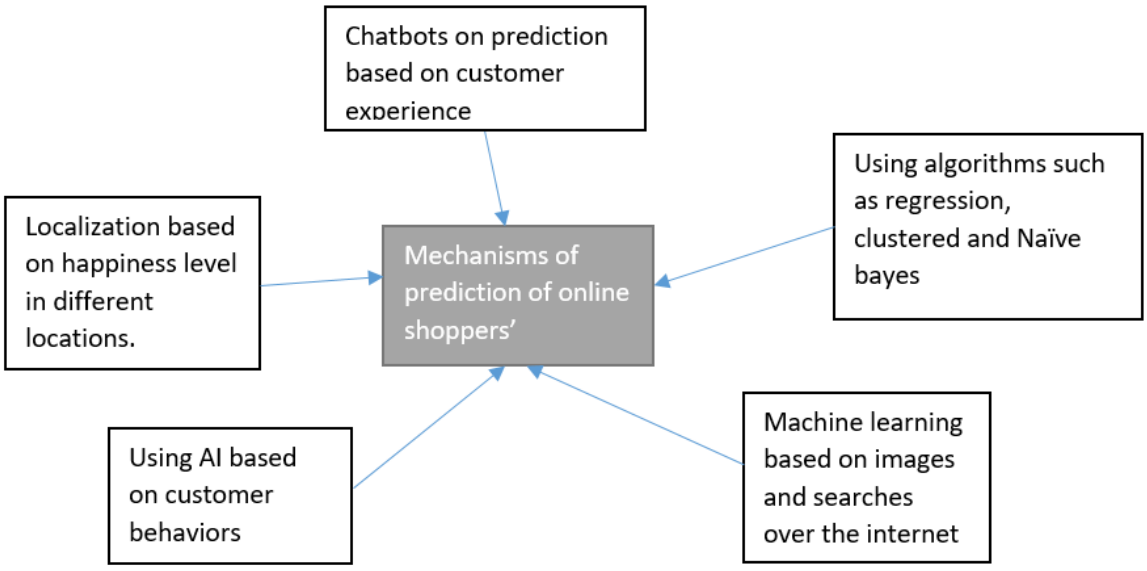

Fig 3. Examples of tools to use in the prediction of happiness levels.

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Ultimately, AI offers several modes one can use to predict the happiness level among online shoppers. The mode includes the various tools in the analysis, such as the various algorithm exemplified by the regression and Naïve Bayes. The NLP characterizes the modern form of using AI in determining AI, though we can use Ai in analyzing voice and image searches on social media platforms (Yau et al., 2021). Chatbots can offer interaction with various clients and an analysis of the client's behavior and interaction with products from a particular shopping platform. Personalization and localization of the AI also offer an avenue for predicting human behavior in interaction with the online platforms offering various products, hence helping to measure the satisfaction level.

VII. RECOMMENDATIONS FOR FUTURE STUDY

Online trade is commonly understood to be the buying and selling of goods over the internet; however, any transaction completed solely through electronic means can be considered internet business. E-business and M-commerce are becoming progressively important in online retail promotion, and the number of people who use this technology is growing globally. The protection of internet business resources from unauthorized access, use, modification, or deletion is referred to as online business security (Sharif & Mohammed, 2022).

Metrics for online business security; Integrity is the mitigation of unapproved information modification. There will be no disavowal: any subsequent breach of an agreement will be met with retaliation. Information source verification. Secrecy: safeguard against unapproved information disclosure. The arrangement of information control and dissemination is known as security. Customers and web-based business destinations should not only assess security flaws and survey possibly specific formats, but they should also assess, analyze, and resolve the risks involved (Sharma & Dash, 2022). An organized application cannot provide full network, security, and user proportions at the same time; there is a natural trade off here, as well as some disqualification is inevitable. Similarly, the primary security concern for an internet business dealer should be to preserve the web servers' records of continuing pleas not towards the front web applications but instead behind the firewall.

Furthermore, sensitive servers should be kept very precise by killing and removing every unnecessary government and application (e.g., FTP, email). Only when online business merchants achieve the total delicate balance of defense, loyalty, and security will be intriguing and quantifiable internet business exchanges remain an issue. Along such segments, the elements of encrypted communications, affirmation, check, and validation unquestionably influence the perception of security. When buyers have confidence in the commercial center, it can be dependable.

VIII. CONCLUSION

The purpose of this research is to find out what factors influence both online purchasing incentives and online purchasing inhibition. As a result of the findings, it was established that a range of factors influenced customers' purchasing decisions. Consumers are urged to make online purchases for a variety of reasons. According to consumer opinions, the biggest motivator for internet purchases is "saving time." Again, "information accessibility," "open 24/7," "big selection of products/brands," "fair prices," "various offers for online products," "easy ordering method," and "shopping enjoyment" are all aspects that drive people to buy online.

The top obstacles for the respondents, according to the research, are the "online payment method," "personal privacy or security concerns," "delivery delays," "items jumbled up at the delivery time," "products return policies," and "lack of human customer care". Furthermore, it was shown that some consumers do not rely on or trust online shopping because of worries regarding the online payment system and personal privacy.

Internet security is a problem for the consumer as well, especially in light of fraud, privacy, and hacking. Both online consumers and online businesses are concerned about online security as hackers, vandals, and viruses compromise both flimsy personal and corporate security systems. Loss of trust and reputation are the most severe effects of any security or privacy infractions. These effects can affect customer confidence and are particularly detrimental for web-based suppliers.

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