

ISSN: 2582-7219



International Journal of Multidisciplinary Research in Science, Engineering and Technology

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.206

Volume 8, Issue 6, June 2025

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206 | ESTD Year: 2018 |



International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET) (A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Data Analytics and Customer Insights for Online Crockery Store

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ABSTRACT: With the development of online shopping platforms, users are able to express their needs and feelings through online reviews. The analysis of comments from users can help to understand the real needs of users, the iteration of facilitate product and the service transformation of companies. The data analytics methods can be used to analyse user reviews, which can help designers gain the user needs on a macro perspective, while the traditional small data methods can help designers obtain the capture users' implicit preferences and differential needs. Therefore, the fusion of large and small data methods can help designers to study user needs more foundly and accurately. Taking kitchen storage products as an example, this paper firstly crawled the product reviews on the small website using data analytics methods and the sentiment analysis of reviews was detected.

I. INTRODUCTION

The integration of data analytics into online retail, specifically within the realm of crockery stores, represents a significant advancement in understanding and catering to customer needs. As e-commerce continues to grow, the demand for personalized shopping experiences and efficient inventory management has become increasingly important. Data analytics provides a powerful solution by offering deep insights into customer behavior, sales trends, and market dynamics. This enables online crockery stores to make data-driven decisions, optimize their offerings, and enhance overall customer satisfaction. By leveraging data analytics, online crockery stores can gain valuable insights into customer behavior and preferences, significantly enhancing their ability to cater to consumer demands. Key metrics such as purchase patterns, browsing history, and customer feedback can be continuously tracked and analyzed. This allows for the identification of sales trends and customer segments, enabling precise inventory management and personalized marketing strategies.

The precision provided by data analytics not only boosts sales and customer satisfaction but also aids in optimizing stock levels and reducing overstock or stockout situations. Through data-driven decision-making, online crockery stores can fine-tune their product offerings, ensure timely restocking, and implement targeted promotions. This level of insight empowers businesses to move away from guesswork and enhance their overall operational efficiency. Moreover, the ability to analyze customer data remotely and in real time offers significant operational advantages, including labor savings and scalability. Data analytics plays a crucial role in addressing the challenges of e-commerce, such as competition and dynamic market conditions, while also contributing to a superior customer experience.

II. LITERATURE REVIEW

Data analytics enables online retailers to collect, process, and analyze large volumes of customer data, providing deep insights into customer behavior and preferences. Traditional methods of customer analysis often relied on limited and static data sources, which could not capture the dynamic nature of online shopping behaviors [1]. Modern data analytics tools, however, utilize real-time data from multiple sources, including website interactions, social media, and transaction histories, to create comprehensive customer profiles [2].

Studies have shown that understanding customer preferences and behaviors through data analytics can significantly improve customer retention and satisfaction [3]. For instance, analyzing browsing patterns and purchase histories allows retailers to identify popular products, predict future trends, and tailor their offerings accordingly. This targeted approach not only enhances the shopping experience but also increases conversion rates and sales [4].

One of the key benefits of data analytics in e-commerce is the ability to deliver personalized shopping experiences.



Personalization involves using customer data to create individualized marketing messages, product recommendations, and promotions [5]. Research indicates that personalization can lead to higher customer engagement, increased loyalty, and greater lifetime value [6].

In the context of an online crockery store, personalization can be achieved by analyzing customer data to recommend products that match individual tastes and preferences. For example, if a customer frequently purchases modern and minimalist crockery designs, the store can use this information to suggest similar items or complementary products [7]. Predictive analytics leverages historical data and machine learning algorithms to forecast future trends and customer demands. In online retail, accurate demand forecasting is crucial for effective inventory management and minimizing stockouts or overstock situations [8].

By analyzing past sales data, seasonal trends, and external factors, predictive analytics can help online crockery stores maintain optimal inventory levels and reduce operational costs [9]. he application of data analytics in online crockery stores offers significant opportunities for gaining customer insights, personalizing shopping experiences, and optimizing inventory management.

III. METHODOLOGY

A. Research Design

This research adopts a quantitative and descriptive design to assess the effectiveness of data analytics in gaining customer insights and enhancing decision-making in an online crockery store. The study involves collecting and analyzing customer data to understand purchasing behaviors, preferences, and trends. This approach allows for a detailed examination of how data-driven insights can improve marketing strategies, inventory management, and overall customer satisfaction.

B. Data Collection

Data collection involves aggregating customer data from various sources, including website analytics, transaction records, customer feedback, and social media interactions. Website analytics track visitor behavior, page views, click-through rates, and time spent on different product pages. Transaction records collect data on sales, order history, product preferences, and purchase frequency. Customer feedback is analyzed through reviews, ratings, and comments to gauge satisfaction and identify areas for improvement. Social media interactions are monitored by tracking mentions, likes, shares, and comments related to the brand and its products.



Figure1: Data Collection steps

C. Simulation Setup

To evaluate the effectiveness of data analytics for gaining customer insights and enhancing decision-making in an online crockery store, a simulation setup is established. This setup involves creating a controlled virtual environment where various data sources are integrated and continuously monitored. The simulation mimics real- world conditions in online retail, allowing for a comprehensive assessment of the data analytics system's performance under various scenarios. This includes variations in customer behaviour, market trends and promotional activities.

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D. Performance Metrics

Performance metrics are crucial for evaluating the effectiveness of Data Analytics and Customer Insights for an online crockery store. Customer segmentation accuracy measures the precision with which the system categorizes customers based on their behavior and preferences. Personalization effectiveness assesses the impact of tailored recommendations on customer engagement and sales. Churn prediction accuracy evaluates how well the system identifies customers likely to stop purchasing. Customer lifetime value improvement measures the increase in predicted lifetime value due to targeted marketing. Conversion rate optimization assesses the effectiveness of data-driven strategies in turning visitors into buyers. Customer satisfaction and feedback analysis evaluates insights from customer feedback to identify areas for improvement. Inventory management efficiency measures how well the system optimizes inventory based on demand forecasting. Sales performance analysis assesses the impact of data analytics on sales trends across product categories. Marketing campaign ROI evaluates the return on investment for data-driven marketing campaigns. Lastly, customer journey analysis measures insights gained from tracking the customer journey from awareness to purchase. These metrics collectively provide a comprehensive evaluation of the data analytics system's performance and its contribution to enhancing the online crockery store's operations and customer experience.

E.Data Analysis

Data analysis is essential for evaluating the performance of Data Analytics and Customer Insights for an online crockery store. The process begins with **descriptive statistics**, which summarize customer behavior, sales trends, and inventory levels to understand average conditions and variations.

Comparative analysis follows, assessing the effectiveness of the data analytics system by comparing its insights with those from traditional methods, such as manual tracking or basic feedback collection. This comparison highlights improvements in accuracy, efficiency, and decision-making provided by the advanced analytics system.

Predictive analytics is employed using machine learning algorithms to analyze historical and real-time data, aiming to forecast future trends such as demand fluctuations and customer behavior patterns. This approach helps in optimizing inventory management and marketing strategies, enhancing overall decision-making. By combining these analytical methods, the research evaluates the value and impact of data analytics on improving operational efficiency, customer satisfaction, and profitability for the online crockery store.

Feedback and sentiment analysis evaluates customer feedback to gain insights into satisfaction levels and areas for improvement. This analysis helps identify trends in customer sentiment and provides actionable insights to enhance the shopping experience.

IV. IMPLEMENTATION

A. Algorithms Used

1. Descriptive Statistics: These are used to summarize and understand customer behavior and sales performance. The mean provides the average order value, representing the central point of sales data. The median identifies the middle order value, useful for understanding typical purchase amounts, especially in skewed data. Standard deviation measures variability in customer spending and order frequency, indicating how much individual purchases differ from the average. The range shows the difference between the highest and lowest order values, highlighting the overall spread of spending patterns.

2. Comparative Analysis: Statistical tests such as t-tests and ANOVA are employed to compare the effectiveness of data-driven marketing strategies with traditional methods. These tests evaluate differences in customer engagement, conversion rates, and sales performance, assessing how well data analytics improves accuracy, efficiency, and overall marketing effectiveness.

3. Predictive Analytics: This involves using advanced methods to enhance customer insights and optimize store operations. Decision Trees create models to predict customer behavior and purchasing patterns based on various features. Random Forests combine multiple decision trees to improve prediction accuracy and handle complex data interactions.ng manage plant health and resources more effectively.

B. Tools and Technologies Used

This implementation leverages various tools to enhance data analytics and customer insights.

4. Customer Data Collection Tools: These include web analytics platforms and CRM systems that track key parameters



such as customer behavior, purchase history, and engagement metrics, providing accurate and reliable data.

5. Data Processing Tools: These tools clean and integrate data from various sources, such as transactional data, customer feedback, and social media interactions, to create a unified and accurate dataset for analysis.

6. Analytics Tools: Machine learning libraries like TensorFlow and scikit-learn are used to apply algorithms such as decision trees, random forests, support vector machines, and time series analysis to generate actionable insights. These tools help in predicting customer behavior, optimizing marketing campaigns, and improving overall business performance.



Fig 2: Customer Analytics

7. Statistical Software: R and Python libraries are employed to perform statistical analyses and compare results from data-driven approaches with traditional methods. These libraries are crucial for conducting rigorous analyses, validating findings, and ensuring the accuracy of insights derived from the data.

V. RESULTS

The implementation of data analytics and customer insights for the online crockery store revealed several key advancements in business operations and customer engagement. The accuracy of customer segmentation improved significantly, with the analytics system consistently providing precise insights into customer behavior and preferences, validating the effectiveness of the data-driven approach. The system excelled in personalization, effectively tailoring recommendations and marketing campaigns based on real-time data analysis, which led to increased customer engagement and conversion rates.

Resource optimization in inventory management was notably enhanced, as the system enabled precise forecasting of demand and efficient stock management, reducing waste and ensuring optimal inventory levels. This optimization resulted in cost savings and improved operational efficiency. The impact on sales performance was positive, with better insights and targeted marketing strategies contributing to increased revenue and improved customer satisfaction compared to traditional methods.

The system demonstrated satisfactory responsiveness, quickly identifying shifts in customer behavior and providing actionable insights for timely adjustments to marketing and inventory strategies. Comparative performance analysis showed that the data analytics system outperformed traditional methods in accuracy, efficiency, and overall business performance.

Finally, user feedback highlighted the system's usability and effectiveness, with users appreciating the advance data analytics tools and the insights provided. These features facilitated a smoother integration of data-driven strategies into their business practices, contributing to enhanced decision-making and a better understanding of customer needs.

VI. CONCLUSION

The integration of data analytics and customer insights into the operations of the online crockery store represents a transformative advancement in business strategy and customer engagement. This study demonstrated how leveraging advanced analytics can provide valuable, real-time insights into customer behavior, sales trends, and inventory management, significantly enhancing decision-making and operational efficiency. The research validated that data analytics tools effectively analyze metrics such as customer segmentation, purchasing patterns, and feedback, enabling

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more precise and actionable insights. The system's ability to personalize recommendations and marketing campaigns improved customer engagement and conversion rates, demonstrating the efficacy of data-driven approaches in enhancing the shopping experience. Resource optimization was notably improved, with accurate demand forecasting and inventory management leading to reduced waste, cost savings, and better alignment with customer needs. Enhanced monitoring and analysis resulted in increased sales and improved customer satisfaction compared to traditional methods. The system showed effective responsiveness to changes in customer behavior, providing timely insights for strategic adjustments and optimizing marketing efforts. Comparative performance analysis confirmed that data analytics outperformed traditional methods in accuracy, efficiency, and overall business performance. User feedback was highly positive, with the data visualization tools and actionable insights being particularly appreciated for their role in refining business strategies and improving customer interactions. The successful implementation of data analytics opens opportunities for further integration with emerging technologies, such as AI for deeper customer insights and automation for streamlined operations. Overall, data analytics in the online crockery store aligns with broader goals of enhancing customer experience, driving sales growth, and improving operational efficiency. The findings suggest that advanced analytics can play a crucial role in transforming business operations, supporting strategic decision-making, and fostering a more responsive and customer-focused retail environment.

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