

Use of Predictive Analysis, Forecasting the Trends in the FMCG

Rithesh B

Chirag

Guruprasad Pai B

Students, Assistant Professor

Post Graduate Department of Business Administration

Alva's Institute of Engineering & Technology

Mijar, Moodbidri, Dakshina Kannada Dt.

Abstract

Predictive analytics is a data-driven approach that utilizes historical data, machine learning, and statistical methods to forecast future trends and consumer behaviour for FMCG Products. In today's fast-paced consumer goods (FMCG) industry, staying ahead of the game requires a data-driven approach through the use of predictive analytics. This powerful tool provides invaluable insights into future trends and consumer behaviour, enabling businesses to optimize their commerce campaigns and streamline their operations. By analysing historical data, machine learning, and statistical techniques, predictive analytics empowers businesses to accurately anticipate consumer behaviour and forecast emerging trends. This research delves into the various applications of predictive analytics in the FMCG industry, specifically in predicting consumer behaviour, optimizing commercial campaigns, and enhancing operational efficiency. Through the identification of patterns and trends in past data, predictive analytics allows businesses to develop reliable models that forecast future outcomes with precision. Using predictive analytics in the FMCG sector can enhance digital interactions, forecast potential outcomes by analysing past data, and offer valuable insights for inventory management and supply chain processes. This strategic implementation enables businesses to anticipate consumer actions, boost trading promotions, and enhance inventory efficiency.

Keywords: *Predictive analytics, Forecasting, FMCG, Consumer behaviour, operational efficiency*

Introduction

Predictive analytics, a field of analytics uses data, machine learning algorithms, and statistical techniques to create models that can predict future outcomes or trends this process involves looking for patterns in data to reveal risks and opportunities. This has a lot to do with data science and data science aspects. The fast moving consumer goods (FMCG) industry includes products that are in high demand, sell quickly and are expensive. These products, also known as consumer packaged goods (CPG), have a short shelf life and are quickly consumed. They have a wide variety of packaged foods, toiletries, beverages, over-the-counter products and cleaning supplies. Predictive analytics, a form of business analysis uses data, machine learning, and statistical techniques to develop predictive models of future growth and outcomes Predictive analytics applies to the consumer goods (FMCG) industry landscape Information, Regression Analysis, Decision Trees, Neural networks and other methods can be used to create bespoke models. This enables companies to make informed decisions reflecting risks and opportunities in various applications such as accurate sales forecasting, customer churn management, budgeting etc. It provides insights for analyzing the FMCG sector as it can give companies a competitive advantage in emerging markets. By anticipating customer preferences, in addition to optimizing budgets, businesses can enhance their decision-making processes by optimizing supply chains through predictive analytics techniques such as

accurate sales forecasting or customer churn management efficiency leading to increased operational efficiency and cost reduction as well as ensuring an improved customer experience.

Scope of the Study

Analyzing the role of predictive analysis in predicting the future of FMCG according to the ever-changing preferences of customers. To improve supply chain management, demand forecasting and customer behavior analysis with the use of data analytics. Understanding the consumer demand and purchasing strategies based on online sales promotions on consumer behavior for the FMCG sector using geographical methods. Evaluating the accuracy by using predictive tools such as Random Forests, XGBoost, Artificial Neural Networks, time series, correlation, and regression in the FMCG sector.

Objective of the Study

- To analyze the role of predictive analysis in predicting the future of FMCG according to the customer's ever-changing preferences and to provide products to customer according to it.
- To analyzing the benefits of predictive analysis how it helps company to compete with other competitors

Methodology

This review paper is purely dependent on secondary data which involves collecting and analyzing the research studies which is previously published articles, publications which is related to predictive analysis and FMCG sector. The data analyzing process will be analyzing all the papers and summarizing and identifying the key findings.

Literature Review

Jos'e Nicol'as Valbuena Godoy (2022)

The author explains based on demand forecasting for Fast Moving Consumer Goods (FMCG). The author discusses different methods to predict the demand for products, like classical models, stochastic forecasting methodologies, and qualitative projections. The review also shows the studies where the author proposed models based on the factors measuring common between products, adjusted forecasting models to reduce waste, and used neural network models to improve sales forecasts. And, this paper looks at what other researchers have done to predict how certain products people will buy. It talks about different ways that the author has tried to figure out, by using traditional methods, statistical approaches, and new techniques involving artificial intelligence.

Zenah Yaser Alzubaidi (2020)

The paper provides an Overview of forecasting methods in the context of Fast-Moving Consumer Goods (FMCG) companies. It says about traditional statistical forecasting methods, machine learning techniques, and clustering and product classification. The stage for the comparative study discussing the relevance, limitations, and potential benefits of these methods in improving forecasting accuracy FMCG companies. The importance of accurate forecasting for FMCG companies, the high volume of transactions and the need to optimize inventory levels while meeting market demand. It also emphasizes the challenges associated with forecasting in industry, such as volatility, randomness, and the impact of external factors like trends, seasonality, and competitor activities.

Patdono Suwignjo, Lisda Panjaitan, Ahmed RaECKy Baihaqy, Ahmad Rusdiansyah (2023)

The use of predictive analytics to improve inventory performance in the fast-moving consumer goods (FMCG) industry, optimizing inventory performance is paramount for ensuring market product availability and bolstering competitiveness. Facing challenges of understock and overstock with a diverse product range, the authors leveraged predictive analytics through a Gradient Boosting model. Utilizing predictors like sales, demand forecasts, inventory coverage week, and current inventory levels, the model demonstrated its efficacy in not only foreseeing but also addressing inventory imbalances adeptly. The authors developed both a classification model, predicting inventory status, and a regression model, forecasting the extent of overstock and understock. These models offer valuable insights to stakeholders at various organizational levels, enabling informed decision-making regarding product shipments and a comprehensive analysis of factors influencing inventory incidents.

Alexander C.V.J. Victoria and M. Ganesan (2015)

The author focuses on online sales promotions of grocery and other FMCG products in Chennai, India. Here he, discusses the increasing use of internet for sales promotions and the challenges and opportunities associated with online sector. This study aims to understand how popular online promotions influence consumer behavior and preferences, with an aim to focus on price discounts, coupons, and free shipping. Also, into the role of retailers as a source of information about consumer responses to online sales promotions. The importance of tapping into the preferences and perceptions of retailers as well as consumers to plan future sales promotion activities effectively. The impact of online sales promotions on consumer perceptions of quality and purchase intentions. It also discusses the influence of brand awareness on consumer responses to different promotion schemes.

Luyao Wang, Hong Fan, and Tianren Gong (2018)

The Author focuses on the study of consumer demand and purchasing strategies for fast-moving consumer goods (FMCG) retailers using geographic methods. The aims to estimate market demand at a micro-scale and develop optimizing purchasing strategies based on consumer demand and sales performance. The last studies used traditional methods such as Moving Average and time series analysis to predict consumer demand, but these methods overlook spatial patterns and consumer behaviors. The paper introduces a new method to estimate consumer demand at a micro-scale and proposes optimizing purchasing strategies based on the stability of consumer demand in different regions. This approach aims to provide practical guidance for retailers to improve profits and reduce product waste.

Feiyang Liu (2021)

The application of data mining in the Fast-Moving Consumer Goods (FMCG) industry. The role of establishing a data warehouse to support analytical processes and statistical discovery. It outlines the construction of a data warehouse with five major subjects, sales, inventory, order, consumer, and employee each associated with fact and dimension tables. These tables facilitate the organization of key value information and metric values, enabling comprehensive analysis. The review underscores the diverse data mining techniques applicable, including classification, predictive knowledge, cluster analysis, and outlier analysis. It elucidates the benefits of data mining in the FMCG sector, highlighting its utility in market and trend analysis, customer segmentation, and evaluating the effectiveness of promotional activities. The paper also explores advanced data mining models, such as sequence model mining for analyzing changes in consumer spending habits and purchase recommendation systems to enhance service and increase sales. Overall, it provides valuable insights into leveraging data mining for strategic decision-making and performance improvement in the FMCG industry.

Abdulelah S. Al Mesfer (2023)

The literature review in "Forecast-Driven Inventory Management for the Fast-Moving Consumer Goods Industry" by Abdulelah S. Al Mesfer comprehensively explores the current landscape of demand forecasting and inventory management in the Fast-Moving Consumer Goods (FMCG) industry. It delves into industry trends, various forecasting methods, and the application of machine learning techniques, emphasizing the pivotal role of effective inventory management in global supply chains. The review underscores the potential of data-driven approaches, particularly machine learning, to revolutionize inventory management by leveraging historical demand data for more accurate forecasts. It also addresses the challenges associated with demand forecasting in the FMCG sector, emphasizing the necessity for adaptable methods capable of capturing complex relationships, seasonality, and trends. Notably, the literature review highlights machine learning techniques like Prophet, Random Forests, and XGBoost as promising tools to enhance the accuracy and reliability of retail demand forecasting, particularly for Third-Party Logistics (3PL) providers. Overall, the review establishes a robust foundation for the research, emphasizing the study's objectives and its potential contributions to advancing the field of demand forecasting and inventory management in the FMCG industry.

Taha Serhat Tonbul (2019)

The literature review on Sales Forecasting in the Fast-Moving Consumer Goods (FMCG) sector with Artificial Neural Networks underscores the pivotal role of sales forecasting in marketing and* outlines diverse methods employed for this purpose. The author defines forecasting as a predictive effort crucial for planning enterprise activities, setting targets, and informed decision-making. Stressing the significance of sales forecasting in mitigating future uncertainties, the review delves into methods such as time series analysis, regression and correlation analysis, and artificial neural networks. Time series analysis relies on historical sales data to model future trends, while regression and correlation analysis focus on cause-effect relationships. Artificial neural networks, inspired by the human brain, operate in parallel, exchanging information for enhanced forecasting accuracy. Additionally, the review emphasizes the need to consider both macro and micro factors, advocating for a comprehensive approach that accounts for controllable and uncontrollable environmental factors during marketing planning and forecasting, aiming to adapt to or comply with these influences for successful enterprise outcomes.

Dr. SK. Dhastagiri Bhasha, Dr. Shaik Karim, Dr. K. Vidyasagar, et al., (2022)

The author on this paper focuses on explores the landscape of research on the application of the Machine Learning Multiple Linear Regression Algorithm for sales forecasting in the fast-moving consumer goods industry. It underscores the critical role of accurate demand forecasting in manufacturing organizations for effective production planning. The review extensively covers the utilization of machine learning algorithms, predictive analytics, and time series analysis, specifically addressing non-stationary demand forecasting. Various forecasting methods, such as ensemble empirical mode decomposition, extreme learning machine, and support vector regression, are referenced, along with a focus on deep learning applications and the comparative analysis of auto-correlated time series forecasting methods. Furthermore, the review investigates the influence of adaptive collaboration on demand forecasting accuracy across different product categories throughout the product life cycle. In summary, the literature review serves as a valuable resource for researchers and practitioners in the fast-moving consumer goods industry, offering insights into current research trends, methodological applications, and the technological landscape for enhancing sales forecasting accuracy.

Jaydip Sen and Tamal Datta Chaudhuri (2017)

The author covers research on stock market prediction, time series analysis, and forecasting techniques in the Fast-Moving Consumer Goods (FMCG) sector, emphasizing the importance of time series analysis. The study introduces six forecasting techniques and explores various methods, including artificial neural networks and hybrid systems, for stock market prediction. Specific focus is placed on FMCG-related forecasting, such as hybrid systems application, shrinkage analysis, real-world sales forecasting challenges, and supply chain modeling. The authors utilize structural decomposition of the FMCG sector index time series in India to identify unique characteristics and propose forecasting techniques. The study underscores the significance of the R programming language in data analysis projects. Overall, the literature review offers a comprehensive overview of research in stock market prediction and time series analysis within the context of the FMCG sector.

Elcio Antonio Tarallo (2019)

The research on "Machine Learning in Predicting Demand for Fast-Moving Consumer Goods" provides a comprehensive overview of the benefits and challenges of applying Machine Learning to demand forecasting in the fast-moving consumer goods industry. It discusses the advantages of Machine Learning over traditional statistical techniques, the different categories of Machine Learning algorithms, and the specific benefits observed in various business sectors, such as retail, technology, and fresh food. Additionally, the review highlights the limitations and challenges of using Machine Learning for demand forecasting, emphasizing the need for large amounts of data and the potential for overfitting. Overall, the literature review offers valuable insights into the potential of Machine Learning to improve sales predictability and supply chain efficiency in the fast-moving consumer goods industry.

Authors: Chandra, Y., Kumar, V., & Donthu, N (2022)

The research on Personalization in Personalized Marketing highlights the pivotal role of big data in the proliferation of the personalization concept. It emphasizes the use of bibliometric analysis as a method to provide a comprehensive and objective overview of the field. The review acknowledges the fragmented and multidisciplinary nature of the field and the potential of bibliometric reviews to offer a comprehensive map of the present landscape and future possibilities. The study reports the findings from the bibliometric analyses using a combination of figures, tables, and words based on the results generated from Biblioshiny and VOSviewer. Overall, the literature review provides insights into the use of big data, the adoption of bibliometric analysis, and the need for a comprehensive understanding of the field of personalized marketing.

Seyedan and Mafakheri (2020)

The literature review conducted by Seyedan and Mafakheri provides a comprehensive overview of the existing research on supply chain demand forecasting using big data analytics. The authors found that big data analytics can be used to improve supply chain management by providing insights into customer behavior, optimizing inventory management, and improving demand forecasting accuracy. The literature suggests that big data analytics can provide valuable insights into supply chain management, particularly in demand forecasting and customer behavior analysis. However, there are still challenges to be addressed, such as data quality, privacy concerns, and the need for skilled personnel.

Aisha Banu, Dr. Lily David, Dr. K R Pundareekavittala (2018)

The literature review in the document covers various research articles and their findings related to brand valuation and intangible assets. It includes studies by authors such as Aswath Damodaran, Kristina

Artsberg, Mehtiyeva Nigar, and H. Lee, M. Hu, among others. These studies discuss the characteristics of companies with intangible assets, the valuation issues that follow, and the impact of accounting standards on intangible assets. They also explore the relationship between brand equity and purchase intention, as well as the implications of recognizing internally generated brands. Additionally, the document presents a statistical analysis of brand value and market capitalization for specific FMCG companies, and suggests that brand value can be considered as 31% of market capitalization.

Marek Grzegorowski, Andrzej Janusz, Stanislaw Lazewski , Maciej Swiechowski, and Monika Jankowska (2022)

The authors propose a methodology that combines multivariate time series analysis, demand predictions using machine learning models, and heuristic optimization techniques to generate delivery plans that maximize sales profitability. The study focuses on the financial metrics of the delivery plans and evaluates the performance of different optimization algorithms and diversity heuristics. The results show promising potential for increasing profitability while maintaining the same production size. The authors also emphasize the importance of monitoring supply plans to identify any discrepancies between predicted market potential and actual profit.

Mrs.U.KarthigaiSelvi, Mrs.N.Padmashri (2023)

The author focus on understanding the intricacies of consumer behavior in the fast-moving goods (FMCG) sector in India. With a targeted sample of 100 respondents in and around Chennai, the study reveals that cost, product variety, product quality, and income significantly influence consumers' purchase decisions, with income level emerging as the most impactful factor. This insight is particularly valuable for FMCG marketers aiming to align their strategies with consumer preferences. The research, supported by references to relevant studies and journals, not only contributes to the understanding of FMCG consumer behavior but also provides practical guidance for businesses navigating this dynamic market.

Vaibhav Kumar, M. L. Garg (2018)

The author explains predictive analytics, employing statistical and analytics techniques from statistics, machine learning, database methods, and optimization to forecast future events based on current and historical data. The review encompasses various predictive analytics models and their applications across industries like finance, retail, healthcare, and government. It traces the evolution of predictive models from statistical to machine learning and deep learning, signaling a trend towards deep learning in predictive analytics. The literature review identifies opportunities for developing new models and improving existing ones to enhance performance in predictive tasks, reflecting the continual evolution of predictive analytics methodologies.

Manjari Mukherjee, Ashmita Paul, Ipsita Bhattacharya (2020)

"A Predictive Analysis of the Indian Oil and Gas Sector Using Time Series Decomposition-Based Approach" discusses the challenges in forecasting stock prices and the differences in patterns among different sectors and stocks. It emphasizes the importance of understanding the factors influencing sector and stock performance for investors. Additionally, the paper compares its approach with previous works, highlighting the uniqueness of its structural decomposition of time series data for the Indian oil and gas sector.

Hamed Nozari, Agnieszka Szmelter-Jarosz, and Javid Ghahremani-Nahr (2021)

The paper aims to fill the research gap concerning the use of IT technologies in sustainable marketing in the dairy industry, focusing on the Internet of Everything (IoE). The authors present a list of the most critical factors (criteria) in sustainable marketing, including technological, market, and legal factors, and their sub-criteria. The paper has theoretical implications in creating a framework for IoE usage in the dairy industry and practical implications for decision-makers in the discussed industry. Overall, the literature review provides valuable insights into the future of internet-based marketing strategies and their potential impact on various industries.

Tomasz Kolanowski (2009)

The study on predictive marketing mix modelling in the fast-moving consumer goods (FMCG) industry, specifically focusing on packaged food products. The study emphasizes the estimation and evaluation of the impact of marketing activities, particularly advertising and pricing, on product sales. The modelling approach involves a two-step process using ordinary least squares method, with adstock data transformation utilized to assess advertising impact with time-distributed lag. The paper highlights non-linear relationships between market distribution, consumer price levels, and advertising, and evaluates the accuracy of a 52-week forward sales forecast. Additionally, the study concludes that properly built marketing mix models can effectively forecast brand sales performance, enabling more precise annual planning and improved return on investment for brand managers. The literature review within the document references key sources in marketing, econometrics, and advertising, providing a comprehensive foundation for understanding the challenges and best practices in marketing mix modelling and advertising evaluation.

Need for the Study

The need for research on using predictive analytics to forecast trends in the FMCG industry is important because in the world of ever changing interests of consumers towards FMCG products. By using predictive analytics, the organizations can gain a competitive advantage by anticipating customer need, optimizing their supply chain, improving their overall performance This can improve decision making, identify risk and potential opportunities, increase efficiency in various areas such as sales forecasting, knowing customer preference, budgeting For customers Providing what they want, reducing the risk of supply disruptions, and managed inventory can help businesses increase sales and profits. Research in this area can therefore provide valuable insights and practical applications for businesses in the FMCG sector. And also this study tells about the future trends of the FMCG industry how predictive analysis can help them to maintain competitive advantage.

Key Findings

- In FMCG sector Demand forecasting is the continuous process which should be conducted by the companies if they want to survive or grow in the market because of the continuous change in the customers preferences this can be achieved by the help of scientific tools like Prophet, Random Forests, XGBoost, and Artificial Neural Networks.
- In FMCG sector when it comes to sales forecasting companies will be using the different methods like time series, correlation , regression which helps company to compete with their competitors

- Researchers also covers different aspects of brand valuation like how brand name of a company can help company to sell their products in these fast forwarding sector
- It also discussed use of predictive analysis in understanding the different consumers in different place with different buying behaviors. It's possible through the internet based marketing.
- The importance of accurate forecasting, understanding customer behavior, and optimizing marketing strategies for competitive advantage. Which might lead them to long term success.
- We also found need for FMCG industry to consider both macro and micro economics concepts in predicting the demand and also consumer preferences
- Big data analytics in supply chain management, particularly in demand forecasting and customer behavior analysis, is a valuable tool for businesses in the FMCG industry. However, data quality and privacy concerns need to be addressed to ensure the effectiveness of these analytics.
- **For example: Procter & Gamble (P&G)** has been using predictive analytics to anticipate customer demand and optimize their supply chain. By analyzing consumer behavior and preferences, P&G can forecast which products will be in high demand and adjust their production and distribution accordingly. This allows them to minimize stockouts and overstock situations, leading to improved customer satisfaction and cost savings.
- **Unilever**, on the other hand, has employed predictive analytics to enhance its marketing strategies. By analyzing large volumes of consumer data, including social media interactions, and purchasing patterns, Unilever can tailor its marketing campaigns to specific consumer segments. This targeted approach has led to improved customer engagement and higher conversion rates for Unilever's FMCG products.

Conclusion

The future of predictive analytics in the FMCG industry is promising, with opportunities to develop new models and improve existing ones to increase performance in predictive applications This study shows that industries in FMCG business can continue to use predictive analytics to gain competitive advantage in emerging markets .These findings suggest that predictive analytics can be a valuable tool for companies in the FMCG industry to improve their performance, gain competitive advantage and optimize decision-making processes.

It is clear that predictive analytics can be a valuable tool for businesses in the FMCG industry to improve their performance, gain competitive advantage and improve decision-making processes.

References

- Valbuena Godoy, J. N. (2022). Demand forecasting of Fast Moving Consumer Goods based on modeling of time series and deep learning methods (Unpublished master's thesis). Universidad Central/Universidad Jorge Tadeo Lozano, Bogotá, Colombia.
- Alzubaidi, Z. Y. (2020). A Comparative Study on Statistical and Machine Learning Forecasting Methods for an FMCG Company (Master's thesis). Rochester Institute of Technology.
- Suwignjo, P., Panjaitan, L., Baihaqy, A. R., & Rusdiansyah, A. (2023). Predictive Analytics to Improve Inventory Performance: A Case Study of an FMCG Company. *Operations and Supply Chain Management*, 16(2), 293–310.

Wang, L., Fan, H., & Gong, T. (2018). Estimating Consumer Demand and Optimizing Purchasing Strategies for FMCG Retailers in China. *Sustainability*, 10(2), 466.

Chauhan, C., Rathore, H. S., & Matta, S. K. (2019). An Empirical Research on FMCG Sector. **International Journal of Recent Technology and Engineering (IJRTE)**, *8*(2S7), 553-557. DOI: 10.35940/ijrte.B1103.0782S719

Vaibhav Kumar., M. L. Garg,(2018). Predictive Analytics: A Review of Trends and Techniques. *International Journal of Computer Applications*

Karthigai Selvi, U., & Padmashri, N. (2023). Impact of Consumer Behaviour Towards FMCG - An Analytical Study. *South India Journal of Social Sciences*, XXI(4), 1-8.