Vidhyayana - ISSN 2454-8596
An International Multidisciplinary Peer-Reviewed E-Journal
www.vidhyayanaejournal.org
Indexed in: Crossref, ROAD & Google Scholar

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Systematizing Fashion Brands Using Big Data Analytics

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Abstract:

Data has become the new fuel that powers businesses in the digital age. Due to the internet's and technology's incredible expansion, businesses produce enormous volumes of data each day. However, companies need more than just raw Data to function; to extract valuable insights that may guide their decision-making, a thorough analysis and interpretation process is necessary. This is where Big Data Analytics (BDA) becomes useful. BDA provides transformative benefits in systematizing fashion brands, from identifying customer behavior patterns to forecasting market trends and optimizing operations.

While Big Data has been widely adopted in sectors such as healthcare, finance, and retail, its application in fashion remains relatively nascent. This paper aims to explore how fashion brands can effectively harness BDA to systematize operations and gain a competitive advantage. The author finds that trend forecasting, waste reduction, user experience, consumer interaction and marketing, improved quality control, reduced counterfeits, and shorter supply chains are the main reasons behind the use of BDA in the fashion industry.

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This research adopts a conceptual methodology, relying on insights gained from secondary sources, including academic research, industry reports, and case studies. Through a synthesis of this existing literature, the paper provides a comprehensive overview of the current state of Big Data usage in fashion retail. The analysis identifies both the opportunities, along with real-world case studies of Indian fashion brands, and challenges in implementing BDA, including technological barriers, Data privacy concerns, and organizational resistance to change.

The findings reveal that while many fashion brands have yet to embrace Big Data fully, those that do are already experiencing significant benefits, such as improved trend prediction, more efficient supply chains, and enhanced customer engagement. By offering practical recommendations, this paper aims to guide fashion retailers, industry professionals, and researchers in leveraging Big Data as a critical tool for innovation and long-term growth in the fashion industry.

Keywords: Big Data Analytics (BDA), fashion, brand building, consumer experience, market trends.

Introduction:

According to the Ellen MacArthur Foundation (2019), India's fashion industry generates around 1.5 million tons of clothing waste annually, with only 3% being recycled. This waste stems from a persistent supply-demand mismatch, as fashion brands often rely on gut feelings, assumptions, and incomplete market insights.

As fashion cycles accelerate, retailers struggle to analyze Data quickly enough to respond to emerging trends. The shift from traditional three-season cycles to seasonless fashion has intensified this challenge, as consumers expect immediate availability of new styles. This surge in demand leads to shorter lead times, requiring retailers to adapt their assortment and marketing strategies to maintain adequate stock levels and stay competitive.

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As a result, one in four online fashion retailers miss out on better margins, accurate forecasts, and optimal product choices due to ineffective use of Data. However, the rise of Big Data and advanced analytics offers a solution, allowing users to harness both historical and real-time Data to refine their decisions on what styles to design and produce, transforming the way fashion businesses operate. (Kapoor, 2022)

Big Data Analytics: What Is It?

The process of gathering, arranging, and evaluating massive amounts of data to obtain useful information that will help with future decision-making is known as Big Data Analytics (BDA). Big Data Analytics looks at both historical and real-time data to find patterns and forecast future results, in contrast to typical business intelligence applications, which mostly concentrate on previous Data. Depending on the Data and the goals, methods including natural language processing (NLP), machine learning, modeling with predictions, and social network analysis are frequently employed.

The surge in Data generation by businesses presents both challenges and opportunities. Even though it can be difficult to manage and interpret this Data, organizations that successfully use BDA have a competitive advantage by identifying hidden trends and information that might have been missed.

BDA is changing the face of business in India. Due to the country's large population and expanding economy, the country produces huge amounts of Data every day from numerous sources. Even until recently, a lack of infrastructure and knowledge kept much of this Data from being used, but recent technological developments and a growing understanding of the potential of Big Data are fuelling an increase in demand for analytics specialists. (Brijeshsaluja, n.d.).

Today, we are in the midst of the fourth industrial revolution, driven by the ‘Internet of Things’ and fueled by the integration of BDA, and advanced physical technologies. Big Data, characterized by the 4 V's Volume, Velocity, Variety, and Veracity refers to the massive amount of data generated in today's digital world.

In the fashion industry, Big Data has gained significant importance over the past decade, particularly in trend forecasting, supply chain management, and understanding customer behavior. As customer demands constantly shift toward more personalized styles, fits, and colors, fashion companies face challenges like excess inventory and obsolete stock. BDA offers a solution, helping brands better anticipate trends and tailor their offerings to meet ever-changing consumer preferences. (Jain et al., 2017) (Kareem, 2023)

Review of Literature:

Jain et al. (2017) This paper introduces the concept of "fashion Data" and explores why it qualifies as Big Data, given its volume, variety, and relevance in the fashion industry. It highlights how Big Data is becoming more and more useful for understanding customer behavior, preferences, and emotions as well as trend predictions. The paper provides a classification of different types of fashion Data and outlines the methodology and functioning of a proposed system that leverages this Data for mass customization in fashion. Future work involves collecting fashion Data, building knowledge bases, and integrating them with search engines to enhance the system's functionality.

Silva et al. (2019) Big Data is poised to deliver significant benefits to fashion retailers, but the industry still has a long way to integrate it into daily operations fully. Companies like EDITED, WGSN, SAP, and others are leading the way by developing solutions for applying BDA in fashion. In order to profit from Data and obtain a competitive advantage, more fashion businesses will need to partner with these companies in the future. For an industry renowned for setting trends in design, it’s time to embrace Data and make it a fashionable asset.

Blekanov et al. (2019) This paper highlights the power of BDA from social media in identifying and prioritizing supply chain risks in the clothing industry. Due to the high volume of customer feedback on platforms like Twitter, social media Data is a valuable resource for risk management. Big Data tools can efficiently process this Data to reveal clusters of words, topics, and sentiments, helping decision-makers address negative feedback and mitigate distribution risks. A case study on the footwear distribution chain reviewed Twitter Data for a month, revealing over a million relevant activities. Future research will expand this analysis

over longer periods and across broader product categories to further enhance decision-making in supply chain risk management.

Madsen et al. (2020) Big Data is revolutionising the fashion retail industry, reshaping traditional business models, and unlocking major opportunities for both established brands and start-ups. This paper identifies five key reasons driving Big Data adoption in fashion: trend forecasting, waste reduction, enhanced customer experience and marketing, improved quality control and counterfeit prevention, and streamlined supply chains. However, the industry has yet to fully integrate Big Data into everyday operations. To stay competitive, more fashion brands must collaborate with industry leaders to leverage Big Data's full potential and adapt to the evolving market landscape.

Raut et al. (2021) BDA has garnered significant attention for its potential to enhance strategic, tactical, and operational capabilities, ultimately boosting organizational performance. Twelve major obstacles to the adoption of BDA in Indian production and supply chains are identified in this study. Using a two-stage approach—Interpretive Structural Modeling (ISM) and Decision-Making Trial and Evaluation Laboratory (DEMATEL)—the interrelationships and intensities of these barriers are assessed. Additionally, the Fuzzy MICMAC technique identifies four critical obstacles including a lack of financial resources, expertise, protocols, and support from upper management. The findings help policymakers develop strategies to overcome these barriers and increase BDA adoption in manufacturing supply chains.

In the fashion industry, spotting and generating trends is crucial for success, with accurate demand forecasting key to avoiding profit losses from discounting. The rise of online shopping and advancements in Big Data have transformed the sector. This study explores the applications and impact of Big Data in fashion, revealing how it is reshaping how apparel is designed, produced, marketed, and sold. Big Data insights help designers and retailers craft targeted marketing strategies and optimize their designs, providing a competitive edge. As the industry evolves, leveraging Big Data has become essential to staying relevant and avoiding stagnation. **("BIG DATA IN FASHION INDUSTRY," 2022)**

Significance of the study:

- The Indian fashion industry's slow adoption of BDA underscores the need for guidance on strategic integration.
- Systematizing fashion brands using BDA can drive business growth, improve operational efficiency, and enhance customer engagement.
- The findings will provide actionable insights for fashion brands, policymakers, and stakeholders seeking to leverage BDA.

Objective Of The Study

- To analyze the benefits of Big Data Analytics in the fashion businesses.
- To study some case studies of Indian fashion brands using Big Data Analytics.
- To assess the challenges of implementing Big Data Analytics in fashion businesses.

Research Approach

The research article is purely conceptual. All of the study materials were gathered from secondary sources and were analysed to carry out the study thoroughly. The secondary data was gathered from numerous academics and researchers, published books, and articles that have appeared in a variety of magazines, periodicals, conference papers, working papers, blogs, and websites.

Results and Discussion:

- **Benefits of Big Data Analytics in fashion businesses:**

The following are some important areas wherein Big Data may greatly assist the fashion industry:

1. **Trend Forecasting**: BDA based on past buying patterns can identify the fashion attributes that consumers are most likely to find appealing in the future. For instance, researchers have analyzed runway reviews to identify influence networks among major

designers. Through the identification of potential new designers who connect with clients but are not yet associated with well-known brands, this strategy can assist merchants in sourcing items.

Trend forecasting firms like Edited and WGSN have significantly disrupted the fashion retail landscape by developing advanced BDA applications. In addition, Google Trends has shown hope as a helpful resource for forecasting trends in fashion retailing, indicating that it may add to present strategies. Predicting the present-day or very near future, or "nowcasting," is a concept that represents unused potential in fashion BDA. For more precise trend predictions, one platform that combines search queries, online activity, internet Data, and customer feedback is MakerSights.

The predictive power of BDA for fashion trends depends on their capacity to precisely predict three critical components: color, pattern, and design features. Supporters of Big Data-based forecasting argue that it can significantly improve the precision of trend predictions, offering a more reliable way to anticipate upcoming fashion shifts.

2. **Waste Reduction:** The fashion industry faces significant waste issues, with excess inventory and returns due to poor fit contributing heavily to financial losses. BDA is helping to address these challenges by minimizing returns and improving purchase decisions through insights into return/refund Data. Advanced technologies like "WiseEye" and design recommender systems further reduce waste by optimizing manufacturing and design processes. Fit concerns, a major driver of returns, have been tackled by tools like Fits.me and EyeFitU, which use Data analytics to match customers' body measurements with clothing sizes, enhancing online shopping accuracy and reducing returns.

   In the fashion industry, overproduction is an important issue with many financial and ecological costs. BDA helps address this by enhancing production planning and forecasting demand, decreasing extra inventories, and the need for deep discounts that can harm brand reputation. Companies like H&M have adopted Big Data to minimize markdowns by analyzing customer Data such as store receipts and returns. Additionally,

advanced analytics enable dynamic pricing strategies that help retailers maximize profitability while reducing excess stock. Partnerships between tech companies and environmental organizations further aid in responsible sourcing and production.

3. **Enhancing Consumer Experiences:** Consumers today increasingly connect fashion to their online and offline experiences, making brand experience crucial for competitive advantage. The rise of Big Data has transformed how companies enhance consumer experiences. Fashion brands now use BDA to understand shopping behavior, personalize interactions, and improve pricing strategies. Companies like H&M and Macy's utilize Data to adjust pricing based on factors like currency fluctuations or social media trends, while targeted discounting enhances customer satisfaction. In this competitive landscape, leveraging Big Data offers a significant opportunity for brands to stand out and create memorable consumer experiences.

   Fashion companies today operate in an omnichannel environment, blending online and offline retail to enhance consumer engagement. Big Data plays a crucial role in analyzing how consumers interact with brands, which is key to improving brand equity and communications. By analyzing consumer behavior, brands can optimize store layouts, personalize marketing strategies, and foster long-term relationships with existing customers to meet evolving consumer expectations, enhancing engagement and driving loyalty.

4. **Better Quality Control and Fewer Counterfeits:** The fashion industry faces a significant challenge with counterfeit products, valued at around $500 billion. To combat this, brands and governments are increasingly turning to technology, especially Big Data and machine learning, to protect brand integrity. Platforms like Amazon and Alibaba use Big Data to monitor and remove counterfeit items, partnering with major fashion brands to strengthen their anti-counterfeiting efforts. For example, Alibaba's Big Data Anti-Counterfeiting Alliance collaborates with brands like Louis Vuitton to fight fake goods online.

Luxury brands such as Burberry are utilizing AI-powered image recognition to detect counterfeits with impressive accuracy. These technologies enable quicker identification of fakes, ensuring better quality control and reducing the risk of brand dilution. Additionally, consumers play a role in this fight by using new technologies to recognize and avoid counterfeit products. Together, these efforts highlight how Big Data is transforming the fight against counterfeiting in the fashion industry, ensuring better protection for both brands and consumers.

5. **Shortening Supply Chains:** Efficient supply chain management is essential for fashion brands, and Big Data significantly enhances this process. By streamlining supply chains, retailers can achieve a competitive advantage through faster, more flexible, cost-effective, and sustainable operations.

   For example, Zara uses real-time sales Data and social media insights to swiftly respond to fashion trends, such as quickly producing a dress worn by Beyoncé, capitalizing on the resulting buzz. H&M also employs Big Data and AI to create more agile supply chains.

   Additionally, analyzing customer reviews through Big Data enables better sales forecasting and informed decision-making. Leading fashion companies utilize technologies like RFID for efficient product tracking, automate logistics to improve delivery speed and accuracy, and implement AI-driven predictive models to optimize inventory levels. Overall, Big Data is revolutionizing supply chain management in the fashion industry, allowing for quicker responses and enhanced operational efficiency. (Madsen et al., 2020) ("BIG DATA IN FASHION INDUSTRY," 2022) (Brijeshsaluja, n.d.)

How Big Data Analytics is Transforming the Indian Fashion Business Landscape

In the past decade, India's fashion industry has undergone a digital transformation, driven by a surge in internet and mobile users that has dramatically increased Data generation. This influx of Data has created a crucial demand for BDA to help fashion businesses navigate and leverage this information effectively.

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BDA is revolutionizing the fashion landscape in India by enhancing decision-making, improving operational efficiency, and providing a competitive edge. By analyzing customer Data, fashion brands can better understand consumer preferences, identify emerging trends, and develop targeted marketing strategies.

Additionally, BDA streamlines supply chain operations by uncovering insights that inform inventory management and design processes. It also automates routine tasks, allowing staff to focus on creative and strategic initiatives. Ultimately, BDA equips fashion businesses in India to stay ahead in a fast-paced market, respond quickly to trends, and enhance customer engagement.

- **Indian Fashion Brands Case Studies:**

1. **Raymond**, initiated in 1925, a leading textile and apparel company, effectively harnessed BDA to improve its operations and customer experience. Faced with challenges like manual Data processing, inefficient supply chain management, and limited customer insights, the company implemented a comprehensive BDA platform. This solution integrated Data from various sources, enabling the analysis of customer behavior and demand forecasting. The implementation resulted in a 90% accuracy in sales predictions, reducing inventory wastage by 20%. Personalized marketing campaigns led to a 30% increase in customer engagement and a 25% rise in sales. Additionally, streamlined supply chain operations reduced delivery times by 40% and costs by 15%. Overall, Raymond India achieved a 15% increase in revenue and significantly improved customer satisfaction, demonstrating the transformative impact of Data-driven decision-making in the fashion industry. (Bidyarthy, 2018)

2. **Fabindia**, a prominent Indian fashion brand founded in 1960, faced challenges in understanding customer preferences, managing inventory, and optimizing sales. To enhance customer experience and operational efficiency, the company implemented Data analytics initiatives including customer segmentation, predictive analytics for demand forecasting, market basket analysis for cross-selling, social media monitoring for brand sentiment, and supply chain optimization. Utilizing tools like Amazon

Redshift for Data warehousing, Tableau for visualization, and R and Python for machine learning, Fabindia achieved a 25% increase in sales, a 15% reduction in inventory costs, a 30% improvement in customer satisfaction, and a 20% rise in online engagement. The case highlights the importance of Data-driven decision-making, a focus on customer needs, and collaboration among stakeholders for achieving business success. (Mishra & Cio, 2019)

3. **Myntra**, established in 2007, is India's leading fashion e-commerce platform, has effectively leveraged Data analytics to tackle challenges in personalizing customer experiences, optimizing inventory, and enhancing supply chain efficiency. By implementing initiatives like customer segmentation, predictive analytics, and a recommendation engine, Myntra achieved a 30% increase in sales and a 25% reduction in inventory costs. Tools such as Amazon Redshift and Tableau were utilized to support these efforts. The introduction of innovative applications, including the Myntra Shopping App and AI-powered styling assistance, further enhanced customer engagement and satisfaction by 40%. Myntra's experience emphasizes the importance of Data-driven decision-making, a customer-centric approach, and continuous innovation. Looking ahead, the company plans to enhance its AI capabilities, expand personalized marketing, and explore AR/VR technologies. (Mentor, 2023)

4. **Jabong**, founded in 2012, is a leading Indian fashion e-commerce platform that aimed to enhance customer experience, optimize operations, and drive business growth through BDA. To address the issues of manual Data processing, inefficient supply chain management, limited customer insights, and high cart abandonment rates, Jabong implemented a BDA platform that integrated Data from various sources, analyzed customer behavior, predicted demand, and streamlined operations. As a result, Jabong achieved a 25% increase in sales, improved customer engagement by 30%, reduced inventory costs by 25%, and decreased cart abandonment rates by 15%. The successful implementation of BDA illustrates the transformative potential of Data-driven decision-making for newer brands in the fashion industry, allowing Jabong to enhance their

competitiveness and operational efficiency while significantly improving customer experience. (Online, 2018)

BDA has emerged as a game-changer in the Indian fashion industry, with both established and new brands leveraging its potential to drive success. Legacy brands like Raymond have optimized its supply chains, enhanced customer experiences, and informed design decisions using Data-driven insights. Meanwhile, newer players like Jabong have systematized operations, improved customer engagement, and increased sales through targeted marketing campaigns. These success stories show how BDA may transform the fashion business. By embracing this technology, other brands can also unlock new opportunities, drive business growth, and stay competitive in an ever-evolving market. Whether seeking to revamp operations or propel expansion, BDA offers a valuable toolkit for fashion brands to thrive.

- **The Challenges of Big Data Analytics in fashion businesses:**

Implementing a Data analytics strategy can be complex due to several obstacles. The primary challenges include:

1. Ensuring Data Quality: Guaranteeing Data accuracy, relevance, and timeliness to prevent flawed decision-making.
2. Effective Data Governance: Establishing processes to manage Data collection, storage, and usage.
3. Seamless Data Integration: Combining Data from diverse sources, formats, and locations.
4. Maintaining Data Security: Protecting sensitive Data from cyber threats and breaches.
5. Acquiring Specialized Skills and Resources: Hiring Data scientists, analysts, and professionals amidst high demand.

Overcoming these challenges is essential for maximizing the potential of Data analytics and enabling informed decision-making within organizations. (Silva et al., 2019)

The Indian fashion industry is rapidly evolving, with BDA transforming the business landscape. As adoption grows across apparel, textiles, and accessories, key trends will shape its future. Artificial Intelligence and Machine Learning will optimize design, production, and supply chains, while real-time analysis will enable personalized customer experiences. Cloud-based solutions, Edge Computing, and Data-as-a-Service will also enhance inventory management, trend forecasting, and e-commerce optimization. BDA will remain vital for fashion businesses in India, driving competitiveness, innovation, and agility in the $50 billion industry.

Conclusion:

As India's fashion industry evolves, BDA is emerging as a crucial tool for businesses to remain competitive. By utilizing Data-driven insights, fashion retailers can better understand customer preferences, anticipate trends, enhance service, and streamline operations. Collaborating with analytics firms will be key to unlocking the full potential of BDA. By integrating Data-driven decision-making with their creative heritage, Indian fashion brands can innovate and remain profitable. Ultimately, embracing BDA is essential for thriving in the rapidly changing market.

Conflict of Interest:

The author declares that there is no conflict of interest regarding the publication of this paper. The author declares no competing interests related to the 'Title of the Paper'.

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