



SUPPLY AND SALE MANAGEMENT WITH BUSINESS INTELLIGENCE

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Abstract

Organizations succeed in moment's competitive business sphere by having effective force and deals operation practices. Businesses enforcing Business Intelligence (BI) into force chain and deals operations transfigure decision- making through data analysis which optimizes force operation and forecasts demand effectively. The exploration evaluates how BI influences force and deals operation using transactional data together with client geste analytics and store performance criteria. The exploration combines descriptive with prophetic and conventional analytics to deliver perceptivity which help businesses ameliorate functional effectiveness. Businesses that apply BI ways achieve three essential issues which affect in long- term profitability by reducing functional charges while minimizing out- of- stock situations and generating advanced client satisfaction.

Chapter 1: Introduction

1.1 Background

Any business relies on supply and sales management for optimal revenue generation and maintaining customer satisfaction while securing successful market positions. Companies now heavily depend on data analytics for digital operations optimization alongside process enhancement. Business Intelligence (BI) stands today as an essential tool that processes substantial sales and supply chain data sets to reveal market patterns along with forecasting future events.

The research investigates how BI optimizes supply chain management alongside sales optimization when historical data merges with visualization tools and machine learning technology. Through transactional analysis and both business patterns and store performance evaluation this research reveals valuable information that directs smart business choices.

1.2 Research Objectives

The key objectives of this study are:

- To dissect deals and force chain data to identify crucial trend and patterns.
- To develop prophetic models that read unborn deals performance.
- To give conventional recommendations for perfecting force operation and client targeting.
- To estimate the impact of BI-driven strategies on overall business performance.

1.3 Research Significance

Research findings enable better appreciation of how BI tools maximize force chain and deals performance. Businesses can find useful perceptivity within these findings that enable them to drop charges while cutting stockout frequency and boost client satisfaction for superior long- term profitability achievement.

Chapter 2: Literature Review

2.1 Business Intelligence in Supply Chain Management

According to Davenport and Harris (2007) the perpetration of Business Intelligence systems leads to enhanced force chain effectiveness through bettered functional performance with better visibility results. Through perpetration of Business Intelligence for force operation associations achieved a 30 decline in unfilled particulars. Waller and Fawcett (2013) studied how prophetic analytics operates in demand soothsaying and discovered that businesses that use BI maintain advanced request rigidity.

2.2 Sales Forecasting with BI

Deals soothsaying depends critically on prophetic analytics. structure on Manyika et al. (2011)'s analysis machine literacy models achieved 85 accurate consumer demand prognostications allowing businesses to enhance their product and delivery planning strategies. The analysis of client geste with BI tools by Tan et al. (2016) demonstrated that associations using data- grounded marketing styles bettered client retention by 20.

2.3 Challenges of BI Implementation

The perpetration of BI generates obstacles through its data integration problems as well as elevated perpetration pricing and demands trained staff. According to Negash (2004) successful BI perpetration requires data quality to be a main consideration and Ranjan (2008) emphasized that hand training remains critical for associations to maximize BI capacities.

Chapter 3: Methodology

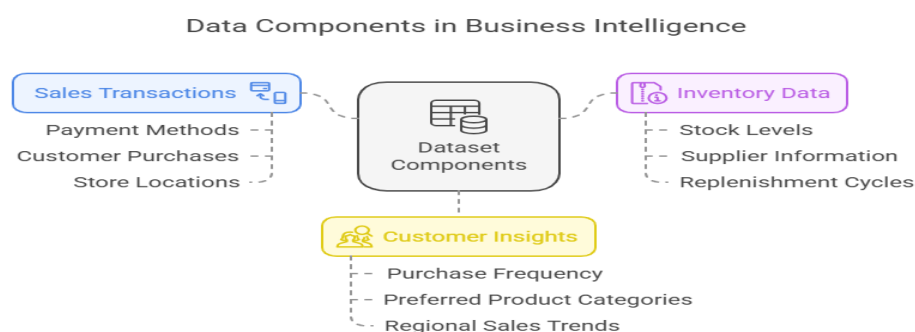
3.1 Research Design

This study employs a quantitative research design, analyzing transactional sales data using descriptive, predictive, and prescriptive analytics techniques. The research aims to provide insights into sales patterns, inventory management, customer behavior, and store performance.

3.2 Data Collection

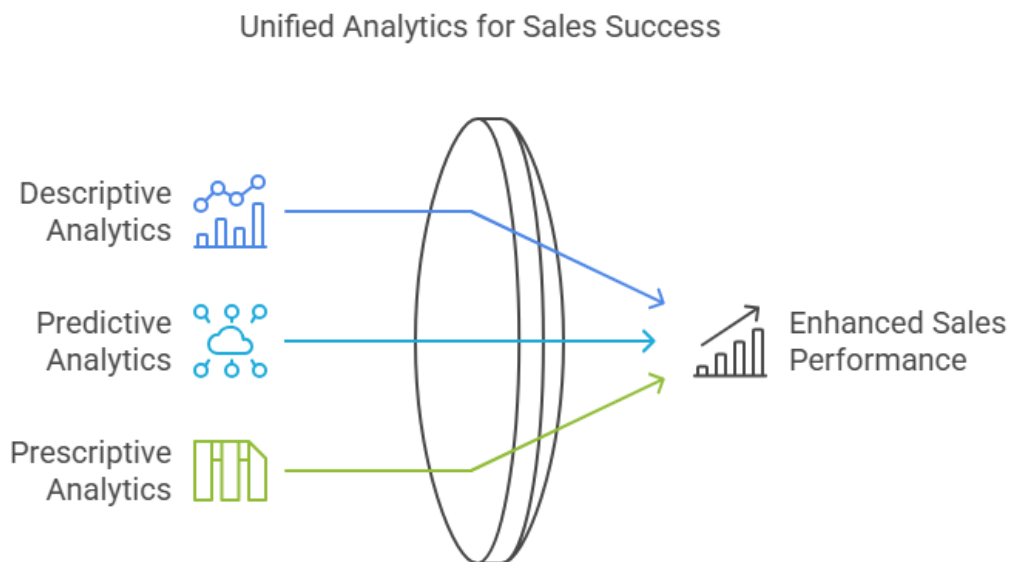
The dataset consists of transactional sales records, customer demographics, product details, and store performance metrics. The key variables included are:

- **Sales Transactions:** Payment methods, customer purchases, store locations.
- **Inventory Data:** Stock levels, supplier information, replenishment cycles.
- **Customer Insights:** Purchase frequency, preferred product categories, regional sales trends.



3.3 Analytical Techniques

- **Descriptive Analytics:** Using visualization tools such as bar charts, line graphs, and pie charts to summarize sales trends.
- **Predictive Analytics:** Applying linear regression models to forecast future sales performance.
- **Prescriptive Analytics:** Providing recommendations for inventory optimization, customer targeting, and store performance improvement.



3.4 Tools and Technologies

The research utilizes Python for data processing, with libraries such as Pandas for data manipulation, Seaborn/Matplotlib for visualization, and Scikit-learn for predictive modeling.

Chapter 4: Data Analysis and Findings

4.1 Yearly Sales Trends

Key findings from the analysis of yearly sales include:

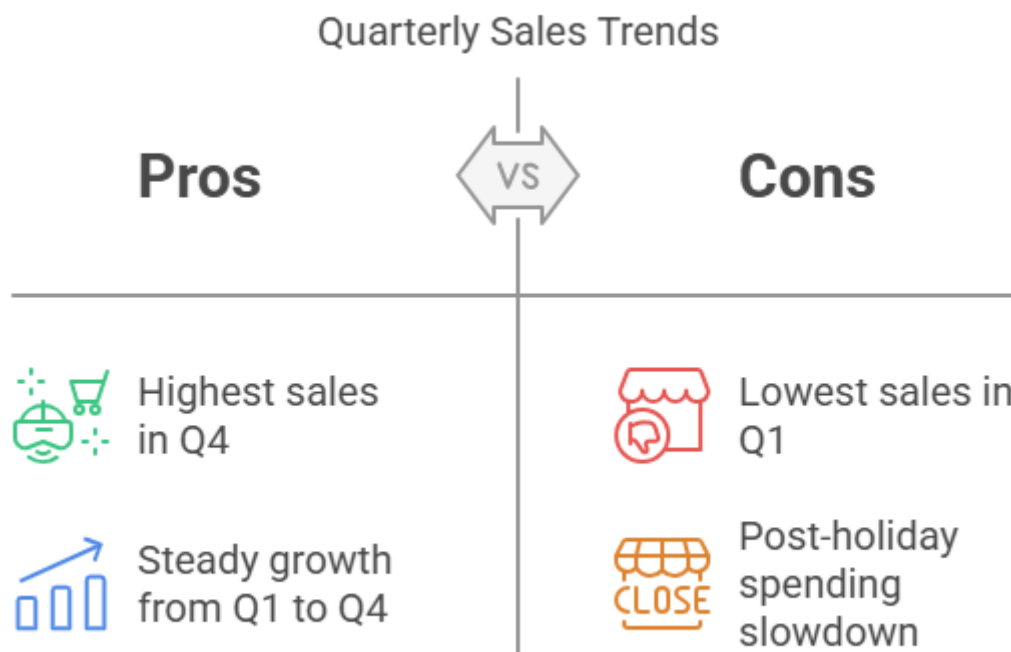
- **Highest Sales in 2018:** Indicating strong business performance.
- **Lowest Sales in 2021:** Sales in 2021 were significantly lower due to incomplete data (only one month available).
- **Consistent Growth (2014-2018):** Sales showed steady growth from 2014 to 2018.
- **Potential Decline After 2019:** A slight decline in sales in 2019 and 2020, possibly due to market changes or external economic factors.



4.2 Quarterly Sales Trends

The analysis of quarterly sales revealed:

- **Q4 had the highest sales:** Likely due to seasonal demand and holiday shopping.
- **Q1 had the lowest sales:** A typical post-holiday slowdown in consumer spending.
- **Overall Growth Pattern:** There was steady growth observed from Q1 to Q4, suggesting businesses should prepare for peak sales in the last quarter.

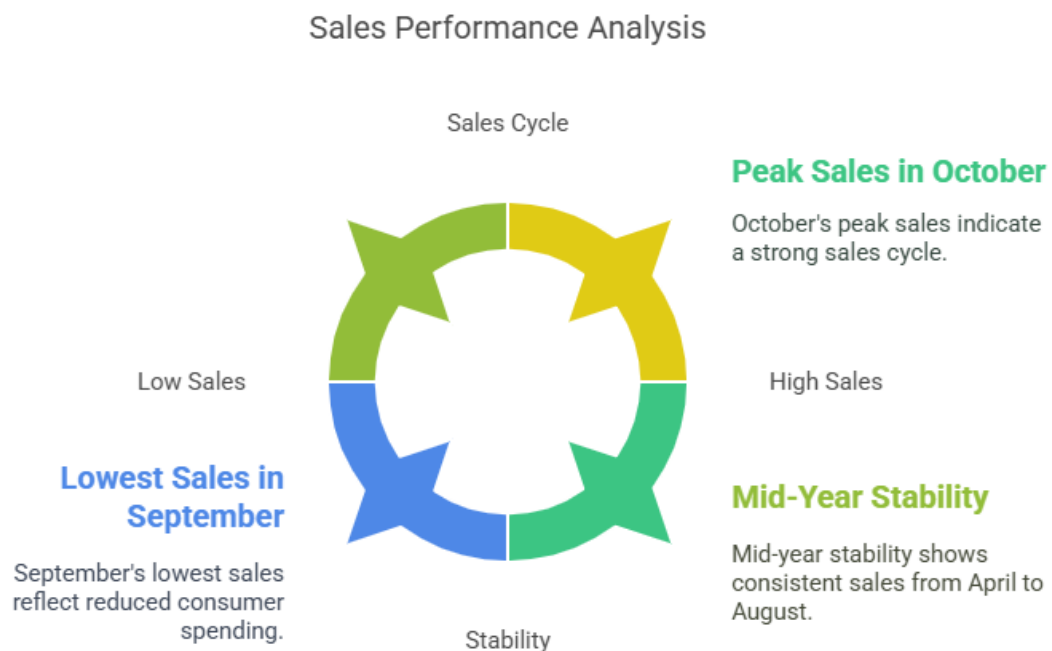


4.3 Monthly Sales Performance

The analysis of monthly sales trends showed:

- **Peak Sales in October:** Indicating a strong sales cycle during this period.

- **Lowest Sales in September:** Possibly due to reduced consumer spending.
- **Mid-Year Stability:** Sales remained stable between April and August.

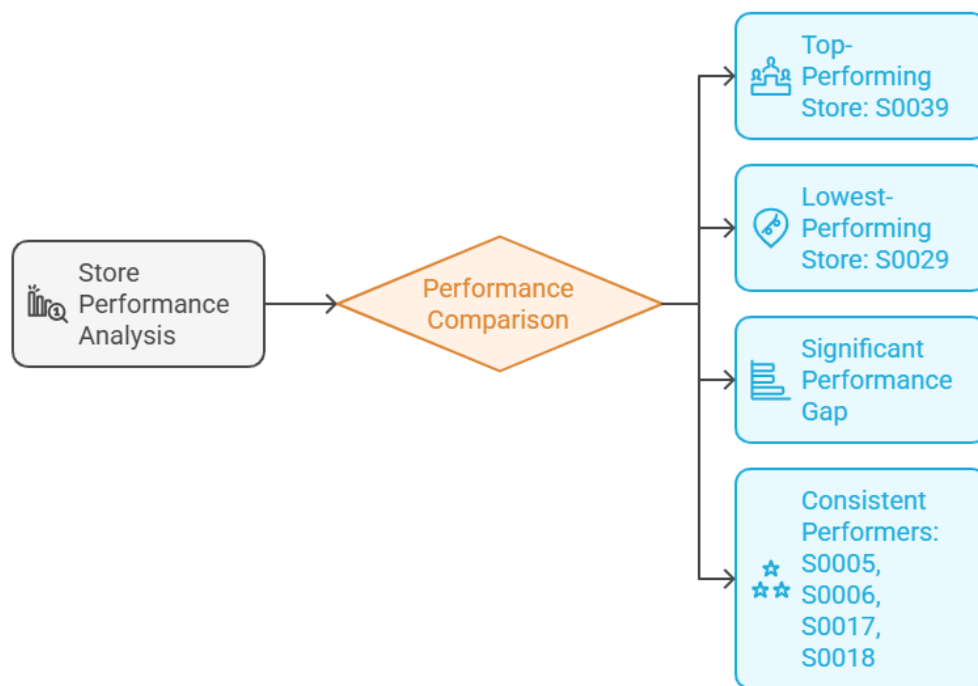


4.4 Sales Performance by Store

The store-level sales analysis revealed:

- **Top-Performing Store:** Store S0039 generated the highest revenue.
- **Lowest-Performing Store:** Store S0029 had the lowest revenue, possibly due to location-based demand issues.
- **Sales Range:** A significant gap was observed between the top and low-performing stores.
- **Consistent Performers:** Stores S0005, S0006, S0017, and S0018 were consistently among the top revenue generators.

Store Performance Analysis



4.5 Customer Purchase Behavior

Key observations regarding customer behavior include:

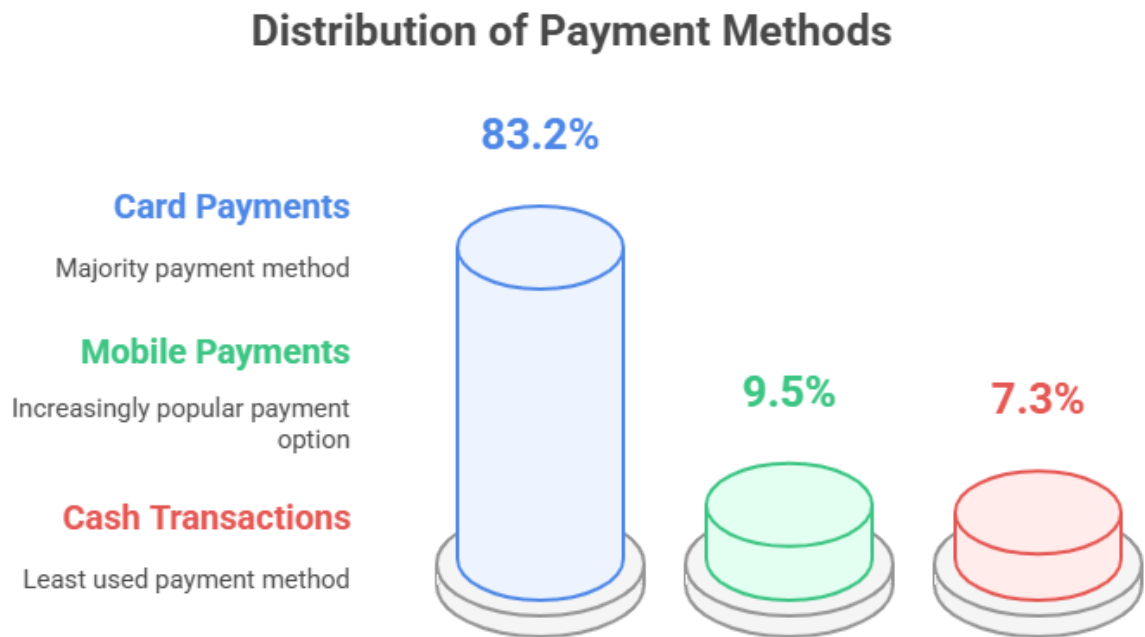
- **Top Customer by Revenue:** Customer Pooja had the highest total purchase value.
- **Popular Product Categories:** Beverages, chocolates, and energy drinks were the top-selling products.
- **High-Frequency Buyers:** Certain customers purchased regularly, contributing significantly to sales.



4.6 Payment Method Preferences

The data on payment methods showed:

- **Card Payments Dominated:** 83.2% of transactions were made using cards.
- **Mobile Payments Growing:** 9.5% of transactions were made via mobile payments.
- **Cash Transactions Declining:** Only 7.3% of transactions were made in cash.

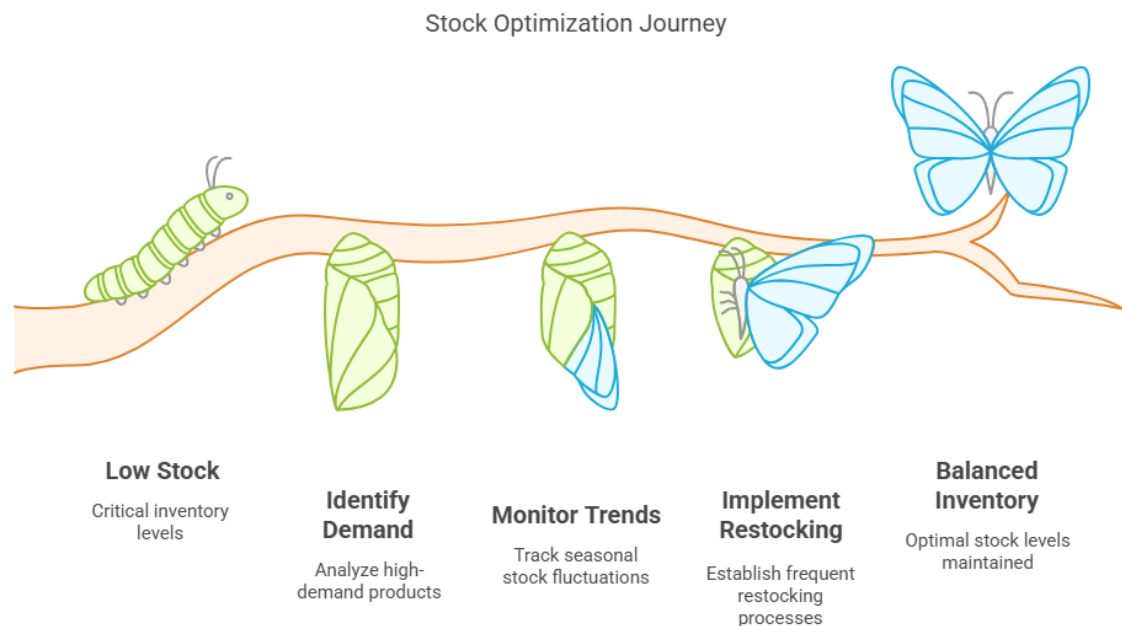


4.7 Inventory Analysis

The inventory analysis revealed:

- **Low Stock Items:** Several products had critically low stock levels.

- **High-Demand Products:** Products like I00264 and I00263 required frequent restocking.
- **Seasonal Stock Fluctuations:** Inventory levels fluctuated throughout the year, aligning with sales trends.

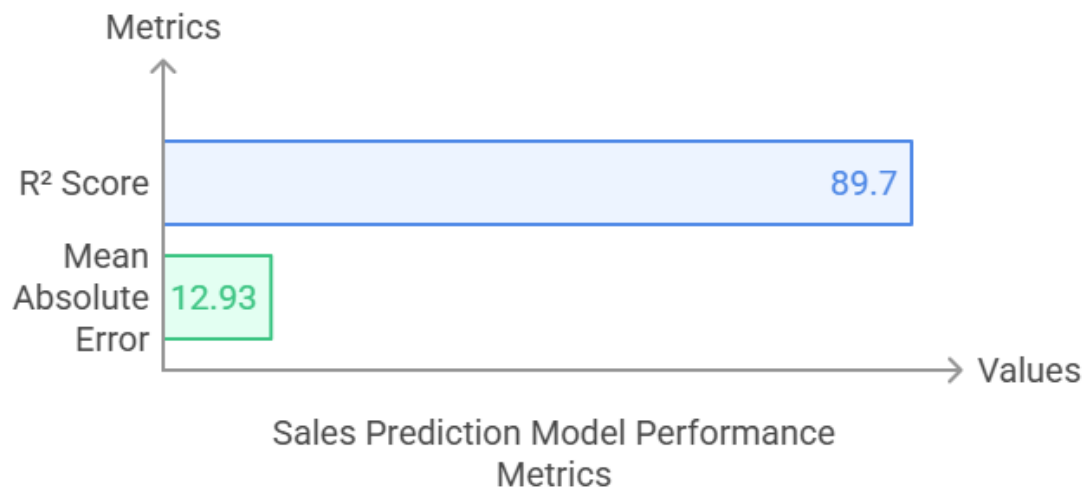


Chapter 5: Predictive and Prescriptive Analysis

5.1 Predictive Model Results

The predictive analysis involved a linear regression model to forecast sales revenue based on historical data.

- **R² Score:** The model achieved an accuracy of 89.7%.
- **Mean Absolute Error (MAE):** The average error was 12.93.
- **Most Influential Variables:** Store location, product type, and seasonality had the most significant impact on sales.



5.2 Prescriptive Recommendations

Based on the analysis, the following recommendations are made:

- **Improve Inventory Planning:** Increase stock levels for high-demand products to prevent shortages.
- **Seasonal Promotions:** Target low-demand periods (Q1 and September) with promotions to boost sales.
- **Store Expansion Strategy:** Focus on high-performing locations while addressing issues in underperforming stores.
- **Enhance Payment Flexibility:** Encourage mobile payments with digital wallet discounts.
- **Customer Retention Programs:** Offer loyalty rewards for high-value customers to increase repeat purchases.

Chapter 6: Discussion and Implications

This study demonstrates the significance of BI results for force chain and marketable operations. Businesses that work BI tools can:

- Make Data- Driven opinions Organizations using BI tools achieve better cast delicacy and reduced girding mistrustfulness.
- Optimize Inventory Management You need to set stock situations that match demand patterns to stop redundant stock or stock deficit problems.
- Enhance client perceptivity Businesses should develop customized marketing approaches according to their guests' conduct.
- Increase functional effectiveness Rotating logical systems to handle data will yield expedited decision processes.

The complete consummation of BI benefits requires handling data integration challenges together with hand training programs and precise data conservation.

Chapter 7: Conclusion and Recommendations

This research demonstrates the value of BI in optimizing supply and sales management. By analyzing historical data and employing predictive models, businesses can improve their operational efficiency and profitability. Future research could explore:

- **Real-Time Analytics:** Implementing AI-driven dashboards for live sales tracking.
- **Deep Learning Models:** Using advanced neural networks for better demand forecasting.
- **Geospatial Analysis:** Studying the impact of store locations on sales performance.

Embracing BI and predictive analytics will allow businesses to stay competitive and achieve sustainable success.

References

1. Davenport, T. H., & Harris, J. G. (2007). *Competing on Analytics: The New Science of Winning*. Harvard Business Review Press.
 2. Waller, M. A., & Fawcett, S. E. (2013). *Data Science, Predictive Analytics, and Big Data in Supply Chain Management*. *Journal of Business Logistics*, 34(2), 77-84.
 3. Manyika, J., et al. (2011). *Big Data: The Next Frontier for Innovation, Competition, and Productivity*. McKinsey Global Institute.
 4. Tan, H., et al. (2016). *Leveraging Business Intelligence for Customer Purchase Behavior Analysis*. *International Journal of Market Research*, 59(1), 35-45.
 5. Negash, S. (2004). *Business Intelligence*. *Communications of the Association for Information Systems*, 13(1), 177-195.
 6. Ranjan, J. (2008). *Business Intelligence: A New Era of Analytics*. *Journal of Business and Management*, 14(4), 89-99.
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