Business Analytics Tutorial

1. KPI (Key Performance Indicator) Development

Definition: KPIs are measurable values that indicate how effectively a company is achieving key business objectives.

- **Steps to Develop KPIs:**

  - **Define Business Objectives** – Understand strategic and tactical goals.

  - **Identify Success Factors** – Determine what success looks like.

  - **Choose KPIs** – Select measurable and actionable metrics.

  - **Set Targets** – Assign numerical benchmarks.

  - **Monitor & Refine** – Continuously evaluate and adjust.

- **Examples:**

  - *Sales Growth*: % Increase in Monthly Sales

  - *Customer Satisfaction*: Net Promoter Score (NPS)

  - *Operational Efficiency*: Average Resolution Time

- **KPI SMART Criteria:**

  - **S**pecific

  - **M**easurable

  - **A**chievable

  - **R**elevant

  - **T**ime-bound

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2. Root Cause Analysis (RCA)

Definition: RCA is a problem-solving method to identify the underlying causes of a problem.

- ◆ **Popular Techniques:**

  - **5 Whys Analysis** – Repeatedly ask "Why?" to drill down to the root cause.

  - **Fishbone Diagram (Ishikawa)** – Categorize potential causes (e.g., People, Process, Machine, Material).

  - **Pareto Analysis** – Identify the 20% of causes leading to 80% of problems.

  - **Failure Mode and Effects Analysis (FMEA)** – Identify potential failure points and their effects.

- ◆ **RCA Workflow:**

  1. **Define the Problem**

  2. **Collect Data**

  3. **Identify Possible Causes**

  4. **Determine Root Cause(s)**

  5. **Implement Solutions**

  6. **Monitor Results**

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3. Descriptive and Diagnostic Analytics

- ◆ **Descriptive Analytics:**

Definition: Uses data aggregation and data mining to provide insights into the past.

- ◆ **Tools/Techniques:**

  - **Data Visualization** (e.g., Power BI, Tableau)

  - **Summary Statistics** (mean, median, mode, etc.)

  - **Trend Analysis**

- ◆ **Use Cases:**

  - Monthly sales reports

- Customer demographic analysis

- Website traffic summaries

◆ **Diagnostic Analytics:**

Definition: Focuses on understanding why something happened using drill-downs, data discovery, correlations.
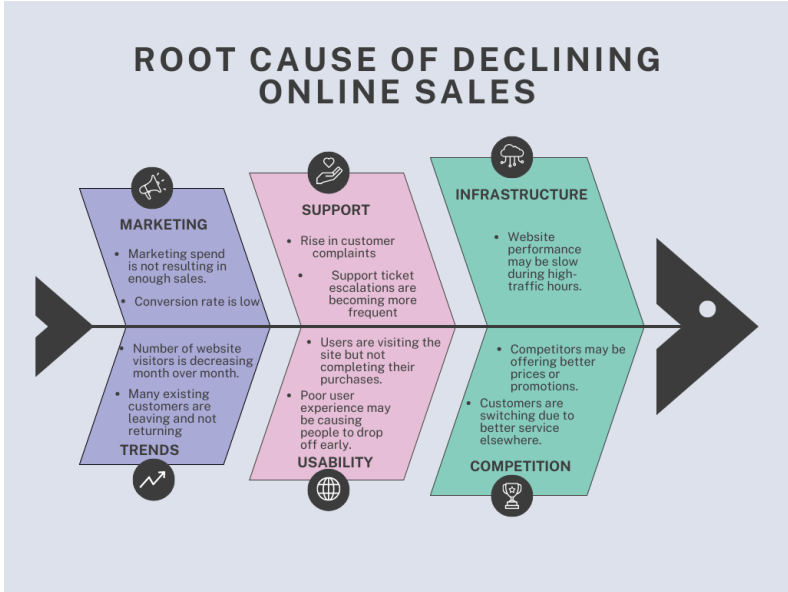
◆ **Tools/Techniques:**

- **Correlation Analysis**

- **Drill-Down Analysis**

- **Segmentation**

- **Comparative Analysis**

◆ **Use Cases:**

- Drop in sales in a region → Analyze customer feedback, competitor pricing

- Decrease in user retention → Segment by device type or onboarding funnel

Business Analytics Assignment

#	Assignment Title	Description & Hint
1	**Identify KPIs for E-commerce**	Determine key performance indicators like sales growth, conversion rate, customer acquisition cost, churn rate. Think SMART metrics. Ans: • Sales Growth (% increase in monthly sales) • Conversion Rate = Total_Sales / Visitors • Churn Rate = Customer_Churned / New_Customers • Customer Acquisition Cost = Marketing_Spend / New_Customers • Customer Satisfaction = (based on complaints or NPS)

2	**Design KPI Dashboard**	Create a visual dashboard (Excel/Power BI/Tableau) to monitor 4–5 KPIs. Include charts, trend lines, and filters.
3	**Root Cause Analysis with 5 Whys**	Choose a common issue (e.g., low sales), ask "Why?" five times to reach the root cause. Keep it logical and specific. Problem: Total_Sales dropped in June 1. Why? Conversion Rate dropped 2. Why? Visitors exited early 3. Why? Product page loading was slow 4. Why? Server was under maintenance 5. Why? No alert/backup server triggered Root Cause: Poor infrastructure alerting system
4	**Create a Fishbone (Ishikawa) Diagram**	Categorize possible causes into People, Process, Materials, Machines, Environment, Method. Use drawing tools or diagramming software. ROOT CAUSE OF DECLINING ONLINE SALES
5	**Perform Descriptive Analytics on Sales**	Use the `ecommerce_sales_data.csv` to calculate mean, median, mode, and standard deviation for `Total_Sales`.
6	**Visualize Sales Trend**	Use line charts to analyze how sales fluctuate across time . Look for seasonal dips or spikes.

7	**Conduct Diagnostic Drill Down**	Compare `Online_Sales` vs `Offline_Sales` over time, correlate dips with `Customer_Complaints` or `Marketing_Spend`.
8	**Evaluate KPIs for Effectiveness**	Assess if KPIs are vague or hard to measure. Refine them to follow SMART goals: Specific, Measurable, Achievable, Relevant, Time-bound. Weak KPIs (Not SMART): - "Increase sales" - "Improve marketing" - "Reduce churn" Improved SMART KPIs: - "Increase Total Sales by 15% in Q3 2024" - "Achieve a 5% conversion rate by December 2024" - "Reduce customer churn by 10% within the next 6 months" *All Created KPIs in this assignment are SMART.*
9	**Create a Pareto Chart of Issues**	Identify top contributors to customer complaints using bar + line combo (Pareto principle: 80/20 rule). - Custom column doesn't work
10	**Critique an Existing Dashboard**	Evaluate a sample dashboard or one you've created. Identify what works and what needs improving: clutter, lack of hierarchy, etc. Ans: The dashboard clearly shows key metrics like conversion rate, CAC, and churn rate. The use of slicers helps filter by product and region easily. The layout is logical and flows from KPIs to trends. Some visuals feel close together and could use more spacing. Adding better chart titles and making the most important metrics stand out would improve understanding.
11	**Conduct RCA on a Case Study**	Analyze a written business case to identify actual vs perceived causes of a problem. Focus on the *why*, not just *what*. In Quarter 3, total sales dropped noticeably. At the same time, customer complaints reached their highest level, and sales growth slowed down. Churn rate remained high, which means many customers stopped buying. There was no strong improvement in either online or offline sales. These signs suggest that the

		main cause of the sales drop was customer dissatisfaction, likely due to service or product issues during that period.
12	**Analyze Segment Performance**	Create visualizations comparing sales performance by region or product category. You may add mock columns to the dataset.
13	**Summarize HR Data in Excel or Python**	From `hr_data.csv`, calculate average tenure, attrition rate by department, and visualize using pie/bar charts.
14	**Design HR KPIs**	Create SMART KPIs like "Reduce attrition by 10% in 6 months" or "90% employee satisfaction rate". Include metrics like internal mobility. 1. "Reduce voluntary attrition by 10% in the Support department within the next 6 months." 2. "Achieve an average employee satisfaction score of 4.2 or higher by the end of Q4." 3. "Ensure that 30% of all open roles are filled through internal mobility by December 2024." 4. "Maintain average tenure above 4.5 years across all departments for the next 12 months." 5. "Reach a 50:50 gender ratio in the Sales department by the end of the fiscal year."
15	**Build a Diagnostic Flow Diagram**	Map a logical decision tree from symptoms (e.g., low revenue) to potential causes and investigation points.

16	**Perform Correlation Analysis**	Use Python to compute correlation between `Marketing_Spend` and `Total_Sales`. Visualize using scatter plot + regression line. - Python issue
17	**RCA on Support Tickets**	Use `support_tickets_data.csv` to identify patterns in increased escalations or resolution time. Look for correlations over time.
18	**Analyze Forecast vs Actual Revenue Drop**	Use hypothetical or real data to explain variance — e.g., unexpected market trends, customer churn, or marketing failures.
19	**Redesign Underperforming KPIs**	Take vague KPIs like "Improve service" and turn them into measurable targets like "Resolve 90% of tickets within 24 hours." • Resolve 90% of support tickets within 24 hours by Q4 2025 • Increase total sales by 15% over the next 3 months compared to Q2 • Reduce customer complaints in Region C by 20% before year-end • Bring down monthly attrition rate to below 5% across departments by Dec 2025 • Achieve an average employee satisfaction score of 8 or higher by Q4
20	**Tell a Data Story with Visuals**	Create a narrative (e.g., declining sales in Region A) backed by charts, tables, and diagnostic data insights. Focus on clarity and logic.

🔷 Widget A

In the **East**, Widget A saw the highest number of visitors (around 18,200) but also the **most complaints** at 145. Sales dropped sharply after Q2, likely due to poor service experience.

In the **North**, visitors were around 14,600 and complaints reached 92. Sales declined moderately, showing early signs of trouble.

In the **South**, visitor traffic was stable (16,400) and complaints were low at 61. Sales remained flat, so no serious issues appeared here.

In the **West**, visitors were high (about 19,100) but sales didn't grow. Complaints were moderate at 70, suggesting some engagement issues.

🔷 Widget B

In the **East**, Widget B had 15,700 visitors and 48 complaints. Sales were steady, showing no major concerns.

The **North** performed best with 17,300 visitors and just 40 complaints. Sales showed slight growth, indicating a healthy trend.

In the **South**, Widget B had 14,900 visitors and 36 complaints. Sales stayed neutral.

In the **West**, complaints increased to 58 despite stable traffic of 16,800. Sales declined slightly, which may signal service or satisfaction problems.

🔷 Widget C

The **East** had 17,800 visitors but complaints were high at 102. Sales fell even though traffic remained stable ,indicating conversion or product issues.

In the **North**, visitor count was around 16,200 with 69 complaints. Sales stayed flat, with no major improvements.

In the **South**, visitors dropped to 13,500 and complaints rose to 88. A noticeable sales decline followed a cut in marketing spend.

In the **West**, Widget C had high visitor traffic (18,600) but low conversions. Complaints were high at 95, suggesting frustration or unmet expectations.

Conclusion: How to Improve Each Widget

Widget A needs urgent support improvements in the East and marketing recovery in the North. Loyalty campaigns and faster resolution could boost retention.

Widget B is mostly stable, but the West region needs attention. Collecting customer feedback and improving response time can prevent decline.

Widget C is attracting visitors but not converting them. Optimizing the buying journey, fixing service issues, and relaunching targeted promotions can help increase sales.