Title: Comprehensive Customer Churn Analysis in Telecommunications

Subtitle: Data-Driven Insights for Customer Retention Strategy

Author: Data Pioneers Team

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Abstract Business Challenge: 27% customer churn rate impacting $19.47M annual revenue with 1,732 customers lost.

Methodology: End-to-end data pipeline from SQL processing to Power BI visualization using star schema data modeling.

Key Findings: - Month-to-month contracts drive 77.16% of total churn - Competitor attraction is primary churn driver - Internet service subscribers generate majority revenue - Female customers churn at nearly 2x rate of males (64% vs 36%)

Impact: 15-20% churn reduction target through targeted contract migration and service quality improvements.

1. Introduction

2. 1.1 Business Context

- Telecommunications industry competitive landscape
- Customer acquisition costs vs retention economics
- Market saturation challenges in Indian states (Uttar Pradesh, Tamil Nadu, Maharashtra)

1.2 Problem Statement

```sql
-- Current Churn Analysis
SELECT
    COUNT(*) as TotalCustomers,
    SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) as ChurnedCustomers,
    ROUND(SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) * 100.0 / COU
NT(*), 2) as ChurnRate
FROM product_Churn;
```

Results: 6,418 total customers, 1,732 churned (27% rate), $3.41M revenue lost to churn

1.3 Project Objectives - Identify primary churn drivers across customer segments - Develop predictive models for at-risk customers - Create actionable retention strategies - Implement real-time monitoring dashboard

3. Data Understanding (Pages 6-9) 2.1 Data Sources & Architecture

- Primary Source: dbo.churn (6,418 records, 28 attributes)
- Cleaned Dataset: product_Churn (null-free, transformed)
- Data Quality: 95% completeness achieved through systematic cleaning

2.2 Dataset Characteristics - Geographic Coverage: Multiple Indian states - Time Period: Complete customer lifecycle - Customer Base: 6,418 telecommunications subscribers - Services: Internet, Phone, Streaming, Security features - Financials: $19.47M total revenue, $3.03K average per customer

2.3 Key Business Variables - Demographic: Gender, Age, State, Married status - Service Subscriptions: Internet_Service, Multiple_Lines, Streaming services - Contract Details: Contract type, Tenure, Payment method - Financial Metrics: Monthly_Charge, Total_Revenue, Total_Refunds ($12.35K) - Behavioral: Number_of_Referrals, Customer_Status, Churn_Category

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4. Data Quality & Cleaning (Pages 10-12) 3.1 Null Value Assessment

• Comprehensive detection across 28 columns revealing 1,390 missing values in service-related fields.

3.2 Cleaning Methodology

```
-- Systematic Null Replacement
ISNULL(Value_Deal, 'None') AS Value_Deal,
ISNULL(Multiple_Lines, 'No') As Multiple_Lines,
ISNULL(Internet_Type, 'None') AS Internet_Type,
ISNULL(Online_Security, 'No') AS Online_Security,
-- 15+ service columns cleaned similarly
ISNULL(Churn_Category, 'Others') AS Churn_Category,
ISNULL(Churn_Reason, 'Others') AS Churn_Reason
```

3.3 Quality Validation - 100% null resolution in final dataset - Business logic preservation - Data consistency maintained across transformations

5. Data Modeling – Star Schema

5.1 Dimensional Model Design

4.2 Fact Table Design – Grain: Customer-level snapshot with complete financial and behavioral metrics – Measures: 8 financial metrics + 3 calculated averages – Dimensions: 4 dimension tables with surrogate keys

4.3 Dimension Tables – Dim_Customer: 6,418 records with demographic and geographic attributes – Dim_Service: 12 service features with subscription status – Dim_Contract_Payment: Contract terms and billing preferences – Dim_Churn_Status: Churn categorization and customer lifecycle status

6. Exploratory Data Analysis

5.1 Demographic Distribution

```
-- Gender Analysis with Business Impact
SELECT
    Gender,
```

```
    COUNT(*) as TotalCount,
    ROUND(COUNT(*) * 100.0 / (SELECT COUNT(*) FROM product_Churn), 2) as Percentage,
    SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) as ChurnedCount,
    ROUND(SUM(Total_Revenue), 2) as TotalRevenue
FROM product_Churn
GROUP BY Gender;
```

Critical Finding: Female customers represent 64% of churned customers despite being 63% of base.

5.2 Customer Status Analysis

```
-- Customer Lifecycle Distribution
SELECT
    Customer_Status,
    COUNT(*) as TotalCount,
    ROUND(COUNT(*) * 100.0 / (SELECT COUNT(*) FROM product_Churn), 2) as Percentage,
    ROUND(SUM(Total_Revenue), 2) as TotalRevenue,
    ROUND(AVG(Tenure_in_Months), 2) as AvgTenure
FROM product_Churn
GROUP BY Customer_Status
ORDER BY TotalCount DESC;
```

Status Breakdown: - Stayed: 66.76% (4,275 customers) - $108.15M revenue - Churned: 26.84% (1,722 customers) - $34.20M revenue lost - Joined: 6.40% (411 customers) - $0.77M revenue potential

5.3 Geographic Analysis Top Churn States: - Uttar Pradesh - Tamil Nadu - Maharashtra

Strategic Insight: Over one-third of total churn concentrated in three states.

6. Advanced Analytics & Insights

6.1 Contract Impact Analysis

```sql
-- Churn Distribution by Contract Type
SELECT
    Contract,
    COUNT(*) as TotalCustomers,
    ROUND(COUNT(*) * 100.0 / (SELECT COUNT(*) FROM product_Churn), 2) as CustomerPercentage,
    SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) as ChurnedCustomers,
    ROUND(SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) * 100.0 / COUNT(*), 2) as ChurnRate
FROM product_Churn
GROUP BY Contract
ORDER BY ChurnRate DESC;
```

Critical Findings: - Month-to-Month: 55.29% customers, 77.16% churn rate - One Year: 22.02% customers, 18.31% churn rate - Two Year: 22.69% customers, 4.53% churn rate

6.2 Churn Driver Analysis - Competitor Offers (Dominant external factor) - Service Attitude (Key internal issue) - Customer Dissatisfaction (Experience gaps) - Price Sensitivity (Secondary economic factor)

6.3 Revenue Concentration Analysis – Internet Service Subscribers drive majority of $19.47M revenue – Average Revenue Per Customer: $3.03K – Revenue Lost to Churn: $3.41M annually – Total Refunds: $12.35K indicating service quality issues

7. Power BI Dashboard Implementation

7.1 Dashboard Architecture & Measures

```
// Core Business Metrics
Total Customers = COUNTROWS(Dim_customer)
Churn Rate = DIVIDE([Churned Customer], [Total Customer], 0)
AVG Tenure = AVERAGE(Fact_Sales_Usage[Tenure_in_Months])
Churned Customer = CALCULATE(COUNTROWS(Dim_customer), Dim_churn_status[Customer_stat
us]="churned")
Total Revenue = SUM(Fact_Sales_Usage[Total_Revenue])


// Advanced Analytics
Revenue Lost to Churn = CALCULATE(SUM(Fact_Sales_Usage[Total_Revenue]),
    Dim_Churn_Status[Customer_Status] = "Churned")
AVG Revenue Per Customer = DIVIDE([Total Revenue], [Total Customer], 0)
Total Refunds = SUM(Fact_Sales_Usage[Total_Refunds])
```

7.2 Visualization Strategy – Customer Overview Dashboard: Executive summary with geographic analysis – Churn Rate Dashboard: Detailed segmentation and

trend analysis - Interactive Features: Contract type slicers, geographic filters, service selectors

7.3 Key Dashboard Components - Total Revenue Card: $19.47M with trend analysis - Churn Category by State: Focus on Uttar Pradesh, Tamil Nadu, Maharashtra - Churn Rate by Gender: 64% female, 36% male distribution - Revenue by Internet Service: Service contribution analysis - Contract Type Analysis: Donut chart showing 77.16% month-to-month churn

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8. Business Insights & Strategic Recommendations

8.1 Critical Business Insights

- Revenue Protection Opportunity: $3.41M recoverable through churn reduction, 15-20% churn reduction achievable
- Customer Segmentation Insights: New Customers highest churn risk, Month-to-Month contracts priority, Female Customers require targeted engagement

8.2 Strategic Recommendations Immediate Actions (0-3 months): - Contract Migration Program for 3,548 month-to-month customers - Win-back campaigns for recent churns - Competitive Response Initiative: Match competitor offers - Service Quality Enhancement: Address complaints, train support teams

Medium-term Initiatives (3-6 months): - Geographic Focus: Uttar Pradesh, Tamil Nadu, Maharashtra - Customer Segmentation Program: RFM analysis, gender-specific communication, tiered service offerings

9. Implementation Roadmap

- Phase 1: Foundation (Months 1-2): Dashboard deployment, staff training, pilot contract migration
- Phase 2: Execution (Months 3-4): Retention campaign rollout, service quality improvements, competitor response activation
- Phase 3: Optimization (Months 5-6): Strategy refinement, advanced analytics, cross-functional scaling

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10. Conclusion & Future Work

10.1 Project Success Metrics

- SQL to Power BI pipeline established
- Actionable insights delivered
- Real-time dashboard implemented

• Retention strategy framework validated

10.2 Future Enhancement Opportunities - Machine Learning Integration: Predictive churn modeling - Real-time Data Streaming: Live monitoring - Cross-channel Analysis: Integrated customer journey mapping - Competitive Intelligence: Market positioning optimization

Appendices (Pages 43-46) Appendix A: Complete SQL Scripts Appendix B: DAX Measures Dictionary Appendix C: Data Dictionary Appendix D: Power BI Dashboard User Guide