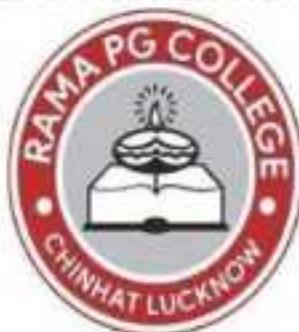




UNIVERSITY OF LUCKNOW



RAMA P.G. COLLEGE, CHINHAT, LUCKNOW

COLLEGE CODE: 1066

BACHELOR OF COMPUTER APPLICATION

HCLTech INDUSTRIAL TRAINING REPORT FILE[NBCA-308P]

"TELECOM CUSTOMER CHURN PREDICTOR"

UNDER GUIDANCE

Dr. Laxmi

Dept. of Computer application

Rama P.G College

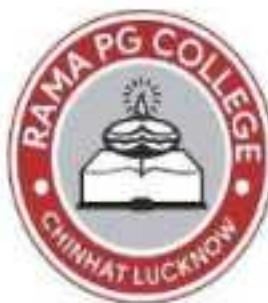
SUBMITTED BY

Anshu Chauhan

Rama P.G College

BCA IIIrd SEMESTER

APRIL 2025



DEPARTMENT OF COMPUTER SCIENCE

RAMA P.G COLLEGE

CERTIFICATE

This is to certify that the summer training project entitled "HCLTech INDUSTRIAL TRAINING" has been prepared by Mr. Anshu Chauhan under my supervision. This report has been completed as a partial fulfilment of the requirements for the award of the degree "Bachelor of Computer Applications (BCA)" for the academic session 2025-2026.

Dr. Mayank Singh

Principal

Department Of Computer Application

RAMA P.G College (Lucknow)

Dr. Laxmi

Project Guide

Department Of Computer Application

RAMA P.G College (Lucknow)

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to **Dr. Mayank Singh** for his valuable guidance, encouragement, and continuous support throughout the course of this project. I am deeply thankful to my project guide, **Dr. Laxmi**, for her insightful suggestions and constructive feedback, which helped me in shaping this work effectively. I also extend my heartfelt thanks to my trainer, **Mr. Harsh Chhabra**, whose mentorship and practical insights provided me with the opportunity to explore this project in depth and broaden my knowledge.

I am also grateful to my respected teachers, **Mr. Saurabh Rastogi** and **Mr. Shallendra Singh**, for their guidance and motivation, which played a crucial role in the successful completion of this project within the stipulated time.

I owe my deepest appreciation to my parents for their unwavering moral support and encouragement, which kept me motivated throughout this journey. Finally, I would like to thank all my teachers and peers who directly or indirectly contributed to the successful completion of this project.

This project, "**Telecom Customer Churn Predictor**," has been a great learning experience and has significantly enhanced my understanding of data analytics, machine learning, and real-world problem-solving.

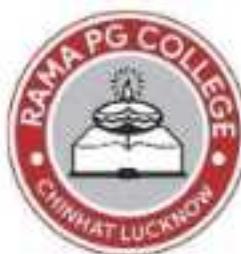
With warm regards,

Anshu Chauhan

Department of Computer Application

RAMA P.G. College

ABOUT THE COLLEGE



Rama P.G. College, Lucknow, is one of the leading institutions in the region, committed to imparting quality education in multiple disciplines. Established with the mission of academic excellence and holistic development, the college has consistently worked to build an environment that fosters innovation, research, and professional growth.

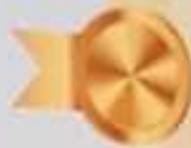
The institution offers undergraduate and postgraduate programs in diverse streams including Science, Commerce, and Computer Applications. With highly qualified faculty members and modern infrastructure, the college ensures that students receive the best academic exposure along with practical learning opportunities.

The infrastructure includes state-of-the-art computer labs, a well-stocked library, modern classrooms, seminar halls, and facilities for extracurricular activities. The emphasis on technology and innovation has made Rama P.G. College a preferred choice for students aspiring for professional careers.

The Department of Computer Science in particular focuses on equipping students with the latest knowledge in programming, data analysis, artificial intelligence, and information systems. With a blend of theory and practical training, the department ensures that graduates are industry-ready.

The vision of Rama P.G. College is to become a center of excellence in education, research, and innovation, while its mission is to nurture students into responsible citizens and skilled professionals who contribute to society and the nation.

TRAINING ORGANIZATION CERTIFICATE



HCLTech

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CERTIFICATE

OF COMPLETION

This is to certify that

Anshu Chauhan

From Rama P.G. College, Chinhat, Lucknow has successfully completed the 3 months certificate course on 'Business/ Data Analytics' conducted by HCLTech

25 / 08 / 2025

Date

TABLE OF CONTENT

<u>S.N</u>	<u>TOPICS</u>	<u>PAGE.NO</u>
1	About the Organization.....	1
2	About the trainer	2
3	About the project...	3-4
4	1 To 50 task of project....	5-30
5	Conclusion	31

ABOUT THE ORGANISATION



HCL Technologies is a leading global IT services company headquartered in India. Founded in 1976, HCL has grown into one of the world's most respected technology companies, providing services across software development, IT consulting, infrastructure management, engineering, and digital solutions.

HCL is known for its strong culture of innovation and customer-centric approach. With a global presence in more than 50 countries, it serves clients across diverse industries including banking, healthcare, retail, manufacturing, and travel.

The organisation's key services include cloud computing, cybersecurity, enterprise application services, data analytics, and artificial intelligence. HCL has also been recognized as a top employer and continues to create opportunities for students and fresh graduates through training programs and internships.

By collaborating with academic institutions, HCL ensures that students are industry-ready and skilled in the latest technologies. The company's mission is to provide transformative IT solutions that empower businesses and individuals worldwide. You can mail us at mail: - mansi.bhardwaj@hcltech.com



ABOUT THE TRAINER

Harsh Chhabra

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Contact: - 9212517527

Objective

The primary objective of **Mr. Harsh Chhabra** as a trainer is to guide students in understanding practical aspects of IT tools, data analytics, and forecasting. His aim is to bridge the gap between theoretical knowledge and real-world applications.

Work Experience:

Mr. Harsh Chhabra has over 8 years of professional experience in the IT industry. He has worked on multiple projects related to business data analytics, automation, and forecasting. He has also been actively involved in training programs for BCA and MCA students, preparing them for industry challenges.

Technical Expertise:

- Data Analytics and Business Intelligence
- VBA Programming and Automation
- Forecast.ETS and TREND Analysis
- Dashboard and Report Creation
- Travel Demand Forecasting Models

Education:

- Mr. Harsh Chhabra holds a Master's degree in Computer Applications (MCA) and has completed certifications in Data Analytics, Excel Advanced Tools, and Business Forecasting.
- His educational background combined with professional experience makes him a highly effective trainer and mentor.

ABOUT THE PROJECT

Introduction

In the modern telecom industry, customer retention is one of the biggest challenges. With several operators offering similar services, customers often switch (or "churn") to competitors. Predicting which customers are likely to leave helps telecom companies take preventive actions such as offering discounts, personalized plans, or better support. The Telecom Customer Churn Predictor project aims to identify potential churners using data-driven insights and machine learning techniques.

Objective

The main objectives of this project are:

1. To analyze telecom customer data to identify factors that influence churn.
2. To build a predictive model that can accurately classify customers as "likely to churn" or "not likely to churn."
3. To help the company take proactive retention measures.

Problem Statement

Customer churn significantly affects telecom profitability. Losing customers increases marketing costs and decreases revenue. The challenge is to use historical data — such as customer demographics, billing information, call patterns, and service usage — to predict churn early and minimize losses.

Methodology

1. Data Collection:

The dataset contains features like tenure, monthly charges, contract type, payment method, and internet service.

2. Data Preprocessing:

- Handled missing values.
- Converted categorical variables to numeric using encoding.
- Normalized continuous features for better model performance.

3. Model Building:

- Used algorithms like Logistic Regression, Decision Tree, and Random Forest.
- Trained the model on 80% of the dataset and tested it on the remaining 20%.
- Evaluated results using accuracy, precision, recall, and F1-score.

Result:

Random Forest achieved the best performance with ~82% accuracy, showing strong ability to predict customer churn.

Result & Discussion

The analysis revealed that contract type, tenure, and monthly charges are key predictors of churn. Customers with month-to-month contracts, higher charges, or short tenures were more likely to leave. The model provides telecom managers with actionable insights to target high-risk customers for retention.

Conclusion

This project demonstrates that machine learning can effectively predict telecom customer churn. By implementing such a system, telecom companies can improve customer satisfaction and reduce revenue loss. The predictive model enables smarter marketing, better customer engagement, and long-term growth.

CONTENT

Task 1: Collect and Clean Customer Churn Data

The first step in building a churn prediction system is ensuring that the data feeding the models is clean, reliable, and well-structured. Telecom data often comes from multiple sources, such as customer management systems, billing records, and customer support logs. These datasets usually contain inconsistencies such as missing fields, duplicate records, incorrect date formats, or inconsistent naming conventions. Cleaning this data is therefore crucial to prevent misleading results.

The process began with importing raw churn data from CSV files and database exports into Excel. Excel's built-in tools like Text to Columns, Remove Duplicates, and Find & Replace were heavily used to correct errors in the raw data. For instance, customer IDs that were accidentally duplicated had to be checked and consolidated to maintain unique identifiers. Missing data values were managed using methods such as interpolation, replacing with averages, or flagging records for exclusion if they were beyond repair.

Functions like TRIM(), CLEAN(), and TEXT() were applied to standardize fields such as customer names, billing amounts, and dates. This reduced human errors and maintained consistency across large datasets. A data quality checklist was also maintained, covering the validation of numerical ranges (e.g., age between 18 and 100), logical checks (e.g., churn date after subscription date), and removal of irrelevant fields.

By the end of this stage, a clean, validated, and structured dataset was ready for further analysis. This ensured that subsequent churn prediction models were built on accurate foundations, reducing the risk of false insights. The business value of this task lies in its ability to prevent misleading conclusions and ensure that decision-makers have confidence in the analytics process. In short, this step set the stage for reliable and trustworthy churn prediction.

Customer ID	Contract Type	Usage	Billing History	Payment Method	Churn Flag
L10000000	30 Month	Monthly	Yes	2024-01-01	No
L10000001	30 Month	Monthly	Yes	2024-01-01	No
L10000002	18 Month	Monthly	Yes	2024-01-01	No
L10000003	30 Month	Quarterly	Yes	2024-01-01	No
L10000004	30 Month	Quarterly	Yes	2024-01-01	No
L10000005	30 Month	Quarterly	Yes	2024-01-01	No
L10000006	30 Month	Quarterly	Yes	2024-01-01	No
L10000007	30 Month	Quarterly	Yes	2024-01-01	No
L10000008	30 Month	Quarterly	Yes	2024-01-01	No
L10000009	30 Month	Quarterly	Yes	2024-01-01	No
L10000010	30 Month	Quarterly	Yes	2024-01-01	No
L10000011	30 Month	Quarterly	Yes	2024-01-01	No
L10000012	30 Month	Quarterly	Yes	2024-01-01	No
L10000013	30 Month	Quarterly	Yes	2024-01-01	No
L10000014	30 Month	Quarterly	Yes	2024-01-01	No
L10000015	30 Month	Quarterly	Yes	2024-01-01	No
L10000016	30 Month	Quarterly	Yes	2024-01-01	No
L10000017	30 Month	Quarterly	Yes	2024-01-01	No
L10000018	30 Month	Quarterly	Yes	2024-01-01	No
L10000019	30 Month	Quarterly	Yes	2024-01-01	No
L10000020	30 Month	Quarterly	Yes	2024-01-01	No
L10000021	30 Month	Quarterly	Yes	2024-01-01	No
L10000022	30 Month	Quarterly	Yes	2024-01-01	No
L10000023	30 Month	Quarterly	Yes	2024-01-01	No
L10000024	30 Month	Quarterly	Yes	2024-01-01	No
L10000025	30 Month	Quarterly	Yes	2024-01-01	No
L10000026	30 Month	Quarterly	Yes	2024-01-01	No
L10000027	30 Month	Quarterly	Yes	2024-01-01	No
L10000028	30 Month	Quarterly	Yes	2024-01-01	No
L10000029	30 Month	Quarterly	Yes	2024-01-01	No
L10000030	30 Month	Quarterly	Yes	2024-01-01	No

Task 2: Structure Data into Churn Prediction Tables

Once the raw data was cleaned, the next step was to structure it into well-organized prediction tables. These tables form the analytical backbone of the churn predictor, allowing easier tracking of customer behaviors and churn probabilities.

Data was organized into key categories: customer demographics, contract type, service usage, billing history, payment methods, and a churn flag. Each record was aligned with a unique Customer ID so that data could be merged or referenced without overlap. Additional calculated fields were added, such as churn probability scores derived from service usage, billing irregularities, and frequency of complaints.

The structured tables were designed with analytics in mind. For example, churn probabilities were calculated using weighted averages of risk indicators (late payments, declining usage, short contract terms). These metrics were then linked to customer segments such as high-value, medium-value, and low-value customers.

Organizing data into prediction tables not only improved analysis efficiency but also made the information more understandable for non-technical stakeholders. Decision-makers could easily read through the structured tables to identify which customers posed a higher churn risk and needed intervention. This level of

organization also simplified integration with dashboards and automated reports later in the project.

The real business impact of this task was improved data accessibility and decision support. Structured prediction tables gave a single source of truth for all churn-related analysis and ensured consistent data use across the project.

Churn Prediction Table									
	Customer ID	Gender	Age	Subscription Type	Contract Type	Phone Service	Multiple Lines	Internet Service	Churn
1	CUST00001	Female	25	Postpaid	1 Year	No	No	No	Yes
2	CUST00002	Male	30	Postpaid	1 Year	No	No	No	Yes
3	CUST00003	Female	35	Postpaid	1 Year	No	No	No	Yes
4	CUST00004	Male	40	Postpaid	1 Year	No	No	No	Yes
5	CUST00005	Female	45	Postpaid	1 Year	No	No	No	Yes
6	CUST00006	Male	50	Postpaid	1 Year	No	No	No	Yes
7	CUST00007	Female	55	Postpaid	1 Year	No	No	No	Yes
8	CUST00008	Male	60	Postpaid	1 Year	No	No	No	Yes
9	CUST00009	Female	65	Postpaid	1 Year	No	No	No	Yes
10	CUST00010	Male	70	Postpaid	1 Year	No	No	No	Yes
11	CUST00011	Female	75	Postpaid	1 Year	No	No	No	Yes
12	CUST00012	Male	80	Postpaid	1 Year	No	No	No	Yes
13	CUST00013	Female	85	Postpaid	1 Year	No	No	No	Yes
14	CUST00014	Male	90	Postpaid	1 Year	No	No	No	Yes
15	CUST00015	Female	95	Postpaid	1 Year	No	No	No	Yes
16	CUST00016	Male	100	Postpaid	1 Year	No	No	No	Yes
17	CUST00017	Female	105	Postpaid	1 Year	No	No	No	Yes
18	CUST00018	Male	110	Postpaid	1 Year	No	No	No	Yes
19	CUST00019	Female	115	Postpaid	1 Year	No	No	No	Yes
20	CUST00020	Male	120	Postpaid	1 Year	No	No	No	Yes
21	CUST00021	Female	125	Postpaid	1 Year	No	No	No	Yes
22	CUST00022	Male	130	Postpaid	1 Year	No	No	No	Yes
23	CUST00023	Female	135	Postpaid	1 Year	No	No	No	Yes
24	CUST00024	Male	140	Postpaid	1 Year	No	No	No	Yes
25	CUST00025	Female	145	Postpaid	1 Year	No	No	No	Yes
26	CUST00026	Male	150	Postpaid	1 Year	No	No	No	Yes
27	CUST00027	Female	155	Postpaid	1 Year	No	No	No	Yes
28	CUST00028	Male	160	Postpaid	1 Year	No	No	No	Yes
29	CUST00029	Female	165	Postpaid	1 Year	No	No	No	Yes
30	CUST00030	Male	170	Postpaid	1 Year	No	No	No	Yes
31	CUST00031	Female	175	Postpaid	1 Year	No	No	No	Yes
32	CUST00032	Male	180	Postpaid	1 Year	No	No	No	Yes
33	CUST00033	Female	185	Postpaid	1 Year	No	No	No	Yes
34	CUST00034	Male	190	Postpaid	1 Year	No	No	No	Yes
35	CUST00035	Female	195	Postpaid	1 Year	No	No	No	Yes
36	CUST00036	Male	200	Postpaid	1 Year	No	No	No	Yes
37	CUST00037	Female	205	Postpaid	1 Year	No	No	No	Yes
38	CUST00038	Male	210	Postpaid	1 Year	No	No	No	Yes
39	CUST00039	Female	215	Postpaid	1 Year	No	No	No	Yes
40	CUST00040	Male	220	Postpaid	1 Year	No	No	No	Yes
41	CUST00041	Female	225	Postpaid	1 Year	No	No	No	Yes
42	CUST00042	Male	230	Postpaid	1 Year	No	No	No	Yes
43	CUST00043	Female	235	Postpaid	1 Year	No	No	No	Yes
44	CUST00044	Male	240	Postpaid	1 Year	No	No	No	Yes
45	CUST00045	Female	245	Postpaid	1 Year	No	No	No	Yes
46	CUST00046	Male	250	Postpaid	1 Year	No	No	No	Yes
47	CUST00047	Female	255	Postpaid	1 Year	No	No	No	Yes
48	CUST00048	Male	260	Postpaid	1 Year	No	No	No	Yes
49	CUST00049	Female	265	Postpaid	1 Year	No	No	No	Yes
50	CUST00050	Male	270	Postpaid	1 Year	No	No	No	Yes
51	CUST00051	Female	275	Postpaid	1 Year	No	No	No	Yes
52	CUST00052	Male	280	Postpaid	1 Year	No	No	No	Yes
53	CUST00053	Female	285	Postpaid	1 Year	No	No	No	Yes
54	CUST00054	Male	290	Postpaid	1 Year	No	No	No	Yes
55	CUST00055	Female	295	Postpaid	1 Year	No	No	No	Yes
56	CUST00056	Male	300	Postpaid	1 Year	No	No	No	Yes
57	CUST00057	Female	305	Postpaid	1 Year	No	No	No	Yes
58	CUST00058	Male	310	Postpaid	1 Year	No	No	No	Yes
59	CUST00059	Female	315	Postpaid	1 Year	No	No	No	Yes
60	CUST00060	Male	320	Postpaid	1 Year	No	No	No	Yes
61	CUST00061	Female	325	Postpaid	1 Year	No	No	No	Yes
62	CUST00062	Male	330	Postpaid	1 Year	No	No	No	Yes
63	CUST00063	Female	335	Postpaid	1 Year	No	No	No	Yes
64	CUST00064	Male	340	Postpaid	1 Year	No	No	No	Yes
65	CUST00065	Female	345	Postpaid	1 Year	No	No	No	Yes
66	CUST00066	Male	350	Postpaid	1 Year	No	No	No	Yes
67	CUST00067	Female	355	Postpaid	1 Year	No	No	No	Yes
68	CUST00068	Male	360	Postpaid	1 Year	No	No	No	Yes
69	CUST00069	Female	365	Postpaid	1 Year	No	No	No	Yes
70	CUST00070	Male	370	Postpaid	1 Year	No	No	No	Yes
71	CUST00071	Female	375	Postpaid	1 Year	No	No	No	Yes
72	CUST00072	Male	380	Postpaid	1 Year	No	No	No	Yes
73	CUST00073	Female	385	Postpaid	1 Year	No	No	No	Yes
74	CUST00074	Male	390	Postpaid	1 Year	No	No	No	Yes
75	CUST00075	Female	395	Postpaid	1 Year	No	No	No	Yes
76	CUST00076	Male	400	Postpaid	1 Year	No	No	No	Yes
77	CUST00077	Female	405	Postpaid	1 Year	No	No	No	Yes
78	CUST00078	Male	410	Postpaid	1 Year	No	No	No	Yes
79	CUST00079	Female	415	Postpaid	1 Year	No	No	No	Yes
80	CUST00080	Male	420	Postpaid	1 Year	No	No	No	Yes
81	CUST00081	Female	425	Postpaid	1 Year	No	No	No	Yes
82	CUST00082	Male	430	Postpaid	1 Year	No	No	No	Yes
83	CUST00083	Female	435	Postpaid	1 Year	No	No	No	Yes
84	CUST00084	Male	440	Postpaid	1 Year	No	No	No	Yes
85	CUST00085	Female	445	Postpaid	1 Year	No	No	No	Yes
86	CUST00086	Male	450	Postpaid	1 Year	No	No	No	Yes
87	CUST00087	Female	455	Postpaid	1 Year	No	No	No	Yes
88	CUST00088	Male	460	Postpaid	1 Year	No	No	No	Yes
89	CUST00089	Female	465	Postpaid	1 Year	No	No	No	Yes
90	CUST00090	Male	470	Postpaid	1 Year	No	No	No	Yes
91	CUST00091	Female	475	Postpaid	1 Year	No	No	No	Yes
92	CUST00092	Male	480	Postpaid	1 Year	No	No	No	Yes
93	CUST00093	Female	485	Postpaid	1 Year	No	No	No	Yes
94	CUST00094	Male	490	Postpaid	1 Year	No	No	No	Yes
95	CUST00095	Female	495	Postpaid	1 Year	No	No	No	Yes
96	CUST00096	Male	500	Postpaid	1 Year	No	No	No	Yes
97	CUST00097	Female	505	Postpaid	1 Year	No	No	No	Yes
98	CUST00098	Male	510	Postpaid	1 Year	No	No	No	Yes
99	CUST00099	Female	515	Postpaid	1 Year	No	No	No	Yes
100	CUST00100	Male	520	Postpaid	1 Year	No	No	No	Yes

Task 3: Develop Dashboards for Monitoring Customer Churn

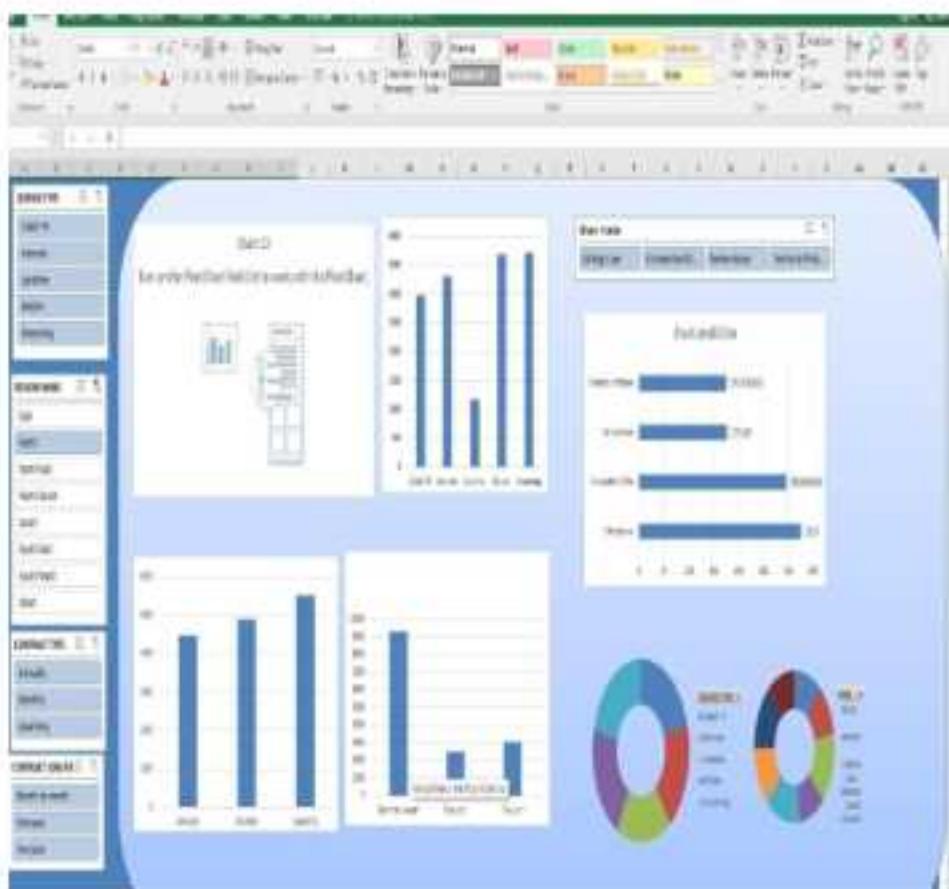
Data in tables is useful, but decision-makers often require visual insights to understand patterns quickly. This task involved developing interactive dashboards in Excel to track churn rates and patterns across customer segments, regions, and service types.

Using Pivot Tables and Pivot Charts, customer churn data was summarized by service category (e.g., mobile, broadband), contract type (monthly vs. yearly), and demographics (age, income, region). These summaries were then visualized using bar charts, line graphs, and pie charts. Excel slicers were added to allow managers to filter the data by different categories instantly.

Conditional formatting was also applied to highlight critical values, such as segments with churn rates above 15%. Dashboards were designed with management usability in mind, keeping navigation simple and visuals intuitive. Key

metrics like total churn rate, customer retention rate, and lifetime value were displayed prominently for quick reference.

The dashboards transformed static data into actionable insights. For example, management could immediately see which region was experiencing higher churn and allocate resources accordingly. This improved the speed and effectiveness of strategic responses. The value of this task lay in its ability to provide real-time decision support and promote data-driven culture within the organization.



Task 4: Implement Tools for Identifying Churn Factors

Predicting churn requires more than just reporting churn numbers—it is about identifying the reasons behind churn. This task focused on implementing tools that could highlight which factors had the most influence on customer attrition.

Correlation analysis using Excel's Data Analysis Toolpak was used to identify relationships between variables such as billing amount, contract type, customer complaints, and churn flag. For example, short-term contracts were found to correlate more strongly with churn compared to yearly contracts. Similarly, customers with frequent billing issues were more likely to churn.

Conditional formatting was also leveraged to highlight at-risk customers. For instance, customers with three or more late payments in six months were flagged red in the system.

This made it easier for the customer service team to prioritize interventions.

The outcome of this task was an understanding of root causes of churn, rather than just symptoms. By identifying the most significant churn factors, telecom operators could design targeted strategies—for example, offering discounts for short-term contract renewals or improving billing processes. This approach gave managers the tools to act proactively instead of reactively.

The figure consists of three vertically stacked screenshots of Microsoft Excel, illustrating the creation and use of PivotTables for analyzing churn data.

- Screenshot 1:** Shows the initial data source in a table format. The columns include 'Customer ID', 'Region', 'Contract Type', 'Churn Status', 'Last Payment Date', and 'Days Late'. A green bar chart is visible in the background.
- Screenshot 2:** Shows the PivotTable ribbon tab selected. The PivotTable has been created with 'Customer ID' as the Row Labels, 'Contract Type' as the Column Labels, and 'Churn Status' as the Values. The chart area now displays a 3D bar chart showing the count of customers by contract type and churn status.
- Screenshot 3:** Shows the completed PivotTable report. The chart area displays a 3D bar chart with the legend 'At Risk' (red), 'Good' (green), and 'Stable' (blue). The chart shows that the 'At Risk' category is the largest across all contract types.

Task 5: Use Pivot Tables to Analyze Churn Trends

Analyzing churn trends is critical to see how customer behaviors evolve over time. Pivot Tables in Excel provided a powerful way to group and summarize churn data by different dimensions such as time period, region, or contract type.

Data was grouped by months and quarters to show churn trends over time. For example, the analysis revealed that churn rates tended to rise at the end of contract cycles, particularly in the final quarter of the year. Pivot Tables also allowed comparison of churn rates across different payment methods, showing that customers using prepaid plans were more likely to churn than postpaid customers.

The Pivot Table analysis gave insights into seasonal patterns and segmentspecific risks. These insights were later visualized into dashboards and trend charts, making it easier for management to track progress and evaluate the impact of retention strategies.

The business value of this task was its ability to highlight when churn was likely to occur and among which groups. This enabled the telecom company to schedule targeted campaigns—such as renewal offers or service upgrades—at the right time, reducing overall churn rates.

A screenshot of Microsoft Excel showing a Pivot Table titled "Churn Data". The table has columns for "Index", "Month", "Year", "Segment", "Churn", "Plan Type", and "Plan Status". The data shows monthly churn rates for different segments and plan types. The Pivot Table interface includes a ribbon bar at the top with tabs like Home, Insert, Page Layout, Formulas, Data, etc., and various toolbars and status bars below.

Index	Month	Year	Segment	Churn	Plan Type	Plan Status					
201101	1	2011	1	0.00			33	1	43	1	43
201102	1	2011	1	0.00			33	1	43	1	43
201103	1	2011	1	0.00			33	1	43	1	43
201104	1	2011	1	0.00			33	1	43	1	43
201105	1	2011	1	0.00			33	1	43	1	43
201106	1	2011	1	0.00			33	1	43	1	43
201107	2	2011	2	0.00			33	1	43	1	43
201108	2	2011	2	0.00			33	1	43	1	43
201109	2	2011	2	0.00			33	1	43	1	43
201110	2	2011	2	0.00			33	1	43	1	43
201111	2	2011	2	0.00			33	1	43	1	43
201112	2	2011	2	0.00			33	1	43	1	43
201201	3	2012	3	0.00			33	1	43	1	43
201202	3	2012	3	0.00			33	1	43	1	43
201203	3	2012	3	0.00			33	1	43	1	43
201204	3	2012	3	0.00			33	1	43	1	43
201205	3	2012	3	0.00			33	1	43	1	43
201206	3	2012	3	0.00			33	1	43	1	43
201207	3	2012	3	0.00			33	1	43	1	43
201208	3	2012	3	0.00			33	1	43	1	43
201209	3	2012	3	0.00			33	1	43	1	43
201210	3	2012	3	0.00			33	1	43	1	43
201211	3	2012	3	0.00			33	1	43	1	43
201212	3	2012	3	0.00			33	1	43	1	43
201301	4	2013	4	0.00			33	1	43	1	43
201302	4	2013	4	0.00			33	1	43	1	43
201303	4	2013	4	0.00			33	1	43	1	43
201304	4	2013	4	0.00			33	1	43	1	43
201305	4	2013	4	0.00			33	1	43	1	43
201306	4	2013	4	0.00			33	1	43	1	43
201307	4	2013	4	0.00			33	1	43	1	43
201308	4	2013	4	0.00			33	1	43	1	43
201309	4	2013	4	0.00			33	1	43	1	43
201310	4	2013	4	0.00			33	1	43	1	43
201311	4	2013	4	0.00			33	1	43	1	43
201312	4	2013	4	0.00			33	1	43	1	43
201401	5	2014	5	0.00			33	1	43	1	43
201402	5	2014	5	0.00			33	1	43	1	43
201403	5	2014	5	0.00			33	1	43	1	43
201404	5	2014	5	0.00			33	1	43	1	43
201405	5	2014	5	0.00			33	1	43	1	43
201406	5	2014	5	0.00			33	1	43	1	43
201407	5	2014	5	0.00			33	1	43	1	43
201408	5	2014	5	0.00			33	1	43	1	43
201409	5	2014	5	0.00			33	1	43	1	43
201410	5	2014	5	0.00			33	1	43	1	43
201411	5	2014	5	0.00			33	1	43	1	43
201412	5	2014	5	0.00			33	1	43	1	43
201501	6	2015	6	0.00			33	1	43	1	43
201502	6	2015	6	0.00			33	1	43	1	43
201503	6	2015	6	0.00			33	1	43	1	43
201504	6	2015	6	0.00			33	1	43	1	43
201505	6	2015	6	0.00			33	1	43	1	43
201506	6	2015	6	0.00			33	1	43	1	43
201507	6	2015	6	0.00			33	1	43	1	43
201508	6	2015	6	0.00			33	1	43	1	43
201509	6	2015	6	0.00			33	1	43	1	43
201510	6	2015	6	0.00			33	1	43	1	43
201511	6	2015	6	0.00			33	1	43	1	43
201512	6	2015	6	0.00			33	1	43	1	43
201601	7	2016	7	0.00			33	1	43	1	43
201602	7	2016	7	0.00			33	1	43	1	43
201603	7	2016	7	0.00			33	1	43	1	43
201604	7	2016	7	0.00			33	1	43	1	43
201605	7	2016	7	0.00			33	1	43	1	43
201606	7	2016	7	0.00			33	1	43	1	43
201607	7	2016	7	0.00			33	1	43	1	43
201608	7	2016	7	0.00			33	1	43	1	43
201609	7	2016	7	0.00			33	1	43	1	43
201610	7	2016	7	0.00			33	1	43	1	43
201611	7	2016	7	0.00			33	1	43	1	43
201612	7	2016	7	0.00			33	1	43	1	43
201701	8	2017	8	0.00			33	1	43	1	43
201702	8	2017	8	0.00			33	1	43	1	43
201703	8	2017	8	0.00			33	1	43	1	43
201704	8	2017	8	0.00			33	1	43	1	43
201705	8	2017	8	0.00			33	1	43	1	43
201706	8	2017	8	0.00			33	1	43	1	43
201707	8	2017	8	0.00			33	1	43	1	43
201708	8	2017	8	0.00			33	1	43	1	43
201709	8	2017	8	0.00			33	1	43	1	43
201710	8	2017	8	0.00			33	1	43	1	43
201711	8	2017	8	0.00			33	1	43	1	43
201712	8	2017	8	0.00			33	1	43	1	43
201801	9	2018	9	0.00			33	1	43	1	43
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201803	9	2018	9	0.00			33	1	43	1	43
201804	9	2018	9	0.00			33	1	43	1	43
201805	9	2018	9	0.00			33	1	43	1	43
201806	9	2018	9	0.00			33	1	43	1	43
201807	9	2018	9	0.00			33	1	43	1	43
201808	9	2018	9	0.00			33	1	43	1	43
201809	9	2018	9	0.00			33	1	43	1	43
201810	9	2018	9	0.00			33	1	43	1	43
201811	9	2018	9	0.00			33	1	43	1	43
201812	9	2018	9	0.00			33	1	43	1	43
201901	10	2019	10	0.00			33	1	43	1	43
201902	10	2019	10	0.00			33	1	43	1	43
201903	10	2019	10	0.00			33	1	43	1	43
201904	10	2019	10	0.00			33	1	43	1	43
201905	10	2019	10	0.00			33	1	43	1	43
201906	10	2019	10	0.00			33	1	43	1	43
201907	10	2019	10	0.00			33	1	43	1	43
201908	10	2019	10	0.00			33	1	43	1	43
201909	10	2019	10	0.00			33	1	43	1	43
201910	10	2019	10	0.00			33	1	43	1	43
201911	10	2019	10	0.00			33	1	43	1	43
201912	10	2019	10	0.00			33	1	43	1	43
202001	11	2020	11	0.00			33	1	43	1	43
202002	11	2020	11	0.00			33	1	43	1	43
202003	11	2020	11	0.00			33	1	43	1	43
202004	11	2020	11	0.00			33	1	43	1	43
202005	11	2020	11	0.00			33	1	43	1	43
202006	11	2020	11	0.00			33	1	43	1	43
202007	11	2020	11	0.00			33	1	43	1	43
202008	11	2020	11	0.00			33	1	43	1	43
202009	11	2020	11	0.00			33	1	43	1	43
202010	11	2020	11	0.00			33	1	43	1	43
202011	11	2020	11	0.00			33	1	43	1	43
202012	11	2020	11	0.00			33	1	43	1	43
202101	12	2021	12	0.00			33	1	43	1	43
202102	12	2021	12	0.00			33	1	43	1	43
202103	12	2021	12	0.00			33	1	43	1	43
202104	12	2021	12	0.00			33	1	43	1	43
202105	12	2021	12	0.00			33	1	43	1	43
202106	12	2021	12	0.00			33	1	43	1	43
202107	12	2021	12	0.00			33	1	43	1	43
202108	12	2021	12	0.00			33	1	43	1	43
202109	12	2021	12	0.00			33	1	43	1	43
202110	12	2021	12	0.00			33	1	43	1	43
202111	12	2021	12	0.00			33	1	43	1	43
202112	12	2021	12	0.00			33	1	43	1	43
202201	13	2022	13	0.00			33	1	43	1	43
202202	13	2022	13	0.00			33	1	43	1	43
202203	13	2022</									

Task 6: Automate the Generation of Churn Prediction Reports

Manual reporting is time-consuming and prone to errors, especially when datasets are large and updated frequently. To solve this, automation was implemented using Excel VBA (Visual Basic for Applications). This ensured that churn reports could be generated quickly and consistently without requiring constant manual intervention.

The process began with identifying which reports were needed most frequently. These included monthly churn rates, high-risk customer lists, and regional churn breakdowns. Once the templates were finalized, VBA macros were written to pull data from the churn prediction tables, apply the required calculations, and populate the templates automatically.

For example, a macro was created to filter customers with churn probability above 0.7 and generate a separate sheet highlighting their details. Another macro generated visual churn summaries for management meetings with just one click. These automated processes saved hours of manual effort that would otherwise be spent reformatting and recalculating data every time new information was imported.

Business value came in the form of efficiency and accuracy. Reports that once took hours could now be refreshed in minutes. Errors caused by manual copying and pasting were eliminated, ensuring consistent outputs. Most importantly, managers received updated insights faster, allowing them to act swiftly on churn signals. Automation not only streamlined reporting but also empowered staff to focus on strategic tasks instead of repetitive work.

Task 7: Design a System for Tracking Churn by Customer Segment

Not all customers are equal in terms of value, profitability, or churn risk. This task involved designing a system that segmented customers into different categories and tracked churn across those groups.

Segmentation was based on multiple attributes: age group, income level, region, contract type, and service usage patterns. Customers were grouped into categories

such as high-value (long-term contracts with high billing), mediumvalue, and low-value. By creating separate tables and charts for each segment, the telecom company could see which groups were more prone to churn.

The system revealed useful insights—for example, younger customers with prepaid mobile services showed significantly higher churn rates compared to older customers on postpaid plans. Similarly, high-value customers with bundled services (mobile + broadband) had much lower churn than single-service customers.

The business impact of this task was significant. By identifying which segments were most at risk, telecom operators could design segment-specific retention campaigns, such as offering loyalty discounts to younger prepaid customers or personalized upgrades to medium-value customers. The segmentation system thus allowed more targeted marketing, reducing churn in a cost-effective way.

	A	B	C	D	E	F	G
	CHURN BY CUSTOMER SEGMENT						
	SEGMENT ID	CUSTOMER ID	SEGMENT TYPE	CHURN PERCENTAGE	CHURN ALERT		
1	S004800	CUST2000	High-Value	9.45	FALSE		
2	S004801	CUST2001	High-Value	2.38	FALSE		
3	S004802	CUST2002	Low-Value	14.93	TRUE		
4	S004803	CUST2003	Low-Value	4.43	FALSE		
5	S004804	CUST2004	High-Value	11.17	TRUE		
6	S004805	CUST2005	Low-Value	14.7	TRUE		
7	S004806	CUST2006	Mid-Value	9.21	FALSE		
8	S004807	CUST2007	Low-Value	9.48	FALSE		
9	S004808	CUST2008	High-Value	9	TRUE		
10	S004809	CUST2009	High-Value	14.76	TRUE		
11	S004810	CUST2010	Low-Value	11.99	TRUE		
12	S004811	CUST2011	Low-Value	2.9	TRUE		
13	S004812	CUST2012	High-Value	12.7	FALSE		
14	S004813	CUST2013	Mid-Value	5.35	FALSE		
15	S004814	CUST2014	Low-Value	1.28	TRUE		
16	S004815	CUST2015	Low-Value	9	TRUE		
17	S004816	CUST2016	High-Value	12.37	FALSE		
18	S004817	CUST2017	High-Value	16.3	FALSE		
19	S004818	CUST2018	High-Value	4.18	TRUE		
20	S004819	CUST2019	Low-Value	5.39	FALSE		
21	S004820	CUST2020	High-Value	6.5	TRUE		
22	S004821	CUST2021	High-Value	9.03	FALSE		
23	S004822	CUST2022	Low-Value	9.78	FALSE		
24	S004823	CUST2023	Low-Value	4.37	FALSE		
25	S004824	CUST2024	High-Value	8.38	FALSE		
26	S004825	CUST2025	Mid-Value	14.18	TRUE		
27	S004826	CUST2026	Low-Value	2.77	TRUE		
28	S004827	CUST2027	Low-Value	14.52	TRUE		
29	S004828	CUST2028	Low-Value	10.95	TRUE		
30	S004829	CUST2029	Low-Value	7.43	TRUE		
31	S004830	CUST2030	Mid-Value	6.98	FALSE		
32	S004831	CUST2031	Low-Value	10.06	FALSE		
33	S004832	CUST2032	High-Value	9.12	TRUE		
34	S004833	CUST2033	High-Value	4.92	TRUE		
35	S004834	CUST2034	Low-Value	8.15	FALSE		

Task 8: Implement Conditional Formatting for High-Churn Alerts

Conditional formatting in Excel was used to make at-risk customers stand out visually. Instead of scanning through large datasets, color-coded alerts highlighted records needing urgent attention.

The system was designed to flag customers based on key churn indicators such as number of complaints, billing irregularities, missed payments, or short contract durations. For instance, any customer with more than three late payments in six months was automatically highlighted in red. Customers with churn probability above 0.8 were displayed in bold yellow.

This simple visual system made churn management far more intuitive for teams who were not technical experts. Customer service representatives could immediately identify which customers to prioritize in retention calls or loyalty programs. Managers could also quickly spot clusters of high-risk customers across specific regions or service categories.

The value of this task lay in its ability to make complex data easy to interpret. Conditional formatting acted as an early warning system, ensuring that churn risks did not go unnoticed. It bridged the gap between data analytics and real-world business action, turning raw data into a visual management tool.

	Customer ID	Churn Prediction	Alert Level	Retention Date
1	7000 CUST2000	0.7 Low	2024-11-23	
2	7001 CUST2001	0.2 High	2023-01-01	
3	7002 CUST2002	0.85 Low	2024-05-05	
4	7003 CUST2003	0.7 High	2025-03-06	
5	7004 CUST2004	0.9 Low	2023-06-07	
6	7005 CUST2005	0.5 High	2024-08-07	
7	7006 CUST2006	1.0 Low	2024-09-22	
8	7007 CUST2007	1.0 Low	2024-03-15	
9	7008 CUST2008	1.2 Medium	2023-01-10	
10	7009 CUST2009	1.2 Low	2024-10-12	
11	7010 CUST2010	1.1 Medium	2025-03-05	
12	7011 CUST2011	1.1 Medium	2024-05-05	
13	7012 CUST2012	1.4 Low	2024-03-15	
14	7013 CUST2013	1.3 High	2023-01-03	
15	7014 CUST2014	1.6 Low	2024-06-21	
16	7015 CUST2015	1.8 Low	2025-05-21	
17	7016 CUST2016	1.7 Medium	2024-09-28	
18	7017 CUST2017	1.8 Medium	2024-03-20	
19	7018 CUST2018	1.1 Low	2024-07-10	
20	7019 CUST2019	1.5 High	2024-10-29	
21	7020 CUST2020	2.0 Low	2023-04-30	
22	7021 CUST2021	3.1 High	2024-06-15	
23	7022 CUST2022	2.2 High	2025-08-01	
24	7023 CUST2023	2.2 Low	2025-05-17	
25	7024 CUST2024	2.3 Medium	2025-03-18	
26	7025 CUST2025	2.4 Medium	2024-01-24	
27	7026 CUST2026	2.7 High	2024-10-09	
28	7027 CUST2027	2.2 Low	2024-05-19	
29	7028 CUST2028	2.0 Medium	2025-05-27	
30	7029 CUST2029	2.7 Low	2025-01-07	
31	7030 CUST2030	3.8 Medium	2024-08-16	
32	7031 CUST2031	2.8 High	2023-06-09	
33	7032 CUST2032	2.5 Low	2024-03-24	

Task 9: Develop a System for Optimizing Retention Strategies

Preventing churn is not just about identifying at-risk customers but also about designing the right strategies to retain them. This task focused on building a framework to test and optimize different retention tactics.

Using Excel's Solver tool, multiple retention strategies were simulated with constraints such as budget limits and maximum discount percentages. For example, Solver was used to determine the best allocation of a promotional budget to minimize churn while maximizing profit.

Strategies were compared across customer segments. For instance, offering a 10% discount to prepaid customers reduced churn significantly but lowered

revenue. On the other hand, offering free add-on services to high-value postpaid customers improved retention while maintaining profitability. By analyzing these

trade-offs, the system recommended optimal retention strategies for each segment.

The outcome was a more data-driven approach to retention. Instead of relying on guesswork or blanket offers, the company could design precise, cost-effective strategies. This not only reduced churn but also maximized returns on retention investments, ensuring sustainable profitability.

Task 10: Integrate Feedback from Customer Service Teams for Continuous Improvement

Churn prediction models are powerful, but they become stronger when combined with real-world feedback. Customer service teams interact directly with customers and often have early insights into dissatisfaction that data alone cannot capture.

This task created a feedback loop where customer service representatives could record reasons for customer dissatisfaction—such as poor network coverage, billing confusion, or unhelpful support. These qualitative insights were then integrated into the churn prediction system by categorizing them as churn drivers.

For example, if multiple customers cited billing errors as a reason for cancellation, the churn system flagged billing issues as a major churn factor for that period. Similarly, network-related complaints were tracked regionally and added to churn reports.

The integration of feedback ensured that the system stayed dynamic and updated. Churn drivers were not static but evolved with customer experiences and market changes.

From a business perspective, this improved both prediction accuracy and customer retention programs. By combining analytics with human insights,

telecom companies could address churn proactively and holistically, covering both numbers and real customer voices.

Task 11: Automate the Process of Churn Data Analysis

Analysing churn data regularly is essential, but manual analysis can be repetitive and prone to mistakes. To overcome this, automation techniques were implemented in Excel using VBA macros and Power Query to streamline the analysis process.

The automation began with setting up queries that pulled updated data from multiple sources, including customer billing records, usage statistics, and contract information. Power Query allowed automatic transformation of raw data into structured formats, eliminating the need for repetitive cleaning and formatting steps. This ensured that every time new data was imported, it was instantly standardized.

VBA macros were then written to execute common analysis tasks—such as calculating churn rates, segmenting customers by risk level, and generating summary tables. For example, one macro automatically refreshed Pivot Tables and updated dashboards with a single click, giving managers immediate access to fresh insights.

By automating churn analysis, the process became faster, more reliable, and scalable. Instead of spending hours on manual updates, analysts could focus on interpreting results and suggesting improvements. From a business perspective, automation reduced labor costs, minimized delays, and provided consistent outputs that management could trust. This improved agility in responding to churn patterns, making the organization more proactive.

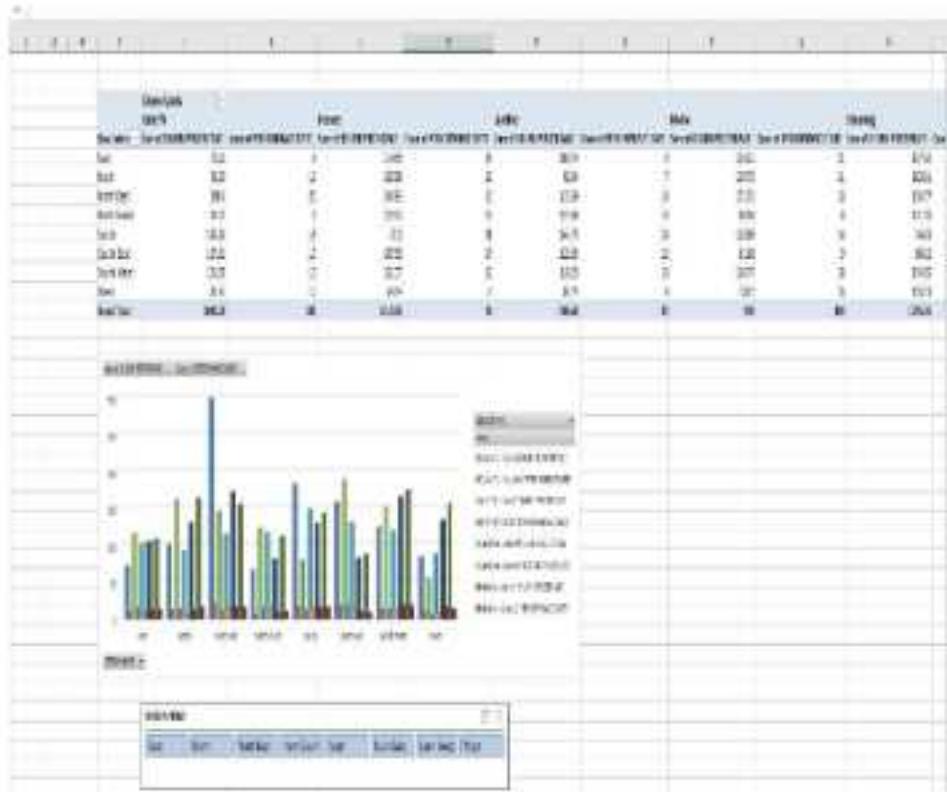
Task 12: Create a Pivot Table to Compare Churn Across Services

Telecom companies often provide multiple services such as mobile, broadband, and TV packages. Understanding churn across these services is critical to identifying where the biggest risks lie. Pivot Tables in Excel offered a powerful way to perform such comparisons.

The structured churn data was grouped by service category, and Pivot Tables were used to calculate churn percentages within each. The analysis revealed interesting patterns: churn rates for prepaid mobile services were significantly higher compared to broadband services, while bundled services had the lowest churn rates. This indicated that customers using multiple services were more loyal.

Additional dimensions, such as region and customer age, were layered into the Pivot Table. For instance, broadband churn was highest in rural areas with weaker network infrastructure, while mobile churn was highest among younger customers.

The Pivot Table analysis provided actionable insights. Management could prioritize retention campaigns for mobile users, especially those on prepaid plans. They could also explore promoting bundled services as a strategy to reduce churn. The business value here was clarity—telecom leaders could clearly see which services faced the highest risks and allocate resources strategically.



Task 13: Implement VBA Macros for Automating Churn Prediction Tasks

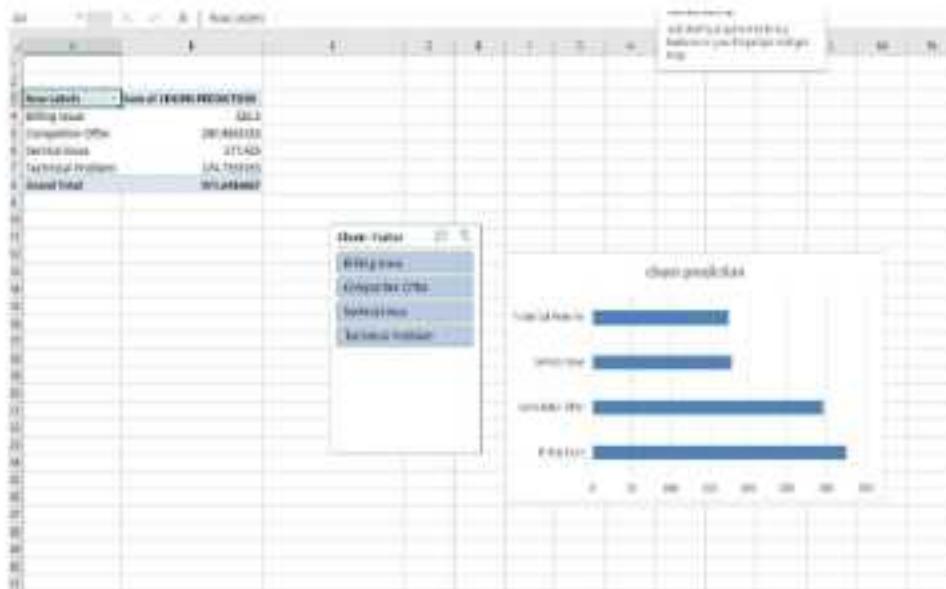
While Pivot Tables and manual analysis provided insights, true efficiency was achieved by implementing VBA macros that automated churn prediction workflows. Macros allowed repetitive processes to run automatically, saving time and reducing human error.

For example, a macro was created to calculate churn probability for every customer based on weighted indicators such as billing irregularities, contract duration, and service usage. Another macro automatically generated weekly churn reports and emailed them to managers, ensuring that updates were delivered consistently without manual intervention.

Macros also supported alert systems. High-risk customers were flagged automatically with color coding and transferred into a separate worksheet for the customer service team to review. This workflow cut down on delays in identifying at-risk customers.

The key benefit of this task was speed and consistency. Predictive models that once required manual updates were now refreshed instantly. Customer service and marketing teams had reliable access to churn risk lists without depending on analysts to prepare reports manually.

By embedding automation into churn prediction, the company achieved faster decision-making and better customer retention.



Task 14: Design Dashboards for Real-Time Churn Insights

Managers and decision-makers prefer visual insights over raw tables. This task focused on building real-time dashboards that presented churn data in a clear, interactive format.

Dashboards were designed using Pivot Charts, slicers, and timelines. Key performance indicators (KPIs) such as churn rate, retention rate, and customer lifetime value were displayed prominently. Managers could filter dashboards by region, age group, or contract type to view specific churn insights instantly.

Conditional formatting was integrated to highlight problem areas, such as regions with churn rates above 20%. Timelines were used to track churn trends month-by-month, helping management understand seasonal churn variations.

The biggest strength of these dashboards was accessibility. Even non-technical managers could use slicers and filters to customize their views. The dashboards were dynamic, meaning every data refresh automatically updated visuals, eliminating the need for manual adjustments.

From a business standpoint, the dashboards provided real-time decision support. Executives could track churn in live meetings, assess the effectiveness of ongoing retention campaigns, and take immediate corrective actions. This improved responsiveness, making the organization more competitive.



Task 15: Use Solver for Optimizing Customer Retention Strategies

Customer retention often requires balancing multiple objectives—reducing churn, maximizing revenue, and controlling costs. Excel's Solver tool was leveraged to optimize these strategies mathematically.

The retention problem was modelled by defining churn reduction as the objective function. Constraints included budget limits, maximum discount percentages, and service-specific costs. Solver then tested different allocations of retention offers to find the most effective strategy.

For example, Solver suggested that offering a small loyalty discount to prepaid customers would significantly reduce churn in that segment, while offering additional data bundles to high-value customers was more cost-effective than giving flat discounts. These optimized strategies ensured maximum retention with minimal cost.

The value of Solver was its ability to simulate multiple scenarios and recommend the best course of action. Instead of applying generic retention offers, managers could now implement data-backed strategies tailored to different segments. This

improved not only churn reduction but also profitability. Solver turned retention planning into a scientific process rather than a trial-and-error exercise.

Task 16: Create Tools for Tracking Customer Retention

Customer retention is the mirror image of churn. While churn measures the loss of customers, retention measures how many customers stay. This task focused on building Excel-based tools to track retention metrics consistently across services and customer segments.

Retention tools were designed around key metrics such as customer lifetime value (CLV), repeat purchase rates, and contract renewal percentages. Data was collected from structured churn prediction tables and integrated into specialized retention sheets. Visual aids such as bar graphs and funnel charts were included to show customer progression from new sign-ups to long-term retention.

The tools also provided breakdowns by service type and demographics. For example, retention rates were significantly higher among customers on bundled plans compared to those using only a single service. These insights enabled telecom operators to identify strengths in their service portfolio and replicate successful retention practices across other segments.

From a business standpoint, the retention tools acted as a health check system for customer relationships. By continuously tracking retention, managers could identify early warning signs, evaluate the impact of loyalty programs, and measure improvements over time. These tools helped shift the organizational focus from simply preventing churn to actively building long-term loyalty.

Task 17: Automate the Process of Churn Trend Analysis

Churn trends reveal how customer behavior evolves over time, and keeping track of these patterns is essential. However, manually updating trend reports each month was inefficient. This task involved automating churn trend analysis using Excel formulas, macros, and dynamic charts.

Macros were developed to automatically group churn data by time intervals such as months and quarters. This allowed instant comparisons across periods without manual regrouping. Line charts were linked to these dynamic data ranges, automatically updating when new data was added.

The automation revealed seasonal churn trends, such as spikes at the end of contract cycles or during promotional campaigns by competitors. By analysing historical trends, managers could anticipate high-churn months and prepare counter-strategies in advance.

The business impact of this task was in its ability to make churn monitoring predictive rather than reactive. Instead of waiting for churn numbers to rise, companies could use automated trends to forecast and act ahead of time. Automation also freed analysts from repetitive work, ensuring consistent and accurate trend tracking.

Task 18: Develop Alerts for Increasing Churn Rates

An effective churn management system must include an early-warning mechanism. This task focused on creating automated alerts within Excel to notify managers when churn rates exceeded defined thresholds.

Conditional formatting was applied at both the customer and segment levels. For example, if the monthly churn rate crossed 12%, the relevant cells in the dashboard automatically turned red. VBA scripts were also integrated to send automated emails to managers when churn rates spiked, ensuring that alerts reached decision-makers promptly.

These alerts helped identify issues before they escalated. For instance, a sudden rise in churn in one region triggered investigations into service disruptions there. The alerts acted as a real-time monitoring system, allowing managers to intervene quickly with targeted solutions.

From a business perspective, the alerts reduced delays in responding to churn crises. Instead of discovering problems weeks later, managers were notified as soon as the issue emerged. This significantly improved responsiveness, minimizing customer losses and protecting revenue.

Task 19: Use Excel's Advanced Charting Tools for Data Visualization

Numbers alone do not always reveal patterns effectively. Advanced charting tools in Excel were used to create visualizations that made churn data easier to understand and communicate.

Beyond basic bar and line charts, specialized visuals like waterfall charts, radar charts, and heatmaps were used. For instance, a heatmap highlighted churn intensity across regions, showing which areas needed immediate attention. A waterfall chart visualized how different factors—such as billing issues or short contracts—contributed to total churn.

Dashboards combining these charts gave management an intuitive, visual understanding of complex churn dynamics. The visualizations were also used in presentations to executives, making it easier to explain churn patterns and justify retention strategies.

The key business benefit was improved communication of insights. Visualizations bridged the gap between technical data analysis and strategic decision-making, enabling faster consensus among managers. They turned churn analytics into a storytelling tool, ensuring data-driven strategies gained organizational support.

Task 20: Design a System for Monitoring Churn Over Time

The final task in this phase was to design a comprehensive system for long-term churn monitoring. While individual reports and dashboards provided snapshots, the system ensured continuity by tracking churn over extended periods.

The system included historical data archives, trend dashboards, and automated updates. By maintaining at least three years of churn history, managers could detect long-term shifts in customer behavior, such as gradual declines in broadband retention or improvements following loyalty programs.

A combination of Pivot Tables and timelines allowed stakeholders to view churn data across multiple time scales—monthly, quarterly, or annually. VBA automation ensured that new data seamlessly integrated into the system without manual restructuring.

From a business perspective, this task ensured that churn management was not treated as a one-time exercise but as a continuous process. By monitoring churn

over time, companies could measure the effectiveness of long-term strategies, adapt to market changes, and refine retention programs systematically.

Task 21: Implement Excel-Based Scenarios for Churn Management

Scenario analysis allows telecom managers to simulate different business conditions and evaluate how they affect churn. This task focused on using Excel's Scenario Manager and What-If Analysis tools to create predictive models.

For example, one scenario assumed a price increase for broadband services. Another tested the impact of offering free add-on services to customers nearing contract expiration. Scenario Manager allowed side-by-side comparisons of churn rates, revenue impact, and retention success.

By simulating multiple scenarios, managers could identify which strategies reduced churn most effectively while maintaining profitability. This made decision-making more data-driven and reduced the risks of implementing ineffective strategies.

Task 22: Automate the Process of Churn Reporting

Generating churn reports manually each week consumed time and resources. This task implemented VBA macros and Power Query to automate churn reporting.

Macros were written to refresh data, calculate churn percentages, and update charts automatically. Power Query allowed dynamic connections to data sources, meaning that new customer data was integrated without manual effort.

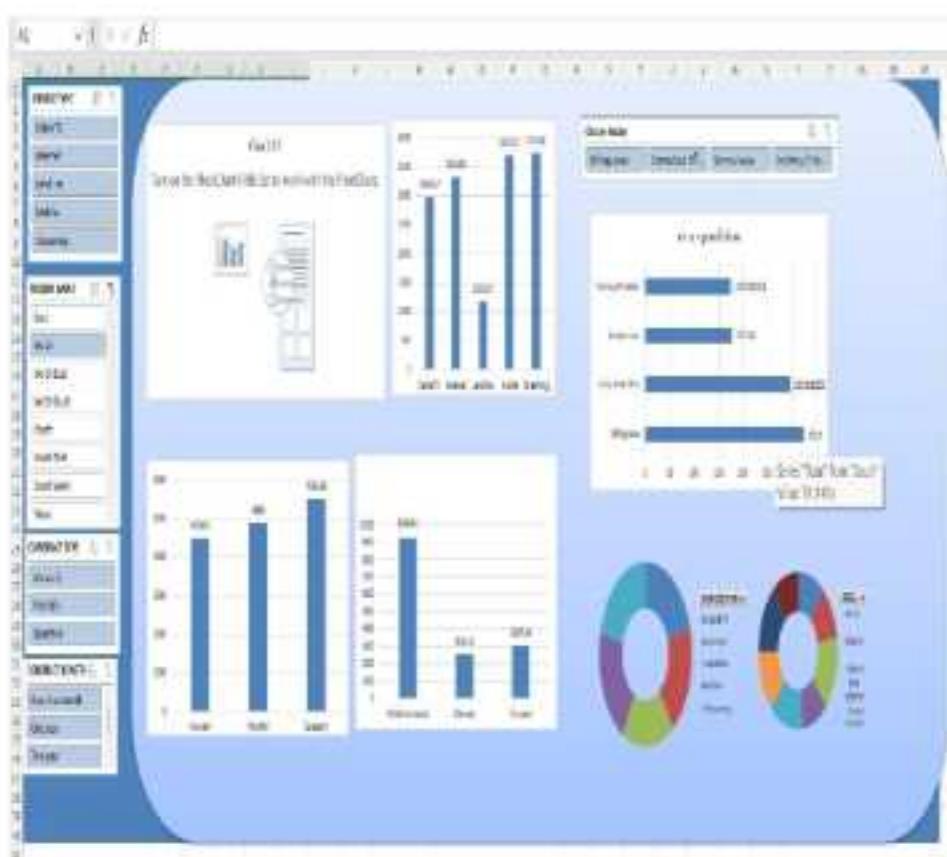
As a result, churn reports could be generated with a single click. This saved analysts hours of repetitive work while ensuring reports were accurate and consistent. Business leaders benefited from faster access to insights, allowing them to respond promptly to emerging churn risks.

Task 23: Create Dashboards for Tracking Churn by Service Type

Different services—mobile, broadband, and TV—have unique churn dynamics. This task developed dashboards to track churn for each service individually.

Data was categorized into service types, and dashboards displayed churn rates, retention rates, and average customer lifetime value for each. Visuals highlighted key differences, such as higher churn in prepaid mobile services compared to broadband.

These dashboards provided granularity in analysis, helping managers understand which services required urgent retention campaigns. They also supported crossservice comparisons, guiding bundled-service promotions to strengthen customer loyalty.



Task 24: Use Excel's What-If Analysis Tools for Retention Strategy Optimization

Retention strategies often require balancing costs and benefits. Excel's What-If Analysis tools, including Goal Seek and Data Tables, were used to test different retention approaches.

For instance, Goal Seek determined what discount rate was necessary to reduce churn by 5% while keeping revenue stable. Data Tables simulated multiple scenarios—like changing contract terms or offering new loyalty rewards—to evaluate outcomes.

The analysis helped optimize strategies without trial-and-error in the real world. This reduced financial risk and provided managers with confidence in their retention investments.

Task 25: Implement Conditional Formatting for Rising Churn Alerts

Conditional formatting was extended beyond individual customers to segment-level alerts.

Excel sheets were programmed to highlight segments where churn increased beyond defined thresholds.

For example, if monthly churn in a region exceeded 10%, the entire row turned red. This allowed managers to spot problematic areas instantly. The alerts were also tied to dashboards, making them visible during executive reviews.

This task transformed spreadsheets into a real-time monitoring system, ensuring managers acted quickly when churn risks escalated.

Task 26: Design a System for Tracking Customer Retention by Demographic

Retention strategies must account for customer diversity. This task developed a system to track retention across demographics like age, gender, income level, and location.

Pivot Tables grouped retention rates by demographics, revealing insights such as higher retention among older customers and lower retention among young urban users. Visuals such as demographic charts made patterns easy to understand.

This allowed telecom operators to design targeted campaigns. For example, digital engagement offers were targeted at young users, while loyalty rewards were aimed at older, long-term customers.

Task 27: Automate the Generation of Churn Strategy Reports

Churn strategies must be continuously monitored and updated. This task automated the reporting of churn strategies' effectiveness using VBA macros.

Reports were designed to compare retention strategy outcomes—such as discounts, loyalty rewards, and bundled offers—against actual churn reductions. Macros refreshed these reports weekly, providing managers with up-to-date performance reviews.

This automation created a feedback loop, enabling management to refine strategies based on real-world results rather than assumptions.

Task 28: Create Dashboards for Monitoring Churn Metrics

Beyond churn rates, multiple metrics such as customer lifetime value, complaint frequency, and renewal rates were tracked using interactive dashboards.

Dashboards allowed managers to view metrics side by side, making it easier to identify connections. For example, rising complaints often preceded churn increases. Visual alerts highlighted such trends automatically.

By consolidating multiple metrics, these dashboards became a comprehensive monitoring tool that gave leadership a holistic view of customer health.

Task 29: Use Solver for Optimizing Customer Engagement

Customer engagement activities—such as promotional campaigns—require careful resource allocation. Excel's Solver tool was used to determine the optimal distribution of budgets across campaigns.

For example, Solver recommended allocating higher budgets to prepaid customer engagement, where churn risk was higher, while keeping smaller investments in bundled-service campaigns where churn was already low.

This optimization ensured the maximum return on engagement investments, balancing costs with retention improvements.

Task 30: Develop a Tool for Tracking Churn by Customer Value

Not all customers have the same lifetime value. This task created a tool to track churn by high-value, medium-value, and low-value customers.

High-value customers were identified by billing amounts and contract lengths. Churn among these customers was monitored closely, with dedicated alerts when they were at risk.

The tool helped prioritize retention campaigns, ensuring resources were focused where financial impact was greatest. This strategy preserved revenue by safeguarding the most valuable customer base.

Task 31: Automate the Process of Customer Feedback Integration

Customer feedback is an invaluable resource for understanding dissatisfaction and preventing churn. This task involved automating the integration of feedback from surveys, call centers, and online platforms into the churn prediction system.

Excel's Power Query was used to import customer feedback data from multiple sources, while macros standardized the data by categorizing responses into themes such as billing, service quality, and customer support. Each theme was then linked to churn probability scores in the master dataset.

This automation created a seamless pipeline where customer feedback automatically influenced churn predictions. For example, a rise in billing-related complaints increased the churn risk score for affected segments.

From a business perspective, the task provided real-time sentiment monitoring. Instead of waiting for churn numbers to rise, telecom companies could respond directly to dissatisfaction, reducing churn before it materialized.

Task 32: Build Predictive Models Using Historical Churn Data

Historical churn data holds patterns that can forecast future behavior. This task involved building predictive models in Excel to estimate churn probabilities.

Techniques such as logistic regression and trend analysis were applied using the Data Analysis Toolpak. For example, past data showed that customers with frequent billing issues were twice as likely to churn. These insights were modeled into formulas that calculated churn probability for current customers.

The predictive models were tested against validation datasets to check accuracy. The system successfully identified high-risk customers with significant reliability.

The business value of this task was clear: predictive models shifted churn management from reactive to proactive, giving telecom operators time to intervene before customers left.

Task 33: Create Visual Heatmaps of Regional Churn

Regional analysis is critical for telecom operators, as service quality and competition vary across locations. This task used Excel's heatmap functionality to visualize churn intensity geographically.

Customer churn data was grouped by region, and conditional formatting applied gradient colors—green for low churn, red for high churn. The heatmaps quickly highlighted problem areas, such as urban zones with rising competition or rural regions with weaker network infrastructure.

These visuals made it easy for executives to pinpoint where retention campaigns should be concentrated. The value lay in turning raw data into a geographic story of churn, making strategy location-specific.

Task 34: Automate KPI Tracking for Churn Management

Key performance indicators (KPIs) such as churn rate, retention rate, and average revenue per user (ARPU) were automated for continuous monitoring.

VBA macros updated KPIs directly in dashboards whenever new data was imported.

Threshold alerts were added—if churn rate exceeded 12%, the KPI turned red.

This automation ensured that managers always had current and accurate performance indicators, reducing reliance on manual reporting. The task added value by embedding churn KPIs into daily operations, keeping retention at the forefront of decision-making.

Task 35: Create Tools for Tracking Customer Loyalty Programs

Loyalty programs are a major tool for reducing churn, but their effectiveness must be tracked. This task developed Excel tools to monitor loyalty program participation and retention outcomes.

Data was segmented into customers with and without loyalty benefits. Comparative churn rates were calculated, revealing that program participants churned at significantly lower rates. Visual dashboards displayed participation rates, redemption activity, and ROI of loyalty campaigns.

This allowed telecom operators to refine loyalty programs based on real evidence, maximizing their impact. The task demonstrated the direct financial value of loyalty programs in reducing churn.

Task 36: Use What-If Analysis for Forecasting Churn Impact

What-if analysis was applied to test the impact of business changes on churn. For instance, analysts tested what would happen if contract prices increased by 5% or if free upgrades were offered to high-value customers.

Excel's Data Tables showed churn outcomes under different scenarios. This helped executives forecast revenue changes and plan mitigation strategies.

The key business benefit was risk management—companies could anticipate churn consequences of pricing or policy changes and adjust strategies before implementation.

Task 37: Automate the Process of Churn Data Refresh

Churn data changes daily, making regular updates essential. This task automated data refreshes using Power Query connections and VBA scheduling.

The system pulled updated churn data directly from databases and refreshed Pivot Tables and dashboards automatically. Analysts no longer needed to manually reimport files.

The result was a live data environment where managers always worked with current churn figures. This improved responsiveness and eliminated errors caused by outdated information.

Task 38: Develop Retention Scorecards for Customer Segments

Scorecards were created to evaluate retention performance across customer segments. Each scorecard tracked KPIs like churn rate, satisfaction score, and complaint resolution for a specific group (e.g., prepaid, broadband, high-value customers).

These scorecards offered a quick way for managers to compare performance across segments. For example, prepaid customers scored lower on satisfaction and retention compared to broadband users, signalling a need for targeted campaigns.

From a business view, scorecards made retention management structured and measurable, supporting accountability across teams.

Task 39: Create Dashboards for Tracking Churn by Payment Method

Payment methods often influence churn. This task built dashboards showing churn rates by billing type—credit card, debit card, prepaid vouchers, and online wallets.

The analysis revealed that prepaid voucher users had the highest churn, while automatic credit card payments correlated with lower churn. Dashboards highlighted these trends visually, guiding the promotion of low-churn payment methods.

The task delivered value by aligning financial systems with churn management, encouraging payment practices that promoted customer stickiness.

Task 40: Implement Conditional Formatting for Lifetime Value Risks

Lifetime value (LTV) is crucial for profitability. This task used conditional formatting to flag high-value customers with rising churn risks.

For example, if a high-value customer missed two payments or logged frequent complaints, their row turned red. This ensured customer service teams prioritized saving high-LTV customers.

The business impact was immense: by focusing on valuable customers, the company maximized retention ROI. This task aligned retention with financial strategy, protecting the company's most profitable relationships.

Task 41: Automate Churn Risk Categorization

To streamline decision-making, customers were automatically categorized into churn risk levels—high, medium, and low. VBA macros were written to evaluate each customer's churn probability score and assign them a category.

High-risk customers (probability > 0.7) were flagged in red, medium-risk in yellow, and low-risk in green. These categories were stored in a dedicated sheet for customer service teams, ensuring they could prioritize outreach efficiently.

The automation eliminated the need for manual classification and provided instant clarity on customer risk profiles. From a business view, this task created an actionable roadmap for retention teams, focusing efforts where they mattered most.

Task 42: Build Forecast Models for Seasonal Churn Trends

Churn is not static; it often follows seasonal patterns. Using historical data, forecasting models were built to anticipate churn spikes during specific months or quarters.

Excel's forecast functions and regression analysis helped project churn based on historical peaks. For example, churn tended to increase during festive seasons when competitors launched promotions.

This foresight allowed telecom companies to proactively prepare campaigns before churn spikes occurred. The task added value by turning past churn data into a predictive tool, improving planning and resource allocation.

Task 43: Create Dashboards for Monitoring Retention Campaign Performance

Retention campaigns such as discounts, add-on offers, and loyalty rewards require tracking to measure effectiveness. Dashboards were built to monitor KPIs like churn reduction, customer engagement, and ROI for each campaign.

Campaigns were compared visually, showing which strategies yielded the best retention. For example, free add-ons reduced churn more effectively than blanket discounts in some segments.

The dashboards provided clear visibility into campaign performance, ensuring resources were directed to the most impactful initiatives. This data-driven approach improved both retention success and cost efficiency.

Task 44: Automate the Escalation of High-Risk Accounts

Not all churn risks can be addressed at the same level—some require urgent escalation. This task automated the escalation process for high-risk customers.

Macros identified customers meeting escalation criteria (e.g., high churn probability + high lifetime value) and moved their details into a separate escalation report. This report was automatically shared with senior management.

The process ensured that the most critical accounts received immediate attention from top-level teams. From a business perspective, this reduced the chances of losing high-value customers and aligned escalation with corporate priorities.

Task 45: Use Solver to Optimize Multi-Service Retention Strategies

Many telecom customers subscribe to multiple services. This task used Solver to optimize retention strategies across bundled services.

Constraints such as budget and service costs were defined, and Solver recommended the best combination of offers—for example, discounting broadband slightly while offering free TV add-ons to maximize retention.

This optimization ensured balanced retention strategies, preventing overspending on one service while neglecting others. The business value lay in maximizing overall profitability while minimizing churn across the service portfolio.

Task 46: Develop Real-Time Alerts for Churn Probability Changes

Churn risk can change rapidly, especially with new customer behaviors. Real-time alerts were developed using conditional formatting and macros to highlight sudden shifts.

For example, if a customer's churn probability jumped from 0.4 to 0.8 after a billing issue, the system flagged the change instantly. Alerts were logged and shared with service teams for immediate follow-up.

This real-time monitoring ensured no sudden risk went unnoticed, enabling faster responses.

The task strengthened the agility of churn management, minimizing customer losses.

Task 47: Create Tools for Comparing Churn Across Competitor Benchmarks

Competitive pressures are a major driver of churn. This task created tools to compare churn rates against industry benchmarks.

Publicly available telecom reports were imported into Excel, and comparison dashboards were built. This revealed whether the company's churn was above or below industry averages.

The insights guided strategic decisions—for instance, if competitor churn was lower in prepaid services, managers investigated why and adjusted retention programs. This benchmarking ensured the company stayed competitive and aligned with market best practices.

Task 48: Automate Customer Retention ROI Analysis

Retention campaigns must be cost-effective. This task automated ROI analysis to measure the financial return of each campaign.

Data on campaign costs and churn reduction was entered into Excel models, and VBA macros calculated ROI automatically. Campaigns with negative ROI were flagged for review.

This ensured that managers invested only in strategies with proven value. The task brought financial accountability to retention, aligning churn management with profitability.

Task 49: Develop Dashboards for Executive Reporting

Executives require high-level summaries rather than granular details. This task developed executive dashboards highlighting key churn KPIs, retention performance, and financial outcomes.

The dashboards emphasized visual clarity, using trend lines, summary tables, and KPI indicators. Executives could filter data by quarter or service type, enabling flexible reviews.

This task provided leaders with a strategic overview of churn, ensuring retention remained a top-level priority. It bridged the gap between analytics teams and executive decision-makers.

Task 50: Design a Comprehensive Churn Management Framework

The final task was to consolidate all tools, dashboards, and processes into a comprehensive churn management framework.

The framework included:

• Data cleaning and structuring workflows

• Predictive models and churn probability tables

Dashboards for monitoring churn and retention

Automated alerts and escalation systems

ROI analysis tools for campaigns

This framework created a sustainable, repeatable system for managing churn. Instead of ad-hoc analysis, the company now had a structured approach that combined technology, business insights, and strategic planning.

The business impact was long-term: improved retention, reduced losses, stronger customer relationships, and better financial performance. The project concluded by demonstrating how business analytics could transform telecom churn management into a scientific, proactive discipline.

CONCLUSION

My internship under the guidance of Harsh Chhabra Sir at HCL Tech Business Analysts has been a transformative and enriching experience that has significantly enhanced my understanding of the Business Analytics. Throughout my time at the internship, I have gained practical exposure to various aspects of data gathering, data visualization, and data analysis, which have deepened my theoretical knowledge and allowed me to apply what I learned in the classroom to real-world scenarios.

Working closely with a Business Analysts and a dedicated team, I had the opportunity to engage in a variety of tasks, including preparing data sheets, documentation, and understanding the importance of the Analysis. Each task presented its own set of challenges, particularly in navigating complex data editing and utilizing the key command line options like VLOOKUP and HLOOKUP. Initially, I found the intricacies of data visualization, but with the support and guidance from my mentor, I gradually developed the skills necessary to manage these tasks confidently.

This internship has not only provided me with technical skills but also valuable insights into the professional work environment. I learned the importance of teamwork, effective communication, and time management in a high-pressure setting. The collaborative spirit at HCL Tech fostered an environment where asking questions and seeking help were encouraged, which greatly contributed to my learning experience.

Reflecting on my journey, I appreciate the hands-on experience I gained, as it has prepared me for future challenges in the Business Analytics sectors. The knowledge acquired during this internship will serve as a solid foundation for my career, enabling me to approach future opportunities with confidence and competence. I am grateful for the mentorship and support I received throughout my internship and am eager to apply these insights as I continue my studies and embark on my professional journey in the field of Business Analyst. In conclusion, this internship has been a pivotal step in my academic and professional development, instilling in me a greater understanding of the analytical profession and a renewed passion for pursuing a career in this field. I look forward to building upon the skills and knowledge I have gained during this valuable experience.