

Assessment of Factors Influencing Customer's Decision for Switching Internet Service Providers in Hetauda: A Data-Driven Analysis

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Abstract

The changing landscape of internet service providers (ISPs) demands a deeper understanding of consumer behaviour when making switching decisions. This research aims to investigate the factors influencing customers' decisions to switch their Internet Service Providers (ISPs) using a dataset of over 300 customer profiles. The study employs a comprehensive approach, leveraging Python for data analysis, to explore patterns, frequencies, and correlations within the dataset. The study utilized descriptive statistics, Chi-Square tests for independence, and data visualizations such as word clouds, count plots, and heat maps to uncover patterns and relationships within the data. The findings indicate that factor like cost and pricing and Speed and Performance significantly impact the decision to switch ISPs. The Chi-Square test revealed a significant relationship between the influencing factors and the choice of previous ISP. The finding also uncovered that Worldlink is the most popular ISP in the market. The findings aim to provide valuable insights into the dynamics of customer choices in the local ISP market, aiding both consumers and service providers in enhancing their understanding and strategies.

Keywords: Internet Service Providers (ISPs), Python, word clouds, heat map, Chi-Square, Worldlink

Introduction

Internet Service Providers (ISPs) are the vital link that connects end-users and businesses to the vast world of the Internet. While fiercely competing with each other in terms of cost, effectiveness, and dependability, ISPs must also work together to ensure seamless global connectivity for all other components on the Internet (Norton, 2001). Service quality has become one the most significant part of the service industry. With increased awareness among customers about the level of service they receive, organizations are now prioritizing the quality of their services in order to enhance customer satisfaction and ultimately build stronger customer loyalty (Joudeh & Dandis, 2018).

Hetauda is one of the major cities in Nepal, with branches of almost all the popular ISPs located and running successfully. In the context of Nepal, there are large numbers of ISPs and each of them are offering varieties of services to individuals and organizations. According to Nepal Telecommunication Authority (2023), there are 23 registered Internet Service Providers with the total of 2,840,627 subscribers in Nepal. Among these ISPs, Worllink Communication has the highest percentage of customer.

Customer satisfaction is one of the important areas where every organization must focus on to build their business today and stay focused for the long run. According to Fader (2020), the competitive market is pushing companies to innovate and add exciting new features and services for customers in order to retain their customer and attract more customers from rival companies. This has caused high level of awareness in customers, that's why customers are switching from one company to another In search of better services overall. In the context the Nepal, there are already more than 20 registered ISPs in Nepal (see Figure 1) with each of them having significant percentage of customer share.

This research paper aims to find out different variables that influence customer's decision about switching the ISPs in Hetauda. The paper also analyzes different factors against different ISPs to see which factors are greatly affecting the particular ISP. Along with that, the paper also highlights this issue using heat map for different attributes related to particular ISP.

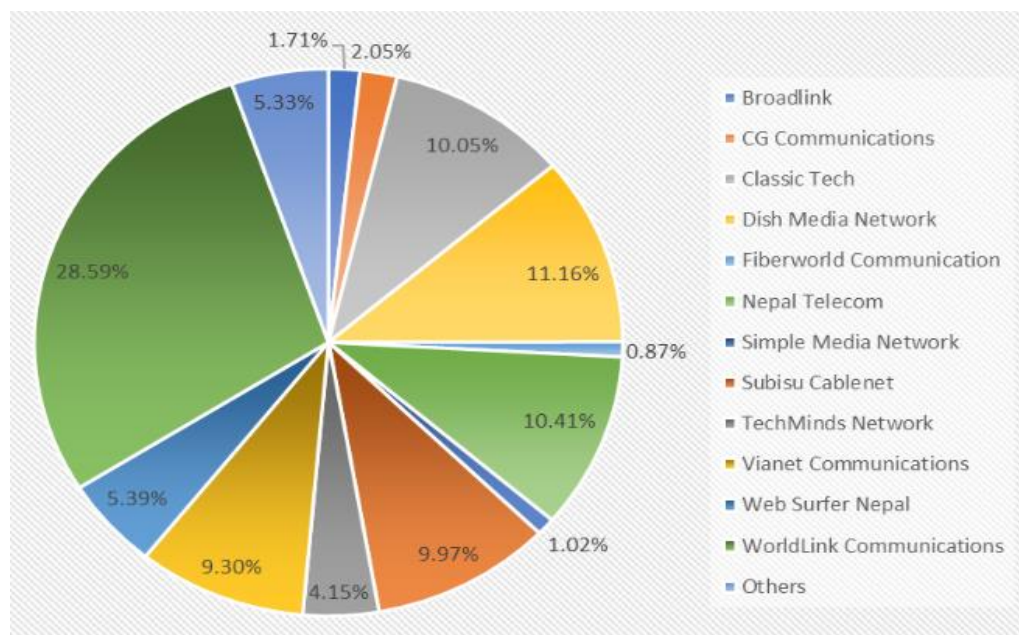


Figure 1: Market proportion of Internet Service Providers in Nepal

Source: (Nepal Telecommunications Authority, 2023)

Literature Review

Several previous studies have investigated customer switching behavior in various industries, emphasizing the significance of factors such as price, service quality, and social influence. However, the ISP market's unique dynamics warrant a specific examination. This literature review section provides insights into existing research on customer switching behavior, drawing parallels and distinctions to the ISP market.

Internet Service Provider market

Over the past few years, there has been a remarkable surge in the utilization of the internet. As a result, numerous internet service providers have eagerly entered the market to meet this high demand. In today's technology-driven world, it is crucial for firms to constantly seek out and draw in new customers. This not only involves enticing them away from competitors, but also ensuring that current customers remain loyal. As such, numerous internet service providers have strategically focused on catering to the unique needs of specific market segments in order to stand out and thrive in the industry (Erevelles, Srinivasan, & Rangel, 2003). According to International Telecommunication Union (2022), around 5.4 billion individuals, accounting for 67% of the global population are connected to the Internet by 2023. This marks an impressive 45% increase in usage since 2018.

According to Lee and Lui (2008), the world of internet has wide range of Internet Service Providers each of them offering services mainly, connectivity and transit. As technology continues to evolve and our world becomes even more connected, Internet Service Providers faces a challenge of maximizing their profits while also ensuring top-notch performance. The author highlights that, this ongoing challenge is a constant reminder of the endless possibilities and demands within this ever-expanding realm. In general, ISPs can be classified into two groups: a) top-tier (the larger ISPs) providers that cover large areas and provide transit services, and b) bottom-tier (the smaller ISPs) providers that supply connectivity services to regional users. In order for the latter group to access the internet, they must purchase transit services from the top-tier ISPs. These top-tier providers then set their prices based on factors such as bandwidth allocation, data transfers, and market competition, all of which contribute to their service offerings.

Brand Switching Behavior of Customers

When it comes to choosing an ISP, one crucial aspect is the quality of customer service. This includes the competence and availability of technical support as well as the responsiveness of the service staff (Erevelles, Srinivasan, & Rangel, 2003). According to the findings presented in Buhajloti (2013), the expansion of the internet market in Albania has brought about a significant growth in Internet Service Providers (ISPs). To enhance competition in this dynamic market, it is crucial to have a deep understanding of the factors that influence customers' preferences among these providers. Through the use of quantitative methods such as in-person surveys and structured questionnaires, this study delves into the intricate elements that shape customers' perceptions and decision-making processes when it comes to selecting an internet service provider. This study

delves into the preferences of household-level internet users with fixed access, identifying crucial factors that influence their purchasing decisions. Results reveal that a company's brand image holds the most sway in the selection of an internet service provider (ISP). To attract and retain customers, ISPs must prioritize cultivating a positive company image and effectively communicating with consumers, while also addressing any associated risks. This research provides vital insights for high-speed internet providers in Albania, offering strategic recommendations for customer acquisition and improving competitiveness.

According to a study (Manzoor, Baig, Usman, & Shahid, 2020) on brand switching behavior in the telecommunications industry of Pakistan conducted in Faisalabad city, this study seeks to understand the key determinants influencing customers' brand-switching decisions. Through a quantitative methodology, the research delves into the interrelationships among different factors by administering a questionnaire to a sample of 204 individuals, chosen through convenient sampling. The data was then processed and analyzed with the use of SPSS, utilizing statistical techniques such as Regression analysis, reliability testing, and Correlation tests to assess the research hypotheses. The study's findings suggest that consumer switching behavior, especially among young individuals, is significantly affected by factors like price, brand image, network quality, value-added services, and promotional activities. This highlights the importance for telecommunication companies in Pakistan to prioritize these factors to maintain customer loyalty and reduce brand switching in the ever-changing market. The results of this study offer valuable insights for these companies to adapt and thrive in the competitive market landscape.

Research Methodology

The research is based on the quantitative approach in which survey questions were used as the main tool for collecting the responses.

Data Collection Method

A google online form was used as the survey questionnaire tool to collect the primary data directly from the customers. The data was primarily collected from different college students of Hetauda. The data were extracted in csv file and necessary cleaning was performed.

Sample Size

The total sample size of the participants was around 385 using the formula mentioned below. The total population for the study was unknown, so the following formula was used to calculate the minimum sample size using a formula:

$$S = \frac{z^2(P)(1-P)}{e^2}$$

Where,

S= Sample size for unknown population

Z= Z-score (1.96) determined on confidence level of 95%)

P= Population proportion (assumed to be 50% =0.5)

$e =$ Margin of error 0.05

Calculation from formula;

$$S = \frac{1.96^2 * 0.5 * (1 - 0.5)}{0.05^2}$$

$$= 384.16 \sim 385$$

$$= 385$$

Therefore, minimum sample size required for the study is 385.

Sampling Technique

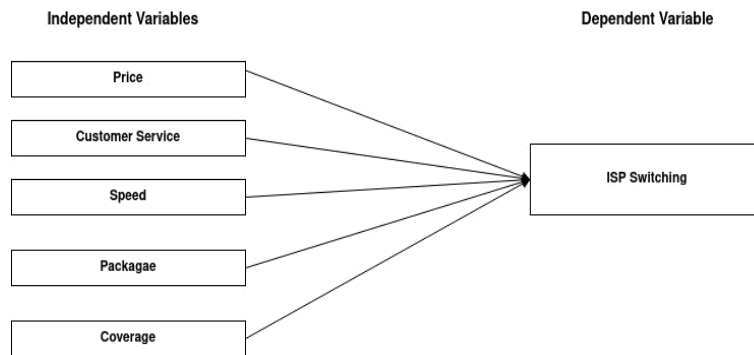


Figure 2: Conceptual Framework for variables

An online random sampling technique was used. Due to time constraints and financial considerations, the study employed random sampling methods to obtain a representative sample of ISP customers and generalize findings to the entire customer base.

Conceptual Framework

The conceptual framework shows that the variables such as price, speed, customer service, packages influence on ISP switching (see Figure 2).

Tools and Algorithms

The analysis in this research paper was conducted using Python, specifically within the **Jupyter Lab** environment. The key libraries and algorithms used for the data preprocessing, visualization, statistical analysis, and results generation are discussed below.

Pandas: Pandas was used to load and preprocess the dataset.

Matplotlib and Seaborn: Matplotlib and Seaborn were used for data visualization, including generating various plots such as bar charts, heatmaps, and word clouds.

WordCloud: WordCloud was used to generate a visual representation of the frequency of Current ISPs based on the count of occurrences in the dataset.

SciPy (Chi-Square Test): The Chi-Square Test of Independence was performed using SciPy to determine whether there is a significant relationship between influencing factors and previous ISPs.

Heatmap Analysis: Heatmaps were generated using Seaborn to visualize the relationship between influencing factors and the ISPs, both Previous ISP and Current ISP.

Analysis

The analysis of the dataset was divided into several steps to explore the factors influencing customers' decisions when switching ISPs.

Data Preprocessing: The dataset was first loaded and the categorical columns (Address, Previous ISP, Current ISP, and Influencing factors) were converted to appropriate categorical types for further analysis.

```
import pandas as pd

# Load the dataset
df = pd.read_csv('final_data.csv')

# Convert categorical columns into a suitable format
df['Address'] = df['Address'].astype('category')
df['Previous ISP'] = df['Previous ISP'].astype('category')
df['Current ISP'] = df['Current ISP'].astype('category')
df['Influencing factors'] = df['Influencing factors'].astype('category')
```

WordCloud for Current ISP: A WordCloud was generated to visualize the frequency of Current ISPs in the dataset. The word cloud represented the most common ISPs, where larger text size indicated higher frequency.

```
from wordcloud import WordCloud

import matplotlib.pyplot as plt

# Extract the 'Current ISP' column
current_isp = df['Current ISP'].value_counts()

# Create a dictionary of Current ISP and their counts
isp_dict = current_isp.to_dict()

# Generate the WordCloud
```

```
wordcloud = WordCloud(width=800, height=400, background_color='white',
colormap='plasma').
generate_from_frequencies(isp_dict)
```

Factor Distribution: A count plot was used to visualize the distribution of influencing factors for ISP switching. This plot showed how often each factor (e.g., Cost and Pricing, Promotional Offers) was cited as a reason for switching ISPs.

```
import seaborn as sns

# Plot the factors influencing ISP switching
sns.countplot(x='Influencing factors', data=df, palette='viridis')
```

Switching Behavior: Another count plot was used to visualize the switching behavior from **Previous ISP** to **Current ISP**. This helped in understanding how customers transitioned from one ISP to another and which ISPs were most commonly chosen.

```
# Plot the distribution of Previous ISP and Current ISP
sns.countplot(x='Previous ISP', data=df, palette='Paired', hue='Current ISP')
```

Chi-Square Test: The **Chi-Square Test of Independence** was conducted to analyze whether there is a significant relationship between **Influencing factors** and **Previous ISP**. The p-value obtained from the test helped in determining the significance of this relationship.

```
from scipy.stats import chi2_contingency

# Chi-Square Test for independence between factors and previous ISP
contingency_table = pd.crosstab(df['Influencing factors'], df['Previous ISP'])
chi2, p, dof, expected = chi2_contingency(contingency_table)
```

Heatmap Analysis: Pivot tables were created to count the occurrences of each influencing factor for both **Previous ISP** and **Current ISP**. Heatmaps were generated for both these relationships, providing a clear visualization of which factors were most significant for each ISP.

```
# Create a pivot table to count the occurrences of each factor for each previous ISP
pivot_table = pd.pivot_table(df, values='Address', index='Previous ISP', columns='Influencing
factors',
aggfunc='count', fill_value=0)

# Plot the heatmap
sns.heatmap(pivot_table, annot=True, cmap='Blues', fmt='d', cbar_kws={'label': 'Count of
Customers'})
```

```
# Create a pivot table to count the occurrences of each factor for each current ISP
pivot_table_current_isp = pd.pivot_table(df, values='Address', index='Current ISP',
columns='Influencing factors', aggfunc='count', fill_value=0)

# Plot the heatmap for Current ISP and Influencing factors
sns.heatmap(pivot_table_current_isp, annot=True, cmap='Paired', fmt='d', cbar_kws={'label':
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# Plot the heatmap for Current ISP and Influencing factors
sns.heatmap(pivot_table_current_isp, annot=True, cmap='Paired', fmt='d', cbar_kws={'label': 'Count of Customers'})
```

Result and Discussion

The findings from the analysis provided valuable insights into the factors influencing customers' decisions for switching ISPs. The following key results were observed after the analysis:

WordCloud: The **WordCloud** visualization revealed that the most common **Current ISP** in the dataset was **Worldlink**, followed by **NT Fiber** and Classic Tech (see Figure 3). The size of the words in the cloud indicated the relative frequency of each ISP, with **Worldlink** being the dominant choice.



Figure 3: WordCloud of ISP

Factors Influencing ISP Switching: The count plot of **Influencing factors** showed that **Cost and Pricing** was the most frequently mentioned reason for switching ISPs, followed by **Customer Service and Support** and Internet Speed and Performance (see Figure 4). This suggests that customers are highly influenced by the cost and pricing aspects when making decisions to switch ISPs.

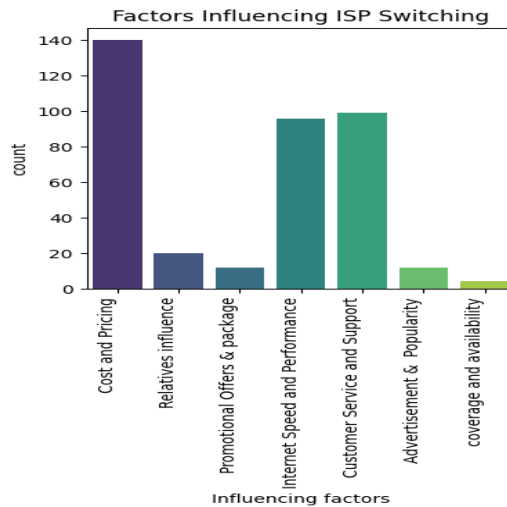


Figure 4: Factors Influencing ISP Switching

ISP Switching Behavior: The count plot showing the transition from **Previous ISP** to **Current ISP** indicated that **NT Fiber** was the most common destination ISP, with many customers switching from Worldlink and **Classic Tech** itself (see Figure 5).

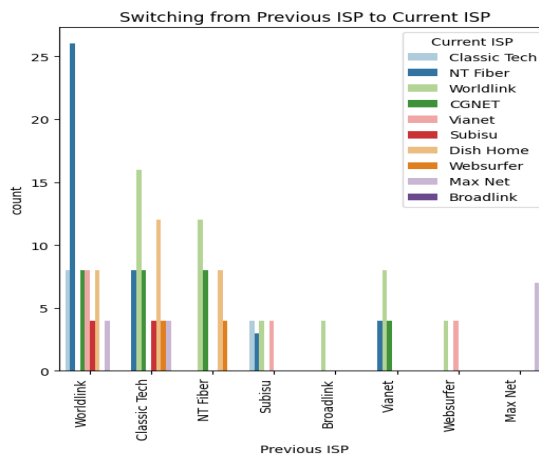


Figure 5: Switching Behavior from current ISP

Chi-Square Test: The **Chi-Square Test of Independence** indicated a significant relationship between **Influencing factors** and **Previous ISP** (p-value < 0.05). This suggests that the factors influencing ISP switching are closely related to the previous ISP that customers were using.

Chi-Square Test Statistic: 255.18653313177123

P-value: 2.4585997901612793e-32

These value suggest that there is a significant relationship between the influencing factors and previous ISP.

Heatmap for Previous ISP: The heatmap for **Previous ISP** and **Influencing factors** showed that **Cost and Pricing** was the most significant factor for customers to switch from Wordlink to other ISPs. Additionally, **Customer Service and Support** had a notable impact on customers switching from **Classic Tech** (see Figure 6).

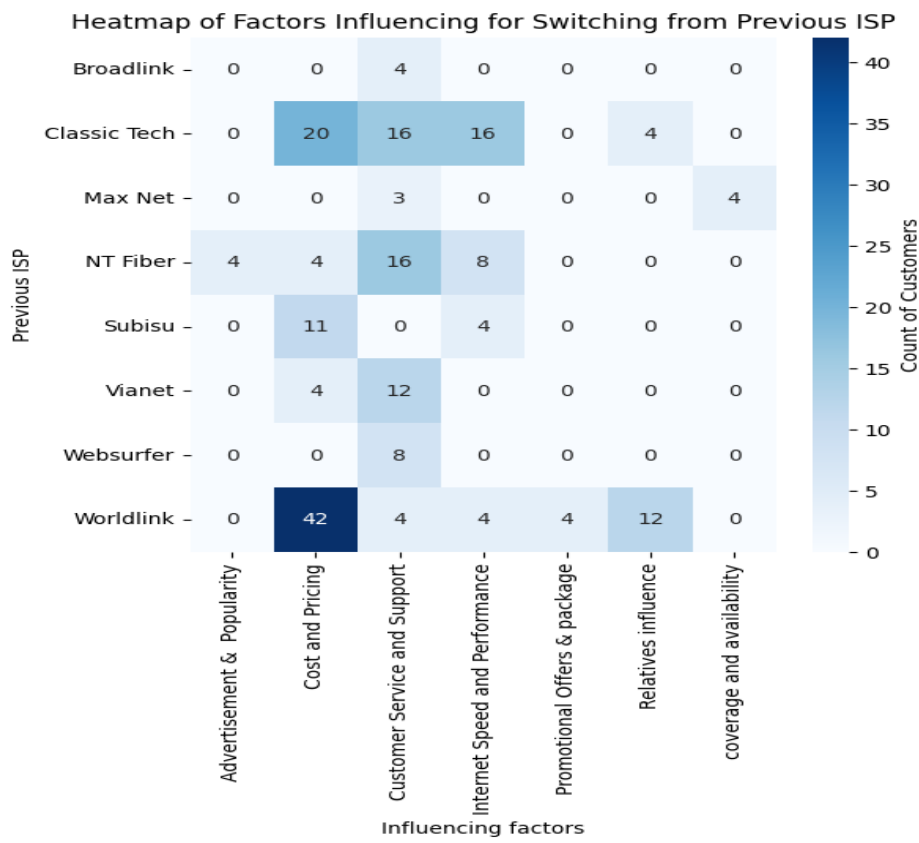


Figure 6: Factors Influencing Switching from an ISP

Heatmap for Current ISP: The heatmap for **Current ISP** and **Influencing factors** revealed that most of the customers switched to Worldlink to Internet Speed and Performance and Customer Service and Support. While NT Fiber was more likely to be chosen by customers citing cost and pricing (see Figure 7).

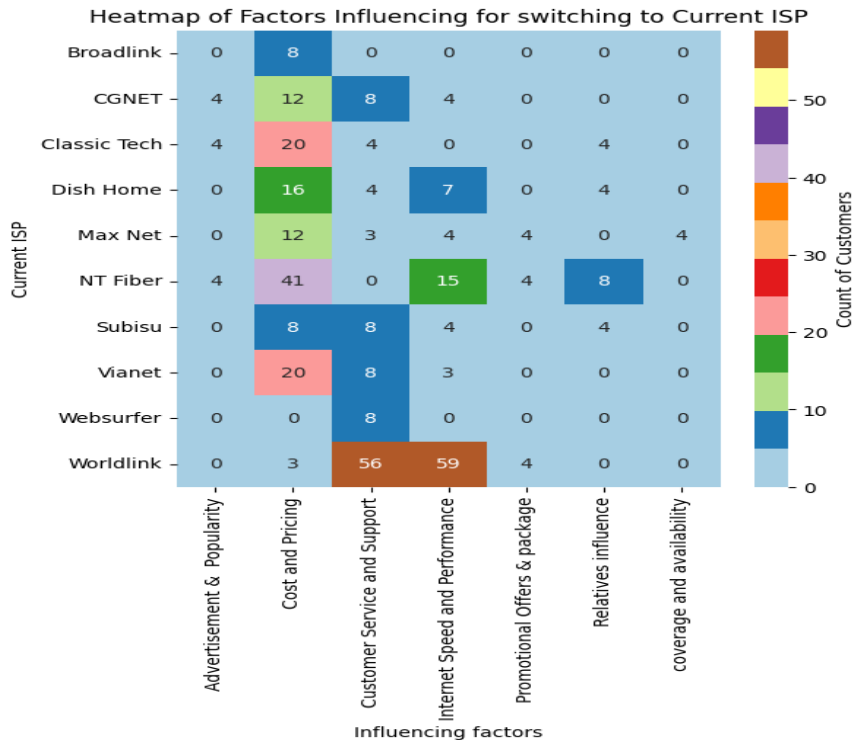


Figure 7: Factors influencing for switching to current ISP

Conclusion

This research paper explored the various factors influencing customers' decisions to switch ISPs in Hetauda. Through a combination of data preprocessing, visualization, and statistical analysis, several insights were drawn. Cost and Pricing was identified as the most prominent factor influencing customers to switch ISPs. Wordlink emerged as the most popular choice for customers when selecting a new ISP. The Chi-Square Test revealed a significant relationship between Influencing factors and Previous ISP, suggesting that certain factors are closely tied to customers' prior experiences with ISPs. The heatmaps provided a clear visual understanding of how influencing factors varied across different ISPs. One of the most valuable insight was that Worldlink is losing customers to its competitors due to cost and pricing factor but at the same time customers are choosing Worldlink for its Speed and Performance. This also suggests that quality comes with a price. Overall, this analysis provides valuable insights into the factors that shape customers' decisions to switch ISPs and offers a foundation for understanding ISP market dynamics

in Hetauda. Future research could delve deeper into customer satisfaction and service quality to provide more comprehensive insights into ISP switching behavior.

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