Evaluation of Internet Speed in the Selection of Broadband ISP in Gujarat – An Associative Analysis

*Dr. Manojkumar B. Janara

*Lecturer in Instrumentation and Control Engineering, Government Polytechnic, Ambawadi, Ahmedabad Gujarat (India)

**Corresponding Author
Email: mbvanara@gmail.com

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ABSTRACT

The present study examined the strength of association in respect of speed with the independent variables such as Age, Education, Occupation, Income, Selection of ISP, Hours spent on the internet, Types of Devices connected with the Internet and No of Devices connected on the Internet. The associative analysis was conducted through Chi square test to observe the association and assess the goodness of fit to prove omnibus null hypothesis that all groups are not associated with the speed dimension of the broadband services. Primary data were collected from 362 respondents of subscribers of various broadband ISP from the four major cities such as Ahmedabad, Vadodara, Surat and Rajkot of the Gujarat state, on the various elements of the study by the way of survey method and with the help of the interviewee administered questionnaire. The results suggest that Age, Education and Income groups are not associated with the speed hence they were found ineffective. Whereas the Occupation, Selection of ISP, Hours spent on the internet, Types of Devices connected with the Internet and No of Devices connected on the Internet are associated with the speed hence they were found effective.

The main purpose of the underlying study is to examine the strength of association of Internet Speed in the Selection of Broadband ISP in Gujarat State. This results helps in the articulating the features of the broadband services. This associative analysis would be more useful in formulating the marketing strategy.

INTRODUCTION

Indian economy is believed to be in transformation phase of the economic reforms. While cross border economic activities have accelerated the continuous flow of key information and transfer of technological know-how; it also has stressed geographical dispersion and cross border networking. In turn, the exchange of knowledge and communication became a cause of concern in the growth and development of the economy of the country. The presence of advanced telecommunication infrastructure has a wider impact on the country's productivity and efficiency. Internet has become a basic necessity in the socio-economic activities. The broadband services continued to be a growth engine of the Indian economy.

Internet paved a transformation in the socio-economic life of the human being. It has revolutionized day to day activities with the speed, precision and quality. Internet is found to be an essential foundation for socio-economic development. There is a multipurpose use of the internet that can be classified in the various categories such as Personal, Educational, Social Networking and Business. However it is most useful for the organizations. The organization’s major tasks in respect of internet can be classified into the something like this: Communication, Publishing, Customer support and Research. There are huge advantages of the internet such as increased credibility and Exposure, Greater quantity and quality of inquiries, increased output, reduced cost, increased access to information and Increased "green rating". In today's world internet became most essential in the daily life. Life cannot be imagined without internet. With the advent of broadband services internet became a speedy, always on and affordable platform to view entire world without geographical barriers. Therefore the broadband services were paid a lot of focus in the field of research.

Numerous studies have paid a focus around the dimensions of broadband services in India. Majority of them have attempted to study one or two aspects of the Customer satisfaction, Buying Behaviour, Service quality and Comparison of performance of NPSU vis-a-vis PSU. However, there was a lack of comprehensive study that assesses the problems and prospects of Broadband services and recommends measures to improve the quality and implementation of mechanism based on the dimensions to find new avenues. BSNL, Airtel, TATA and Reliance are the major broadband service providers in the market and they are occupying major market share, therefore, it is very important to study their present position in the market based on the dimensions of the broadband services. Therefore, precisely this study attempts to evaluate Internet Speed dimension in the Selection of Broadband ISP like BSNL, Airtel, TATA and Reliance internet service providers in Gujarat state.

The present study examines the strength of association in respect of speed with the independent variables such as Age, Education, Occupation, Income, Selection of ISP, Hours spent on the internet, Types of Devices connected with the Internet and No of Devices connected on the Internet to prove omnibus null hypothesis that all groups are not associated with the speed dimension of the broadband services.
LITERATURE REVIEW

Numerous studies have outlined the importance of the internet; Th. Purmina Devi and Y. Herojit Singh pointed out that Internet is a vast ocean of information pertaining to almost all subjects. The present study indicates that a majority of users use Internet as their sources of information. The study also indicates that most of the users are satisfied with the information available on Internet. It has been established that Internet serves as an important tool in the world of information. However, to utilize the resources of Internet to its maximum, it is necessary to make the users (research scholars) well-versed in the surfing and browsing on the Net (Th. Purmina Devi and Y. Herojit Singh, 2009).

Delloitte pointed out that the broadband has been transforming many economies of the world and rapidly becoming a utility. By nurturing a digital environment, broadband offers number of benefits like increased business productivity, improved healthcare, better education, interactive entertainment, and greater government efficiency. The economic growth can be achieved when more population have easy access to information, retail and service sectors. Broadband is critical for India’s inclusive growth in financial, healthcare and education sector, among others (Aegis School of Business and Telecommunication and Delloitte, 2014)

Tanguturi and Harmanztiz outlined the success factors (social, economic, and technological) that have contributed to the growth of the mobile communications industry. Based on its success, further strategic investment opportunities for service providers, governments, and corporate organizations in the field of broadband services were proposed and touched on major areas that are outside the telecom arena but contribute to its success (Venkata Praveen Tanguturi and Fotios C.Harmanztiz, 2007).

Seymour and Naidoo pointed out that Broadband infrastructure is seen as crucial to a country’s social, economic and scientific goals and a requirement of the knowledge economy. Broadband has the ability to improve the lives of citizens as it can provide ICT skills for employment and improve access to online forms of education. It has been purported to provide consumers with better work/life balance attributed to increased empowerment and productivity, the ability to work from home and reduced stress. Furthermore they found that Users with higher usage of broadband in terms of variety or rate of use are able to work from home and purport to save time which results in a more comfortable lifestyle. They are more satisfied with the technology and show an interest in future-oriented communication technologies (Lisa F. Seymour and Mogen Naidoo, 2013).)

Goolsbee examined the demand for broadband Internet access using SP data from a 1999 survey of about 100,000 consumers. A probit model is estimated relating the probability of choosing cable modem Internet access to price and demographics such as years online, age, income, and education. After controlling for individual demographics, model results show an increase in the likelihood of cable modem access for people with lower incomes (Goolsbee, 2006)

Jackson et al suggested that always on connectivity and speed are critical or important in driving business toward broadband subscription. Integrated delivery of data, voice and video services was a relatively less important broadband driver to SOHOs (Small Office-Home Office) than always on and speed (Jackson et al, 2002).

Hatfield et al obtained data from a nationwide survey of US residences during 2002 were used to investigate household awareness of high-speed Internet access, profile Internet access and use, and gain insight into how important “always on”, cost, speed, installation and reliability attributes are in choice of service. It was suggested in the preliminary analysis that the relatively high awareness of cable modem and DSL availability. Almost 19 percent of the sample has high-speed connectivity, and the mean price paid per month for dial-up and high-speed access was $17.51 and $40.76, respectively. Preference for high-speed access was apparent among households with higher income, college education, and multiple PCs. 63 percent of high-speed users have more than five years of online experience, compared to 48.2 percent of dial-up users, and high-speed users were two times more likely to share music files and photos, bank, trade stocks and pay bills “many times a week” than dial-up users. Reliability of service, speed, and always on were important attributes to high-speed and experienced online users (Hatfield et al -, 2003).

Chetty et al pointed out that with the widespread broadband adoption, more households report experiencing sub-optimal speeds. Not only are slow speeds frustrating, they may indicate consumers are not receiving the services they are paying for from their internet service providers. Yet, determining the speed and source of slow-downs is difficult because few tools exist for broadband management. They reported on results of a field trial with 10 households using a visual network probe designed to address these problems. They described the results of the study and provide design implications for future tools. More importantly, they argued that tools like this can educate and empower consumers by making broadband speeds and sources of slow-downs more visible (Chetty et al -, 2011).

Jiya indicated that a coordinated inter-governmental approach on broadband initiatives is required to deliver high speed communications infrastructure to citizens (Lebogang Jiya, 2013).

Russo et al have occasionally noticed that when a provider upgrades its highest speed offering. During the regression analysis, every city except San Francisco, CA suggested that as a customer pays more, she receives a higher speed. But in San Francisco, CA, we found the relationship between speed and price is negative, due to some very cheap, fast plans that break from the city’s pricing trend (Russo et al -. 2014).

Beede observed that in sum, the report finds that the number of ISPs from which consumers can choose varies by speed; there are multiple providers of lower speed broadband but this number dwindles at higher speeds. All else equal, having fewer competitors at a given speed is likely to drive up prices. As a result, some consumers will decide not to adopt Internet access at all, some will choose a slower speed that otherwise, and some will economize in other ways (David N. Beede, 2014).

Paynter and Chung indicated that user satisfaction directly reflects retention. Narrowband and broadband users have slightly different satisfaction requirements. Whereas Connectivity, Speed, Email Service and Customer Support and Service (in order) are significantly important for narrowband users, Broadband users however perceive that Speed and
Customer Support and Service (in order) are the two significant importance factors (John Paynter and Winnie Chung, 2014).

M.Vanishree and Keerthy K observed that the brand name and low charges are the main factors which influence the customers to subscribe BSNL broadband. But the company should improve the quality of service, the internet access speed, the download limit and also the broadband speed (M.Vanishree and Keerthy K., 2016)

RESEARCH HYPOTHESES

The proposed study based on following omnibus hypothesis; further the omnibus hypotheses were divided in the alternative hypotheses.

The Omnibus Null Hypothesis

\( H_0 \) All Groups are not associated with the speed dimension of the broadband services.

Examining the association of speed dimension of the broadband services that might differentiate between groups

\( H_{a1} \) Age and speed are associated.
\( H_{a2} \) Education and speed are associated.
\( H_{a3} \) Occupation and speed are associated.
\( H_{a4} \) Income and speed are associated.
\( H_{a5} \) Selection of ISP and speed are associated.
\( H_{a6} \) Hours Spend on Internet and speed are associated.
\( H_{a7} \) No of Device connected with the internet and speed are associated.
\( H_{a8} \) Types of Device connected with the internet and speed are associated.

RESEARCH METHODOLOGY

The descriptive research design was adopted and the scope of the study was restricted to the four major cities namely, Ahmedabad, Surat, Vadodara and Rajkot of the Gujarat State. A stratified sampling with proportionate allocation method was applied. Primary data was collected through personally administered questionnaire and 362 respondents were asked their opinion on the Likert Scale. Measure of association such as chi square was employed and Interpretation of the analysis and results were presented in APA style. Primary data was analyzed using SPSS.

ASSOCIATIVE ANALYSIS

The associative analysis was conducted through Chi square test to observe the association and assess the goodness of fit to prove omnibus null hypothesis that all groups such as Age, Education, Occupation, Income, Selection of ISP, Hours spent on the internet, Types of Devices connected with the Internet and No of Devices connected on the Internet are not associated with the speed dimension of the broadband services.

| Table – 1 Chi-Square Tests and Symmetric Measures |
|-----------------|-----------------|-----------------|-----------------|
| Chi-Square Tests | Symmetric Measures | Value | df | Sig.* | Value | Sig** |
| Pearson Chi-Square | Nominal by Nominal | 11.464 | 6 | .075 | .178 | .075 |
| Likelihood Ratio | Phi | 12.269 | 6 | .056 | .126 | .075 |
| Linear-by-Linear Association | Cramer's V | 7.531 | 1 | .006 | .175 | .075 |
| 1 Age | Contingency Coefficient | |
| Pearson Chi-Square | 5.663 | 6 | .462 | .125 | .462 |
| Likelihood Ratio | Phi | 5.538 | 6 | .477 | .088 | .462 |
| Linear-by-Linear Association | Cramer's V | .012 | 1 | .912 | .124 | .462 |
| 2 Education | Contingency Coefficient | |
| Pearson Chi-Square | 14.299* | 6 | .026 | .199 | .026 |
| Likelihood Ratio | Phi | 14.943 | 6 | .021 | .141 | .026 |
| Linear-by-Linear Association | Cramer's V | 11.388 | 1 | .001 | .195 | .026 |
| 3 Occupation | Contingency Coefficient | |
| Likelihood Ratio | Phi | 10.56 | 6 | .103 | .120 | .109 |
| Linear-by-Linear Association | Cramer's V | .012 | 1 | .912 | .167 | .109 |
| 4 Income | Contingency Coefficient | |
| Pearson Chi-Square | 22.253 | 12 | .035 | .248 | .035 |
| Likelihood Ratio | Phi | 22.644 | 12 | .031 | .143 | .035 |
Table - 1 reveals non-significant results in determination of the strength of association between the Age, Education and Income versus selection of speed, it indicates that there was no association between the Age/Education/Income versus selection of speed variable. The symmetric measures also indicate that there was neither a goodness of fit nor strength of Association in terms of effect size.

However there was a significant results in determination of the strength of association between the Occupation/Selection of ISP/Hours spent on the internet/Types of Devices connected with the Internet/No of Devices connected on the Internet versus selection of speed, it indicates that there was an association between the Occupation/Selection of ISP/Hours spent on the internet/Types of Devices connected with the Internet/No of Devices connected on the Internet versus selection of speed variable. The symmetric measures also indicate that there was a goodness of fit and strength of Association in terms of effect size.

**DISCUSSION OF RESULTS**

Chi Square test was conducted to prove the omnibus null hypothesis that all groups are not associated with the selection of speed dimension.

**H₄₁ Age and speed are associated.**

The non-significant results offers the information (Table – 1 (1));\(x^2\) (6, N = 362) = 11.464, \(p = .075\). The symmetric measures output indicate the nonsignificant score of Cramer’s V (.075). The non-significant result of the Pearson Chi Square reveals: \(p (.075) > \alpha (.05)\) that indicates the preference of speed seems to be disassociated to the Age groups. Hence the H₄₁ was not proved and it was rejected. Therefore it was observed that the association between the age groups and selection of Speed was not found. Since this test involves a nominal/ordinal variable and there was not a 2 X 2 table; therefore Phi Score was not appropriate measure for the strength of association; the appropriate measure for the strength of association to use is Cramer’s V Score that indicate the effect size of the association. The Cramer’s V value was .126. Using the rule of thumb, this association was moderate.

**H₄₂ Education and speed are associated.**

Table - 1 (2) offers information on the non-significant results;\(x^2\) (6, N = 362) = 5.663, \(p = .462\). The symmetric measures indicate the nonsignificant score of Cramer’s V (.462). The non-significant result of the Pearson Chi Square reveals: \(p (.462) > \alpha (.05)\) that indicates the preference of speed seems to be disassociated to Education. Hence the H₄₂ was not proved and it was rejected. Therefore it was observed that the association between the Education groups and selection of Speed was not found. Since Cramer’s V Score indicates the effect size of the association. The Cramer’s V value was .088. Using the rule of thumb, this association was weak.

**H₄₃ Occupation and speed are associated.**

Table - 1 (3) reveals significant results;\(x^2\) (6, N = 362) = 14.299, \(p = .026\). The symmetric measures output indicate the significant score of Cramer’s V (.026). The significant result of the Pearson Chi Square reveals: \(p (.026) < \alpha (.05)\) that indicates the preference of speed seems to be related to Occupation. Hence the H₄₃ was proved and it was accepted. Therefore it was observed that the association between the Occupation and selection of Speed was found. Since Cramer’s V Score indicates the effect size of the association. The Cramer’s V value was .141. Using the rule of thumb, this association was moderate.

**H₄₄ Income and speed are associated.**

Table - 1 (4) shows the non-significant results;\(x^2\) (6, N = 362) = 10.402, \(p = .109\). The symmetric measures indicate the non significant score of Cramer’s V (.109). The non-significant result of the Pearson Chi Square reveals: \(p (.109) > \alpha (.05)\) that indicates the preference of speed seems to be disassociated to Income. Hence the H₄₄ was not proved and it was rejected. Therefore it was observed that the association between the Income and selection of Speed was not found. Since Cramer’s V Score indicates the effect size of the association. The Cramer’s V value was .120. Using the rule of thumb, this association was moderate.

<table>
<thead>
<tr>
<th></th>
<th>Linear-by-Linear Association</th>
<th>Contingency Coefficient</th>
<th>Phi</th>
<th>Cramer's V</th>
<th>Contingency Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Hours spend on internet</td>
<td>Pearson Chi-Square 31.473</td>
<td>9 .000</td>
<td>.295</td>
<td>.000</td>
<td>.241 .035</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio 29.822</td>
<td>9 .000</td>
<td>.170</td>
<td>.000</td>
<td>.283 .000</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association 10.976</td>
<td>1 .001</td>
<td>.283</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>7 No of Device Connected</td>
<td>Pearson Chi-Square 23.402</td>
<td>9 .005</td>
<td>.254</td>
<td>.005</td>
<td>.163 .022</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio 25.263</td>
<td>9 .003</td>
<td>.147</td>
<td>.005</td>
<td>.163 .022</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association 11.553</td>
<td>1 .001</td>
<td>.246</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td>8 Type of Device Connected</td>
<td>Pearson Chi-Square 9.626</td>
<td>3 .022</td>
<td>.163</td>
<td>.022</td>
<td>.163 .022</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio 9.784</td>
<td>3 .020</td>
<td>.035</td>
<td></td>
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<tr>
<td></td>
<td>Linear-by-Linear Association 2.315</td>
<td>1 .128</td>
<td>.110</td>
<td></td>
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</tr>
</tbody>
</table>

*Asymp. Sig. (2-sided) **Approximate Sig.
Selection of ISP and speed are associated.

Table - 1 (5) offers information on the significant results: $x^2 (12, N = 362) = 22.253, p = .035$. The symmetric measures also offer information on the significant score of Cramer’s V (.035). The significant result of the Pearson Chi Square reveals: $p (.035) < \alpha (.05)$ that indicates the preference of speed seems to be related to Selection of ISP. Hence the Ha5 was proved and it was accepted. Therefore it was observed that the association between the Selection of ISP and selection of Speed was found. Since Cramer's V Score indicate the effect size of the association. The Cramer's V value was .143. Using the rule of thumb, this association was moderate.

Hours spend on internet and speed are associated.

Table - 1 (6) reveals the significant results: $x^2 (9, N = 362) = 31.473, p = .000$. The symmetric measures also indicate the significant score of Cramer’s V (.000). The significant result of the Pearson Chi Square reveals: $p (.000) < \alpha (.05)$ that indicates the preference of speed seems to be related to Hours spend on the internet. Hence the Ha6 was proved and it was accepted. Therefore it was observed that the association between the Hours spend on the internet and selection of Speed was found. Since Cramer's V Score indicates the effect size of the association. The Cramer's V value was .170. Using the rule of thumb, this association was moderate.

No of Devices Connected with the internet and speed are associated.

Table - 1 (7) shows the significant results: $x^2 (9, N = 362) = 23.402, p = .005$. The symmetric measures also indicate the significant score of Cramer’s V (.005). The significant result of the Pearson Chi Square reveals: $p (.005) < \alpha (.05)$ that indicates the preference of speed seems to be related to No of Devices. Hence the Ha7 was proved and it was accepted. Therefore it was observed that the association between the No of Devices and selection of Speed was found. Since Cramer's V Score indicates the effect size of the association. The Cramer's V value was .147. Using the rule of thumb, this association was moderate.

Types of Devices Connected with the internet and speed are associated.

Table - 1 (7) indicates the significant results: $x^2 (3, N = 362) = 9.626, p = .022$. The symmetric measures indicate the significant score of Cramer’s V (.022). The significant result of the Pearson Chi Square reveals: $p (.022) < \alpha (.05)$ that indicates the preference of speed seems to be related to Types of Devices. Hence the Ha8 was proved and it was accepted. Therefore it was observed that the association between the Types of Devices and selection of Speed was found. Since Cramer's V Score indicates the effect size of the association. The Cramer's V value was .163. Using the rule of thumb, this association was moderate.

Conclusion

The present study examined the strength of association in respect of speed independent variables such as Age, Education, Occupation, Income, Selection of ISP, Hours spent on the internet, Types of Devices connected with the Internet and No of Devices connected on the Internet. The results suggest that Age, Education and Income groups are not associated with the speed hence they were found ineffective. Where as the Occupation, Selection of ISP, Hours spent on the internet, Types of Devices connected with the Internet and No of Devices connected on the Internet are associated with the speed hence they were found effective. This results helps in the articulating the speed feature of the broadband services. It was also observed that one can not compromise on the speed dimension. Occupation is associated with the speed it suggests that in economic life no one is ready to compromise the quality of work. The selection of ISP is associated with the speed therefore it suggests the competitiveness of the ISP; users are very cautious in the selecting the ISP on the dimension of speed. They are supposed to prefer better speed while selecting the ISP. Occupation, hours spent on the internet, No of device connected on the internet and Types of Device connected with the internet suggests the professional use of the internet; they are also supposed to prefer the better speed. This associative analysis would be more useful in formulating the marketing strategy.