AN EMPIRICAL FACTORS THAT INFLUENCES THE ADOPTION AND SELECTION OF INTERNET SERVICE:AN EXPLORATORY STUDY IN HIGHER EDUCATION

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Abstract – The purpose of the study is to investigate and identify the key factors that influence the adoption and selection of internet by students studying at the HE (Higher Education) institution. These factors determine the selection of the Internet Service Provider (ISP) and the time duration they are going to use their services. The research paper in an exploratory study that will assist in identifying the key factors that defines internet access quality and help the educational institution to improve the internet quality standards according to the inspirations of the students. In order to conduct the research, data was collected from 280 students who are using Internet at the HE institution and play a vital role in the selection of the service at their home or work. The findings from the research clearly indicate the factors that influences the adoption and selection of Internet services are based on cost of the service, bandwidth of the connection, reliability of the service, availability, and flexibility of the service are the key factors that influence the decision making process in the adoption of internet service.

Keywords – Internet Service Provider (ISP), Internet Users, Bandwidth, Reliability, Availability of Service.

I. INTRODUCTION

Internet is playing a vital role in the transformation of our educational institutions and how we disseminate knowledge to our young generation. In education sector the role of internet can't be ignored where we live in an unique era where the digital transformation and development of new knowledge is forcing institutions to rethink the usage of internet in the educational section [1]. The need of the hour is to ensure that students are ready for increased competition at the workplace where use of technology will play a vital role to promote collaboration, team work, and active participation to improve their skills sets which are crucial to be successful in this "Learning Society" [2]. With the exponential growth and influence of the internet on all economic sectors of our modern life has changed the meaning of internet from a repository of data to way of life [3]. The quality of internet access and the level of service provided for any institution is very crucial to succeed in this challenging environment as the demand to improve the QoS (Quality of Service) is becoming far louder than before. The research paper initially contains the literature review providing in-depth review of various critical factors that influence the decision to adopt and continue to use the internet service followed by the research question to be investigated. In the next section of the paper research methodology is discussed that will be deployed to investigate the problem followed by findings of the research in the last section.

II: Set the Context: A Brief Literature Review

Internet swiftly made an entry into our lives in the late 20th century and in a small duration of time spread across the world by providing rapid means of communication [3]. Use of internet not only provided various financial and employment opportunities but enabled an environment where people across the globe can know each other, find common things among various nations and identify differences of culture and religion that should be considered to achieve better understanding. The use of internet favors the educational institutions and the learning process by increasing the ease and speed of knowledge dissemination [4]. Integration of internet into higher education has allowed the access to information from different sources across the world becoming the main point of contact for students, researchers, and staff. For this reason the educational institutions are investing to take advantage of the technology and effectively use internet for teaching, learning, and research activities. According to [5] and [6], the integration of internet services at the educational institutions has resulted in revolutionary changes in enhancing the students' knowledge and intellectual skills as compared to the traditional closed classroom approach. The use of internet in education can achieve many benefits such as collaboration, team working, rapid transmission of knowledge, flexibility and change the teaching style where the material can be at remote location connected via internet [7]. The use of internet in higher education institution can open new venues to develop the learning process and provide a platform to students that can ensure flexible way of learning [8]. The business of education is affected by tech disruption just as other sectors where the dissemination of knowledge doesn't require to stay in a college campus anymore [9]. The use of internet and the quality of internet access for any institutions

is very crucial to succeed in this challenging environment. In the following section the paper will discuss the key factors that determine the adoption and use of internet.

A. **Internet: Access Quality Factors**

I) Pricing & Quality Factor

It has been reported throughout literature the critical issues related to internet access are quality of the connection, cost and reliability are major concerns for the end-users. It is evident that the exponential growth of internet provides opportunities that can enhance access to data, sharing of knowledge and information for an educational institution but there is an urgent need to clarify the concerns highlighted by the internet users and providers [11]. There is a massive increase of internet traffic due to high data rate applications and more use and sharing of content via social platforms. In order to manage these issues the network providers on a continuous basis increases the network capacity but quality issues are persistent due to overload of network traffic resulting in delays, poor quality, jitter and packet losses [12]. This will affect the service level and reduce the quality of standards for various applications such as VoIP, online gaming, e-commerce activities, and internet-television. These problems that are affecting the quality of internet services are due to systematic failures in the structure of the internet design. The first inefficiency that is reported mostly is the internet-flat rates. The congestion models highlights clearly that flat rates are considered as inefficient as all the service is given the same priority resulting in congestion [13]. There is a debate to give priority to particular services during the overload situation can be a solution but it risks discriminating some service providers and applications. The pricing is debated heavily and being a controversial issue with the usage of internet. Different authors have proposed a solution by suggesting the priority pricing in which users are ready to pay extra to receive priority services while facing a congestion solution. The cost and willing to pay extra can have an impact on the quality of service received by the provider. The decision to pay extra depends on various factors such as quality-sensitivity of the data and willingness of the provider to pay for such a service. The provider with quality sensitive service can consider to pay extra for traffic prioritization. The question that is not addressed in the literature is the mechanism to define the service quality sensitive status and uniform mechanism to define the cost that will be associated to the particular service based around its sensitivity. The cost plays a vital role in the selection of internet as the entire market is price dominated mass market that leads to end-users having more opportunities to compare process and move to the providers that are cost effective. The providers that offers lower cost would be able to attract more customers [14]. Cost being a major factor in the decision of selecting the internet services.

II) Quality of Service (QoS) Factor

The next factor that affects the adoption and use of internet is the Quality of Service (QoS) offered by the internet service providers. According to [15] the service quality defines standards and create competitive advantage by offering a differentiator factor. The provider offering better service quality will result in customer's satisfaction and promotes consumers loyalty and more business [16]. Service quality is an essential element and important for internet provider to establish and maintain loyal and profitable customers for the future [17]. Service quality is different from the quality of manufactured good as the services are intangible so it can a major hurdle for the service provider to offer better quality service consistently as the market is changing considerably. The competition between the internet service provider is intense in which the network bandwidth extension and up gradation is one element that is implemented for customers retention to provide better services. The service quality states the difference between the customer's expectations from the service compared to their presume perception of service performance [18]. It is clearly evident that better Quality of Service (QoS) can play a direct role in the customer's retention which will be profitable for provider. The internet provider by offering effective quality of service can positively impact the retention of customers, attract more business, increase financial gains, and reduce resistance to use the service [19]. It is evident that Quality of Service (QoS) offered by the provider play a vital role in the adoption and use of service.

III) Bandwidth Consumption and Slow Speed

As the networks are being shared by large amount of end-users resulting in slow speed due to bandwidth consumption. This leads to congestion where the users have to wait for a very long time for a simple request to be completed. The situation is similar to rush hour on the public roads when traffic at a particular peak time can result in excessive delays. According to the white paper published by Cisco, 2012 "Bandwidth Consumption and Broadband Reliability", one of the major problems reported by the internet users was "slow speed". The research paper further highlights the underlying reasons to the bandwidth consumption and slow connection speed as the majority of users are streaming content and using real-time application which has become a norm in this day and age. The Bandwidth Consumption and Broadband Reliability study reveals major challenges emerging due to bandwidth consumption and slow connection as the network usage is growing in complexity and demand with more devices per connection trying to access the richer application. This exponential growth of devices and demand to access high definition applications has created a bottleneck which is resulting in bandwidth consumption and slow connection speed. The study identifies that the amount of bandwidth consumption per home is growing and it is expected to grow more than four times around 2018. At the same the growth of mobile smartphones and tablets are showing the fastest growing sector which is resulting in contention within the home network for a shared resources. So bandwidth and connection speed influences the decision to adopt the internet service and possess high importance for the end-users.

IV) Reliability and Security Factor

The security challenges are not new when dealing with information technology as the internet user is facing unique security challenges. Providing reliability and dealing with security issues faced by the internet user must be on the top priority list. Internet users' needs to trust the service and provider from various vulnerabilities as the use of technology is now an integral part of our lives [20]. The security of internet users is a major challenge as poor secured

connections can affect the security and resilience of internet access globally. With the growth of internet penetration on the increase the global e-commerce is also a major beneficiary of this technology. Ever-increasing number of internet users are shopping online with comfort. Due to this advancement there is an expansion to criminal activity led by cybercriminals how are involved in illegal activities over the internet using spams, malwares and phishing scams. One of the major issues highlighted by the internet users is spam which is a cause of concern. According to MessageLabs Intelligence [21], the global ration of spam in an e-mail traffic is on increase. The report states that global ration of spams in email traffic is 75.8% which is one in every 1.32 emails received. The recent trends indicate that the level of spam is on increase and Russia is the most spammed country in the world with the rate of 82% according to the report published [22]. For internet users spam message considered as low risk but it can lead to identity theft and financial loss for the users. The other problem faced by the internet user is malware which is more serious as it is software or a program used for malicious or fraudulent intent to steal highly confidential data [23]. According to MessageLabs Intelligence report identified that one in every 290.1 emails worldwide contains some sort of malware that are used to steal user's data for illegal activities. The report indicates that the highest level of malware detected in South Africa is one in 81.8 emails that contains malware and virus. The cybercriminals are using portable document format (PDF) file attachment as an attack vector with the usage increase from 12.4% between 2009 and 2010 [24]. These criminals are using the PDF to share electronic document to conceal malicious programs which is a major threat to the internet users. These malicious program act as spyware to steal private data such as passwords, medical insurance information detail, credit card to be used for illegal activity. As mentioned in 2010 [25], more than 100 cybercriminals were arrested stealing $70 million from bank account using the crimeware toolkit names 'Zeus'. The internet users in developing countries are more susceptible to these attacks as the licenses for operating system are not registered and getting antivirus software is too expensive. This vulnerability can lead to compromise of privacy and network security issues which are a major concern for internet users. So it is consider as a major factor in the adoption of internet services. The following figure 1 highlight the key factors that are influencing the end-users while adoption or use of internet services.
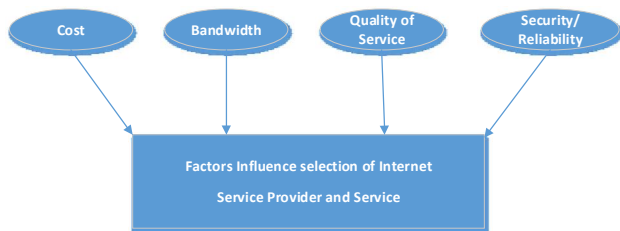

Figure 1: Factors Influences the selection of Internet

The next section of the paper will present a research questions followed by the research methodology that will be used to conduct the research.

RESEARCH QUESTION

Q) What factors contribute to the adoption and usage of internet as a service at the Higher Education institution?

The main question to be investigated is the factors that contributes in the selection and usage of internet as a service at the Higher Education institution. These factors helps the decision making process to select internet services and differentiate various internet services based on the quality of service offered. For end-users these factors will help to decide which service provider provides better Quality of Service (QoS) according to their expectations and demands.

Methodology

For this research in the HE (Higher Education) institution 280 students from different specialization were selected between the age of (18-25). The group has 150 male and 130 female students as participants in the research studying at different levels at the HE institutions. The participants in the research are frequent users of internet having multiple electronic devices and prefer to communicate using online social platforms. These group of students are also decision maker in the selection of internet connection for their personal usage at home and are well familiar with the underlying issues and problems they face while using internet at home, at work or at the HE institution. The research methodology that will be deployed in order to collect qualitative data is Grounded Theory. The methodology best suites this research as it will collect data from people who have experienced the issues faced by the HE (Higher Education) institutions. As reinforced by Fortin [30], Grounded theory provides mechanism to collect data from a particular area from those individuals who have relevant experience in that field. As reinforced by [30], grounded theory is a comprehensive technique for data collection by using semi-structure interviews from the key stakeholders, using observations, conducting questionnaires from the focus groups that will generate data for grounded theory. The theory is flexible [31] as it provides a systemic way of clearly defined analytic steps but at the same time provides flexibility for the researcher to make adjustments to meet the research requirements. The theory allows the researcher to collect data from the participants, provide a mechanism to identify the data by using open coding, and provide relationships between different key areas and entities. The participants in the research are selected according to the job designation or title from different areas so that different opinions are gathered in the research. The theory is a systematic methodology in the social sciences involving in the detail analysis of the data and tries to establish relationships between set of data as seen from the following figure 2.
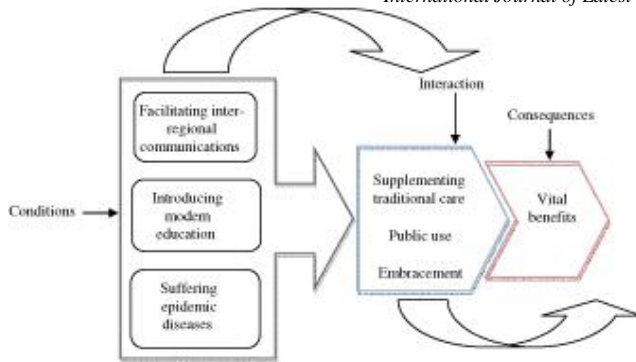
Figure 2: The Grounded Theory [31]

For the research initially the permission from the case study HE (Higher Education) institution was obtained to conduct the research from students at the institution. After the approval, emails were sent to the students to voluntarily take part in the research. Participants were divided into different groups and online survey with series of questions were asked from the participants. The participants to answer the questionnaire were presented with the consent form that stated the data usage policy that has been previously approved by the case study 'Management Ethics committee'. The data will collected from different participants will presented by using a coding system to hide the identity of the participants. The findings of the research will be presented in the next section.

Results and Discussions

Q1: How many web-enabled devices you have in your possession?

The data collected from the question is represented in the following Figure 3 from students clearly indicates that the overwhelming majority of respondents have multiple web-enabled devices. 55% of respondent have between 1-3 web enabled devices, whereas 20% have 4-6, 12% 6-8, 10% 8-10 and 3% have 10+ web-enabled devices in their possession. The data highlights clearly that the students more than ever before have multiple devices in their possession to access and use internet services.
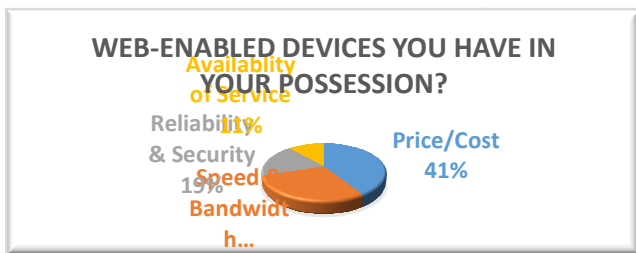

Figure 3: Web-enabled Devices in Possession

Q2: Do you regularly use bandwidth rich application such as online gaming, video conferencing, and e-commerce?

The overwhelming majority of students 82% agreed that they regularly use bandwidth rich applications such as online gaming, video conferencing whereas 18% respondent stated that they don't use bandwidth intensive application on a regular basis as presented in Figure 4.
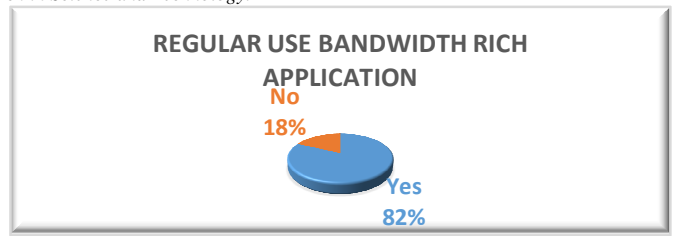

Figure 4 Bandwidth Rich Application Usage

Q3: Did you contacted ISP (Internet Service Provider) bacause of poor QoS (Quality of Service)?

The data collected for the above questions clearly indicates that 71% of respondents were not pleased with the Quality of Service (QoS) offered by their ISP (Internet Service Provider) and have reported this to the provider whereas 29% never contacted their ISP due to poor QoS (Quality of Service) as shown from the Figure 5.
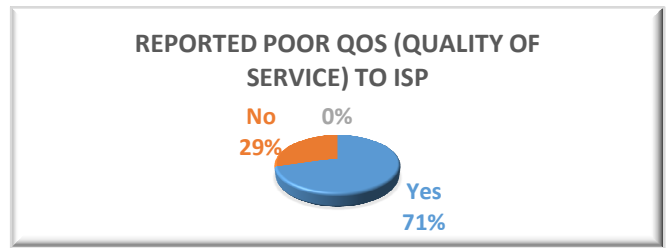

Figure 5: Reported poor (QoS)

Q4: Which problem you reported to the ISP (Internet Service Provider)?

The respondents are facing various problems while using the internet service. 43% of respondents reported slow connection speed, 27% respondents reported outages of service or poor quality of service, 18% respondent cost as a major problem while 11% reported security and reliability as problems to the provider as detailed in the Figure 6.
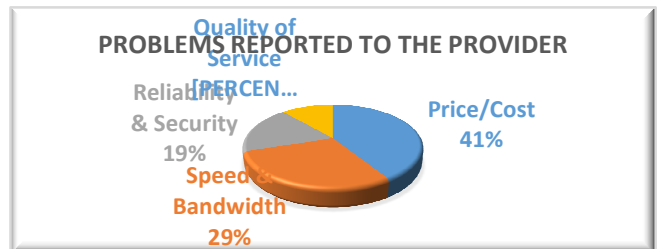

Figure 6: Problems reported to the Internet Provider

Q5: Identify the Top factors that influence the selection of Internet Service Provider and best service offered?

It was evident from the data collected as shown in **Figure 7**; Cost/Price (41%) of the internet package is the top factor that influence the decision in the selection of the service whereas for 29% of respondents speed and bandwidth for the internet connection is the factor that influences their decision while selecting the internet service. For 19% of respondents reliability and security whereas 11% is the overall Quality of

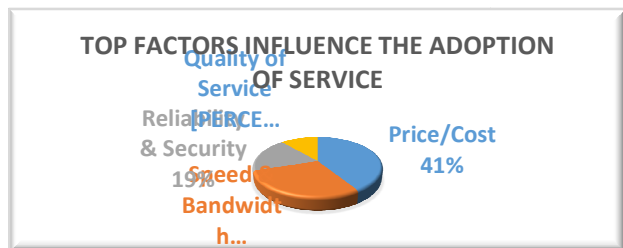Service (QoS) is factor that influences their selection of internet service provider and service offered.

Figure 7: Factors that Influence the Adoption of Service

CONCLUSION

  Internet swiftly made an entry to our lives in the 20th century and in a small duration of time spread across the world by providing a rapid mean of communication by getting people closer to each other. The quality of internet access and the level of service provided for any institution is very crucial to succeed in this challenging environment as the demand to improve the QoS (Quality of Service) is becoming far louder than before. The research was able to indicate the following findings that states the key factors that influence the adoption and usage of internet service by the student's studying at the HE (Higher Education) institution. The findings of the research are as follows:-

1. Key factors that influences the decision to use a particular internet service is based around factors such as cost, bandwidth or spend of connection, reliability & security of the connection and overall QoS (Quality of Service).

2. 41% of student's respondent by stating cost/price as a key factor that will influence the selection and use of Internet Service Provider and service.

3. 29% of student's respondent by stating bandwidth/ speed of internet connection as a key factor that will influence the selection and use of Internet Service Provider and service.

4. 19% of student's respondent by stating reliability/ security issues as a key factor that will influence the selection and use of Internet Service Provider and service.

5. 11% of student's respondent by stating that overall QoS (Quality of Service) as a key factor that will influence the selection and use of Internet Service Provider and service.

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