



Factors influencing broadband adoption and digital content consumption in developing countries: A case from Pakistan

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Abstract

The importance of being connected and of citizens' access to the information society, along with the social and economic benefits it brings with it, has been well recognised and documented. However, studies related to household adoption and the impact of ICT, especially broadband Internet, are largely overlooked. The majority of the research associated with the topic of broadband is exploratory in nature, mainly focusing on the various aspects of technology in use and provides very little insight into consumer adoption, digital content consumption, or rejection determinants. This paper attempts to redress the issue and provide detailed analysis on the factors that influence broadband adoption, digital content consumption, and rejection determinants in a developing country like Pakistan. The research reveals that household income, education, age, and gender play a very important role in determining the level and type of Internet access. The research also suggests that the price of broadband service remains a barrier to adopting broadband service for consumers. Households with high incomes were 39% more likely to adopt broadband than lower-income households. The level of access and consumption of digital content is much higher among males than females, creating a digital divide in access and digital content consumption.

Keywords: broadband adoption; digital content consumption; digital divide; broadband rejection determinants; broadband price.

Introduction

Policymakers, academics, and researchers have examined national broadband policy from various angles. From a development perspective, interest in this topic stems from the economic growth potential that has been linked with widespread broadband adoption (Crandall and Jackson, 2001). However, the widespread adoption of broadband also leads to a number of direct benefits for consumers. Access to online services can lead to better information about jobs, education, and healthcare (Brodie *et al.*, 2000). Additionally, broadband access can also improve quality of life through greater convenience, increased information, and increased involvement with civic, government, and community organisations (Norris, 2001). Broadband promises to connect communities and provide substantial economic benefits to a large portion

of the population by providing access to information and decreasing the total cost of communication. Many of these benefits, however, are dependent upon the adoption of broadband technologies. Even though broadband penetration is on the rise globally, the distribution of available broadband in developing countries is still a cause for concern among policymakers. A number of development experts have documented the emergence of a digital divide separating households that have regular access to online information from those that do not. They are also of the view that if the divide is allowed to persist, broadband-related benefits will accrue disproportionately to certain segments of the population. The socio-economic factors of this divide have been explored in several studies. Researchers have collected evidence on the under-provision of broadband to rural households, economically disadvantaged regions, and areas populated primarily with racial minorities (Hoffman

and Novak, 1998; Parker, 2000; Prieger, 2003). Using household data and diffusion analyses, various studies have also explored how geography is related to consumer diffusion of broadband technologies (Greenstein and Prince, 2006).

Due to the fixed costs involved with deploying these networks, availability of broadband technologies is often determined by estimates of local demand. Researchers have used different approaches to illustrate the determinants of household demand for broadband access. In the INDEX project, researchers gauged consumers' willingness to pay for higher bandwidth. They found that the subjects in their research were willing to pay relatively little for higher bandwidth, but they suggest that this may in part be due to the lack of compelling broadband applications available at the time of the experiment (Varian, 2002). Other research studies have looked at demographic factors that influence household demand for bandwidth. Madden and Simpson (1996) showed that socio-economic factors are related to interest in network subscription, so that there is strong potential for a disadvantaged, information-poor class to develop. Rappoport *et al.*, (2001) used data from ten cities to determine what demographic and usage factors distinguish narrowband households from broadband households. They found that demographic characteristics alone do not provide a clear distinction between broadband households and narrowband households, but they discovered that prior usage of narrowband services and the opportunity cost of time are good predictors of broadband adoption. As broadband penetration continues to increase and governments step in to fill market gaps in broadband provision, some researchers have turned their attention from availability towards usage. The availability of various broadband technologies, social support, and skills have shown to drive large variations in household internet usage (Dimaggio and Hargittai, 2001), as have demographic and other individual factors (Kraut *et al.*, 1996). In a recent study, Goldfarb and Prince (2006) found that higher-income people are more likely to have adopted Internet access technologies and lower-income people provided with Internet access are more likely to spend more time online. They also advocate that if provided with Internet access, non-adopters will use the Internet for

many of the purposes intended by policy initiatives, such as telemedicine and e-government.

Theoretical foundation and previous research

The importance of being connected and citizens' access to the information society, along with the social and economic benefits it brings with it, has been very well recognised and documented. Information and communication technologies (ICTs) are arguably the most potent tools shaping the twenty-first century as they redefine the way human beings communicate, learn, work, and play. In essence, ICTs are re-defining how we live. As tools for human development and empowerment, ICTs have no equal. Their ability to enable inclusion and access to information, as well as to offer a vast array of opportunities across the social, economic, environmental, and political domains, make them strategic tools for individual, national, and global development (Rahim *et al.*, 2005). The purpose of this paper is to give an overview of broadband Internet adoption and digital content consumption in Pakistani households in order to understand the extent to which Pakistani households are able to participate in the knowledge economy that is deemed so essential.

When reviewing literature and published material on Internet adoption in Pakistan, it is striking to see how little or that no material is available. There is no previously known work available which examines broadband Internet adoption trends over a longer period of time. Researchers have been studying the adoption and impacts of ICTs at the organisational and individual level. However, studies related to household adoption and the impact of ICTs, especially broadband internet, are largely overlooked. One of the first studies to examine the adoption of personal computers and the Internet in households was undertaken by Venkatesh and Brown (2001). The findings of their research revealed that the decisions of the adopters and non-adopters are significantly different. The adopters were influenced by social factors, while non-adopters were partial to changes in technology. To continue the aforementioned research, but in a different country and subject area (Anckar, 2003), offered an understanding of the drivers and

inhibitors to e-commerce adoption within the households located in Finland. Although such studies are becoming prevalent, they are yet to be extended to examine the adoption of emerging ICTs such as broadband Internet. This is due to the technology in question, which is broadband and which is still taking off. The research associated with the topic of broadband is exploratory in nature, mainly focusing on the various aspects of technology in use and provides very little insight into consumer adoption, digital content consumption, or rejection determinants.

Using South Korea as a case study, Lee *et al.*, (2001) found three major factors that explained the high rate of broadband adoption in the country. A recent study suggested that there are six success factors responsible for achieving the highest penetration rate of broadband in South Korean households (Lee *et al.*, 2002; Choudrie *et al.*, 2003; Dwivedi *et al.*, 2003), who examined the Internet service providers (ISPs) opinion on the deployment of broadband, offered a different perspective. The findings suggest that a high price, lack of content, and lack of awareness are amongst the major factors that have severely affected the uptake of broadband in the UK households (Dwivedi *et al.*, 2003). The South Korean and UK studies are not the only contexts that have been investigated for broadband

adoption at the national levels. Other exploratory studies conducted on different countries are those of Shim *et al.*, (2003) – Sweden; Gardner (2003) and Chang *et al.*, (2003) – Australia and Canada. These studies are valuable in recognising the macro factors; however, they provide little insights on broadband adoption at the household level. The differential rates of usage and adoption of broadband Internet suggest that understanding broadband connectivity is a complex subject. Therefore, systematic research efforts like the present research on the adoption of broadband and digital content consumption in households is necessary to identify the possible factors for unequal adoption and digital content consumption.

Data sources

Previous research has revealed that the survey method is most appropriate when investigating unequal technology adoption and usage patterns (Tan and Teo, 2000; Venkatesh *et al.*, 2000; Venkatesh and Brown, 2001; Ankar, 2003). On the basis of previous research, survey research methodology was considered to be the most suitable research method for this investigation. The interviewer administered questionnaire survey is considered to be the most appropriate method of



Figure 1. Research locations.

collecting representative data of the target population within a limited time frame and with limited resources. This questionnaire-based method also addresses the issue of information reliability by reducing and eliminating differences in the way in which questions are asked (Cornford and Smithson, 1996), and it facilitates data collection from the majority of respondents within a short period of time (Walliman, 2001). Different factors, such as social, economic, ethnic, cultural, modernisation, and Internet access were considered before selecting the three research locations, i.e. Karachi, Lahore, and Quetta. The primary objective was to get a diverse sample from all regions of Pakistan with different ethnicity, language, cultural values, and socio-economic status of their populations, along with different stages of modernisation and access to ICTs.

Sampling

The overall survey methodology was designed under the supervision of Prof. David Souter.¹ The first phase of the research consisted of researching slow broadband uptake and Internet growth in Pakistan over the years, as well as the benefits that broadband can bring to Pakistan's economy. Since there was no information available on the digital content consumption pattern of Internet users of the country, the idea was to analyse the bottlenecks of broadband and also get an idea on the digital content consumption patterns of broadband Internet in the country. The second phase consisted of questionnaire design, and it was made sure that the overall length of the questionnaire was not too long (as there is always a limit to how much time respondents are willing to devote to answering questions for a household survey). Secondly, with the limited timeline for the research it would not have been possible to gather a lot of information so it was decided to focus more on the questions that would answer the research question for this study. The selection of questions was made based on the nature of information required to achieve the research objectives. In light of this, the questionnaire was designed to secure information about:

1. **Demographic descriptors** – Respondent's name, gender, age, address, education level, household characteristics (monthly income, monthly expenditure, and number of dependants).
2. **Access and online behaviour** – Respondents have access to computer, Internet, places to access the Internet, amount of time and money spent on Internet connection, advantages and disadvantages of the Internet, usage of Internet connection, and preferred language to use the Internet in.
3. **Awareness and adoption** – Awareness of broadband services, reasons for not adopting broadband services, and amount of money willing to spend on acquiring broadband services.

The first draft of the questionnaire was sent out for field testing to give an idea of how the questionnaire works and whether the respondents are able to understand it easily. Twenty people were selected for the pre-testing of the questionnaire, which consisted of 24 questions and took 5–10 min on average. Generally, most of the people interviewed for the survey were happy with the length of the questionnaire, the wording of the questions which were easy to interpret, and the amount of time it took to complete the survey form. The targeted sample size for the survey at each research location was set around 250 households. This would provide an aggregate sample of 750 individuals from the households, which is a large enough sample to provide statistically useful data for analysis and comparisons. The cities were divided into different zones based on the socio-economic status of the people. The reason for dividing the cities into zones was to get a diverse sample that was representative of the population and also sufficient enough to indicate patterns of behaviour, usage, availability, and access to ICTs based on socio-economic demographics. A random sampling method was adopted in the selected research locations for interviewing the household's individuals. It was very important for the research sample to have a full range of income level groups, gender groups, and literacy level groups in order to assess the adoption and non-adoption of broadband and digital content consumption patterns. The samples collected from the three cities were consist-

1 An international ICT4D expert with more than 20 years of experience in research design and implementation of ICT research.

ent enough for cross city comparison and representativeness of the population as a whole.

The demographic data reveals that the least number of respondents belong to the age group of 55 and above, while the age groups between 15–35 represent the maximum number of respondents. Both the male and female genders were represented almost equally in the returned sample.

Using the collected sample data, our research analysis reveals the difference between adopter and non-adopter’s households and explores the impact that age, income, education, and location has in determining digital content consumption patterns in Pakistan. This data set can be used as a basis for the assessment of how well an information society fits the needs of various groups of Pakistanis.

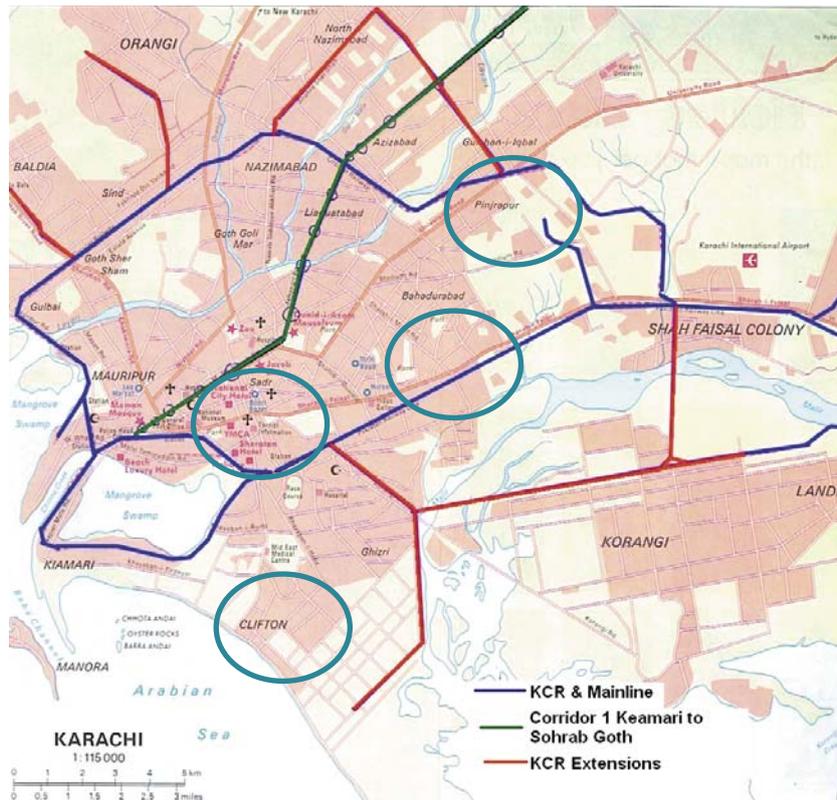


Figure 2. Map of Karachi City showing research areas.

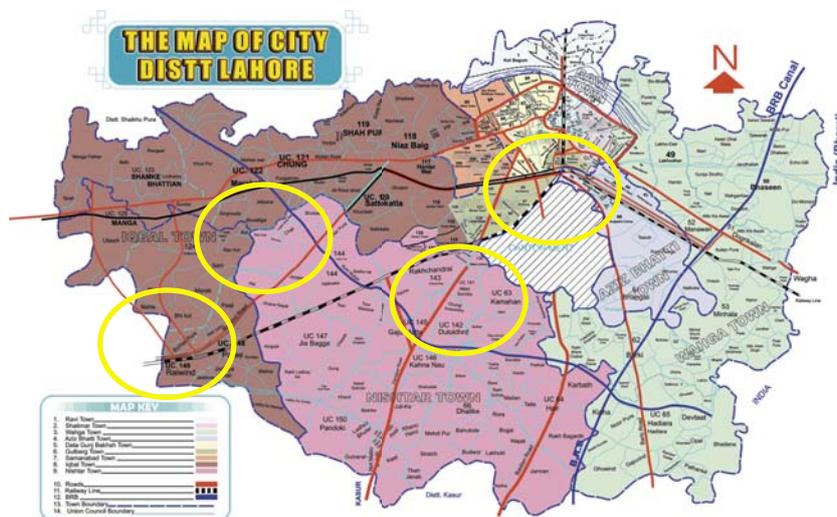


Figure 3. Map of Lahore showing research areas.

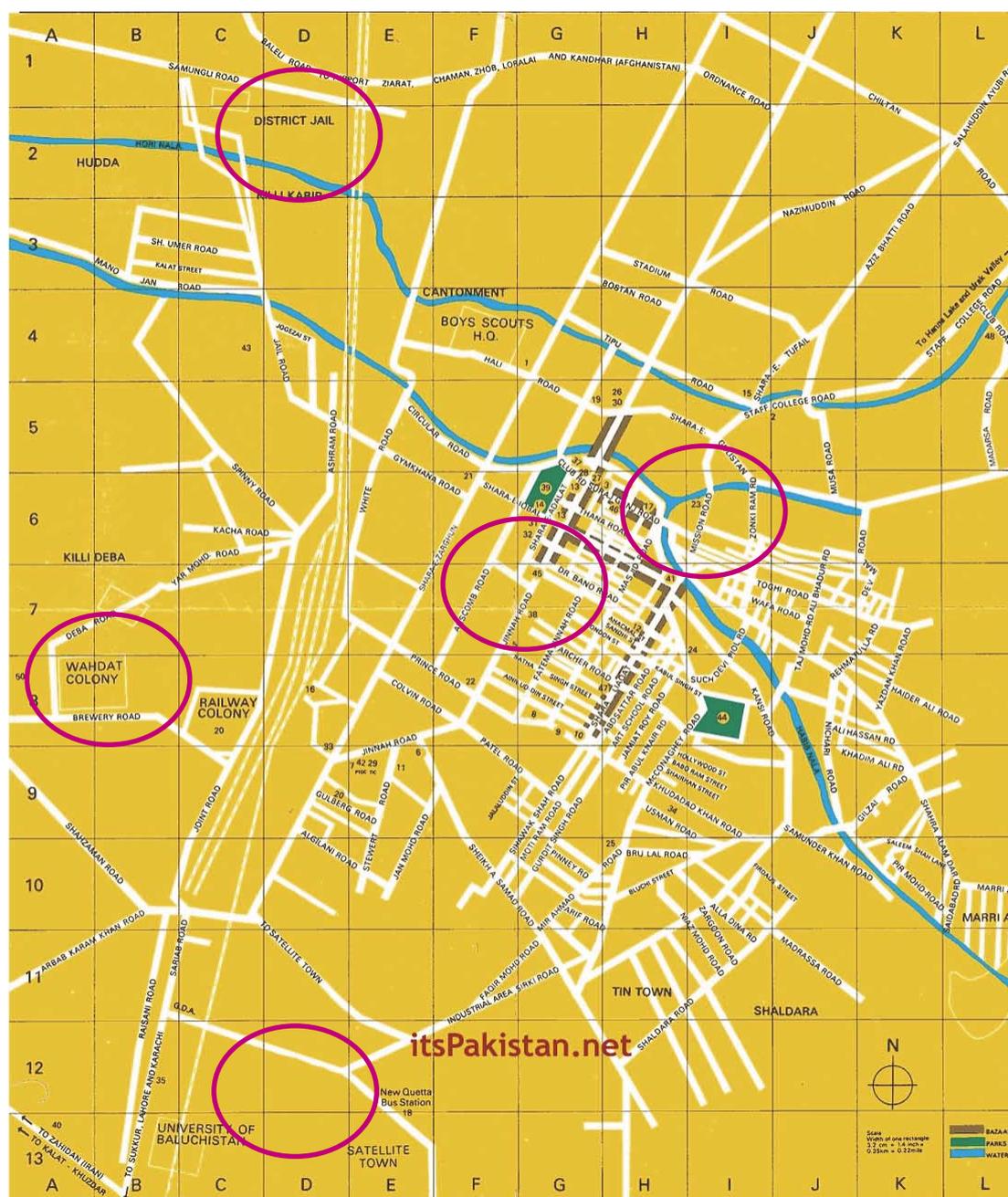


Figure 4. Map of Quetta showing research areas.

Table 1. Breakdown of respondents by location.

City	Respondents	Male	Female
Karachi	233	196	35
Lahore	214	101	113
Quetta	225	173	52
Total	672	471	201

Table 2. Demographic details of respondents.

Age	Male	Female	Male%	Female%	Total
15-25	139	138	50.2	49.8	276
26-35	230	40	85.2	14.8	271
36-45	70	11	86.4	13.6	81
46-55	28	04	87.5	12.5	32
55+	03	03	50	50	6

Research analysis

The slow and unequal adoption of broadband in many countries, including developing countries like Pakistan, generates considerable academic and public debate. Despite the provision of broadband access, the demand for broadband has not increased as expected in many countries around the globe. Researchers are suggesting that the provision of broadband can be more ‘demand constrained’ than ‘supply constrained’ (Haring *et al.*, 2002). Ford *et al.*, (2007) argue that a household’s decision to subscribe to broadband is influenced by a number of factors, including income, education, availability, and affordability. Household income is one of the major determinants for broadband Internet adoption and to analyse the opportunity, households with various income levels have to participate in the information economy.

Table 3 shows the economic status of household individuals interviewed from all three cities. The monthly earning of 51% of the respondents was between 10 000–20 000 rupees per month, which resembles the economic condition of the country since most of the population belongs to the upper and lower middle class and a very limited to the higher class. The sec-

ond highest percentage is the income level group of 21 000–30 000 rupees, and there are very few in the highest monthly income range. Adoption of any technology, including broadband Internet, requires investments in initial fixed capital, as well as recurring variable costs. A lower income level implies that users have to invest a higher proportion of their income in acquiring and using a technology. The total perceived sacrifice in adopting the technology is thus higher for individuals with lower income levels. From the income levels, it can also be seen that the higher the income level, the higher the percentage of males. The overall percentage of income per month of women is less than that of men.

Broadband adoption and digital content consumption patterns

Adoption of personal computers

The issue concerning PC technology adoption in households is both a cultural and an economic one. The potential complexity or ease involved in computer use is also a strong attitudinal antecedent which may influence the computer adoption decision. The influx of second-hand cheap computers in Pakistan has seen the

Table 3. Monthly income of respondents.

Monthly Income		Male	Female	Male%	Female%	Total
10-20K PKR	117-235 USD	161	92	63.6	36.4	253
21-30K PKR	247-352 USD	82	27	75.2	24.8	109
31-40K PKR	364-470 USD	49	13	79	21	62
41-50K PKR	482-588 USD	19	04	82.6	17.4	23
51K+ PKR	600 + USD	36	08	81.8	18.2	44
Total=		347	144			491

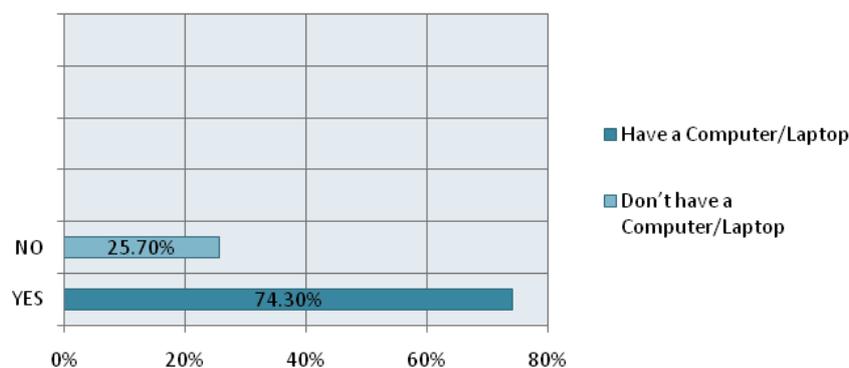


Figure 5. Ownership of computer in household.

adopting of computers taken off in the country. The result of the survey shows that 74.3% of household individuals interviewed in the survey owned a laptop or computer at home.

In general, individuals who owned a computer at home felt it was necessary for their children to grow up computer literate. Adults use computers for information and entertainment purposes. The people who did not own a computer were mostly unable to afford a computer/laptop or did not feel the need to buy one (Figure 5).

Figure 6 details the ownership of PCs in households in Pakistan on the basis of monthly income. The gap between the lowest income cohort and the highest income cohort is considerable and may be due to lack of financial resources and the rising of cost of living.

Adoption of the Internet

Internet adoption patterns in Figure 7 highlights interesting trends in access to the Internet among households in Pakistan. The major-

ity of individuals interviewed in the survey use the Internet from home (67.10%), while accessing the Internet from a work location was second highest (30.50%).

Most of the females interviewed in the survey access the Internet from home, while Internet cafés were their least preferred location to access the Internet from, owing to the cultural barriers and limited accessibility for females.

Accessing the Internet

Level and type of Internet access at home strongly depends upon a number of complex variables, such as availability of technology, gross income, education, age, and gender. Figure 9 shows the type of Internet connection available to access the Internet at home in Pakistan. As it is apparent, dialup is still the most dominant method of accessing the Internet in Pakistan. Even though we have witnessed a surge in the take-up of other broadband services, the majority of households are still connected to the Internet using the narrowband connection.

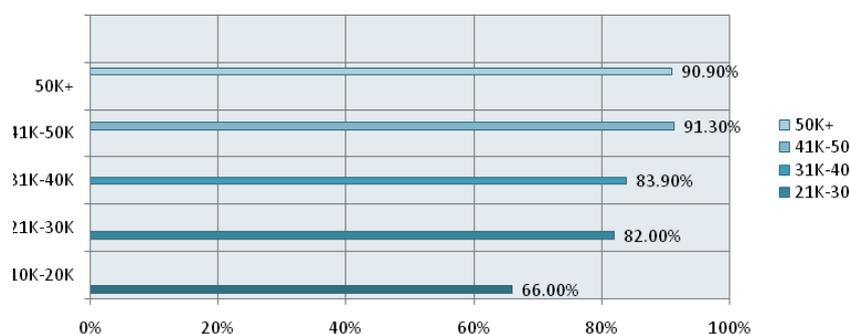


Figure 6. Ownership of PCs on an economic basis.

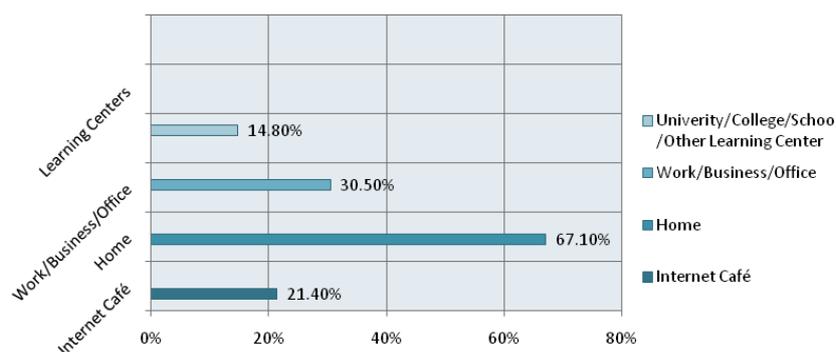


Figure 7. Access to the Internet.

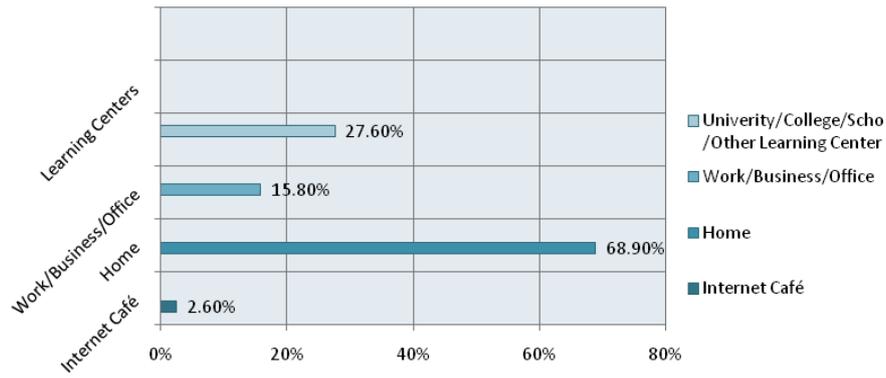


Figure 8. Female access to the Internet.

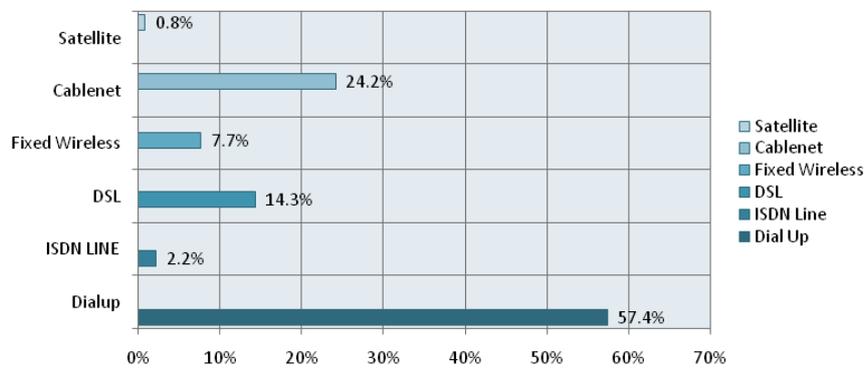


Figure 9. Methods of connecting to the Internet at home.

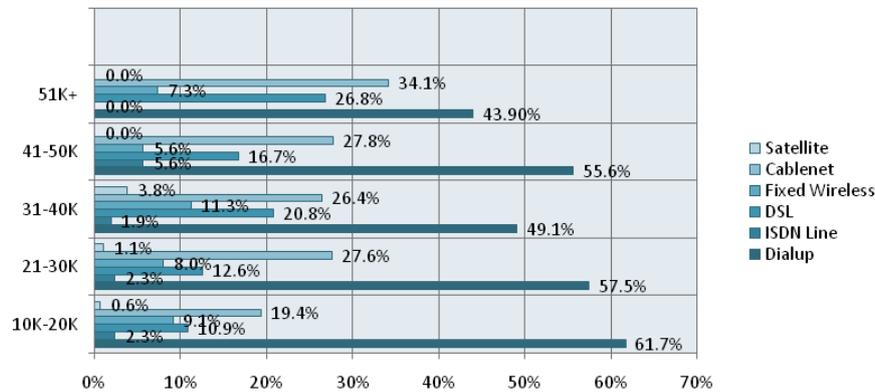


Figure 10. Income and type of Internet connection.

Dholakia (2006) and others indicate that economic resources and availability of technology are key determinants for choosing connection type in households. Figure 10 details the type of connection against income. As compared to low income households in Pakistan, a high percentage of high-income households have adopted high-speed broadband connections such as DSL and cable.

Time spent online

The average weekly time spent online can depend upon various factors, such as income level of households, age (younger and middle aged people tend to spend more time online), household size, and type of connection (broadband or narrowband) used to connect to the Internet. Figure 11 indicates pat-

terns of average weekly time spent online by household individuals. The weekly time spent online is distributed into two groups:

- 1. Heavy Internet Users:** Household individuals who are spending more than 10-50+ hours a week online are categorised as heavy Internet users.
- 2. Low Internet Users:** Household individuals who are spending 1–10 hours a week online are categorised as low Internet users. These categorisations have been done for the ease of understanding and comparisons for the research work.

With the rise in income levels, the time spent online also increases, which is creating a

divide between high and low income households. The divide is more evident between men and women where 72% of the men were spending more than 10–50 hours online in a week, compared to 28.6% of women who were spending the same amount of time online in a week; 28% of men were spending 1–10 hours a week compared to 71.4% of women who spent 1–10 hours online in a week.

Women in Pakistan fall short of men in the amount of time spent online in accessing the Internet. It appears from previous studies, and as highlighted above, that the time spend online depends on such well-known characteristics as age, gender, race/ethnicity, weekly employment hours, education, and income (Davidson

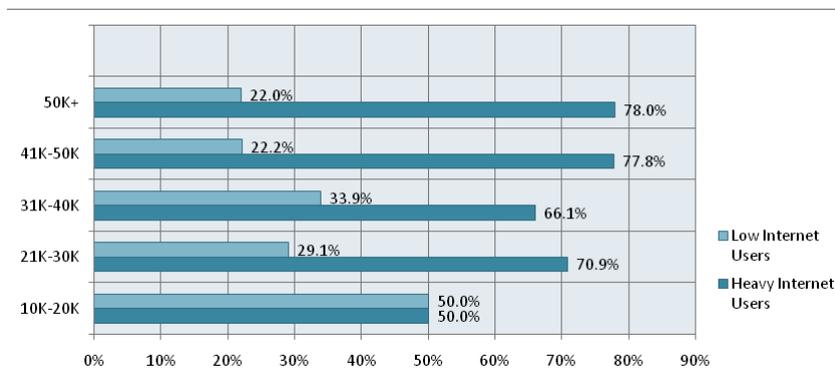


Figure 11. Internet usage pattern consumption on basis of monthly income.

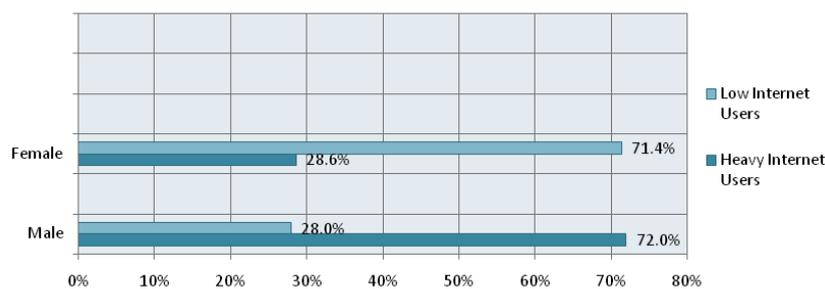


Figure 12. Divide between men and women in spending time online.

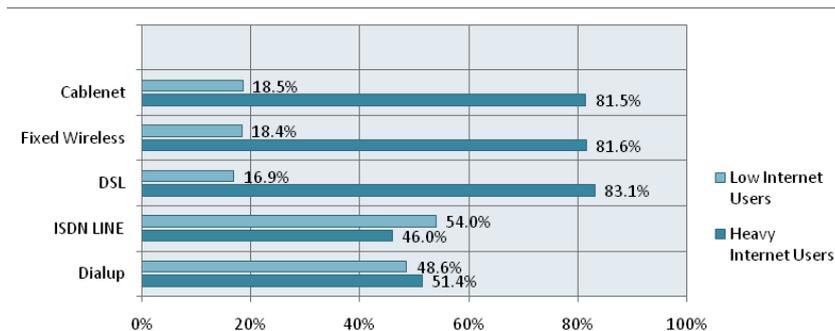


Figure 13. Type of connection and time spent online.

and Cotton, 2003; Fallow, 2005; Nie *et al.*, 2005; Dholakia, 2006). Another relevant factor is the Internet connection speed (dial-up/broadband), which is associated with time online (Davidson and Cotton, 2003). The effects of all these variables are often quite complex and interwoven with one another. Figure 13 details the time spent online and type of Internet connection used. It is clearly evident that households with high speed broadband connection are spending more time online in Pakistan than compared to narrowband Internet connections users.

Digital content consumption

How most people consume digital content with an Internet connection has been of great interest for academics and scholars. The behaviour of Internet users also depends on several factors, like the age of user, type of Internet connection, and the amount of time spent online; 65.5% of the respondents used their Internet connection for Internet surfing and web browsing, followed closely by accessing e-mail with 65.2%. The using of online services was the lowest of the all and only 13.0% of all the respondents used online services with their Internet connections. Online gaming was only 16.4%, since most people are still using dialup connections. The playing of online games is still very low but

can prove to be a great application for broadband services for the younger generation, as seen by the growth of online gaming in South Korea.

Broadband adoption

The rate of broadband adoption is strongly related to a number of demographic and economic conditions, including household income, income inequality, and education. The present research reveals that the majority of households were unaware of broadband services before this interview, and the same is reflected in Figure 15.

Education is an important factor that increases broadband growth. Some experts like Ford *et al.*, (2007) argue that education effects broadband adoption at a far larger magnitude than income levels. Figure 14 depicts the importance of education; lack of it can have a disastrous affect on the adoption and growth of broadband Internet in Pakistan.

As we can see from Figure 15, a very high percentage of respondents are not aware of broadband services, especially those household individuals who have lower and secondary education. The lack of awareness about broadband service is much higher among women than men. A handful of Pakistan

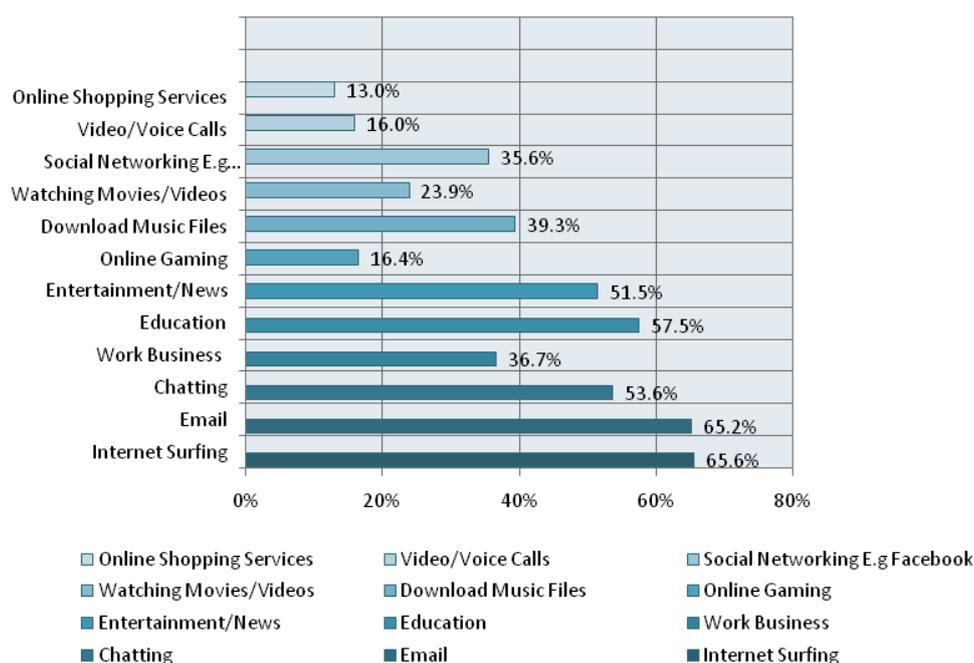


Figure 14. Digital content consumption.

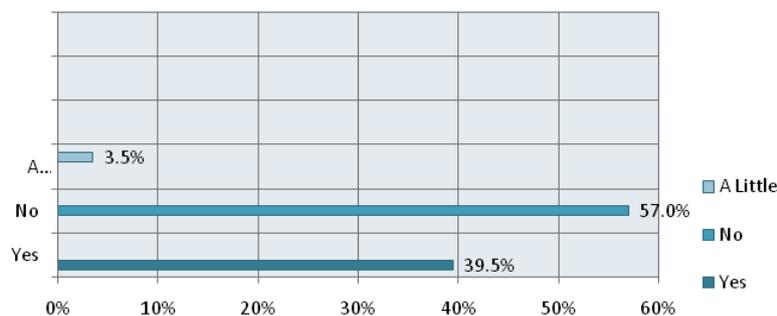


Figure 15. Awareness about broadband services.

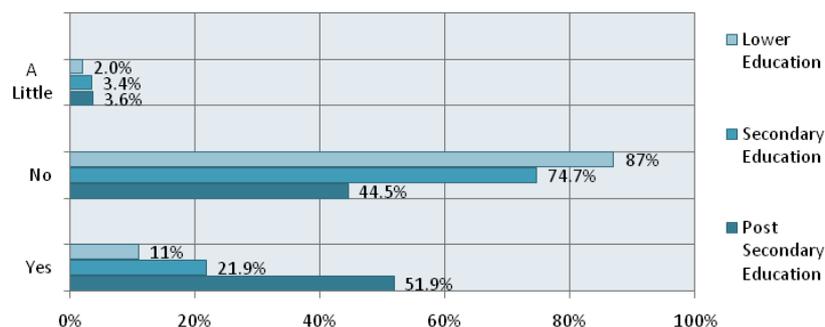


Figure 16. Education and awareness of broadband.

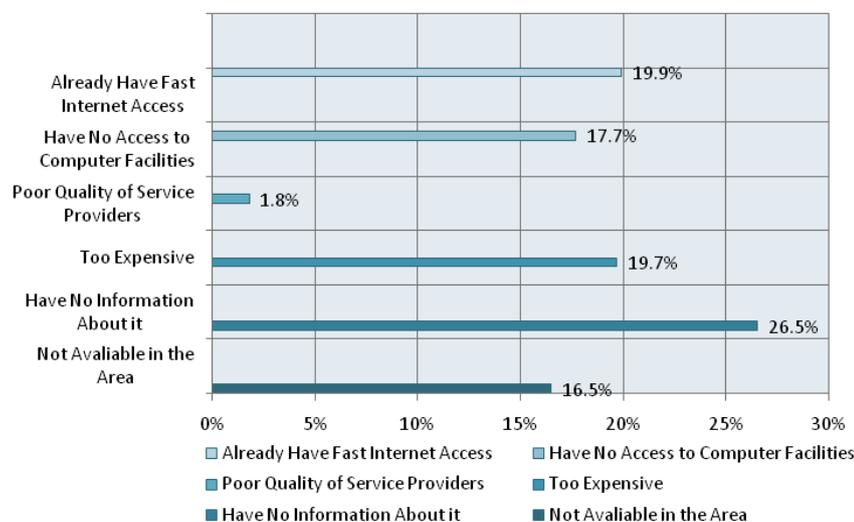


Figure 17. Reasons for not adopting broadband connection.

Telecommunication Authority (PTA) initiatives seek to improve consumer awareness on the issue, especially focusing on women.

The pace of broadband availability and adoption is drawing increased attention from policymakers at the local and regional levels, as a growing body of evidence shows a strong link between broadband and economic development. The level of broadband adoption in Pakistan remains relatively low with penetration level at 0.39% (PTA,

2010). The data and studies regarding the reasons for non-adoption of broadband Internet suggest that there are a variety of factors that explain why household individuals choose not to subscribe to broadband. The key factors are affordability (e.g. the cost of broadband service, the cost of a PC), usability (e.g. lack of digital literacy skills), and lacking basic information on using the service.

If Pakistan is to become part of the information economy, effective broadband policy must

deal with issues that arise from income inequality. Similarly, cost plays an important role in making decisions to adopt broadband services. A number of studies suggest that broadband adoption in particular is sensitive to costs (having what economists call a high elasticity of demand). As the US Government Accountability Office (GAO) has reported, the 'price of broadband service remains a barrier to adoption of broadband service for some consumers' and it noted that 'households with high incomes were 39% more likely to adopt broadband than lower-income households' (Cohen, 2008). In Pakistan, the tariff for broadband services has been declining over the year but still the price paid to be connected online is higher for the majority of population. Table 4 provides a look at the comparison of 1 Mbps connections available in Pakistan (PTA, 2010).

The present research findings in Figure 18 reveal that the majority of households can barely afford the minimum package of broadband services. The cost of broadband service is likely to be a major barrier for low-income families, and it is likely to explain why a disproportionate number of people in lower income fam-

ilies have access to broadband at home. The results also suggests that efforts to reduce costs can play a role in spurring demand, particularly among lower income households, who are unable to adopt broadband services due to higher tariffs and limiting economic factors.

Conclusion and future research directions

This study provides a snapshot of how connected Pakistan is in terms of broadband adoption and digital content consumption. The results themselves are not surprising as factors such as income level, education, family type, and region play an important factor in the adoption of broadband Internet. What are surprising are the differences that exist in adoption rates within each category. It is also surprising that very little academic research has been made of such differences. This paper only scratches the surface of Pakistan broadband Internet adoption and digital content consumption data and highlights inequities in access and consumption. To fully understand the extent to which Pakistanis are prepared to engage in the information society, a fuller

Table 4. Broadband tariffs in Pakistan

Broadband Tariff Comparison

Technology	Company	Price (Rs/month)	Data Volume (GB)	Additional Cost (Rs)	
				Installation	CPE/Device Charges
DSL	<i>Micronet*</i>	749	Unlimited	750	2,494
	<i>PTCL**</i>	839	Unlimited	Free	Free
WiMax	<i>Wateen</i>	499	5	2499	99
	<i>Wi-Tribe</i>	650	5	Free	Free
FTTH	<i>Nayatel***</i>	1199	10	--	--
EvDO	<i>PTCL</i>	2000	Unlimited	Free	3,999

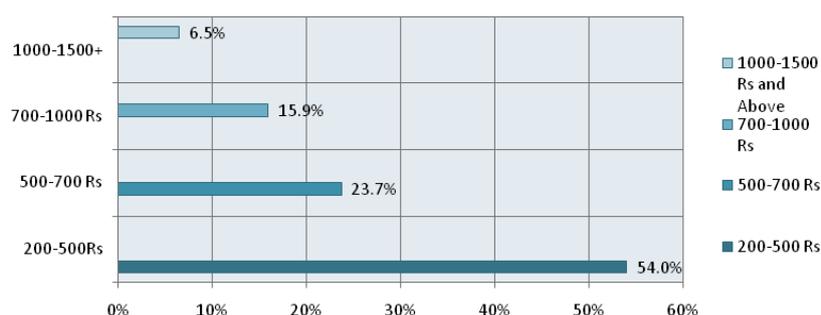


Figure 18. Households willing to pay to acquire broadband connection.

understanding of their Internet usage is required, which can be garnered from further analysis of the present data set. Further analysis can provide much needed insights for policymakers to better understand the market and develop policies.

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