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Internet Use and Issues in Singapore: An Empirical Study

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Introduction

The pace of change in the information age has been dizzying. We have moved past the importance of computer and information literacy and entered the era in which Internet literacy is becoming critical. Internet is revolutionizing the way society accesses information. It has ignited the creativity and imagination of individuals and businesses to new heights.

The Internet current and potential size is simply mind boggling. Estimates as of January 1995 suggest that Internet consists of over 60,000 networks connecting more than 7 million host computer systems with over 50 million people having access to e-mail around the world. What is more astounding is the pace of Internet growth -- 10 percent per month with a prediction that user population will exceed 100 million by 1998. According to Business Week special report (1): (a) by the year 2000, Internet will have as many as 100 million servers and dish out to couple of hundred million client PCs; (b) there is a flood of internet startups, 90% of all companies in its \$350 million+ portfolio are making the WWW a strategic component of their products and services; (c) one prediction is that the total internet market including software, hardware, and services will hit \$4.2 billion by 1997; and (d) Internet is open to nearly infinite geographical expansion, to any brand or type of computer, to virtually any use that human ingenuity can conceive of.

In the broadest sense, the Internet connects individuals, organizations, companies, governments, colleges, schools, and many adhoc groups. Singapore's IT2000 vision articulated that Singapore's National Information Infrastructure (NII) will connect existing and new computers in schools, offices and homes by the year 2000. With the introduction of Singnet, Technet and other local networks (based on January 1995 data from *nic.merit.edu*, Singapore had 107 networks), Singapore has jumped onto the bandwagon of countries trying to exploit Internet's potential for economic advantage. According to John Perry Barlow, cyberspace writer and pundit, the Singapore Government is more aggressive about promoting Internet than the US Government is, it cares about the economy and knows that Singapore's economy is going to be information based (11).

This study, the **first of its kind**, documents the results of an empirical study conducted in 1994-95 to capture various uses of Internet and resulting issues faced by the business and academic communities in Singapore. Wherever appropriate, a comparison with corresponding status of these uses and issues in USA is also provided.

Use of Internet by Academic Community in Singapore

Singapore has started teaching the use of Internet in some secondary schools, polytechnics and the two universities. Plans were afoot to provide Internet access at all libraries (3). All 14 junior colleges and 24 secondary schools are now plugged into the Internet.....the Education Ministry plans to give all schools access in about three years' time (7).

Based on extensive literature review of textbooks, magazines, newspapers, journals and a series of interviews with six professors -- two survey questionnaires, one for faculty members and the other one for students were developed, pre-tested, and administered. A total of 200 and 500 questionnaires were distributed to professors and undergraduate students (using stratified random sampling method) resulting in a usable response rate of 35.5% and 58.0% respectively. The results of data analysis are described next.

There is a high level of Internet awareness among faculty members (89%) and undergraduates (78%) in both universities. Faculty members use Internet primarily (90%) for teaching and research purposes. The overall Internet use by undergraduate students is low (40%) with students in the computer disciplines using Internet to a relatively greater extent (60%). The majority of the respondents (81%) felt that Internet is an

important and useful resource, and that undergraduate students must become Internet literate. However, among students, the support for making "Internet course" a required course was not strong citing current heavy workload as the main reason. Some faculty members suggested that although Internet is potentially useful and adds value for the undergraduate students, it is not critical for them to learn how to access and use Internet. Electronic mail was the most popular and widely used Internet service among faculty members (97%) and students (75%) alike.

Use of Internet by Individuals and Business Organizations in Singapore

Two samples were selected -- one for organizational users and the other for individual users. The organizational sample was selected from the list of users having Internet access through Technet as of September 1993. The population consisted of 130 organizations with approximately 400 users in total. The questionnaires were sent to these users via postal and electronic mail. The survey achieved a 33% response rate with a sample size of 150 users. For individual users, the targeted sample comprised of 100 employees (faculty and non-faculty) and 500 students from Nanyang Technological University. The questionnaires were sent out via electronic mail. In addition, a copy of the questionnaire was posted in a Usenet newsgroup called *alt.Internet services*. The survey achieved a response of 23% translating into a useable size of 115 respondents. Major findings based on an analysis of these responses are:

Reasons to start using the Internet: The need for communication (e-mail) was the primary reason (100% individuals, 94% organizations) followed by the need to gather information (79% individuals, 87% organizations).

Types Of Information Explored: The two top types were: current affairs awareness and research for both individuals and organizations, however the rankings were opposite: 68% and 45% for individuals versus 49% and 81% for organizations.

Accessibility Of Information Resources: Both individuals and organizations found accessibility to be moderately satisfactory. However, they reported some frustration with respect to non-availability of certain nodes or web sites and sometimes unusually long response times.

Reliability And Usefulness Of Information Obtained: Both individuals and organizations felt that the information obtained was considerably reliable and useful. Even though Internet started as an exclusive club of scientist, researchers, academics, it has now become fully democratized, accessible by all from anywhere at anytime around the world without any monitoring of who writes what when and how. The implication is clear -- don't believe everything you hear on the net. There are people who impersonate as the Prime Minister of Singapore, or the Arts Minister of Singapore (8).

User Friendliness Of Internet Tools: Internet navigational tools: Archie/Veronica, FTP, Gopher, and Telnet were all rated moderate in user-friendliness. However, WWW stood out in the eyes of individuals and organizations as significantly more user-friendly than other tools.

Experience Using Electronic Mail: E-mail is by far the most widely used facility by both individuals and organizations. Communications was the primary reason for using e-mail: 75% for individuals, 91% for organizations' external communication, and 40% for organizations' internal communication. Current event awareness was the second most important reason for both groups. For individuals, another major reason was cultural exchange whereas recruitment was also a reason for organizations.

A majority of the individuals (94%) surveyed indicated that they would increase Internet use despite security problems such as virus attacks and hacking of important files and programs. The reasons given are: (a) Internet is very convenient to use and provides a good opportunity to make more friends both locally and overseas. (b) It is also a time saving tool. Only a minority of respondents (6%) stated that they would maintain the usage at the current level. They suggested that they would increase the use if Internet access became faster and more affordable.

As for the organizations surveyed, a majority (95%) of the respondents said they would increase Internet usage while a minority of about 5% said they would not. The reasons given by the majority are: (a) Internet is a global tool without any alternative. (b) As more gateways are setup, connectivity through Internet will further increase thus enabling access to more information. The minority respondents suggested that, even though viruses and security breaches are not big problems, they would increase Internet use only if data transfer rates can be increased (leading to faster response time and cost savings).

Improving Internet Access and Use

Several recommendations, condensed from suggestions by the respondents of both studies and from literature survey are detailed below.

1. More User-friendly Navigational Tools: Most users suggested the need for more user-friendly tools to help in searching relevant materials. Users prefer tools that have graphical user interfaces. They also like screens with help commands to assist them when necessary. As Internet becomes more popular, many non-technical users encounter problems when using the various navigational tools. These non-technical users need tools that are easy and comfortable to use to facilitate improved Internet access. Users also suggested the need for improved classification/grouping of archived information to eventually speed up information retrieval. While the problem of "inefficient information search" is being effectively addressed in Netscape by using search engines such as Infoseek, Lynx, Web Crawler, and Yahoo; the problem of "inefficient archival of information" is not yet effectively addressed. The reason is that networks and the accompanying databases are not being managed by any single or even few authorities/ agencies. Yet home pages, newsgroups, inter relay chat groups, lists keep increasing unabated at an explosive rate.

A word of caution about developing icon-based user friendly interfaces is in order. Since Internet search engines are and will be used by people from all over the world, the design of the icons should be culture-sensitive (customized for specific cultures) or culture-independent (globally accepted).

2. Training: In order to enable non-technical users to gain full access to the Internet, training courses have to be conducted. This will enable them to learn how to use the various tools such as the ones used for searching of information. Besides training on the use of the tools available, users need to learn about Internet culture or "netiquettes". Some of the "netiquettes" include **avoiding** Internet use during peak hours if at all possible, the use of foul language and angry tone (called "flaming" in Internet parlance), overt commercialism, and sending junk E-mails.

3. Faster Connection: As the number of Internet users increase rapidly, connection is slowed down when many people crowd in to use the Internet at the same time. Some users surveyed felt that the response time for on-line databases, such as Food and Drug Administration should be improved. There is a need for wider bandwidth and advanced technology to enable faster connection and faster data transmission. In this context ISDN technology promises significant improvement. ISDN helps people with a high demand for fast graphics, video, and other high bandwidth use.

4. Tighter Security: To encourage organizations to join Internet in full force, they need to be assured of a certain minimum level of security. Users want their E-mails to be private and confidential. Users also need to know that their files transmitted over Internet will not be interrupted or corrupted. With tight security measures taken, organizations will be more willing to do business on the Internet. Since Internet is an open system, potential for fraud is enormous. Anyone, anywhere, anytime with a computer, a modem and the right software can access any data anywhere around the globe. Sophisticated encryption and decryption techniques are being developed and used.

The constantly burgeoning size of the Internet user community is going to put viruses back into the headlines in a big way. Satan (Security Administrator Tool for Analyzing Networks), a devilish computer program designed to sniff out security weaknesses in computer networks is available on the Internet to

anyone who wants to use it. The program makes it easy to penetrate the defenses of an estimated five million Internet-linked computers around the world. (4,5)

5. Regulations on the Internet: At the moment, there is no one to regulate the Internet. People are able to download or upload almost anything they want. There are files that contain pornographic images that can be downloaded and viewed. Palyboy and Penthouse are competing in this arena. People can use foul language as and when they please. This can have a very bad influence on children and students who are beginning to use the Internet. **Internet is only as good as its use.** A technology by itself is neither good nor bad, it is what people use it for. Some form of regulation is needed to make Internet a more desirable place to be in and to allow it to function to its best potential. In March, 1995, United States senator Jim Exon introduced the Communications Decency Act of 1995 -- legislation to regulate the information highway and make it illegal for anyone to send obscene or harassing electronic transmissions. Examples of misuse of Internet abound -- from race hate propaganda to recipe for a bomb to spreading prescriptions for violence.

Internet is seamlessly global. Yet what is legal in Amsterdam may not be legal in Atlanta. Furthermore, existing regulatory models do not fit the anarchic world of cyberspace. For example, defamation laws of libel and slander may apply in cyberspace, but many problems remain in interpreting and enforcing them. Cyberspace censorship will be a nightmare to enforce.

Singapore is a very pro-active Government and is determined to pursue its own approach of limited democracy to achieve fast economic growth. The Government recognizes that it must enter Internet and help create a Singapore neighborhood by repudiating any propaganda against Singapore on the Internet. It envisages both the private and public sectors taking part to increase the country's influence, effectiveness, and competitive advantage. (10).

6. Others: Some organizations suggested that they be allowed to advertise their products and services on the Internet and also make Internet shopping more customized for Singaporeans. More local access providers of navigational tools like Gopher, FTP, WWW will be preferred. Technet has its own Gopher Home page which local users can access.

References available on request from the first author.