Introduction

In Singapore, the Internet was first available to academics of the National University of Singapore in 1990. Technet was subsequently set up in January 1992 to make the Internet available to the rest of the research and development community in Singapore. The first Internet access service provider (IASP), Singnet, was launched in July 1994 to enable the general public and businesses to tap into the vast array of information resources on the Internet.

In September 1995, Technet was privatized and renamed as Pacific Internet. It became the second IASP in Singapore. To encourage more users to subscribe to its services, it embarked on an aggressive marketing campaign which resulted in greater publicity regarding the Internet, lower rates for subscribers (due to price war between the two IASPs) and rapid growth in the number of subscribers.

The third IASP, Cyberway, was launched in March 1996. It facilitated further growth in the number of Internet users in Singapore. An estimated 32 percent of the population are Internet users (including dial-up subscribers, commercial users, schools, cybercafes, etc.) (Emanuel, 1999) (or more than one million out of a population of about four million by December 2000), and this represents a substantial growth from the 52,000 users in early 1995 (Tan and Teo, 1999).

With the continued rapid growth of the Internet, it is vital to understand the demographic and motivation factors that are associated with Internet usage. Most research focuses on Europe or the USA rather than on non-western countries. Singapore is an ideal country in Asia to examine the Internet phenomenon since it is reputed to have one of the highest densities of Internet users in the world and is generally recognized as one of the world leaders in electronic commerce (Vogel and Gricar, 1998). For example, in a report on the readiness for business-to-business electronic commerce in Asia, Goldman Sachs awarded gold medals to Australia and Singapore, while
Hong Kong and South Korea were given silver medals (Toh, 2000).

Similarly, in a Deutsche Bank research report, Singapore’s e-commerce volume was expected to surge to US$2.1 billion in 2000, nearly a fourfold increase from US$600 million in 1999. In fact, by 2005, Singapore may be able to rival the USA as an IT-dominated economy (Chuang, 2000). Furthermore, the Internet plays an important role in Singapore’s IT2000 plan which aims to make information easily accessible to all citizens at home or at work (National Computer Board, 1992).

Past research has investigated a wide variety of factors influencing computer adoption and usage such as demographic characteristics (Brancheau and Wetherbe, 1990; Thong, 1999), perceived ease of use, perceived usefulness (Davis et al., 1989; Gefen and Straub, 2000), and perceived enjoyment or fun (Igbaria et al., 1994). In contrast, research in the context of factors influencing Internet usage is relatively limited.

Researchers examining the Internet phenomenon have examined a wide range of issues such as demographics and growth (Hoffman et al., 1996; Pitkow and Kehoe, 1996), strategic and commercial uses (Cockburn and Wilson, 1996; Farhoomand, 2000), use in various functional areas (Quelch and Klein, 1996; Upton and McAfee, 1996), adoption and diffusion (Soh et al., 1997; Teo et al., 1997-98), and gender differences (Teo and Lim, 1997; 2000).

In one of the few studies on factors influencing Internet usage, Atkinson and Kydd (1997) examined individual characteristics associated with WWW use. The results suggested that both intrinsic (defined as perceived ease of use and perceived enjoyment) and extrinsic (defined as perceived usefulness) factors affect WWW use differentially for entertainment and for course work purposes. Our study extends Atkinson and Kydd’s work by examining demographic and motivation variables associated with Internet usage (defined in terms of four generic activities of messaging, browsing, downloading and purchasing). The results will facilitate further understanding of factors associated with Internet usage, thereby enabling researchers, practitioners and policy makers to better design appropriate strategies to promote Internet adoption and usage. Furthermore, the generalizability of previous results on factors associated with computer adoption and usage can be examined in the context of the Internet.

Research model and hypotheses

Figure 1 shows the research model which seeks to examine how demographic variables (gender, age, educational level), intrinsic motivation variables (perceived ease of use, perceived enjoyment) and extrinsic motivation variables (perceived usefulness) are associated with Internet usage activities (messaging, browsing, downloading and purchasing). Note that in this study, we are examining the direct associations of demographic variables with usage activities rather than its indirect associations via motivation variables. The reason is that previous research has commonly focused on the indirect associations of demographic variables with usage and less so on its direct associations. Another reason is that previous studies have commonly found that Internet users tend to possess certain demographic characteristics (e.g. predominance of males, highly educated users) and we would like to examine the direct relationships between such characteristics and usage activities.

Note that in deriving support for the various hypotheses, we will discuss how demographic and motivation variables are associated with Internet usage activities in general rather than

**Demographic Variables**
- Gender
- Age
- Educational level

**Motivation Variables**
- Intrinsic motivation
  - Perceived ease of use
  - Perceived enjoyment
- Extrinsic motivation
  - Perceived usefulness

**Internet Usage Activities**
- a. Messaging
- b. Browsing
- c. Downloading
- d. Purchasing
specific to each of the four generic activities (i.e. messaging, browsing, downloading, purchasing). This is done to minimize repetition as the arguments for the hypotheses are likely to be similar for each of the four activities. Furthermore, since research on factors associated with Internet usage is relatively sparse, we will derive our support for the various hypotheses from past research on computer adoption and usage. In other words, we are making the assumption that prior studies on computer adoption and usage can perhaps be extrapolated to Internet usage.

### Demographic variables

#### Gender

Several studies have examined gender issues in computer anxiety and attitudes, and their results can perhaps be extended to the context of the Internet. For example, Qureshi and Hoppel (1995) found that there are some gender differences in how students feel about computers. Similarly, Harrison and Rainer (1992) found some relationship between gender and level of computer skills, with males more likely to have better computer skills. Elder et al. (1987) found that females are more likely to experience technostress (physical and emotional burnout caused by inability to adapt to new technology) in using PCs compared to males. Some studies have found that females reported greater computer anxiety than males (Igbaria and Chakrabarti, 1990; Gilroy and Desai, 1986) while others found no gender differences (Parasuraman and Igbaria, 1990; Howard and Smith, 1986).

In the context of the Internet, studies have generally shown that users are predominantly males and that men took to the Internet faster than women (Straits Times, 1996). Based on these findings, coupled with past research on computer predispositions which have generally shown that males are more interested in learning about computers than females (Qureshi and Hoppel, 1995; Wilder et al., 1985), we can, by extension to the Internet, postulate that males are more interested in the Internet than females. Consequently, we may expect that males are more likely to use the Internet for various activities compared to females. It follows that:

**H1**: Males are more likely to use the Internet for the following activities:
- a. messaging;
- b. browsing;
- c. downloading;
- d. purchasing;
when compared to females.

#### Age

In a study on the use of computers in government finance organizations, Elder et al. (1987) found that older workers are more likely to experience technostress compared to younger workers. Similarly, Harrison and Rainer (1992) examined individual differences on skill in end-user computing and found that age is negatively correlated with skill level. Zeffane and Cheek's (1993) study of computer usage in an Australian telecommunications organization found that age is negatively correlated with computer usage.

In the context of the Internet, studies have shown that users tend to be young adults (Straits Times, 1996). Taken together with previous findings of the relationship between age and computer usage, we can hypothesize that:

**H2**: Age is negatively related to usage of the Internet in terms of the following activities:
- a. messaging;
- b. browsing;
- c. downloading;
- d. purchasing.

#### Educational level

There is a limited amount of research that examines the relationship between educational level and computer usage. In most cases, educational level is not among the main constructs and is usually measured as part of demographic characteristics or as a control variable in data analysis (e.g. Igbaria et al., 1995). Furthermore, researchers commonly relate educational level to usage indirectly via computer anxiety.

For example, in a study of the determinants of user acceptance of microcomputer technology, Igbaria (1993) found that educational level has a significant negative effect on computer anxiety and a significant
positive effect on perceived usefulness. Computer anxiety was found to have a strong negative effect on perceived usefulness and behavioral intentions while perceived usefulness was found to have positive effects on attitudes, behavioral intentions and user acceptance. Taken together, these results imply that higher educational level is likely to have a positive relationship with usage. Furthermore, higher educational level may result in greater knowledge about computers, thereby facilitating Internet usage. This notion is supported by Branch and Wetherbe (1990) who found that early adopters of spreadsheet software are likely to be more highly educated than late adopters. It follows that:

\[ H_3: \text{Education level is positively related to usage of the Internet in terms of the following activities:} \]
\[ \text{a. messaging; b. browsing; c. downloading; d. purchasing.} \]

**Motivation variables**

**Intrinsic motivation**

Intrinsic motivation refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity **per se**. Both perceived ease of use and perceived enjoyment are forms of intrinsic motivation factors (Atkinson and Kydd, 1997).

**Perceived ease of use**

Perceived ease of use refers to the degree to which the user expects the use of the system to be user friendly. Since effort is a finite resource that a person may allocate to various activities (Radner and Rothschild, 1975), it implies that all else being equal, an application perceived to be easier to use than another is more likely to be accepted by users. Past research has generally confirmed that perceived ease of use can influence computer usage directly (Davis, 1986; 1989).

In general, if a system is easy to use, it requires less effort on the part of users, thereby increasing the likelihood of adoption and usage. Conversely, systems that are complex or difficult to use are less likely to be adopted since it requires significant effort and interest on the part of the user. In the context of the Internet, the easy to use browsers have largely been responsible for the rapid growth in the number of Internet users. Hence, perceived ease of use is likely to be positively related to the four generic Internet activities. It follows that:

\[ H_4: \text{Perceived ease of use is positively related to usage of the Internet in terms of the following activities:} \]
\[ \text{a. messaging; b. browsing; c. downloading; d. purchasing.} \]

**Perceived enjoyment**

Perceived enjoyment may be defined as the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated (Carroll and Thomas, 1988; Deci, 1971; Malone, 1981a). Hence, individuals who experience immediate pleasure and joy from using the computer **per se** will be more likely to use it more extensively than others. This notion is supported by Triandis (1971, 1980) who posited that affect – “the feeling of joy, elation, pleasure or depression, disgust, displeasure and hate associated by an individual with a particular act” – has an impact on behavior. Furthermore, research on the role of enjoyment in workplace computing (Webster, 1989; Webster and Martocchio, 1992) and computer games (Holbrook et al., 1984; Malone, 1981a, 1981b) have suggested the importance of enjoyment on usage intentions and behaviors. In a similar vein, Davis et al. (1992) found that perceived enjoyment has significant effects on intention to use a word processing program.

By extending these results to the context of the Internet, we can therefore postulate that perceived enjoyment will have a positive effect on usage activities such as messaging, browsing, downloading and purchasing. It follows that:

\[ H_5: \text{Perceived enjoyment is positively related to usage of the Internet in terms of the following activities:} \]
\[ \text{a. messaging; b. browsing;} \]
Extrinsic motivation
Extrinsic motivation refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself. In other words, extrinsic motivation influences behavior due to the reinforcement values of the outcomes. Hence, perceived usefulness is a form of extrinsic motivation factor (Atkinson and Kydd, 1997).

Perceived usefulness
Previous research has found that perceived usefulness has a strong and consistent relationship with computer usage. For example, Davis (1989) found that perceived usefulness was significantly correlated with both self-reported current usage and self-predicted future usage. Similarly, Igbaria et al. (1995) found that perceived usefulness has strong direct effects on system usage dimensions. Igbaria et al. (1994) and Adams et al. (1992) also confirmed that perceived usefulness is positively related to system usage. A plausible reason is that individuals will use computers only if they perceive that such usage will help them to achieve the desired task performance.

Similarly, in the context of the Internet, we can postulate positive relationships between perceived usefulness and the four generic Internet activities. It follows that:

H6: Perceived usefulness is positively related to usage of the Internet in terms of the following activities:

a. messaging;
b. browsing;
c. downloading;
d. purchasing.

Method
Sample and procedures
An extensive literature review as well as interviews were carried out with 16 Internet users (divided into four focus groups with four users each). The aim was to understand the various uses of the Internet. As Internet usage activities are generally uncomplicated and similar across different groups, we felt that the sample of 16 users was sufficient. Based on these interviews, four generic Internet usage activities were identified:

1. Messaging (e-mailing, using discussion groups, Internet relay chat, etc.).
2. Browsing (surfing the Internet).
3. Downloading (copying files from the Internet such as images, shareware, etc.).
4. Purchasing (ordering products through the Internet).

The questionnaire was designed as Web pages on the World Wide Web (WWW). Javascript programming was used to check for missing responses and prompt users to answer them. Pretesting of the questionnaire was conducted in three phases with three Internet users in each phase. Pretesting with three users in each phase was deemed sufficient as the items measuring various constructs were derived from past research where psychometric properties had been established. Amendments were made at the end of each phase based on feedback from respondents. At the end of the third phase, no major comments were received from the respondents and the questionnaire was deemed ready for posting on the WWW.

Several measures were taken to increase the response rate. First, the length of the questionnaire is about three and a half pages, thereby enabling respondents to take only about five to ten minutes to fill up the survey. Second, S$2 phonecards were offered as incentives to the first 100 respondents. This was later increased to 150 S$2 phonecards due to the overwhelming response. Third, respondents were promised an executive summary of the results. This may further motivate participation as respondents may be interested in the results of the survey.

Fourth, the Web site for the survey was publicized in the local newspaper (Straits Times), Computeworld as well as 11 major local newsgroups, namely, sg.announce, sg.general, sg.marketplace, sg.cyberway.announce, sg.pacnet.announce, sg.pacnet.help, sg.singnet.announce, sg.singnet.marketplace, sg.singnet.test, sg.singnet.help, and nusannounce. These newsgroups were chosen because of their wide reach and tolerance of such advertising messages. The call for
participation was also made in another newsgroup, namely, soc.culture.singapore because of its popularity with Singaporeans who used it to discuss local issues. Fifth, hyperlinks were established on Singnet’s “What’s New” page and the National University of Singapore WWW homepage. These sites have high traffic flow and help to further publicize the Web site location.

Since users may participate due to any one of the publicity media, it was not possible for us to determine which of the above measures generated the most responses. The survey lasted about two months. Winners of phonecards were contacted by e-mail for their home addresses and phonecards were duly mailed out to them.

A total of 1,378 responses were received, of which six were rejected due to incomplete responses. Another two were rejected since respondents were not local Internet users. Hence, a total of 1,370 responses were used for data analysis.

Table I summarizes the demographic profile of respondents.

### Table I Demographic profile

<table>
<thead>
<tr>
<th>Demographic profile</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,219</td>
<td>89.0</td>
</tr>
<tr>
<td>Female</td>
<td>151</td>
<td>11.0</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-15</td>
<td>31</td>
<td>2.3</td>
</tr>
<tr>
<td>16-20</td>
<td>276</td>
<td>20.1</td>
</tr>
<tr>
<td>21-25</td>
<td>515</td>
<td>37.6</td>
</tr>
<tr>
<td>26-30</td>
<td>260</td>
<td>19.0</td>
</tr>
<tr>
<td>31-35</td>
<td>131</td>
<td>9.6</td>
</tr>
<tr>
<td>36-40</td>
<td>92</td>
<td>6.7</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>64</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Missing data</strong></td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Highest education level</strong></td>
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<td></td>
</tr>
<tr>
<td>Primary</td>
<td>37</td>
<td>2.7</td>
</tr>
<tr>
<td>Secondary</td>
<td>192</td>
<td>14.0</td>
</tr>
<tr>
<td>Pre-university/junior college</td>
<td>365</td>
<td>26.6</td>
</tr>
<tr>
<td>Polytechnic/diploma</td>
<td>315</td>
<td>23.0</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>320</td>
<td>23.4</td>
</tr>
<tr>
<td>Master degree</td>
<td>89</td>
<td>6.5</td>
</tr>
<tr>
<td>Doctorate degree</td>
<td>22</td>
<td>1.6</td>
</tr>
<tr>
<td>Others</td>
<td>28</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Missing</strong></td>
<td>2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Of the 1,370 responses, 89 percent were males. Hence, there appear to be a dominance of male Internet users in Singapore. This is consistent with the findings by Singapore Polytechnic and the Batey Research Center which found that men took to the Internet faster than women (Straits Times, 1996). Furthermore, previous research on computer predispositions generally found that males are more likely to be interested in learning about computers (and by extension, the Internet) compared to females (Qureshi and Hoppel, 1995; Wilder et al., 1985).

The majority of respondents fall in the 16-30 years old age group, thereby implying that most Internet users in Singapore are teenagers or young adults. More than 55 percent of respondents have at least a diploma or bachelor’s degree. This is consistent with previous surveys conducted in America which found that Internet users tend to be college educated (cyberatlas @ http://www.cyberatlas.com/; GVU @ http://www.cc.gatech.edu/gvu/). Similarly, previous research conducted in Singapore also found that Internet users are relatively young and generally well educated (Straits Times, 1996).

### Instrument

The instrument gathered information about the demographic characteristics of respondents, and the research constructs (see Appendix), namely perceived usefulness, perceived ease of use, perceived enjoyment and the four dimensions of Internet usage. The demographic characteristics were measured in terms of gender, age and highest educational level.

The items used to measure perceived usefulness and perceived ease of use were adapted from Davis (1989) and Iigbaria et al. (1995). Individuals were asked to indicate their agreement or disagreement with several statements using a five-point Likert-type scale ranging from (1) strongly disagree to (5) strongly agree. Cronbach alphas of 0.89 and 0.87 were obtained for perceived usefulness and perceived ease of use respectively.

Seven different pairs on the seven-point semantic differential scale adapted from Iigbaria et al. (1995) were used to measure perceived enjoyment. Individuals were asked to rate the
items according to how they feel about the Internet. The items are, using the Internet is: fun-frustrating, pleasant-unpleasant, negative-positive, pleasurable-painful, exciting-dull, foolish-wise and enjoyable-unenjoyable. This scale had a Cronbach alpha of 0.90.

Internet usage was measured in terms of frequency of usage and daily usage (DeLone, 1988; Igbaria et al., 1995; Thompson et al., 1991) for each of the four generic activities (messaging, browsing, downloading, purchasing). Frequency of Internet usage (for each of the four activities) was measured on a six-point scale ranging from (1) never/almost never to (6) several times a day. Daily Internet usage was measured by the amount of time spent daily on the Internet (for each of the four activities). A six-point scale ranging from (1) never/almost never to (6) more than three hours per day was used to measure daily Internet usage.

As commonly done in past research, the average scores for frequency of usage and daily usage were computed in terms of the four activities. The scales had the following Cronbach alpha values: messaging (0.70), browsing (0.65), downloading (0.71) and purchasing (0.80). Since the Cronbach alpha values for all the research constructs are generally above or close to 0.70 as stipulated by Nunnally (1978), the constructs are deemed to exhibit adequate reliability.

**Construct validity**

Factor analysis with varimax rotation was performed to ascertain that perceived usefulness, perceived ease of use and perceived enjoyment are distinct constructs. The results confirmed the existence of three factors with eigenvalues greater than 1.0 that accounted for 67.5 percent of the total variance. The criteria used to identify and interpret factors were: each item should load 0.50 or greater on one factor and 0.35 or below on the other two factors (Igbaria et al., 1995). Table II shows that factor 1 (with four items) measures perceived ease of use. Similarly, factor 2 (with seven items) and factor 3 (with five items) measure perceived enjoyment and perceived usefulness respectively. These results therefore confirm that each of these constructs are unidimensional and factorially distinct and that all items used to operationalize a particular construct loaded onto a single factor.

**Intercorrelation matrix**

The intercorrelation matrix for the research variables are shown in Table III.

Age and gender are negatively correlated ($r = -0.10$), with males generally being older than females. Age appears to be positively correlated with educational level ($r = 0.57$), thereby implying that older respondents tend to be better educated than younger respondents. Males are more likely to engage in browsing, downloading and purchasing activities compared to females. However, the correlation between gender and messaging activities is not significant.

Age is negatively correlated with messaging ($r = -0.06$) and downloading ($r = -0.11$) activities and positively correlated with purchasing ($r = 0.10$) activities. This implies that younger respondents tend to use the Internet more but older respondents may have greater purchasing power.

Perceived ease of use, perceived usefulness and perceived enjoyment are positively correlated with
messaging, browsing and downloading activities. However, in terms of purchasing activities, only the correlation with perceived usefulness is significant ($r = 0.14$). This implies that when purchasing activities are carried out, it is due more to perceived usefulness of the Internet in facilitating such activities than perceived ease of use or perceived enjoyment.

**Hypotheses testing**

Hierarchical regression analysis was used to test the research hypotheses since it allows us to examine the effects of various variables separately. In step 1, we enter the demographic variables to examine their effects on the dependent variables (messaging, browsing, downloading and purchasing). In step 2, we enter the motivation variables to enable us to examine any increase in explained variance over that contributed by the demographic variables. The results are shown in Table IV.

From Table IV, the demographic variables contributed only 1 percent in the variation of messaging and browsing activities, 7 percent for downloading activities and 2 percent for purchasing activities (as indicated by the adjusted $R^2$ values). In contrast, the motivation variables generally contributed about 7 to 8 percent in the variation of messaging, browsing and downloading activities. The contribution to purchasing activities is only 1 percent. One likely reason is that purchasing activities are carried out rather infrequently by respondents.

Females are more likely to engage in messaging activities ($<=0.06$) while males are more likely to use the Internet for downloading ($<=-0.21$) and purchasing ($<=-0.07$) activities. The relationship between gender and browsing activities is negative and significant in step 1 ($<=-0.07$) but becomes insignificant in the presence of motivation variables in step 2 ($<=-0.04$). Hence, only hypotheses 1c and 1d are supported.

Hypotheses 2a to 2d which postulate negative relationships between age and the four generic activities are partially supported since age is negatively related to messaging ($<=-0.08$, hypothesis 2a is supported) and downloading ($<=-0.11$, hypothesis 2c is supported) activities. The relationships between educational level and the four generic activities are not supported. In fact, educational level is significantly related to browsing activities in the negative direction ($<=-0.09$). Overall, it can be seen that the relationships between demographic variables and the four generic activities are not uniform.

Perceived ease of use, perceived enjoyment and perceived usefulness have significant positive relationships with messaging ($<=0.13$, $0.08$, $0.18$), browsing ($<=0.08$, $0.17$, $0.14$) and downloading ($<=0.13$, $0.06$, $0.14$) activities. While the relationships between intrinsic motivation variables and purchasing activities are not significant, that for extrinsic motivation variables is significant ($<=0.13$). Hence, $H4a$, $4b$, $4c$, $5a$, $5b$, $5c$, $6a$, $6b$, $6c$ and $6d$ are supported.
Table IV Hierarchical regression analyses

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<tbody>
<tr>
<td></td>
<td>Step 1</td>
<td>Step 2</td>
<td>Step 1</td>
<td>Step 2</td>
</tr>
<tr>
<td>Gender</td>
<td>0.02</td>
<td>0.06*</td>
<td>-0.07**</td>
<td>-0.04</td>
</tr>
<tr>
<td>Age</td>
<td>-0.10**</td>
<td>-0.08*</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td>Educational level</td>
<td>0.09**</td>
<td>0.04</td>
<td>-0.06</td>
<td>-0.09**</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>0.13***</td>
<td>0.08**</td>
<td>0.13***</td>
<td>-0.02</td>
</tr>
<tr>
<td>Perceived enjoyment</td>
<td>0.08**</td>
<td>0.17***</td>
<td>0.06*</td>
<td>-0.03</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>0.18***</td>
<td>0.14***</td>
<td>0.14***</td>
<td>0.13***</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.01</td>
<td>0.09</td>
<td>0.01</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Discussion

The support for $H1c$ and $H1d$ indicates that males use the Internet for downloading and purchasing activities to a greater extent compared to females. One likely reason is that since males are more likely to be interested in learning and using PCs compared to females (Qureshi and Hoppel, 1995; Wilder et al., 1985), they are likely to be more skilled in downloading and purchasing activities on the Internet. Both males and females use the Internet for browsing activities to a similar extent as indicated by the non-significant result. Interestingly, females use the Internet for messaging activities to a significantly greater extent than males. This is consistent with previous research which found that females tend to view computer-mediated communication more favorably than males (Hiltz and Johnson, 1990; Allen, 1995). One possible reason is that females prefer to use the Internet to chat with people compared to males who prefer to use it for other activities (Straits Times, 1996).

The lack of support for $H2b$ and $H2d$ indicates that respondents across a wide range of ages engage in browsing and purchasing activities. One likely reason is that browsing is a basic common activity on the Internet while, consistent with surveys done in America (e.g. Paulson, 1997), purchasing is likely to be carried out infrequently by respondents. In contrast, the support for $H2a$ and $H2c$ indicates that younger respondents are more likely to engage in messaging and downloading activities compared to older respondents. This is in line with previous studies which found that age is negatively correlated with skill level (e.g. Harrison and Rainer, 1992). In other words, younger respondents are likely to be more proficient in carrying out messaging and downloading activities on the Internet compared to older respondents.

In terms of educational level, the lack of support for $H3a$ to $H3d$ is unexpected as previous research usually shows educational level being positively related to usage of computers (e.g. Igbaria et al., 1995). One plausible explanation is that the Internet, with its easy to use browsers make differences in educational level unimportant. For example, it is relatively easy to send and receive email (messaging), download software or buy things online. Further, the demographic profile of our respondents show that about 97 percent have at least secondary school education which is more than sufficient to be able to use the Internet for messaging, downloading or purchasing activities.

Interestingly, educational level is negatively related to browsing activities. One possible explanation is that a high percentage of our respondents are students who may have more time to engage in browsing activities compared to older working adults. In other words, the young may tend to be more engrossed with the Internet compared to older working adults who have other important family and work activities than spending too much time browsing the Internet.

The support for $H4a$, $H4b$, $H4c$, $H5a$, $H5b$ and $H5c$ indicates that intrinsic motivation variables (perceived ease of use and perceived enjoyment) are positively related to messaging, browsing and downloading activities. One plausible reason is
that user friendly browsers make the Internet easy to use while the almost infinite pool of entertainment and other information available makes the Internet enjoyable to use. The lack of support for $H4d$ and $H5d$ pertaining to purchasing activities can be explained by the relatively low level of purchasing activities carried out by Internet users.

The results for extrinsic motivation variables (perceived usefulness) show support for all the four generic activities, i.e. $H6a$ to $H6d$ are supported. An examination of the beta values in Table IV show that, with the exception of browsing activities, the beta values for perceived usefulness are generally higher than for perceived enjoyment. This is consistent with previous research which found that perceived usefulness plays a stronger role than perceived enjoyment in computer usage (Igbaria et al., 1994; 1995). In contrast, the high beta value of 0.17 for perceived enjoyment in terms of browsing activities indicates that browsing the Internet is generally perceived to be an enjoyable activity.

The relatively high beta values for perceived ease of use in terms of messaging ($< 0.13$) and downloading ($< 0.13$) activities reflect well on current browsers in enabling these activities to be easily carried out.

In terms of purchasing activities, the significant results for the effect of perceived usefulness but not for perceived ease of use and perceived enjoyment are consistent with Gefen and Straub’s (2000) study of e-commerce adoption, which found that perceived usefulness affects intention to purchase while perceived ease of use does not.

Limitations

There are three main limitations in this study. First, the usage measures are self-reported since objective use logs were not practical as users may use the Internet anytime, anywhere, using different computers and browsers for different tasks. Although self-reported measures may not be precise, previous research suggests that they are appropriate as relative measures (Blair and Burton, 1987). Hence, this limitation is not serious.

Second, this study examines how demographic and motivation variables are associated with the four generic Internet activities. It is important to realize that other factors may also affect these activities e.g. computer experience and anxiety (Igbaria, 1993), self-efficacy (Igbaria and Iivari, 1995), computer skills, organizational support and social pressure (Igbaria, 1994). Future research can examine the effects of these factors on the four generic Internet activities.

Third, the use of an online survey may result in sample bias since people with certain characteristics may be more likely to respond to online surveys. This limits the generalizability of the results as the set of users who respond may not be a representative sample of the population of Internet users. This is a common limitation of all online surveys.

Conclusions

Results of this study suggest that males are more likely to engage in downloading and purchasing activities compared to females. In addition, younger users tend to engage in messaging and downloading activities to a greater extent than older users. Surprisingly, educational level seems to have little effect on messaging, downloading and purchasing activities probably because the Internet has diffused widely to various sectors of the population.

The finding that perceived usefulness is significantly associated with the four generic activities while perceived ease of use and perceived enjoyment are associated with only three generic activities (messaging, browsing and downloading) confirmed previous research which found that perceived usefulness plays a more significant role (compared to perceived ease of use or perceived enjoyment) in the usage of computers. One explanation is that users are unlikely to continue to use the Internet (after the initial novelty wears out) if they do not find the Internet to be useful. Hence, it is important that Web page designers should ensure that Web pages are useful to users by providing up-to-date and relevant information. In fact, useful content coupled with excellent e-service are often associated with stickiness of the Web site (Zemke and Connellan, 2000).
Another explanation which has some empirical support from Grefen and Straub's (2000) work is that intrinsic motivation tends to be associated with inquiry type usage activities while extrinsic motivation tends to be associated with both inquiry and purchasing type usage activities. In other words, the varying importance of intrinsic motivation variables may be related to the nature of usage activities as shown in our results.

The strong association between perceived enjoyment and browsing activities indicates that browsing the Internet is generally perceived to be an enjoyable experience. One plausible reason is the wide variety of information available coupled with the interesting design of Web pages that incorporate multimedia features. Internet users are therefore able to easily search for and obtain leisure and entertainment information quickly for their enjoyment. Policy makers and Internet access service providers (I ASPs) seeking to encourage more people to use the Internet can highlight that browsing the Internet is not only a useful activity but that it is also enjoyable as users may find a wide variety of Web sites related to their interest. They can also emphasize that the Internet is easy to use for communication with other people and for downloading leisure or work-related information.

Overall, the results contribute to existing literature by highlighting that different demographic and motivation variables may influence the four generic Internet activities differently or to a different extent. The results also generally confirm the generalizability of previous research carried out in America since perceived usefulness was found to be generally more important than perceived ease of use or perceived enjoyment in encouraging Internet usage. Future research can survey respondents from different countries and carry out cross-cultural comparisons.

References


Straits Times (1996), “Finding out who surfs the Internet is their business”, November 12.


Appendix: Questionnaire

Perceived ease of use
Please indicate your agreement or disagreement with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Learning to use the Internet would be easy for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I would find it easy to use the Internet to do what I want to do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. It would be easy for me to become skilful at using the Internet.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. I would find the Internet easy to use.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Perceived usefulness
Please indicate your agreement or disagreement with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using the Internet improves my work performance.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Using the Internet increases my work productivity.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I find the Internet useful for my work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Using the Internet enhances my effectiveness in my work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Using the Internet provides me with information that would lead to</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>better decisions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Perceived enjoyment
Please rate the scales below according to how you feel about using the Internet.

Using the Internet is:
- Fun: 1 2 3 4 5 6 7 Frustrating
- Pleasant: 1 2 3 4 5 6 7 Unpleasant
- Negative: 1 2 3 4 5 6 7 Positive
- Pleasurable: 1 2 3 4 5 6 7 Painful
- Exciting: 1 2 3 4 5 6 7 Dull
- Foolish: 1 2 3 4 5 6 7 Wise
- Enjoyable: 1 2 3 4 5 6 7 Unenjoyable

Messaging, browsing, downloading and purchasing activities
(1) Frequency of Internet usage
On the average, how frequently do you use the Internet for (a) messaging; (b) browsing; (c) downloading; and (d) purchasing activities?

- 1. Never/almost never
- 2. Less than once a month
- 3. A few times a month
- 4. A few times a week
- 5. About once a day
- 6. Several times a day

(2) Daily Internet usage
On the average working day, how much time is spent on the Internet for (a) messaging; (b) browsing; (c) downloading; and (d) purchasing activities?

- 1. Never/almost never
- 2. Less than 1/2 hour
- 3. From 1/2 hour to 1 hour
- 4. 1-2 hours
- 5. 2-3 hours
- 6. More than 3 hours