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Intrinsic and extrinsic motivation in Internet usage

Thompson S. H. Teo[a,*], Vivien K. G. Lim[b], Raye Y. C. Lai[a]

[a]*Department of Decision Sciences, Faculty of Business Administration, National University of Singapore, 10 Kent Ridge Crescent, Singapore, Singapore 119260*

[b]*Department of Organizational Behavior, Faculty of Business Administration, National University of Singapore, 10 Kent Ridge Crescent, Singapore, Singapore 119260*

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Abstract

This study focuses on both intrinsic (i.e. perceived enjoyment) and extrinsic (i.e. perceived usefulness) motivation for the use of the Internet. An electronic Webpage survey was used to collect the data required for this study. A total of 1370 usable responses were obtained. Results indicated that local Internet users used the Internet mainly because they perceived the Internet to be more useful to their job tasks and secondarily, because it is enjoyable and easy to use. Findings demonstrated that while perceived usefulness had consistently strong effects on all usage dimensions (frequency of Internet usage, daily Internet usage and diversity of Internet usage), perceived ease of use and perceived enjoyment affected each specific usage dimension differently. © 1998 Elsevier Science Ltd. All rights reserved.

Keywords: Internet; Adoption; Motivation; Perceived usefulness; Ease of use; Enjoyment

1. Introduction

> We are promoting the Internet in a very big way in Singapore. We already have one of the highest penetration rates in the world today. And still growing very rapidly. Singapore has a total of 750 000 households. We already have over 150 000 subscribers. It means that some 20% of the households already have the Internet. We are teaching computers to all our school children from kindergarten; from secondary school onwards they'll be taught the Internet.

The above quotation illustrates the government's strong support for the mass literacy and adoption of the Internet in Singapore. It is taken from the transcript of the Minister for Information and The Arts, BG George Yeo's interview with Mr David Willis of the BBC at MITA on 13 September 1996. To achieve the quoted goal, it important to understand the motivators underlying the acceptance of the Internet as well as the general usage patterns and preferences of local Internet users in Singapore.

Davis [6, 7] studied the determinants of IT adoption and usage by individual users, and consequently established the Technology Acceptance Model (TAM). The TAM model was adapted from the model of Theory of Reasoned Action (TRA) developed by Ajzen and Fishbein [3]. TAM originally posits that two external variables, perceived usefulness and perceived ease of use, are primarily relevant for computer acceptance behaviors.

Perceived usefulness is defined as the prospective user's subjective belief that using a specific application system will increase his or her job performance within an organizational context. A system high in perceived usefulness, therefore, is one which the user believes in the existence of a positive use–performance relation-

* Corresponding author. Tel: 65 874 3036; Fax: 65 779 2621; Email: fbateosh@nus.edu.sg.

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ship. In other words, the user believes that the use of such a system would yield positive benefits for task performance.

Perceived ease of use refers to the degree to which the prospective user expects the use of the target system to be free of effort. Radner and Rothschild [28] stated that effort is a finite resource that a person may allocate to the various activities for which he or she is responsible. Hence, Davis purported that all else being equal, an application perceived to be easier to use than another is more likely to be accepted by users.

These two constructs of perceived usefulness and perceived ease of use have been extensively investigated by other researchers using different samples and generally confirmed to be important factors in affecting system usage [1, 14, 30].

Other researchers [34, 35] ascertained the importance of the role of enjoyment, a form of intrinsic motivation, in workplace computing. Davis [9] proposed that people expend effort due to both extrinsic and intrinsic motivation. *Extrinsic motivation* is defined as the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself. *Intrinsic motivation* refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity per se. Hence, perceived usefulness is a form of extrinsic motivation and perceived enjoyment, a form of intrinsic motivation.

In a study to examine intrinsic and extrinsic motivations in the workplace, Davis *et al.* [9] found that people's intentions to use computers are influenced mainly by their perceptions of how useful the computers are for improving their job performance, and less so, by the degree of enjoyment they experience in using the computers per se. Similar findings have also been reported by Igbaria *et al.*'s [22] study on the respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology.

However, since previous studies on extrinsic and intrinsic motivations were mainly conducted in the U.S., there is a need to conduct similar studies in a non-U.S. context so as to examine the external validity of current research results to other cultures. In an attempt to do so, Igbaria *et al.* [20] conducted a study using Finnish companies and found that participants were more affected by perceived usefulness than their North American counterparts, possibly due to cultural differences.

This study is an attempt to modify Igbaria *et al.*'s [20] study by examining intrinsic and extrinsic motivations in the context of the Internet instead of microcomputers. We chose Internet usage rather than microcomputer usage as our dependent variable because the rapid proliferation of the Internet globally makes its study crucial and timely. We will also examine whether previous research findings remain valid in an Asian country, namely Singapore. Singapore is an ideal country in Asia to study Internet usage since she is reputed to have one of the highest Internet penetration rates in the world. Furthermore, Singapore is well known for her IT2000 plan which seeks to transform Singapore into an "intelligent island" and key global business hub by the turn of the century [26].

2. Research model

Fig. 1 shows the research model which seeks to examine the impact of extrinsic and intrinsic factors on the usage of the Internet in Singapore. The model shows that perceived usefulness (an extrinsic motivator) and perceived enjoyment (an intrinsic motivator) may have a direct impact on the usage of the Internet. In addition, the model also shows that perceived ease of use may affect usage of the Internet directly or indirectly via perceived usefulness and/or perceived enjoyment. Similar to previous research [20], three dimensions of Internet usage can be defined: frequency of Internet usage, daily Internet usage and diversity of Internet usage. We chose to use these three dimensions because we felt that they can also be applied to Internet usage. Furthermore, we felt that by using similar dimensions as computer usage, more direct

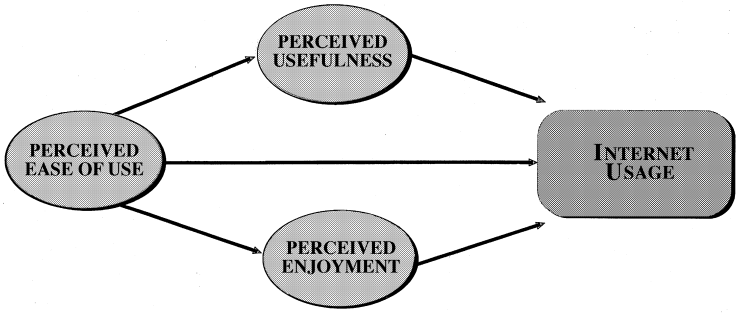

Fig. 1. Research model.

comparisons between computer usage and Internet usage can be made with regards to the influence of the independent variables on the various usage dimensions.

3. Research hypotheses

Note that in deriving support for the various hypotheses, we will discuss the effect of perceived usefulness, perceived enjoyment and perceived ease of use on Internet usage in general rather than specific to each of the three usage dimensions. This is done to minimize repetition as the arguments for the hypotheses are likely to be quite similar for each of the three usage dimensions.

3.1. Perceived usefulness

Motivation theorists have argued that behavior (usage) is determined by both intrinsic and extrinsic motivation. Individuals adopt technology because its use is enjoyable and because they derive some benefits from its use. Davis [6, 7] has shown that perceived usefulness affects behavior and hence, usage of computers. A plausible reason is that individuals will use computers only if they perceive that such usage would help them to achieve the desired task performance. Hence, it is not surprising that previous research has found that perceived usefulness has a strong and consistent relationship with usage. In the context of the Internet, we can postulate that perceived usefulness is positively related to Internet usage. Since Internet usage dimensions can be defined in terms of frequency of Internet usage, daily Internet usage and diversity of Internet usage, Hypotheses 1a to 1c are stated as follows:

Hypothesis 1a. *Perceived usefulness is positively related to frequency of Internet usage.*
Hypothesis 1b. *Perceived usefulness is positively related to daily Internet usage.*
Hypothesis 1c. *Perceived usefulness is positively related to diversity of Internet usage.*

3.2. Perceived enjoyment

Individuals may engage in a particular behavior if it yields fun and enjoyment. This implies that individuals may adopt technology because its use is enjoyable. For example, Davis *et al.* [9] found that perceived enjoyment has significant effects on intention to use a word processing program. Similarly, Triandis [32, 33] proposed that affect (i.e. the feeling of joy, elation, pleasure, disgust, displeasure) may affect behavior. In the context of the Internet, we can therefore postulate a positive relationship between perceived enjoyment and Internet usage. Since Internet usage dimensions can be defined in terms of frequency of Internet usage, daily Internet usage and diversity of Internet usage, Hypotheses 2a to 2c are stated as follows:

Hypothesis 2a. *Perceived enjoyment is positively related to frequency of Internet usage.*
Hypothesis 2b. *Perceived enjoyment is positively related to daily Internet usage.*
Hypothesis 2c. *Perceived enjoyment is positively related to diversity of Internet usage.*

3.3. Perceived ease of use

We will derive separate hypotheses for the direct and indirect effects of perceived ease of use on Internet usage.

3.3.1. Direct effect

Perceived ease of use has been found to influence computer usage directly [6, 7]. In general, if a system is easy to use, it requires less effort on the part of users, thereby increasing the likelihood of its adoption and usage. It follows that:

Hypothesis 3a. *Perceived ease of use will positively affect frequency of Internet usage directly through perceived usefulness and perceived enjoyment.*
Hypothesis 3b. *Perceived ease of use will positively affect daily Internet usage directly through perceived usefulness and perceived enjoyment.*
Hypothesis 3c. *Perceived ease of use will positively affect diversity of Internet usage directly through perceived usefulness and perceived enjoyment.*

3.3.2. Indirect effect

Perceived ease of use has also been found to influence computer usage indirectly via perceived usefulness [6, 7] and perceived enjoyment [20].

Since perceived ease of use is inversely related to the perceived complexity of use of the technology, it can also influence perceived usefulness because systems that are difficult to use are less likely to be perceived as useful. A similar argument can be made for the effects of perceived ease of use on perceived enjoyment because systems that are difficult to use are less likely to be perceived as enjoyable. In turn, this will lead to decreased usage. In other words, perceived ease of use can also affect computer usage indirectly through perceived usefulness and/or perceived enjoyment. Defining Internet usage dimensions in terms of frequency of Internet usage, daily Internet usage and diversity of Internet usage, Hypotheses 4a to 4c can be stated as follows:

Hypothesis 4a. *Perceived ease of use will positively affect frequency of Internet usage indirectly through perceived usefulness and perceived enjoyment.*

Hypothesis 4b. *Perceived ease of use will positively affect daily Internet usage indirectly through perceived usefulness and perceived enjoyment.*

Hypothesis 4c. *Perceived ease of use will positively affect diversity of Internet usage indirectly through perceived usefulness and perceived enjoyment.*

4. Method

4.1. Sample and procedures

The questionnaire was designed to be placed as Web pages on the World Wide Web (WWW). Javascript programming was added to the electronic survey 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. 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 given by the respondents and the questionnaire was deemed ready for posting on the WWW.

Several measures were taken to increase the response rate. First, according to Social Exchange Theory [13], the decision to fill out a survey is based on how respondents perceive the survey in its entirety. Specifically, Social Exchange Theory posits that we act only when we perceive the expected rewards to be greater than the costs of the action. By limiting the questionnaire to about three and a half pages, we reduced the time taken to fill up the survey to about 5 to 10 min. As a reward, 100 $2 phonecards were offered as incentives to the first 100 respondents. This was later increased to 150 $2 phonecards due to the overwhelming response.

Second, respondents were promised an executive summary of the results as an added incentive for participation. Third, the advertisement message "Free phonecards for the first 100 participants" was publicized in 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 nus.announce. These newsgroups were chosen because of their wide reach and tolerance of such advertisement 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.

Fourth, the survey Web site was publicized in the main local English newspaper, The Straits Times, which interviewed the researchers and featured an article describing the survey and the location (URL or Uniform Resource Locator) of the Web site. In addition, the Web site location (URL) was also advertised in Computerworld magazine.

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-mails for their home addresses and phonecards were duly mailed out to them.

Table 1 summarizes the demographic profile of respondents.

Males and females comprise 89% and 11% of respondents respectively. Hence, there appear to be a dominance of male Internet users in Singapore. This is consistent with the findings by Singapore Polytechnic and Batey Research Center which found that men took to the Internet faster than women [29]. Most of the respondents fall in the 16–30 yr old age group, thereby implying that most Internet users in Singapore are teenagers or young adults. More than 55% of respondents have at least a diploma or bachelor's degree. This is consistent with previous surveys con-

Table 1
Demographic profile

		No.	%
1.	Gender		
	Male	1219	89.0
	Female	151	11.0
2.	Age (years)		
	11–15	31	2.3
	16–20	276	20.1
	21–25	515	37.6
	26–30	260	19.0
	31–35	131	9.6
	36–40	92	6.7
	> 40	64	4.7
	Missing data	1	0.1
3.	Highest educational level		
	Primary	37	2.7
	Secondary	192	14.0
	Pre-university/junior college	365	26.6
	Polytechnic/diploma	315	23.0
	Bachelor degree	320	23.4
	Master degree	89	6.5
	Doctorate degree	22	1.6
	Others	28	2.0
	Missing	2	0.1

ducted 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 [29].

4.2. Instrument

The instrument gathered information about the demographic characteristics of respondents, and the research constructs (see Appendix A), namely perceived usefulness, perceived ease of use, perceived enjoyment and three 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 [7] and Igbaria *et al.* [20]. Individuals were asked to indicate their agreement or disagreement with several statements using a 5-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 of 7-point semantic differential scale adapted from Igbaria *et al.* [20] 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. Since the Cronbach alpha values for perceived usefulness, perceived ease of use and perceived enjoyment are greater than the guideline of 0.70 as stipulated by Nunnally [27], the constructs are deemed to exhibit adequate reliability.

Three indicators of usage derived from previous research on computer usage [12, 21, 31] were used as indicators of Internet usage. They are frequency of Internet usage, daily Internet usage and diversity of Internet usage. Frequency of Internet usage was measured on a 6-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. A 6-point scale ranging from (1) never/almost never to (6) more than 3 h per day was used to measure daily Internet usage.

The diversity of Internet usage was measured in terms of the number of tasks performed on the Internet. Seven main tasks were identified from interviews with Internet users during the development of the research instrument. The tasks are getting information, getting product support, communicating with people, getting free resources, purchasing/shopping, applying for a job, and carrying out swapping/selling transactions. Participants were asked to indicate the extent of their use for these tasks on a 5-point scale ranging from (1) not at all to (5) to a great extent. This method of measuring diversity of usage in terms of variety of tasks performed has been used successfully in previous research pertaining to usage of computers [20].

4.3. 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% 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 [20]. Table 2 shows that factor 1 (with 4 items) measures perceived ease of use. Similarly, factor 2 (with 7 items) and factor 3 (with 5 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.

Table 2
Factor analysis

Items	Factor 1	Factor 2	Factor 3
Ease1	0.13	0.10	0.84
Ease2	0.16	0.21	0.79
Ease3	0.14	0.18	0.82
Ease4	0.17	0.17	0.84
Enjoy1	0.82	0.02	0.12
Enjoy2	0.83	0.05	0.19
Enjoy3	0.68	0.11	0.13
Enjoy4	0.84	0.05	0.13
Enjoy5	0.77	0.14	0.11
Enjoy6	0.63	0.29	0.02
Enjoy7	0.83	0.07	0.12
Useful1	0.09	0.87	0.13
Useful2	0.11	0.86	0.10
Useful3	0.09	0.81	0.16
Useful4	0.08	0.87	0.14
Useful5	0.15	0.62	0.17
Eigenvalue	5.94	2.90	1.97
Cumulative % of variance	37.10	55.20	67.50

Table 3
Intercorrelation matrix

Constructs		1	2	3	4	5	6	7	8
Control variables									
1.	Gender (1 = male, 2 = female)	1.00							
2.	Age	−0.10‡	1.00						
3.	Education	−0.01	0.57‡	1.00					
Research variables									
4.	Perceived ease of use	−0.10‡	−0.03	0.06	1.00				
5.	Perceived usefulness	−0.11‡	0.09†	0.15‡	0.37‡	1.00			
6.	Perceived enjoyment	−0.06*	−0.06*	−0.01	0.34‡	0.27‡	1.00		
7.	Frequency of use	−0.20‡	0.04	0.08†	0.32‡	0.31‡	0.22‡	1.00	
8.	Daily use	−0.04	−0.13‡	−0.10‡	0.12‡	0.18‡	0.15‡	0.50 ‡	1.00
9.	Diversity of use	−0.14‡	−0.07†	0.03	0.22‡	0.27‡	0.14‡	0.41‡	0.33‡

* $p < 0.05$; † $p < 0.01$; ‡ $p < 0.001$.

4.4. Intercorrelation matrix

The intercorrelation matrix for the research variables are shown in Table 3. Note that three demographic variables, namely gender, age and education are also included in Table 3. These three demographic variables serve as control variables in our regression analysis so that the conclusions on Internet usage will not be confounded by demographics.

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. This may appear surprising because the educational level of the younger generation can be expected to be higher than that of the older ones. One likely explanation is the skewed age distribution of the sample, in which about 60% are younger than 25 yr and only 11% are older than 35 yr.

Perceived ease of use, perceived usefulness and perceived enjoyment are positively correlated with all three system usage dimensions (i.e. frequency of Internet usage, daily Internet usage, and diversity of Internet usage). In addition, perceived ease of use is positively correlated with both perceived usefulness ($r = 0.37$) and perceived enjoyment ($r = 0.34$).

4.5. Data analyses

To empirically test the postulated hypotheses, path analysis was performed by applying Ordinary Least Squares hierarchical multiple regressions on the research variables. Path analysis is a method of measuring the influence of explanatory variables along each separate path in a system and finding the degree to which variation of a given effect is determined by each particular cause [24]. We decided to use path analysis rather than LISREL or Partial Least Squares (PLS) in order to be consistent with the methodology used by Igbaria *et al.* [20]. This will enable more direct comparisons between our study and that of Igbaria *et al.*

We took several steps to check for possible violations of the assumptions underlying path analyses. First, an examination of the Cronbach alpha values indicated satisfactory levels (ranging from 0.87 to 0.90) of internal consistency reliability among the multi-item scales. Second, we checked the intercorrelation matrix in Table 3 for evidence of multicollinearity among the independent variables. Since all the correlations are below 0.50, multicollinearity is not a problem. Third, Durbin–Watson test for autocorrelation indicated the absence of correlated residuals.

To obtain the path coefficients required to test the research model, iterations of multiple regressions were performed. First, we regressed perceived usefulness on demographic variables as control variables in step 1, adding perceived ease of use in step 2. Second, perceived enjoyment was first regressed on demographic variables as control variables in step 1, adding perceived ease of use in step 2. Third, the three indicators of Internet usage (namely, frequency of Internet usage, daily Internet usage and diversity of Internet usage) were regressed on demographic variables in step 1, perceived ease of use in step 2, and perceived usefulness and perceived enjoyment in step 3. The hierarchical regression results are shown in Tables 4 and 5.

The path coefficient of an exogenous (independent) variable represents the direct effect of that variable on the endogenous (dependent) variable. In addition, an indirect effect represents those effects interpreted by

Table 4
Prediction of perceived usefulness and enjoyment

	Perceived usefulness		Perceived enjoyment	
Constructs	Step 1	Step 2	Step 1	Step 2
Control Variables				
Gender	–0.11‡	–0.07†	–0.07†	–0.04
Age	–0.00	0.03	–0.08*	–0.05
Education	0.16‡	0.11‡	0.03	–0.01
Research Variables				
Perceived ease of use		0.35‡		0.34‡
Adjusted R^2	0.03	0.16	0.01	0.12
Δ adjusted R^2		0.13‡		0.11‡

* $p < 0.05$; †$p < 0.01$; ‡$p < 0.001$.

the intervening variables and is the product of the path coefficients along an indirect route from cause to effect via tracing arrows in the headed direction only. When more than one indirect path exists, the total indirect effects is their sum. The sum of the direct and indirect effect reflects the total effect of the variable on the endogenous (dependent) variable [2]. The estimated path coefficients will therefore indicate the strength and the sign of the stipulated theoretical relationships.

For example, in the case of frequency of Internet usage, the direct effect of perceived ease of use is 0.19 as shown in Table 5. In the case of indirect effects, there are actually two indirect paths with perceived usefulness and perceived enjoyment as intervening variables. Hence, the indirect effect for each of the two indirect paths is given by the product of the path coefficients from cause to effect, i.e. $(0.35 \times 0.19 = 0.07)$ and $(0.34 \times 0.09 = 0.03)$. The total indirect effect is therefore the sum of the two indirect effects, i.e. $0.07 + 0.03 = 0.10$. The total effect, which is the sum of the direct and indirect effects is therefore $0.19 + 0.10 = 0.29$.

The path coefficients for direct, indirect, and total effects, as well as zero order correlations are shown in Table 6.

To test the "goodness of fit" of the model, we used the criterion that the absolute difference between the reproduced (i.e. total effect from sum of direct and indirect effects) and original correlations does not exceed 0.10 [25]. As seen from Table 6, this criterion is satisfied for all variables with direct and indirect effects, thereby confirming the "goodness of fit" of the research model.

Section 5 proceeds to present the results given in Tables 4–6.

Table 5
Hierarchical regression analyses for system usage

	Frequency of Internet usage			Daily Internet usage			Diversity of Internet usage		
Constructs	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Control variables									
Gender	–0.20‡	–0.17‡	–0.15‡	–0.04	–0.03	–0.02	–0.16‡	–0.14‡	–0.12‡
Age	–0.02	0.01	0.01	–0.11†	–0.10†	–0.10†	–0.15‡	–0.13‡	–0.13‡
Education	0.09*	0.06	0.04	–0.03	–0.05	–0.07*	0.11‡	0.09†	0.06*
Research variables									
Perceived ease of use		0.29‡	0.19‡		0.11‡	0.03		0.20‡	0.11‡
Perceived usefulness			0.19‡			0.16‡			0.21‡
Perceived enjoyment			0.09‡			0.09†			0.03
Adjusted R^2	0.04	0.13	0.17	0.02	0.03	0.06	0.03	0.07	0.11
Δ adjusted R^2		0.09‡	0.08‡		0.01‡	0.03‡		0.04‡	0.04‡

* p 0.05; †$p < 0.01$; ‡$p < 0.001$.

Table 6
Prediction of Internet usage

Variables	Frequency of Internet usage			Daily Internet usage			Diversity of Internet usage					
	Direct	Indirect	Total	r	Direct	Indirect	Total	r	Direct	Indirect	Total	r
Control variables												
Gender	−0.15‡	−0.02	−0.17‡	−0.20‡	−0.02	−0.01	−0.03	−0.04	−0.12‡	−0.02	−0.14‡	−0.14‡
Age	0.01	0.00	0.01	0.04	−0.10†	0.00	−0.10†	−0.13‡	−0.13‡	0.00	−0.13	−0.07†
Education	0.04	0.02	0.06*	0.08†	−0.07*	0.02	−0.05	−0.10‡	0.06*	0.02	0.08†	0.03
Research variables												
Perceived ease of use	0.19‡	0.10†	0.29‡	0.31‡	0.03	0.09†	0.12‡	0.12‡	0.11‡	0.08†	0.19‡	0.22‡
Perceived usefulness	0.19‡	–	0.19‡	0.31‡	0.16‡	–	0.16‡	0.18‡	0.21‡	–	0.21‡	0.27‡
Perceived enjoyment	0.09‡	–	0.09‡	0.22‡	0.09‡	–	0.09‡	0.15‡	0.03	–	0.03	0.14‡
Adjusted R^2	0.17				0.06				0.11			

* $p < 0.05$; † $p < 0.01$; ‡ $p < 0.001$.

5. Results

The results are presented as follows. First, we will present the effects of control variables on perceived usefulness, perceived enjoyment and Internet usage dimensions using results in Tables 4 and 5. Second, we will test the various hypotheses using results in Table 6.

5.1. Control variables

From Table 4, gender has significant negative effects ($\beta = -0.07$) while education has significant positive effects ($\beta = 0.11$) on perceived usefulness. The control variables contributed 3% to the variances in perceived usefulness. Although age and gender were found to have significant negative effects on perceived enjoyment in step 1, in the presence of perceived ease of use in step 2, the results are no longer significant. In fact, the control variables contributed only 1% to the variation in perceived enjoyment.

From Table 5, control variables generally contribute about 2 to 4% of the variance in the three Internet usage dimensions. Gender has significant negative effects on frequency of Internet usage ($\beta = -0.15$) and diversity of Internet usage ($\beta = -0.12$), thereby implying that males use the Internet more frequently and for a greater number of tasks than females. In contrast, age has significant negative effects on daily Internet usage ($\beta = -0.10$) and diversity of Internet usage ($\beta = -0.13$), thereby implying that older Internet users use the Internet for a lesser number of hours per day and a lesser range of tasks than younger Internet users.

Education level appears to negatively affect daily Internet usage ($\beta = -0.07$) but positively affect diversity of Internet usage ($\beta = 0.06$), thereby implying that the higher the education level of Internet users, the less time is spent on the Internet daily but the diversity of tasks performed is greater compared to less educated Internet users. One possible reason is that more educated users may have less time daily to use the Internet perhaps due to work commitments. Alternatively, more educated Internet users may be more focused on using the Internet to perform specific tasks, thereby requiring lesser time on the Internet daily. Diverse tasks are performed by more educated Internet users probably because they are more knowledgeable about the Internet compared to less educated Internet users. An additional explanation is that the work of more educated people may be more diversified.

5.2. Hypotheses testing

From Table 6, Hypotheses 1a to 1c which state that perceived usefulness is positively related to Internet usage is supported for all usage dimensions (frequency

of Internet usage, daily Internet usage and diversity of Internet usage). However, the effect of perceived usefulness on diversity of Internet usage appears to be the greatest as evident from its direct path coefficients ($\beta = 0.21$), followed by frequency of Internet usage ($\beta = 0.19$) and daily Internet usage ($\beta = 0.16$).

Hypotheses 2a and 2b which states that perceived enjoyment is positively related to frequency of Internet usage and daily Internet usage are supported. However, Hypothesis 2c is not supported since insignificant results were obtained for the effect of perceived enjoyment on diversity of Internet usage.

Hypotheses 3a and 3c which concern the direct effect of perceived ease of use on frequency and diversity of Internet usage are fully supported. Hypothesis 3b which states that perceived ease of use will affect daily Internet usage directly is not supported.

Hypotheses 4a, 4b and 4c which deal with the indirect effects of perceived ease of use on the three Internet usage dimensions are supported.

6. Discussion

The support for Hypotheses 1a–1c is expected since past research literature has consistently shown that perceived usefulness is positively related to system usage [8, 20]. In terms of the effects of perceived enjoyment, the significant results obtained for frequency of Internet usage ($\beta = 0.09$) and daily Internet usage ($\beta = 0.09$) are expected because if an activity is enjoyable, it is likely to be indulged in more frequently and for a longer time each day. The non-significant results for diversity of Internet usage ($\beta = 0.03$) can perhaps be explained by the notion that although a wide diversity of tasks may be performed on the Internet, users are likely to enjoy performing only a small subset of tasks. This explanation is further supported by our results which indicated that out of the seven different tasks in the questionnaire, three of them (purchasing/shopping, applying for a job and swapping/selling transactions) are performed only to a limited extent.

Overall, these results are consistent with the notion that Internet users would choose to engage in a greater variety of tasks on the Internet because of the perceived usefulness of these tasks, as opposed to simply conducting more tasks because it is enjoyable per se.

Note that the direct effects of perceived usefulness ($\beta = 0.19, 0.16, 0.21$) are much stronger than perceived enjoyment ($\beta = 0.09, 0.09, 0.03$) as is evident from the values of path coefficients for all three usage dimensions. This is consistent with previous research which found that perceived usefulness plays a more significant and stronger role than perceived enjoyment in the acceptance and usage of computers [20, 22].

An explanation can perhaps be derived from Deci's [11] work which suggested that introducing an extrinsic reward can diminish the effect of intrinsic motivation on tasks which were originally purely and intrinsically motivating. Furthermore, Deci's cognitive evaluation theory argues that an extrinsic reward causes a shift in locus of causality for the activity from internal to external and in the process, reduces feelings of competence and self-determination which are key determinants of intrinsic motivation. Thus, the more prominent effects of perceived usefulness could have, therefore, implicitly diminished the intrinsic motivational effects of perceived enjoyment.

The support for Hypothesis 3a is consistent with literature that the easier a system is to use, the less effort will be needed to conduct tasks, which means more work done and hence greater frequency of usage [8]. In other words, the result for frequency of Internet usage is logically expected because the easier a system is to use, the greater will be the propensity to use the same system since little or no extra cognitive learning efforts will be required. Thus, the system will be used more frequently. In a similar vein, it is logical to expect that the easier a system is to use, the easier it would also be to conduct various tasks on the system. Consequently. the user might be motivated to perform a greater variety of tasks on the system, thereby lending support to Hypothesis 3c.

The insignificance of the direct effect of perceived ease of use on daily Internet usage can be explained as follows. The direct effects of perceived usefulness and perceived enjoyment are about three or more times greater than the direct effects of perceived ease of use on daily Internet usage. Therefore, it is logical to deduce that in a single day, perceived usefulness and perceived enjoyment will be stronger motivators encouraging greater daily usage as compared to perceived ease of use. Learning to use the Internet is generally considered easy (among ease of use items, highest mean of 4.44 out of maximum 5). Thus, this learning process would be quickly completed [15]. Furthermore, previous research has found that perceived ease of use is important as a determinant of intention to use a system is significant only in the early adoption period but becomes less important for post-adoption usage [1]. Since our results suggest that the Internet is perceived to be very easy to use, this may indicate that high ease of use facilitates early adoption, but becomes less important than perceived usefulness in the post-adoption stage. This would explain why the effect of perceived ease of use is less salient than perceived usefulness and perceived enjoyment on the extent of daily Internet usage.

Another plausible reason is that users are driven to adopt and use a system primarily because of the functions it performs for them and secondarily for how

easy or hard it is to get the system to perform these functions. Users would also be willing to cope with some difficulty of use for systems that provides crucial functionality [8].

The results also showed that perceived ease of use can influence Internet usage dimensions through their effects on perceived usefulness and perceived enjoyment. The easier a system is to use, the greater will be a user's feelings of self-competence and determination which will in turn lead to exploration of the different features of the system, thereby increasing perceived usefulness. Furthermore, such feelings may increase intrinsic motivation and, thus, result in greater enjoyment while conducting an activity [4, 9–11].

With respect to the strength of the direct and indirect effects for perceived ease of use, we note that the direct effects on frequency of Internet usage and diversity of Internet usage are stronger than the indirect effects. The converse is true for daily Internet usage. These findings are different from Igbaria *et al.*'s [20] study, which found that the indirect effects on similar three dimensions of usage were stronger than the direct effects.

One plausible explanation for our dissimilar findings to Igbaria *et al.*, can be traced to the development of the Internet. The first windows browser, NCSA Mosaic, was created specifically to be user-friendly via its point and click hyperlinks system [23]. This system uniquely epitomized the World Wide Web concept which enables information to be easily retrieved by selecting between unlimited associations of objects and words. This user-friendliness was thus a crucial factor in bringing the Internet to popularity with the masses.

Moreover, the ever-evolving succeeding versions of browsers such as Netscape's Navigator and Microsoft's Internet Explorer have greatly improved the ease of browsing, e-mailing, downloading and participating in newsgroups discussion. This may therefore explain why perceived ease of use has relatively strong direct effects on usage dimensions compared to Igbaria *et al.*'s study on motivation for computer usage.

A "disappointing" finding of the paper is the low variances of the dependent variables explained by the model. They are clearly lower than those of Igbaria *et al.* [20]. One possible explanation is that the Internet is relatively new for most people while microcomputers have been around for some time. Consequently, respondents may not be aware of the different functionalities or use only few functionalities of the Internet. Another explanation could be that the Internet is often viewed as a source of entertainment or information, rather than directly related to work (as in the case of microcomputers). Consequently, the ease of use, usefulness or enjoyment variables may explain less variance in the dependent variables because the Internet is not the only source of entertainment or information available.

7. Concluding remarks

This research examined three motivators relevant to explaining the acceptance of information systems in general, namely: perceived usefulness, perceived enjoyment and perceived ease of use. Results indicate that local Internet users use the Internet mainly because they perceived the Internet to be more useful to their job tasks and secondarily because it is enjoyable and easy to use. Hence, researchers, practitioners and policy makers seeking to facilitate the adoption of the Internet should emphasize the usefulness of the Internet in assisting users in performing their job tasks more efficiently and effectively.

Since perceived usefulness is generally more important that perceived ease of use and perceived enjoyment in affecting Internet usage, this may imply that systems that at first seems easy to use and enjoyable may in the long run be abandoned if they do not provide critically needed functionality. For the case of the Internet, one common observation is that new users are often fascinated by the capabilities of the Internet in giving them access to almost an infinite number of information resources. However, continued usage without any specific purpose or usefulness may decline over time when the novelty effect of the Internet wears off. This has important implications for individuals and companies with Web pages in that they must continue to update and make their Web pages useful and interesting to Internet users.

Although the results showed that extrinsic motivation is generally stronger than intrinsic motivation, it is important to realize that other factors may also play an important role in affecting usage. Examples of such factors include computer experience and anxiety [16], computer skills, organizational support and social pressure [17], self-efficacy [19] and user training [18]. Future research can attempt to examine intrinsic and extrinsic motivations in the context of the above factors.

Our results, which are generally consistent with previous research carried out in North America and Finland, demonstrate the generalizability of previous results to Singapore. Future research can survey respondents from different countries and carry out cross-cultural comparisons. In addition, since the present study examines Internet usage, future research can replicate or extend this study by using different information technologies.

Since the usage measures used in this study were self-reported, future research can attempt to develop more direct and objective measures. Objective use logs

were not practical in this study since participants may use the Internet anytime, anywhere, using different computers and browsers for different tasks. Self-reported usage should not be regarded as precise measures of actual usage, although previous research suggests that they are appropriate as relative measures [5]. Hence, this limitation is not viewed as serious.

Appendix A. Questionnaire

A.1. Perceived ease of use

Please indicate your agreement or disagreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Learning to use the Internet would be easy for me	1	2	3	4	5
2. I would find it easy to use the Internet to do what I want to do	1	2	3	4	5
3. It would be easy for me to become skilful at using the Internet	1	2	3	4	5
4. I would find the Internet easy to use	1	2	3	4	5

A.2. Perceived usefulness

Please indicate your agreement or disagreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Using the Internet improves my work performance	1	2	3	4	5
2. Using the Internet increases my work productivity	1	2	3	4	5
3. I find the Internet useful for my work	1	2	3	4	5
4. Using the Internet enhances my effectiveness in my work	1	2	3	4	5
5. Using the Internet provides me with information that would lead to better decisions	1	2	3	4	5

A.3. 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

A.4. Usage

(1) Frequency of Internet usage
On the average, how frequently do you use the Internet?

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

(2) Daily Internet usage
On the average working day, how much time is spent on the Internet?

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

(3) Diversity of Internet usage
Please indicate the extent to which you use the Internet to perform the following tasks.

	Not at all				To a great extent
1. Get information	1	2	3	4	5
2. Get product support	1	2	3	4	5
3. Communicate with people	1	2	3	4	5
4. Get free resources	1	2	3	4	5
5. Purchasing/shopping	1	2	3	4	5
6. Apply for job	1	2	3	4	5
7. Swapping/selling transactions	1	2	3	4	5

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