Impact of Personal Innovativeness on the Use of the Internet Among Employees at Work[1]

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ABSTRACT

Examining Internet use among employees, this research investigated the theoretical proposition that personal IT innovativeness will positively impact the use of novel computer technologies. The research model included the individual traits of age, gender, experience with IT, and educational level. The article discusses the categories of organizationally relevant versus personal use of the Internet. Using a questionnaire, data was collected from 328 respondents in one organization. The results indicated that users perceive structural differences across various types of Internet use areas, although no clear support for a distinction between organizationally relevant and personal use was found. Additionally, the analyses indicated that personal use is considerably lower than organizationally relevant use of the Internet. However, employees may not distinguish clearly between these two categories. Personal IT innovativeness was the best predictor of organizationally relevant use of the Internet. Age contributed negatively to Internet use. Males appear to use the Internet more frequently than females. Educational level had no impact on Internet use.

Keywords: information technology; innovativeness; Internet use

INTRODUCTION

A recurring theme within the domain of end-user computing is explaining differences in individual computer use patterns among employees (DeLone & McLean, 1992; Harris, 2000; Powell & Moore, 2002; Seddon, 1997). Recently, Internet usage has emerged as an area of particular importance (Otto, Najdawi & Caron, 2000; Stanton, 2002). Because of the recent dot-com bubble collapse and numerous e-commerce failures, one would expect the Internet to have less importance to individual users. However, in addition to some dot-com successes, private and public institutions are developing an increasing number of Internet services. Employees of large organizations are active users, and their use is expected to grow (Charlton et al., 1998; Roberts, 2000). Research addressing differences

in personal Internet use patterns has relevance.

Based on the view that change is key, a series of studies have investigated the effect of *personal information technology (IT) innovativeness* on the use of novel technologies. Studies addressing *personal IT innovativeness* often differ from research using the technology acceptance model (Chau, 2001) because the impacts of attitude, beliefs, and intention on behavior (that is, use) are not the focus. Rather, *personal IT innovativeness* has been viewed as a trait that in its own right may explain use. Hence, the present research builds on the theoretical assumption that *personal IT innovativeness* is positively related to the use of novel technologies regardless of usage area.

The samples used in previous studies addressing *personal IT innovativeness* are users (in general) of the World Wide Web (Agarwal & Karahanna, 2000), online shoppers (Limayem, Khalifa & Frini, 2000), academicians (Pajo, 2000), and adolescents (Wolfradt & Doll, 2001). The overall interpretation is that *personal IT innovativeness* has a positive impact on Internet use, yet the relationship between *personal IT innovativeness* and Internet use among the broad population of employees in business organizations has not been directly investigated.

The argument that the present fast-changing business environment requires constant innovation efforts also applies to individual employees. The concept of innovation covers a wide range of issues (Damanpour, 1991; Robey & Boudreau, 2000). Clearly, *personal IT innovativeness* is only a small element within the larger issue of innovation in organizational settings. It has also been argued that there is a difference between change and innovation (Katz & Kahn, 1978; Larsen, 1993). According to these authors, an innovation effort would impact a large part of, if not the entire, organization. Change activities are defined as individual actions taken where the objective is limited to improvements in the individual's own job situation.

However, an information technology that offers a large degree of freedom with regard to its use may leave the responsibility of its use to individual users. In this regard, the degree of *personal IT innovativeness* may play a role. Obviously other socioeconomic characteristics may explain use (Brancheau & Wetherbe, 1990; Rogers, 1983). For these reasons, the present research project focused on the following research question: What are the relationships among employees' degree of *personal IT innovativeness*, other socioeconomic factors, and the use of the Internet at work?

THEORY, HYPOTHESES, AND RESEARCH MODEL

IT use (also denoted *system use or utilization*) is one of the most frequently applied concepts of IS success (e.g., Seddon, 1997; Straub, Limayem & Karahanna-Evaristo, 1995). Among IS researchers, there is a widespread belief that use of IT affects white-collar performance (Davis, 1989; Thompson, Higgins & Howell, 1991). However, as Guthrie and Gray (1996) and Markus (1994) have

observed, IT can be utilized in both appropriate and inappropriate ways. Ineffective or inappropriate use often prevents or undermines positive impacts (Markus, 1994). For example, indiscriminate use of the Internet for personal matters may result in reduced job performance. Because the Internet can be employed for multiple purposes, the issue has been raised that organizations must promote appropriate or organizationally relevant Internet use[2] (Spar & Bussgang, 1996). Conversely, it has also been argued that employees should be allowed to spend time on nonproductive tasks since any experience in computer use may increase a person's computer literacy and general ability to take advantage of IT (Guthrie & Gray, 1996).

Based on the work by Guthrie and Gray and Markus, in this research Internet use was conceptualized as a construct including both organizationally relevant and personal use, with use of the Internet as a vehicle for business information search being an example of the former, and use of the Internet for personal banking being an example of the latter. Organizations would obviously promote Internet use that is business related. Consequently, many organizations have established policies that limit or prohibit personal Internet use. Because the information found on the Internet frequently is not organized into clear categories, distinguishing between organizationally relevant and personal Internet use may not be straightforward (for example, reading news, browsing, and locating home pages). Personal banking and shopping products are examples of personal use. Organizations may not want employees to spend hours on these. Yet, organizations may encourage employees to explore new technologies and new possibilities. Hence, limited personal use of the Internet at work may not be seen as synonymous with inappropriate use. Because of this, employees may not perceive a clear distinction between organizationally relevant and personal use.

In summary, in situations where limited personal Internet use occurs and the organization does not explicitly forbid it or implicitly encourages it to some degree, it may be difficult for employees to differentiate between organizationally relevant and personal Internet use. Also, the information found on the Internet is quite often not presented in clear categories. Hence, the present research anticipated that active Internet users are more active across usage areas than less active users. The argumentation leads to the following hypothesis:

H1.a: Use of the Internet among employees will not exhibit structural differences across Internet usage areas.

It is reasonable to expect that personal Internet use occurs in most organizations and, at least in part, is indistinguishable from organizationally relevant use. As indicated above, reading business news may be a typical example of use that mixes organizationally relevant and personal Internet use. However, shopping and banking are strong personal use candidates, but even these two usage areas may have organizational relevance. For example, filing a business travel compensa-

tion request may require access to personal bank and credit card information. Although personal Internet use may be structurally consistent across usage areas (cf. H1.a), we anticipate that Internet use in areas deemed highly organizationally relevant will exceed the use of the Internet in areas deemed mostly personal.

H1.b: Personal use of the Internet in areas deemed organizationally relevant will be more frequent than use of the Internet in areas deemed personal.

As the research question implies, we were particularly interested in exploring the relationship between *personal IT innovativeness* and use of the Internet, the relationship being a well-established research issue (Citrin, Sprott, Silverman & Stem, 2000; Wolfradt & Doll, 2001). However, recent conceptualization of *personal IT innovativeness* is radically different than that originally defined by Rogers and Shoemaker (1971). They conceptualized innovativeness as an observable phenomenon, the individual point in time of adoption relative to others.

The employment of diffusion theory in organizational settings has been criticized for various reasons; for example, that organizational IT-based innovations in their own right are more complex than Rogers' (1983, 1995) diffusion theory specifies or that organizational IT innovation processes are richer and more diverse than sigmoidal (Larsen, 2001; Lyytinen & Damsgaard, 2001). In particular, the objective of this research was not the investigation of the date of adoption but the level of Internet use. With regard to Rogers' diffusion theory, an employee using the Internet at an early date may not necessarily have maintained that use. Also, an employee having initiated Internet use at a somewhat later date may have become a heavy user or discontinued that use. Therefore, the date of Internet adoption may not necessarily be correlated with use.

Because of these difficulties and the focus on the amount of use, we turned to Agarwal and Prasad's (1998) conceptualization of innovativeness as a personal trait. Agarwal and Prasad argued that IT innovativeness is a relatively stable descriptor being invariant across user populations. Moreover, they described *personal IT innovativeness* as a general innovative behavior in the context of microcomputer interactions, expressed as "the willingness of an individual to try out any new information technology" (p. 206). The assumption is that individuals scoring high on *personal IT innovativeness* would take advantage of a new technology (Agarwal & Karahanna, 2000; Goldsmith, 2001; Limayem et al., 2000; Pajo, 2000; Wolfradt & Doll, 2001). Based on these findings, we anticipated that *personal IT innovativeness* among employees would influence the level of both organizational and personal Internet use. Although in their work context, users may exhibit a willingness to try out new information technology, one cannot infer that the Internet is used for strictly organizationally relevant matters. As discussed previously, it is quite likely that the Internet is used for both organizational and personal purposes. Hence, the hypothesis indicated here is:

H2: Personal IT innovativeness will be positively related to (a) organizationally relevant Internet use and (b) personal Internet use.

Based on earlier articles on individual use (Bannert & Arbinger, 1996; Brancheau & Wetherbe, 1990; Larsen, 1993; Larsen & Wetherbe, 1999; Thompson et al., 1991, 1994), the four socioeconomic factors of experience (with IT), gender, age, and education, were included. With regard to experience with IT, Lee (1986) demonstrated that prior experience with computers was correlated with the number of applications used. In a study of the adoption of advanced manufacturing technology, Martin (1988) found that employees who had worked with computers had a more favorable attitude toward complex uses of computers. Based on Triandis' (1971) theory of behavior, Thompson et al. (1994) demonstrated that computer experience has an impact on both attitudes toward use and use. It seems reasonable to assume that experience with IT has a positive impact on Internet use.

H3.a: More experience with IT will be positively related to (a) organizationally relevant Internet use and (b) personal Internet use.

Gender differences are primarily examined outside the specific context of end-user computing. For instance, in a study of secondary school students, Bannert and Arbinger (1996) demonstrated that gender was correlated to differences in attitudes toward computers and actual use of computers. In a study of 202 college students, Shashaani (1993) found that females were less interested in computers and, consequently, they were low-frequency users. These results suggest that gender differences occur. Although these studies both used students as subjects, we inferred that gender differences might be found in the context of Internet use:

H3.b: Men will be more frequent users of the Internet for (a) organizationally relevant use and (b) personal Internet use than women.

Age and education have served as correlates to a variety of computer-related outcomes. Brancheau and Wetherbe (1990) found that age (negative) and education (positive) were correlated with the early adoption of spreadsheet packages. In his study of middle managers, Larsen (1993) documented a positive correlation between educational level and the use of end-user computing applications, although the relationship disappeared when regression analysis was employed. The result for age was nonsignificant. Although not clear-cut, these results suggest that age and education may influence user behavior. This might be particularly true when the IT being investigated is new and easy to use. It is expected that the impact of age and education on Internet use may parallel Brancheau and Wetherbe's findings, hence:

H3.c: Older employees will use the Internet less for (a) organizationally relevant use and (b) personal Internet use than younger employees.

H3.d: Educational level will be positively related to (a) organizationally relevant Internet use and (b) personal Internet use.

Items (for example, age, gender, experience, and educational level) that might be strongly related to the dependent variable are commonly included to ensure that relationships between focused independent and dependent variables are not spurious (Bollen, 1989; Judd, Smith & Kidder, 1991). A common finding is that the strength of the relationship between focused independent and dependent variables is reduced when other items or variables are included, indicating a spurious relationship. An increase in the relationship between an independent and a dependent variable might indicate a suppressed relation (Judd et al., 1991). Our proposition is that inclusion of the four socioeconomic factors in the research model will reduce the relationship between *personal IT innovativeness* and Internet use. However, we still believe that *personal IT innovativeness* will remain the strongest predictor of Internet use.

H4.a: Inclusion of age, gender, experience (with IT), and educational level will reduce the relationship between personal IT innovativeness and the use of the Internet for (a) organizationally relevant and (b) personal Internet use.

H4.b: After inclusion of age, gender, experience (with IT), and educational level, personal IT innovativeness will remain the strongest predictor of use of the Internet for (a) organizationally relevant and (b) personal Internet use.

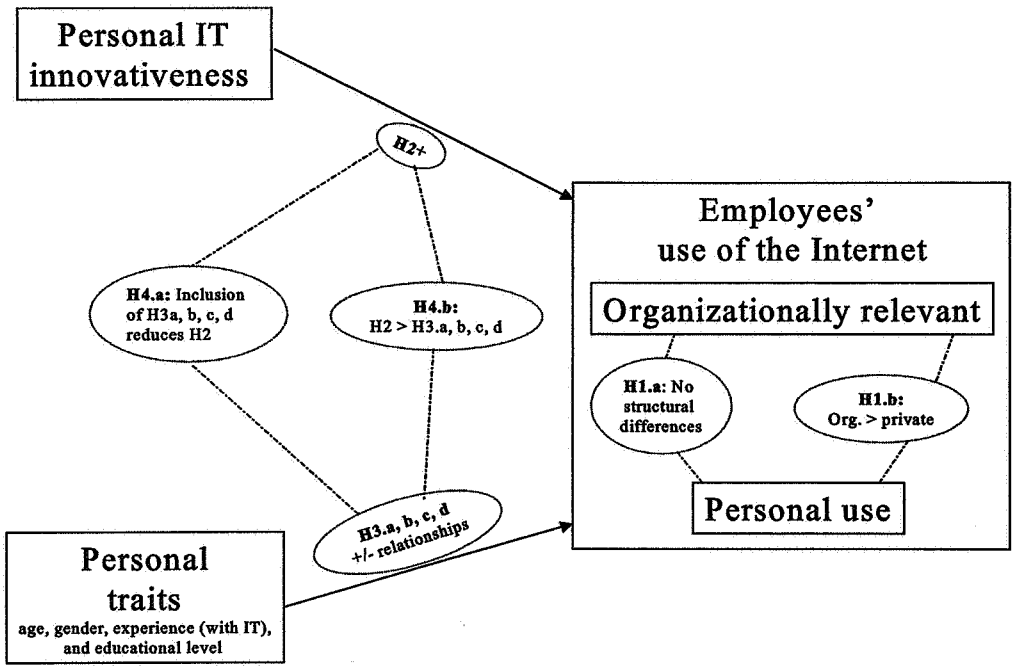
The research model is shown in Figure 1.

METHODS

Generalizability concerns indicate that a study of employees' use of the Internet should employ a multiple organization data collection design. A particular challenge in general surveys is a low response rate, which may indicate that only subjects with a particular interest in the research issue responded. If so, the collected data may be skewed toward respondents with a particular interest in Internet use and *personal IT innovativeness*. In our research, we were equally interested in collecting data from employees that (1) were infrequent or nonusers of the Internet as those that are users, and (2) display a low degree of *personal IT innovativeness* as those that display a high degree of *personal IT innovativeness*. Collecting data from a cross section of employees with these key characteristics may be more likely when a large organization agrees to participate and, hence, encourages its employees to take their time to participate in the research. A large oil company, where the Internet was made available to most employees in April 1997, agreed to participate in the study.

Since our variables and items had been used in previous research efforts and found to be reliable with acceptable validity, a questionnaire (see Appendix A)

Figure 1. Research model including hypotheses



was developed as the vehicle for data collection. The language of the questionnaire was Norwegian. English items were first translated into Norwegian and then back into English by a second person to ensure wording reliability. All items, except for Internet use, were derived from previous research. Agarwal and Prasad's (1998) four items tapping a person's willingness to try out new IT were employed as the measure of *personal IT innovativeness*.

At the time the data was collected, no scale measuring areas of Internet use could be found. Based on 11 semi-structured interviews with selected users, the researchers developed their own. Subjects for the interviews were selected from different departments; they were perceived as conscious users. The interviews questioned the subjects about their own and their coworkers' present Internet use. Based on the interview data, seven items were developed (see Appendix A).

The 11 interview subjects then completed a close-to-final version of the instrument without the researchers being present. Subjects were encouraged to write comments if items were found to be ambiguous or difficult to understand.

Using the internal mail system at the company, the final questionnaire was distributed to 500 administrative workers drawn randomly from a pool of 15,000 candidates. Respondents were guaranteed individual anonymity; only aggregated results would be reported. Anonymity was strongly stressed because the company had implemented a no-electronic-games policy. Because of this policy, respondents may have automatically under-reported their real level of Internet use for personal purposes. Returns were by ordinary public mail. By the end of March 1999, 328

Table 1. Descriptive statistics for the final sample

Women	30%
Men	70%
Age (%):	
< 25	1
25 – 35	29
36 – 45	36
46 – 55	24
> 55	10
Type of education (%):	
Primary school	1.5
College	13
University (≤ 2 years)	13
University (> 2 years)	31
Master's degree	34
Doctor's degree	7.5
Job type (%):	
Skilled work	74
Administrative work	16
Other	10
Average computer experience	11 years

usable questionnaires were returned, for a response rate of 66%. Table 1 shows the descriptive statistics of the final sample.

The collected data mirrors Internet use four years ago and may be dated. However, the research objective was to study the impact of *personal IT innovativeness* on a new technology. In this respect, it might be said that data about Internet use in 1999 reflects, to a larger degree, the use of a new technology than would be the case if data were collected today. Also, in 1999 the Internet had been available to respondents for about one year. Hence, although relatively new, the Internet was not a totally unknown phenomenon to the respondents. A somewhat stable usage pattern would have had time to evolve. Additionally, using data from a period where the Internet was relatively new allows for future comparison. For these reasons, we concluded that the collected data has validity.

The recommended two-step procedure of checking item data quality measurement before hypothesis and relationship testing was followed (Anderson & Gerbing, 1988). Items were checked for skewness and kurtosis (see Appendix B for details). The use of the Internet for *personal banking* and *shopping products* yielded, approximately, skewness = 4 and kurtosis = 15, which might indicate a problem (Kline, 1998). However, data representing use of a specific IT type might behave erratically, warranting careful consideration but not immediate deletion. Only one questionnaire in the sample contained missing values for a completion rate of nearly 100%.

The statistical techniques employed were factor analysis, Tukey's follow-up procedure for differences among means, structural equation modeling (SEM) using LISREL, and stepwise regression. Because hypothesis formulations include reliability and validity aspects, these two issues will be discussed in the analysis section.

ANALYSIS

The method employed for testing H1.a, that there would be no structural differences among Internet use items, was factor analysis. The maximum likelihood calculation using the varimax and oblim methods documented two factors yielding the similar result of no clear patterns except for *Internet surfing* and *travel information* clearly loading on separate factors. The clearest pattern appeared

Table 2. Factor analysis of Internet use items

Items	Factor 1	Factor 2
Information seeking	0.58	0.41
Reading news	**0.62**	0.11
Travel information	**0.80**	0.11
Home page reading	**0.74**	0.22
Internet surfing	0.61	0.51
Personal banking	**0.63**	-0.37
Shopping products	0.06	**0.51**
Percent of variance explained	87.6	12.4
Cronbach's Alpha	0.77	n.a.

Notes: Extraction method is principal component analysis and rotation method is varimax. Numbers in bold represent items that clearly load on one factor—using the rules of item loading ≥ 0.50, no other loading ≥ 0.40, and difference between loadings for one item ≥ 0.20.

when using the principal component analysis with varimax methods, as shown in Table 2.

The factor analysis shows that most items load on Factor 1 and that the only item that clearly loads on Factor 2 is *shopping products*. The two items of *information seeking* and *Internet surfing* may load on both factors, although the highest loading values occur for Factor 1. Judging these results conservatively, H1.a, which postulated no structural differences among Internet use items, is rejected.

The one-way Anova test for exploring H1.b, detecting differences among Internet use item means, was significant ($F = 106.64$, $p < 0.01$). The Tukey B follow-up procedure was employed to document statistically significant nonoverlapping groupings of areas of Internet use, as shown in Table 3.

As measured in this research, there is a significant difference in Internet use levels among items. The items of *personal banking* and *shopping products* form a common group. As can be seen in Table 3, the means for these two items are very low, in fact, approaching the absolute minimum numeric value of 1. Comparing the two means of *personal banking* and *shopping products* with the other Internet use items, the indication is that H1.b is

Table 3. Groupings of Internet use items

Items	Group 1	Group 2	Group 3	Group 4	Group 5
Information seeking	3.84				
Reading news		3.17			
Travel information			2.60		
Home page reading				2.17	
Internet surfing				2.00	
Personal banking					1.34
Shopping products					1.28

Notes: Follow-up procedure is Tukey B. Numbers represent Internet use mean values.

supported; that is, Internet use that may be *organizationally relevant* is more frequent than *personal Internet use.*

The test results with regard to skewness, kurtosis, factor loadings (Table 2), and means groupings (Table 3) indicate that *personal banking* and *shopping products* are problematic items. Indeed, the initial LISREL model, with all items included, confirmed the concern. (Model statistics; $c^2 = 90.31$ [$p < 0.0$, degrees of freedom (DF) = 43]; root mean square error of approximation (RMSEA) = 0.06 [p (close fit) = 0.20]; comparative fit index (CFI) = 0.97; non-normed fit index (NNFI) = 0.96.) In particular, the loadings of *personal banking* and *shopping products* to the latent construct of *organizationally relevant use of the Internet* was 0.12 and 0.09, respectively. Due to their low loadings, both items were dropped from further modeling (see Figure 2 for the final model). Because of this, the remaining hypothesis testing only addresses *organizationally relevant use of the Internet.* That is, for hypotheses H2, H3.a, H3.b, H3.c, H3.d, H4.a, and H4.b only section (a) *organizationally relevant* is tested. Section (b), addressing *personal Internet use*, is dropped.

The redefined model, including *personal IT innovativeness*, individual traits, and *organizationally relevant use of the Internet,* resulted in an improved fit above suggested cut-off levels (Model statistics; $c^2 = 49.22$ [$p < 0.0$, DF = 26], RMSEA = 0.052 [p (close fit) = 0.41]; CFI = 0.98; NNFI = 0.98). The square of the correlation between the two latent variables is approximately 0.12, which is less than the variance explained between each latent construct and its items; hence, discriminant validity is regarded as adequate (Fornell & Larcker, 1981). The composite reliability for *personal IT innovativeness* is 0.91 and for *organizationally relevant use of the Internet* is 0.79. Both are above the recommended threshold of 0.70. The conclusion is that the model can be accepted. The revised LISREL model is shown in Figure 2.

As can be seen in Figure 2, the loading factor on the path between the two latent constructs of *personal IT innovativeness* and *organizationally relevant use of the Internet* is 0.35, $p < 0.01$. Hypothesis 2 is supported. The higher the degree of *personal IT innovativeness*, the higher the *organizationally relevant use of the Internet.*

With regard to personal traits, the results indicate that:

H3.a is supported: the longer the IT experience, the higher the organizationally relevant use of the Internet.

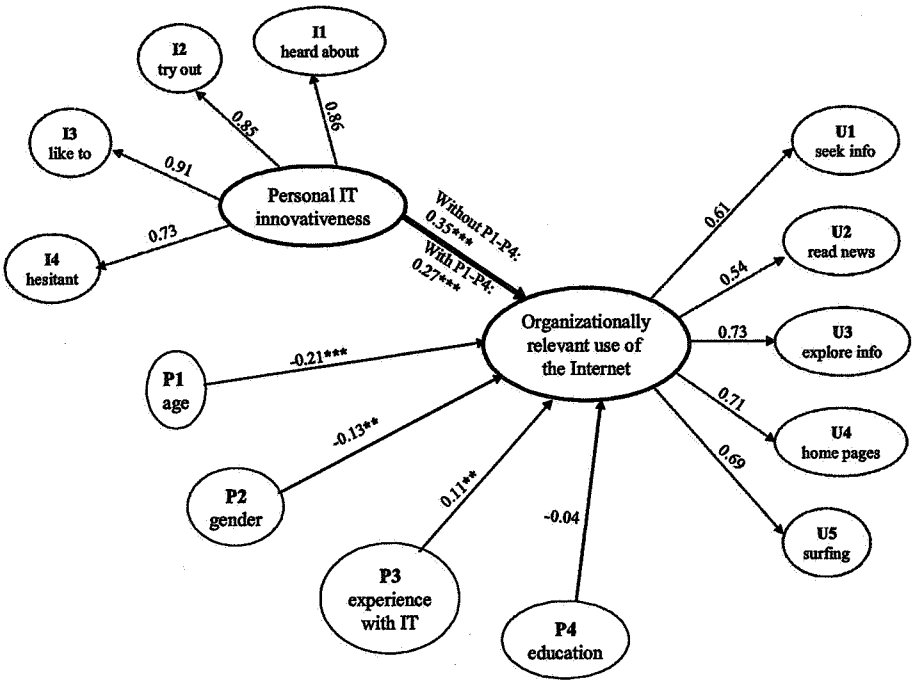
H3.b is supported: men are more inclined to use the Internet than women.

H3.c is supported: the older the person, the less the organizationally relevant use of the Internet.

H3.d is not supported: in the present sample, a higher degree of education does not result in a higher degree of organizationally relevant use of the Internet.

For hypothesis H4.a, which states that the impact of *personal IT*

Figure 2. Complete structural equation model



*Notes: Asterisks indicate significance levels: *(p<10), **(p<0.05), ***(p<0.01). Complete model goodness of fit: $c^2 = 115.30$ [p < 0.0, DF = 54]), RMSEA = 0.059 [p (close fit) = 0.15], CFI = 0.96, and NNFI = 0.94. The result of running two models is also indicated on the path between* personal IT innovativeness *and* organizationally relevant use of the Internet. *The path coefficient for the full model including personal traits (P1-P4) is 0.27***. The path coefficient for the model without personal traits is 0.35***.*

innovativeness on *organizationally relevant use of the Internet* would be reduced, a separate LISREL model without the trait items of age, gender, experience, and education was run. The model had acceptable fit. The item to latent variable loadings did not change significantly. When introducing the personal traits, the (regression standardized) coefficient between *personal IT innovativeness* and *organizationally relevant use of the Internet* was reduced from 0.35 to 0.27, that is, by 23%. This indicates that H4.a is supported. However, the coefficient is significant, $p < 0.01$, with and without these personal trait items. Although a change in the predicted direction, the observed change might be a result of other factors (such as operationalization, measurement method, and sample characteristics). Semi-partial correlations were also investigated, but no major differences between the two models could be found. The major conclusion is, therefore, that the inclusion of age, gender, experience, and education, although in the predicted direction, do not necessarily significantly reduce the impact of *personal IT innovativeness* on *organizationally relevant use of the Internet*. Our final conclusion is that H4.a is not supported.

Table 4: Stepwise regression of independent variable and items on organizationally relevant use of Internet

Model #	Variable entering	Adjusted R-square	Unstand. Regr. Coeff.	Beta at first model entry	Beta at final model entry
1	Innovativeness	0.10***	0.39	0.32***	0.27***
2	Age	0.12***	-0.23		-0.17***

*Notes: *(p ≤ .10), **(p ≤ .05), ***(p ≤ .01). The beta value for the path between* personal IT innovativeness *and* organizationally relevant use of the Internet *when trait variables are not included is 0.35 in the LISREL model but 0.32 in the stepwise regression analysis. The difference is due to the higher degree of sophistication in LISREL calculations when compared to (stepwise) regression.*

Because the two LISREL models did not document any significant change in item to latent variable loadings, stepwise regression was used to explore Hypothesis H4.b, that *personal IT innovativeness* will remain the strongest predictor of Internet use (see Table 4).

In Table 4, we see in Model #1 that *personal IT innovativeness* is the variable that enters first in the stepwise regression. In Model #2, the respondent's *age* enters the equation. The stepwise regression did not find that *gender*, *experience with IT*, and the level of *education* would contribute to explaining *organizationally relevant use of the Internet* beyond the results documented in Model #2. The conclusion is that H4.b is supported. As measured here, *personal IT innovativeness* contributes most to *organizationally relevant use of the Internet*; that is, *personal IT innovativeness* explains 7% and *age* 5% of the variance in the variable of *organizationally relevant use of the Internet*. The indication is that *age* plays a more decisive role in explaining Internet use than does *gender*, *experience with IT*, and level of *education*. The partial correlations for *gender*, *experience with IT*, and level of *education* with *organizationally relevant use of the Internet* are 0.8%, 1%, and 0%, respectively. However, as Table 4 documents, these three items were eliminated from the models generated by the stepwise regression procedure. Hence, among the included personal traits, our data suggest that being younger impacts the use of Internet.

DISCUSSION

Structural differences across various types of Internet use areas were documented, although emerging conceptual categories were somewhat unclear. In the factor analyses, *personal banking* and *shopping products* loaded on different factors. Additionally, the ratio of Internet use in these two areas was very low. Although the reason why personal use is infrequent may be that this type of use is relatively less needed, the explanation may also be that the organizational policy of

not using the Internet for personal purposes is understood. Since the present research did not explicitly ask respondents about the reasons why personal use is infrequent, further investigation is needed.

Internet usage areas, at least as measured here, may blend organizationally relevant and personal use. For example, a manager may expect that professionals (say, economists and engineers) read news within their professional field but would object to having them spend time on news in general. Yet users may not know whether news is relevant until having read it. Given the structure of media news on the Internet, the proportion of general news quite likely is much greater than relevant news. As discussed previously, accessing personal bank and credit card accounts may be a legitimate activity. Increasingly, employees are encouraged to take advantage of Web-based air travel and hotel booking applications. Besides, occasionally business and personal travel are combined. For these reasons, employees might perceive that Internet use by its very nature makes organizationally relevant and personal use indistinguishable. If so, organizational policies that are too strict may discourage desired use (however, some categories of Internet use, for example adult entertainment, would be categorized as unacceptable by all). Given the ambiguities with regard to organizationally relevant and private Internet use discussed here, further in-depth research is needed to develop a deeper understanding of purely organizationally relevant use, acceptable combinations of organizationally relevant and personal use, and obviously unacceptable Internet use. Otherwise, concrete advice with regard to appropriate Internet use policies cannot be forwarded.

In our analyses, *age*, *gender*, and *experience with IT* were significantly related to *organizationally relevant use of the Internet*. *Age*, as the strongest contributor, was negatively related to Internet use. This finding parallels previous research on innovative adoption; that is, earlier adopters were younger (Brancheau & Wetherbe, 1990). In Larsen's (1993) research with IT, age, and educational level were not related to IT innovation. The reason for the differences in findings may be that the present research and the study by Brancheau and Wetherbe addressed change limited to the respondent's job while Larsen defined innovation as an effort that would result in improvement for (part of) the organization. The perceived scope of the innovation may, therefore, play a decisive role.

In the present sample, *personal IT innovativeness* was found to have the greatest impact on *organizationally relevant use of the Internet*. This finding supports previous theoretical as well as empirical research stating that *personal IT innovativeness* is a central construct in understanding and explaining innovation adoption (Agarwal & Prasad, 1998; Larsen, 1993), hence, use of Internet (Agarwal & Karahanna, 2000; Goldsmith, 2001; Limayem et al., 2000; Pajo, 2000; Wolfradt & Doll, 2001). The theoretical proposition that *personal IT innovativeness* is positively related to the use of novel technologies across usage areas is supported. Taking Popper's (1959) research objective recommenda-

tion into account, further studies aiming at testing this proposition may not be appropriate. Rather, future research efforts may benefit from addressing other aspects, for example, the impact of *personal IT innovativeness* on the use of well-established technologies.

With regard to further research within an established theoretical proposition, Popper recommends that the objective should be to test its assumptions. For example, the Agarwal and Prasad instrument may not necessarily measure *personal IT innovativeness* correctly. The four items in the instrument have a strong resemblance to the attitude toward change instrument (Ettlie, 1983; Ettlie & O'Keefe, 1982). The latter instrument includes 12 items divided equally between a factor explaining a person's attitude toward change and a factor representing a preference for the established order. The Agarwal and Prasad instrument may, therefore, not tap the richness of *personal IT innovativeness*. Additionally, Agarwal and Prasad tap a person's willingness to experiment with IT. It is quite likely that the willingness to experiment with IT implicitly includes use. If so, one would expect that the *willingness to try out any new information technology* and use are related. Therefore, the willingness to try out any new IT may be viewed as a dimension of technology use (alongside using the technology for strictly job-relevant purposes, using the technology to stay informed, etc.). In fact, an exploratory factor analysis divides the four items representing *personal IT innovativeness* and the five items representing *organizationally relevant use of the Internet* into two separate factors with no overlap.

It may also be argued that the more a person uses IT, the more the person would be willing to experiment with it—the causal relationship being reversed when compared to the present research's model (and previous publications utilizing the personal IT innovativeness instrument). Hence, the combined use results presented here may be viewed as a basis for increased understanding of IT use. These arguments indicate that our understanding of IT innovation through *personal IT innovativeness* needs further elaboration.

The present study has other limitations, such as the use of cross-sectional survey data. Correlation designs lack the ability to explicitly test directionality. However, this does not imply that the present research model is invalid. Theories of *personal IT innovativeness* (behavioral, diffusion, and marketing) and the present SEM analyses provide support for causal relationships. Despite this, conclusive statements about causality cannot be made since alternative explanations cannot be ruled out. At the very least, one cannot disregard the possibility of reciprocal interactions among the factors studied. Further research, in particular experimental and longitudinal studies, is clearly needed to address these issues.

Our findings indicate the need for future studies. The relationships in our research model can be moderated by other variables, such as organizationally specific Internet use regulations and local managers' statements about appropriate Internet use. The meaning of organizationally rel-

evant and personal Internet use must be investigated. Other constructs and variables representing the use of technology and work content may moderate or intervene between relationships in the research model or demand a research model respecification. The notions of change on the individual level and innovativeness need further elaboration. It seems appropriate to recommend that future research return to the original innovativeness scale (Ettlie, 1983; Ettlie & O'Keefe, 1982) because there the concept of *innovativeness* is defined as a trait regardless of technology content. The importance of innovativeness in research settings exploring our understanding of individual change requires simultaneous analysis of similar constructs, for example, learning style (Bostrom, Olfman & Sein, 1990) and personality style (Wolfradt & Doll, 2001).

IMPLICATIONS FOR PRACTICE

The findings of this study indicate that that the willingness of an employee to try out new information technology may have importance for encouraging increased *organizationally relevant use of the Internet*. Managers should recognize *personal IT innovativeness* as a factor in fostering the use of new applications and IT. Moreover, the construct of *personal IT innovativeness* can be used to identify individuals who can either serve as change agents or be targeted specifically for adoption when resources are limited (Agarwal & Prasad, 1998).

In many areas, the Internet allows organizationally relevant use as well as purely private use, for example, reading news, banking, and travel. Therefore, organizational Internet policies that ban Internet use in these areas might be counterproductive. Rather, organizational policies should address the intent of Internet use and not specific usage areas. That is, Internet policies should emphasize organizationally relevant use relative to purely private use across Internet usage areas.

This study also indicated that younger employees and males are the most frequent Internet users. Although older employees and females may learn about the benefits of using the Internet from their peers, organizational policies and incentives should specifically target these user groups. This might be of particular importance in the early usage phase of a new technology or when new major software functionality is introduced.

CONCLUSIONS

Based on a sample of 328 employees within one corporation, the present research found that *personal IT innovativeness* was positively related to the use of the Internet for *seeking information, reading news, travel information, looking up home pages*, and *surfing in general*. The positive relationship between *personal IT innovativeness* and use parallels other research reports in the areas of use of the World Wide Web in general, online shoppers, academicians, and adolescents. Since our sample was limited to only one business organization, this conclusion does not necessarily apply to administrative employees in general. Further studies are required.

The major indication is that *personal IT innovativeness* as a predictor of computer use has validity. In fact, further studies within this theoretical proposition may not be warranted. Future research may benefit from testing under what conditions the proposition does not hold or shifting its focus to other areas, for example, the impact of *personal IT innovativeness* on well-established areas of computer use.

Also, the construct of *personal IT innovativeness* measures an individual's willingness to experiment with new technologies. The wording of instrument items indicates use directly and implicitly. Hence, finding that people who experiment with technology also use it may be viewed as tautological. The instrument for measuring *personal IT innovativeness* may need further development.

Our results indicated that organizational members perceive structural differences across various types of Internet use. However, no support was found for concluding that unequivocal categories of Internet use exist. Use of the Internet in areas that might be viewed as purely personal, for example, *personal banking* and *shopping products*, was significantly lower than for any other category of Internet use. The established literature carries the impression that areas of Internet use can be distinctly divided into the two main categories of organizationally relevant and personal. We anticipate that in many areas organizationally relevant versus personal use is not clear-cut. For example, reading news, making travel arrangements, or filing travel expenses may blend these two main categories of use. Because of this, organizational Internet use policies may benefit from addressing the concept of organizationally relevant versus personal use rather than specifying specific areas of Internet use.

Among the independent variables and items, *personal IT innovativeness* was the strongest predictor of *organizationally relevant use of the Internet.* Age, as the second strongest predictor, contributed negatively to Internet use. The inference is that older employees used the Internet less than younger. This finding parallels previous end-user computing research findings (Brancheau & Wetherbe, 1990). The analysis also suggested that males are more frequent Internet users than females. The indication here is that organizations may need to establish specific policies for these employee categories. The policies would include benefits of Internet use and targeted activities. Previous experience with IT contributed positively to Internet use. As employees gain hands-on IT experience, their use of new applications and new functionality may increase. However, gender and experience with IT may contribute little to explaining Internet use.

Because data was collected from one organization only, our findings are not necessarily generalizable. Further research is needed. We found that *personal IT innovativeness*, as presently operationalized, positively impacts Internet use. The result parallels previous research, lending support to the notion that *personal IT innovativeness* plays a role in determining use of new technologies in organizational settings. It should also be noted that the explained variance (also denoted "R-Square") is about 12%, leaving ample

room for inclusion of other constructs that may explain Internet use in future research efforts. Our findings apply to an early phase of Internet use. Obviously, the results may change as use of the Internet becomes mature. The present findings may serve as a baseline for analyzing these changes.

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ENDNOTES

[1] The authors are listed in alphabetical order and have contributed equally to the article. An earlier version of this paper appears in the proceedings of the 2002 Information Resources Management Association International Conference on Issues and Trends of Information Technology Management in Contemporary Organizations, Seattle Washington, USA, May 19-22, 2002.

[2] In the literature, *organizational members' IT use* is denoted as *employees' IT use, end-users' IT use, individual use,* or *personal use.* The terms are used interchangeably, with individual and personal use being employed here.

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APPENDIX A

Questionnaire Items

Personal willingness to try out new information technology—*personal IT innovativeness* (Agarwal & Prasad, 1998)—using a Likert type scale ranging from 1 (strongly disagree) to 7 (strongly agree):

I1 If I heard about a new information technology, I would look for ways to experiment with it.
I2 Among my peers, I am usually the first to try out new information technologies.
I3 I like to experiment with new information technologies.
I4 In general, I am hesitant to try out new information technologies.

The use of Internet technologies. The introduction to Internet use items read:

"Sometimes I use the Internet to," using a Likert type scale ranging from 1 (not a correct description) to 7 (an exactly correct description):

U1 seek information of interest to me (for example using Kvasir, AltaVista, etc.).
U2 read newspaper headlines (examples of national newspapers provided).
U3 explore information about upcoming travel whether business or personal.
U4 look up home pages of areas of interest to me (literature, sports, personal economy, chess, etc.).
U5 surfing the Internet (as time allows).
U6 pay my bills and check account balances.
U7 shop products (for example, books, CDs, or other merchandise).

Personal traits:

P1 Age: A scale: 1 = <25, 2 = 25-35, 3 = 36-45, 4 = 46-55, 5 = >55
P2 Gender: 1 = male, 2 = female
P3 Experience: Number of years (in absolute figure) respondent has used a with IT PC, irrespective of use at work or at home
P4 Education: A scale ranging from 1 (primary school) to 6 (doctoral degree) level

APPENDIX B

Descriptive Statistics

	Mean	Std.dev.	Skewness	Kurtosis	N
Personal IT innovativeness					
I1	3.424	1.742	0.342	-0.879	328
I2	2.960	1.727	0.565	-0.719	327
I3	3.527	1.740	0.245	-0.913	328
I4	3.604	1.859	0.266	-1.092	328
Internet use:					
U1	3.845	2.028	0.016	-1.285	328
U2	3.171	2.126	0.522	-1.216	328
U3	2.598	1.866	0.919	-0.356	328
U4	2.168	1.655	1.363	0.750	328
U5	2.003	1.420	1.582	1.974	328
U6	1.341	1.154	4.009	15.618	328
U7	1.280	0.868	4.199	19.749	328
Age	3.138	0.989	0.295	-0.773	327
Gender	1.275	0.447	1.011	0.994	316
Experience with IT	11.234	4.371	0.089	-0.468	320
Education	4.071	1.177	-0.517	-0.444	324