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Abstract

This study focuses on exploring Internet technical literacy and social awareness as antecedents to Internet privacy concerns. We report on the development and validation of instruments for Internet technical literacy and social awareness. Individual's privacy concerns are then considered with respect to these two constructs. The relationships are measured and explored through Exploratory Factor Analysis (EFA) followed by linear regression models. We found that all the hypothesized relationships are statistically significant - social awareness positively and Internet technical literacy negatively related to the Internet privacy concerns. The contribution of this research is in the attempt to explore psychological antecedents to privacy concerns that could direct IS managers and e-commerce marketers towards strategies of broadening Internet user base and facilitating the interaction and usage of Internet web sites and applications, thus opening more opportunities for growth and competitive advantage.

1 Introduction

Along with the increased Internet usage and with web sites becoming more personalized and interactive, privacy increasingly becomes a key social and personal issue that may affect the further growth of the Internet usage. Due to the explosive growth of information technology, copious amount of personal information has been stored, processed, and shared with third parties. Customer data has become a major marketing asset, used to improve customer service and build the company's competitive advantage. A more pronounced conflict is now present between the following two trends: 1) the need to gather more personal data to serve customers better and 2) the increasing threat to invasion of customers' privacy because of the more personal data gathered. The results of this conflict are increased privacy concerns and subsequent resistance to Internet use. Every time stories about security breaches or the rising number of identity thefts appear in the media, consumers question how safe their credit card really is and whether buying online is worth the risk (Kelley et al. 2003).

Nine out of ten Americans are concerned about the potential misuse of their personal information, and 77% say they are "very concerned" (Westin 2001). Privacy concerns is the single most cited reason for non-Net-users declining to use the Internet (Westin

2001). Individuals using the Internet repeatedly cite privacy as a primary factor of concern (ex. Harris Interactive 2001, 2002, 2003) that discourages users from shopping online (UCLA Reports 2000, 2001, and 2002). According to another study, about 80% percent of Americans said that controlling what information is collected was extremely important (Harris Interactive 2001). However, 80 percent of US consumers believe they have lost control over how personal information is collected and used by companies (IBM, 1999). A recent study of Forrester research (Kelley et al. 2003) found that after peaking during the 2000-2001 period, web buyers' online credit card security confidence has steadily declined in 2002-2003. Currently, nearly 33% of mainstream web buyers are technology pessimists compared with only 16% in 1998. According to Forrester, these cautious e-commerce participants aren't nearly as enamored with the Web as their early-adopter counterparts were.

Based on the above arguments, we find several important and justifiable reasons to investigate and understand the factors affecting individuals' Internet privacy concerns: 1) Internet is increasingly becoming part of the life of every individual, 2) such understanding will help promote and encourage further and more extensive voluntary usage, including more extensive and frequent engagement in e-commerce, and 3) it will also help in understanding the ways to narrow the gap between the need for personal information and consumers' resistance to supply such , achieve more social cohesion and digital inclusion of more diverse social groups to benefit from the Internet use.

This study focuses on exploring certain factors which we believe are salient to Internet privacy concerns, namely Internet technical literacy and social awareness. The contribution of this research is in the attempt to explore psychological antecedents to privacy concerns that could direct IS managers and e-commerce marketers towards strategies of broadening Internet user base and facilitating the interaction and usage of Internet web sites and applications, thus opening more opportunities for growth and competitive advantage.

We report on the development and validation of an instrument for Internet technical literacy and social awareness. Individual's privacy concerns are then considered with respect to these two constructs. The relationships are measured and explored through Exploratory Factor Analysis (EFA) followed by linear regression models.

2 Theoretical Considerations And Propositions

2.1 Privacy Concerns

The concept of privacy has a rich research history in a broad field of social studies, ranging from behavioral perspectives (e.g., Goodwin 1991; Laufer and Wolfe 1977; Margulis 1977) to organizational perspective. Most of the previous research involves employees' perceptions of privacy values and beliefs (Kelvin 1973; Milberg et al. 1995; Milberg et al. 2000; Smith 1993; Smith et al. 1996). Admitting the difficulty to define privacy as psychological construct, most sociologists define it as the "right to be left alone" (Westin 1975), or the right to control the collection and use of information about oneself (Mason, 1986; O'Neil, 2001).

The explosive development of digital, Internet, and storage technologies has triggered MIS researchers' interest in privacy (e.g., Clarke 1998; Culnan 1993, 1995; Culnan and Armstrong 1999; Jones 1991; Mason 1986; Rindfleish 1997). As far as the Internet privacy is concerned, the results of most empirical studies confirm survey findings that privacy has consistently been rated as one of the most important issues by online users.

For example, Ranganathan & Ganapathy, (2002) confirmed that online purchase intent is most influenced by security and privacy concerns. Internet users are becoming conscious of the power of the Internet technologies to monitor users' behaviors and gather information about them without their knowledge (Cranor et al., 2000, Harris, 1996, 1998). As reported by Carroll (2002), only six percent of US consumers had a high level of trust in how web sites handle and protect personal data.

Many Internet users simply browse web sites or use free applications. Yet, they become more aware that unsolicited software installations and plug-in controls have been installed on their computer, which provide click-stream data or monitor the users' online behavior. Thus some Internet users might be prone to develop concerns and suspicions about the additional purposes of free software applications or websites, which claim to facilitate their browsing experience. These concerns might lead to behavioral changes, which might inhibit their Internet usage and/or result in aversion to experimenting with new applications and/or web sites.

2.2 Internet Technical Literacy

The Internet technical literacy can be expected to be closely related to computer literacy. Internet is a technology which involves computer use and, therefore, will be affected by the user's computer skills, attitudes, and beliefs. In addition, however, we believe the Internet technical literacy is a more complex construct. Along with computer literacy, several more aspects define Internet technical literacy – orienting oneself efficiently on a web page, completing an Internet e-commerce transaction, connecting online, submitting personal information, choosing and using a search engine to process the search result in a fast and efficient way, using a variety of Internet applications readily available for enjoyment, entertainment, communication, or for work-related tasks, handling offensive content retrieved by accident, handling spam email, handling spy applications and ActiveX controls, setting the browser's privacy and security options, etc.

Privacy invasive technologies present several challenges to the user even if he or she is competent with computers. Internet users are aware that when they are online, their computer is networked and thus vulnerable to attacks, virus spread, and intrusion caused by malicious intentions of other Internet users. Substantial amount of skills and knowledge is needed on how to prevent and handle situations in order to protect their own computers, privacy, and information that would rather not be shared. Internet users are constantly exposed to spam emails, to unsolicited contacts through all communication channels available on the Internet. Some web sites or some free attractive applications (for example music download software sites), through ActiveX controls change browser preferences, home page and various settings, some of which are more advanced and need more than average computer skills to manipulate. Other web sites or free software applications install additional surreptitious software without the user's knowledge and consent that "sneaks" and self-installs into the user's computers.

Examples include several categories of what is popularly referred to as spyware programs. These kinds of programs gather information about the individual or his or her organization through that individual's Internet activities. They will record the browsing activities of the user, his or her mouse clicks, and broadcast all that information (ostensibly for marketing purposes). It is part of a class of increasingly surreptitious software. This class includes software which serves up commercials directly from the computer system (without the need to visit a web site), and software which alters the origin of links on a Web page.

Once on the PC, spyware can sequester itself deep inside the operating system in the registry files. Anti-virus software cannot prevent the spyware because the spyware masks itself as chosen to be installed by the user (Tyler, 2002; Staples 2004). Thus the user may find himself or herself in situations beyond his or her control, feeling that his or her privacy has been invaded. This may substantially elevate the user's emotional state associated with the Internet use, generating aggravation, hopelessness, and resulting in more restricted Internet usage.

Although many software packages and applications are available, specifically designed to secure protection from the above listed intrusions, additional and advanced knowledge is needed for the users to install them and take advantage of the benefits they offer. Further difficulty is presented from the fact that users have to constantly keep up with newer versions of the protection software as well as with newer operating systems. The individual's acknowledgement of this situation could spiral into a perception of insurmountable challenge which can only be overcome with more advanced computer knowledge. Therefore, the less the Internet technical literacy the user has, the higher his or her privacy concerns will be, because he will feel that he cannot protect his or her computer and control intrusive technologies gathering personal data. Spiekerman et al. (2001) argue that privacy technologies need to allow even moderately computer-literate online users to protect themselves through allowing a degree of disclosure they are comfortable with**.** The above considerations suggest the following:

Hypothesis 1: There is a negative relationship between Internet technical literacy and Internet privacy concerns.

2.3 Social Awareness

Social awareness (Bickford and Reynolds, 2002) is viewed as one of the key components of consciousness-raising, the other being social action. Social awareness is related not only to identifying the icons of social movements, such as the civil rights movement, but to also appreciate the needs, impetus, and historical specificity that drive social change movements (Bickford & Reynolds, 2002). Speaking up against social injustice, creating awareness of how people affect the environment, promoting racial tolerance and respect, and making consumer decisions based on a company's ethics are all dimensions of the social awareness construct. A person with high social awareness will tend to understand how a democracy works and exhibit interest in the U.S. political system (Giroux, 1987; Hepburn, 1985). Previous research had linked social awareness to individuals' attitudes and cognitive development (Piaget, 1975; Tsui, 2000; Perry, 1970).

American citizens place a high value on privacy as an expression of personal dignity (Cohen 2000, Laufer and Wolfe 1977). Privacy is fundamentally honored as a highest of privileged individual rights (Etzioni 1999, Lyon 2001, Swire 1999 and 2003, Westin 1975 and 2001). In a 1999 Wall Street Journal poll that asked Americans what they feared most in the upcoming century, "erosion of personal privacy" was the first ranking (among 29% of respondents) issue, among many more frightening concerns such as world war, global warming, international terrorism, etc. (Harvey 1999). No other issue has scored above 23%. 79% of the public believe that "if the Framers of the Declaration of Independence were rewriting that document today, they would add privacy to the trinity of life, liberty, and pursuit of happiness" (Westin 2001, p.11).

Therefore, with respect to privacy concerns, we posit that Internet users which are socially engaged and have greater social awareness, will tend to know more about the privacy debate, privacy policies, privacy risks associated with Internet, legal implications of privacy invasions and identity thefts. Thus, these users would have formed a stronger awareness about privacy and the importance of privacy in social life. The greater the

citizenship engagement and social awareness of an individual, the greater importance that individual would place on privacy as a societal value. Therefore, we would expect that that individual's privacy concerns would be higher as well:

Hypothesis 2: There is a positive relationship between social awareness and Internet privacy concerns.

3 Methodology, Instrument Development, And Results

The research model was empirically tested using data collected from a survey. Two pilot tests and a final survey were administered to a broad sample of individuals in the southeast of United States. The survey demographics were reported elsewhere (identifying reference - for reviewers' convenience the survey demographics is shown in Appendix 1). The 369 respondent to the final survey comprised a sample of wide range in age, employment, education, race, with almost equal representation of gender. The respondents were a heterogeneous group that may approximate a representative sample of a larger population of Internet users.

The development of the scales for the constructs considered in this study was initiated by examining prior work on similar constructs. For measuring Internet technical literacy, we used as a basis the computer literacy instrument developed by Gutek et al. (2000). However, the instrument for computer literacy could not be applied directly and needed substantial modification, because Gutek et al. measure computer literacy basically through programming experience questions, which cannot be applied to an Internet user.

We found no validated measures of social awareness in the literature. Consistent with current best practices in scale development (Clark & Watson, 1995; Hinkin, 1998; Smith & McCarthy, 1995), we cast a wide net in identifying candidate items. Based on an extensive search of the Internet and academic, professional, and popular literatures, a list of 10 items was drafted. Following the two pilot studies, minor wording changes were made, 3 items were dropped because of poor loading and face validity, and no additional items were suggested. The final list of items is shown in Appendix 2.

Thus, all of the items used in each of the pilot tests and in the survey were developed by the authors using a 5-point Likert scale.

Exploratory Factor Analysis (EFA) of the privacy construct were reported elsewhere (identifying reference – for reviewers' convenience the instrument is shown in the Appendix 2). During the EFA of the privacy concerns instrument previously reported, we identified two dimensions of privacy concerns: privacy concerns related to information finding (PCIF) and privacy concerns related to information abuse (PCIA). Our analyses demonstrated that these two privacy concerns are distinctly different however they display similar relationships.

In this paper we report on the EFA of Internet technical literacy and social awareness instruments and on the linear regression analysis of the relationships with respect to the two privacy concerns constructs. The items for the constructs are shown in Appendix 3.

Reliability tests using Cronbach's alpha coefficients were used to assess the internal consistency of the scale items for each construct. In most cases, the coefficients were above .87 - much higher than the threshold level of 0.6 suggested for exploratory research (Nunnally 1978). The corrected item-total correlations which provide initial indications for reliability were also high for all of the items.

The convergent and discriminant validity of the all the items through EFA is established by examining the correlations among all items of all constructs. Factor analysis with

Varimax rotation and Kaiser normalization was utilized to make the initial assessment of the constructs' adequacy, with all items run simultaneously in EFA (Table 1). All indicators loaded on the latent variables they were intended to measure, with insignificant cross-loadings of items. This ensures the face/content validity of the instrument. Furthermore, most of the factor loadings range between .7 and .88, as shown in the table. In addition, all inter-item correlations were examined for further verification of discriminant validity. The values of the correlations between items measuring different constructs were significantly lower than the correlations between the items measuring one and the same construct. These results suggest that both discriminant and convergent validity were established through the classical EFA approach.

Table 1: *Exploratory Factor Analysis. (The items' means, standard deviations, corrected item-total correlations, and factor loadings. Cronbach's alpha α is shown for each factor.)*

Item	Mean	Standard Deviation	Corrected Item- Total Correlation	Internet Literacy	Social Awareness	PCIF	PCIA
				α = .87	α = .87	α = .87	α = .89
TL1	4.38	.72	.61	.70	.20	-.18	.03
TL2	3.93	1.07	.72	.85	.10	.01	-.11
TL3	3.62	1.19	.64	.76	.15	-.08	.03
TL4	4.05	1.01	.80	.88	.09	-.11	-.03
TL5	3.90	1.13	.74	.84	.15	.02	-.11
SA1	3.55	1.05	.67	.01	.78	-.02	.08
SA2	3.43	.93	.68	.05	.78	.09	.07
SA3	3.66	.95	.60	.12	.70	.10	-.01
SA4	3.84	.91	.77	.16	.84	-.04	.04
SA5	3.33	.96	.62	.31	.68	.09	-.05
SA6	3.24	.98	.66	.18	.74	.02	.06
SA7	3.64	1.16	.62	.02	.75	-.07	.01
PC1	3.78	.67	.67	-.03	.05	.20	.78
PC2	3.84	.77	.77	-.07	.00	.32	.80
PC3	3.86	.86	.86	-.05	.11	.30	.86
PC4	3.73	.78	.78	-.01	.06	.28	.77
PC5	3.38	.86	.86	-.05	.06	.86	.23
PC6	3.36	.86	.86	-.05	.06	.88	.17
PC7	3.55	.85	.85	-.07	.00	.84	.27
PC8	3.52	.84	.84	-.05	.06	.86	.22
PC9	3.4	.80	.80	-.07	-.02	.85	.11
PC10	3.33	.83	.83	-.05	.01	.84	.11
PC11	3.94	.71	.71	-.06	.01	.68	.30

After validating the measures and the validity of the constructs, linear regression analyses were run for the two privacy concerns constructs – PCIF and PCIA – as dependent variables, and Internet technical literacy and social awareness as independent variables. The results from testing the two hypotheses are presented in Table 2.

Table 2. *Results of Linear Regression. * p<.05; ** p<.01*

	Social Awareness		Internet Literacy		R^2 Added	df	F
	β	t	β	t			
PCIF	.11	1.97*	-.17	-2.96**	9.54	2	4.93**
PCIA	.15	2.69**	-.16	-2.81**	9.35	2	5.85**

4 Discussions

The purpose of this research study was to better understand how Internet privacy concerns are related to the Internet technical skills of the Internet users, and their social engagement and awareness. The findings reported in the previous section suggest support for the relationships described in the hypotheses. As shown in Table 2, all of the relationships indicated in the hypotheses are statistically significant.

For each regression analysis the main effects were significant and accounted for 9.54% and 9.35% of the variance for the privacy concerns for information finding and privacy concerns for information abuse, respectively. The F values for both dependent variables were $4.93_{(2)}$ and $5.85_{(2)}$, respectively, both with $p<.01$.

Individually, each of the hypothesized relationships was supported for both privacy concern constructs. Social awareness was statistically significant and positively related to both privacy concerns for information finding ($\beta = .11$, $t=1.97$, $p<.05$) and privacy concerns for information abuse ($\beta = .15$, $t=2.69$, $p<.01$). Thus, socially engaged individuals who are aware of the social and political processes in the society tend to exhibit more privacy concerns with respect to the Internet use. In addition, the relationship between the privacy concerns for information abuse and the social awareness is stronger than the one for privacy concerns for information finding and social awareness. Thus, the Internet users with high social awareness tend to be concerned with the abuse of personal.

As hypothesized, the Internet technical literacy is negatively related to both types of privacy concerns. The relationship coefficient between technical literacy and privacy concerns for information finding is $\beta = -.17$ ($t=-2.96$, $p<.01$), and between technical literacy and privacy concerns for information abuse is $\beta = -.16$ ($t=-2.81$, $p<.01$). Indeed, savvy and technically literate Internet users are more likely to be able to handle and deny privacy invasive technologies, customize browsers' or Internet applications' options, eliminate processes of surreptitious software programs running on background, keep up with newest antivirus, anti-spam applications. Therefore, by feeling that they have more control over the processes of their computers, such users' privacy concerns would be significantly lower.

5 Limitations

Although the results are provocative and hypothesized relationships confirmed, there are limitations in the study itself. The study considered only two antecedents to the privacy concerns while there are more antecedents, such as ability to control information, perceptions of vulnerability, etc., well researched in the literature. While the current study confirms the statistical significance of the relationships, they have not been tested

within the nomological network of the other antecedents, so the relative importance of each antecedent can be estimated.

As with most empirical studies, the sample size and spectrum of respondents is a limitation. Even though we made a concerted effort to include a range of different individuals representing different social groups of Internet users, the sample is limited to a certain geographical region of USA. A statistically random sample would have increased confidence in our results.

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Appendix 1. Profile of Respondents (N=369)

Gender	Male	140 (46.5%)
	Female	161 (53.5%)
Race	White	161 (53.5%)
	Black	46 (15.3%)
	Hispanic	56 (18.6%)
	Asian	23 (7.6%)
	Native American	2 (0.6%)
	Other	4 (1.3%)
	Undisclosed	9 (3 %)
Age	<20 years	8 (2.7%)
	21-30 years	193 (64.1%)
	31-40 years	64 (21.3 %)
	41-50 years	27 (9 %)
	>50 years	9 (3 %)
Education	High School	11 (3.7%)
	Associate Degree	45 (15%)
	Undergraduate student	144 (47.8%)
	4 year college degree	61 (20.3%)
	Graduate student	23 (7.6%)
	Graduate degree	17 (5.6%)
Income	<$20,000	62 (20.6%)
	$20,001- $40,000	87 (28.9%)
	$40,001-$60,000	57 (18.9%)
	$61,001-$100,000	60 (19.9%)
	>$100,000	29 (9.6%)
	Undisclosed	6 (2%)
Occupation	Clerical	25 (8.3%)
	Supervisory	11 (3.7%)
	Managerial	33 (11%)
	Professional	79 (26.2%)
	Homemaker	9 (3.0%)
	Student	111 (36.9%)
	Other	32 (10.6%)
	Undisclosed	1 (.3%)
Employment	Technology	46 (15.3%)
	Finance	44 (14.6%)
	Retail	20 (6.6%)
	Services	58 (19.3%)
	Education	25 (8.3%)
	Government	15 (5.0%)
	Entertainment	5 (1.7%)
	Sports	6 (2.4 %)
	Other	35 (13.8%)
	N/A (students)	47 (15.6%)

Appendix 2. Privacy Concerns Items

Item Symbol	Item
PC1	I am concerned that the information I submit on the Internet could be misused.
PC2	When I shop online, I am concerned that the credit card information can be stolen while being transferred on the Internet.
PC3	I am concerned about submitting information on the Internet, because of what others might do with it.
PC4	I am concerned about submitting information on the Internet, because it could be used in a way I did not foresee.
	I am concerned that a person can find the following information about:
PC5	My date and place of birth, and the names of my parents
PC6	Names and information about my immediate family members
PC7	Addresses and telephones of my home/workplace
PC8	Address and telephone of my current and previous residences
PC9	The location, the appraisal, and the price I paid for my assets/properties (house/apartment), as well as all the detailed information about my house.
PC10	My driving records
PC11	Credit card/mortgage/other credit records

Appendix 3. Internet Technical Literacy and Social Awareness Items

Item Symbol	Item
	Rate the extent to which you feel competent in using:
TL1	Surfing the World Wide Web
TL2	Audio software for listening to audio clips or radio stations over the Internet
TL3	Posting/reading/following a thread on Internet Message and Discussion Boards
TL4	Downloading files/audio/video/executables from the Internet.
TL5	Installing software downloaded form the Internet.
	To what extent do you agree with the following:
SA1	I am interested in reading political commentaries or watching them on TV.
SA2	I closely follow developments in my community.
SA3	I enjoy discussing important business or social issues with others
SA4	I watch news and other television programs/channels that address current issues.
SA5	I closely follow issues related to the use of the Internet.
SA6	I closely follow government support and regulation of high tech businesses.
SA7	I read at least one newspaper everyday or watch news on TV.