Exploring the Factors Affecting Internet Content Filters Acceptance

SHUK YING HO[1]
SIU MAN LUI[1]

Data traveling along the Internet wire is generally unrestricted. The Internet may always bring surfers fun, but sometimes give them unpleasant experiences. Web surfers may be exposed to gory pictures of adult-oriented contents unwittingly. International organizations are working on content rating systems and software filters for the Internet. These tools empower the general public to understand the electronic media by means of the open and objective content labels. Though filters accompany some common browsers out of the box, they are disabled by default. As a result, the efforts spent by these organizations to protect users from Internet harms are wasted. This paper presents an exploratory study on one's acceptance of the Internet content filters in publicly accessed computers. Demographic factors, such as gender, and perception factors, such as severity of the Internet problems, were examined by way of multivariate regression. Results show that the acceptance of blocking filters is significantly related to one's demographics and perception of the Internet. This article discusses implications of the findings, from both an academic and a commercial perceptive, for future research.

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General Terms: Technology Acceptance, Perception, Software Content Filter
Additional Key Words and Phrases: Content Rating, Internet Blocking

1. BACKGROUND

The Internet provides Web surfers myriad materials. Data passing along the Internet wires are generally unrestricted and uncontrollable. Surfers can access gory pictures of violence, pornography, information about illegal drugs and computer viruses through the network. There are numerous Web sites hosting adult-oriented materials. According to the figures from Contentwatch.com, 230 million pornographic page accesses are being locked out of 39 billion via their content filters (http://www.contentwatch.com/audit/). The problems become more complicated, when the Internet controversies involve anonymity, censorship and decentralization. In the traditional media, such as television programs and movies, legislation can alleviate the problems. However, in the global and international network, the unscrupulous individuals can simply hold their materials in a country with less restrictive policies. Thus, the uncoordinated regulation cannot function effectively at the national level. To protect children and prevent adults from accessing inappropriate content while at work, content rating systems and blocking filters have been developed by software houses.

Content filters were incorporated into common browsers in the mid of 1990s. Content filters assist the surfers to screen improper network content. Some advisory boards, such as International Content Rating Association (ICRA) and Internet Content Rating for Europe group (INCORE), form open and objective rating systems, based on a standard, known as the Platform for Internet Content Selection (PICS) by the World Wide Web

[1] Department of Information Systems and Management, The Hong Kong University of Science and Technology. {susanna, imcarrie}@ust.hk.

Consortium (W3C) to generate pieces of metatag data for content rating. Though filters accompany some common browsers, they are disabled by default. Few people actively purchase commercial filters with more functionality. As a result, the efforts spent by these organizations to protect users from Internet harms are less effective. This study aims at exploring the factors affecting content filter acceptance. It proceeds as follows. Section II gives the literature review. Hypotheses are constructed in Section III. Section IV describes the survey data, while Section V sets out the model analysis. A conclusion and future research make up the final section.

2. LITERATURE REVIEW

The study of content filter acceptance is a social issue in information systems and it is interdisciplinary in nature. In the United States, both industries and the public realize the importance of the Internet blocking systems. The Communications Decency Act (CDA) was passed in 1995. The Information Highway Parental Empowerment Group (IHPEG), a coalition of Microsoft Corporation, the Netscape Communications, and Progressive Networks, developed standards for empowering parents to screen inappropriate network content. Blocking filters, such as CyberPatrol, Internet Filter, NetNanny, and SurfWatch, have been announced.

Academic studies in information systems focus on the technical issues of blocking filters. Balkin (1999) designed a three-layer architecture for the blocking systems. Blumenthal and Clark (2001) studied the redesign of the Internet for higher flexibility, generality, and openness, their principals were tailored for ISP service differentiation and blocking systems.

Acceptance of blocking systems can be affected by personal attributes and perception domain. Personal attributes is based on the personal demographics, whereas the perception domain includes user perception on technical issues and the Internet.

1. Personal Attributes
   - Gender: Many researches studied the gender differences for computer technology adoption. Houtz and Gupta (2001) found that males generally are more interested in information technology and Young (2000) suggested that males regard the computer technology as a male domain. Gattiker and Nelligan (1999) showed the association between gender and attitude towards computer technology. Males have a larger tendency to experience new technology. Are males still dominant users for content filters?
   - Age: Age and experience with computers all affect individuals' perception of information technology (Gattiker *et al.*, 1988). Willard (1997) studied moral issues, such as copyright infringement and irresponsible speech, which are raised when young people interact in cyberspace. Gattiker and Kelley (1999) showed that younger and older computer users make different moral judgments. Generally, people concern themselves over the impact of objectionable materials on the young, because the reasoning framework of young people is easily shaped. Curiosity and need for adult-oriented materials vary with age. The young are curious about sex, violence and drugs; whereas the old demand a different morality. Age could be an important variable in the acceptance of content filters.
2. Perception Domain
   - Perceived Harm from the Internet: Sproull and Kiesler (1991) suggested that the identification of objectionable materials became more abstract and difficult when computer technology was involved. Public should determine whether there were any problems indeed. On the other hand, Gattiker and Kelley (1999)

successfully demonstrated that computer users can assess the objectionable contents from the Internet, and likely, this perception affects the adoption of certain types of computer tools. Survey and telephone interviews conducted by Environics Research Group in Canada in 2000 included the parents' perceived risks from the Internet to their children. 1,081 parents were involved. More than half of the respondents concerned the benefits and the problems the Internet provides for their children, and the blocking filters are regarded as a necessity.

- Perceived Usefulness of the Content Filters: An important element for the adoption of information technology innovation is perceived usefulness (Moore and Benbasat, 1991). Also, Agarwal and Karahanna (2000) suggested that perception of tool functionality explains 48% of the variance in behavioral intention of technology adoption.

Figure 1 depicts the research model.

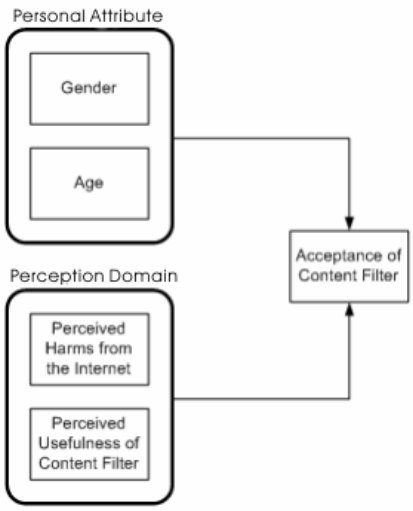

Figure 1. Research Model

In Section III, hypothesis will be developed.

3. THE STUDY

The present study was based upon publicly available data from GVU's tenth WWW user survey (http://www.gvu.gatech.edu). The GVU WWW User Survey began in 1994. It collected data from Internet users worldwide twice per year and accumulated a unique store of historical and up-to-date information on the growth and trends in Internet usage. It is valued as an independent view of developing Web demographics, culture, user's attitudes, and usage patterns.

Two datasets, namely *Software Filters and Content Rating on the Internet Questionnaire* and *General Demographics Questionnaire*, were employed. There were 1,327 respondents in the first questionnaire and 5,022 in the second one. The two datasets were integrated, and 1,323 complete responses were obtained for analysis. Of 49 items in the first questionnaire, 24 items were extracted. We interpret them as 15 independent variables and 9 dependent variables (Appendix A). All independent variables are of 3-point Likert scales, whereas all dependent ones are of 5-point Likert scales. Information

on respondents' demographical profiles was obtained from the second questionnaire. Descriptive statistics on the respondents are given in Table 1.

Table 1. Demographics Profile on Respondents

Age	Female	Male	Total
Below 25	44	191	235
25 to 40	156	402	558
Above 40	156	357	513
Don't Say	9	8	17
Total	365	958	1323

The bottom data row in Table 1 ("Don't Say") was so small. One would expect that most people did not answer the survey, and out of those who answered, many did not answer most of the questions. Likely, the GVU dataset is not a count of the raw data, but rather highly filtered and massaged data. Variables from the questionnaire are grouped by factor analysis (Kim and Mueller, 1979). The outcomes of the analysis are the needs for restriction and the acceptance of content filters. The gender and age differences are first analyzed by the following four hypotheses.

H1: There is no gender difference in the needs to restrict Internet objectionable materials.
H2: There is no gender difference in the adoption of blocking filters.
H3: There is no age difference in the needs to restrict Internet objectionable materials.
H4: There is no age difference in the adoption of blocking filters.

4. FINDINGS

4.1 Exploration of the Latent Variable Structure

The independent variables were standardized and then grouped by factor analysis. Principal Components Analysis is employed for factor extraction, whereas Varimax with Kaiser Normalization is used for factor rotation. A four-factor solution is obtained with all component eigenvalues greater than one. The independent factors are *Attitudes Towards Objectionable Content for Children* (FX1), *Perception Severity of the Unscrupulous Problem in the Traditional Media* (FX2), *Perceived Functionality of Content Filters* (FX3), and *Perceived Severity of the Unscrupulous Problem in the Internet* (FX4). These factors explain 65.24% of the total variance in survey.
The dependent variables are factor analyzed. A two-factor solution is obtained. They represent *Needs of Restrictions of Internet Objectionable Materials* (FY1), and *Content Filters Acceptance in Public Area* (FY2). Items are all loaded highly (loading > 0.60) on their associated factors.

4.2 Predictive Model

Tables 2 and 3 provide the descriptive statistics for the variables and constructs. Multivariate regression is employed, because there are both discrete and continuous independent variables. The multivariate tests suggest a statistically significant relationship between the five dimensions of the individual variables and the two outcome variables, *Needs of Restriction* (FY1), and *Content Filter Acceptance* (FY2) ($p < .0001$).

Table 2. Descriptive Statistics for FY1 (Needs for Restriction)

	Female				Male			
	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.
Below 25	0.16	5.40	2.0248	1.3154	0.16	5.32	1.9775	1.1919
25 to 40	0.16	6.20	2.3438	1.5045	0.01	5.46	1.9529	1.2095
Above 40	0.13	5.77	2.6439	1.5291	0.16	5.68	2.1013	1.2751
Overall	0.13	6.20	2.4546	1.5076	0.01	5.68	2.0115	1.2332

Table 3. Descriptive Statistics for FY2 (Content Filter Acceptance)

	Female				Male			
	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.
Below 25	0.20	6.05	2.7790	1.5970	0.45	5.75	2.5168	1.4843
25 to 40	-0.04	5.48	2.6914	1.5662	0.44	5.92	2.7890	1.4929
Above 40	0.52	5.94	3.0088	1.4126	0.13	5.71	2.6128	1.4095
Overall	-0.04	6.05	2.8341	1.5045	0.13	5.92	2.6718	1.4617

Results show that individuals, as a whole, do not strongly support that the government restricts the objectionable materials in the Internet and force the installation of content filters. Figure 2 depicts that in general, females have a greater desire to restrict adult-oriented materials.

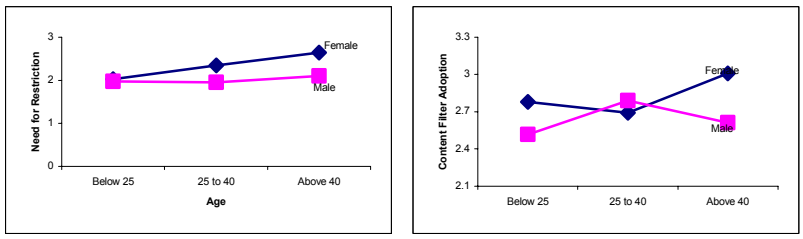

Figure 2. Needs for Restriction of Objectionable Materials and Blocking Software Acceptance

Four ANOVA are performed. For H1, it is highly significant to reject the null hypothesis ($p<0.001$). Females report perceiving a higher need to restrict objectionable materials from the Internet. With critical value of 5%, it is marginally significant to reject the null in H2 ($p=0.074$). Females express a higher intention to adopt blocking filters.

The null hypothesis in H3 ($p=0.011$) is rejected, but that in H4 ($p=0.374$) is not rejected. Age is a significant factor affecting one's expressed needs to restrict Internet objectionable materials. Multivariate regression models are constructed to demonstrate the effects of other constructs on the content filter acceptance. Since age is measured as an ordinal variable, it is not used in the regression models. Both regression models have p-value < 0.01, and they are statistically significant. Table 4 shows the regression models.

Table 4. Multivariate Regression Model

	FY1		FY2	
	Estimate	p-value	Estimate	p-value
Constant	-1.889	.000	1.015	.000
Gender	0.183	.001	0.070	.426
FX1	0.932	.000	0.371	.000
FX2	0.866	.000	0.468	.000
FX3	0.330	.000	0.075	.204
FX4	0.481	.000	0.129	.025

Gender is a significant factor to determine the perceived needs for restriction of Internet objectionable materials, but not to determine the content filter acceptance. A serious attitude towards Internet objectionable content (FX1), and the perception of the objectionable content in the traditional media (FX2) and that in the Internet (FX4) are significant factors in affecting both dependent variables. Perceived functionality of content filters (FX3) affects its acceptance in publicly-accessed computers (FY2) only.

5. DISCUSSION

Our findings demonstrate that gender and age have impacts on one's perceived needs to restrict the objectionable materials from the Internet. It is reasonable, because females and older people generally have higher concern to the adult-oriented materials in the Internet. There are three implications for the practitioners. First, males, are sometimes dominant decision makers, are aware less of the Internet problems or people's perceptions of ethical problems in the cyber world. Thus, the content filter software vendors should consider gender difference when promoting their products. Second, it is surprising to learn that the perception of the traditional media affects the acceptance of content filters in the cyber world. Promotions can emphasize the advantages and impacts of content rating systems in the traditional media when promoting the Internet blocking filters. Factors concerning the traditional media should also be included in the implementation of filtering software. Third, since older people have different morality and they show higher acceptance of software filters, TV advertisements for content filters should be arranged in the time slot for older audiences.

6. LIMITATIONS AND FUTURE RESEARCH

In our study, the adoption of blocking software in publicly accessed computers is examined. Yet, the outcomes might be different if the use of content filters in computers at home is investigated, because some users may spend much more time on their home computers. Studying the installation of blocking software in public places is an important issue in future research.

Furthermore, limitations arise when secondary data are used. Some constructs, such as perceived ease of use of the content filters, user control of filters and outcome demonstrability, are not included in this study. It is reasonable that people appreciate easy-to-use and effective computer technology. But what is the optimal effectiveness? Some filters do not scan graphics formats, and some do not filter the advertisements served by the Internet marketers, such as 24/7 media and double click. On the other hand, some filters are over-aggressive and they block some innocent, valuable sites. This causes inconvenience to Web surfers and they might feel frustrated during searches. Thus, surveys with additional variables should be conducted in order to gain a complete

picture of acceptance factors of content filters. Also, the design of content filters can be another interesting research problem. What functionalities should be set as a default option? Moreover, since content filters mainly aim at protecting children from being able to access adult-oriented materials, filters for children and adults should be designed differently. How much can Web users customize the blocking settings? This is an open question. Filters encourage censorship by religions, governments, and corporations which cannot stand if their market finds out the truth. In order to discourage censorship, they would need to stop keeping records of filter use. Providing anonymity for the users of the filters is essential.

A balance among privacy, free expression and content filtering leads to social dilemmas. On one hand, libertarians are sincere about their desire for free speech, and industries are fighting for effective markets. On the other hand, legitimate parental desire to control to stop access to unscrupulous materials increases demands on blocking systems. The proliferation of blocking schemes leads to the interaction of technical and social studies and implies that there will be new computer technologies. These areas of research remain open.

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Appendix A: Items from *Software Filters and Content Rating on the Internet Questionnaire*

FX1: Attitude Towards Objectionable Content For Children (1=Not Serious; 3=Serious)

X1: Where you, yourself, are concerned, which of the following statements best describes your attitude toward objectionable content on the Internet?

X2: Where children under 10 years of age are concerned, which of the following statements best describes your attitude toward objectionable content on the Internet?

X3: Where children between the ages of 10-13 are concerned, which of the following statements best describes your attitude toward objectionable content on the Internet?

X4: Where children between the ages of 14-17 are concerned, which of the following statements best describes your attitude toward objectionable content on the Internet?

FX2: Perceived Severity in Traditional Media (1=Not Serious; 3=Serious)

X5: In your opinion, what percent of the content in traditional media (that is, television, newspapers, radio, etc., but not the Internet) is objectionable?

X6: In your opinion, how easy or difficult is it to view objectionable content in traditional media?

X7: Where you, yourself, are concerned, which of the following statements best describes your attitude toward objectionable content in traditional media?

X8: How frequently are you, yourself, exposed to content in traditional media that you find objectionable?

FX3: Perceived Usefulness (1=Users are not in favor of filters; 3=Users are in favor of filters)

X9: Software filters are not 100% effective. That is, they not only block objectionable content, but may also block content that users find important. Given that, which of the following statements best describes your support for software filters?

X10: Software filters give me more control.

X11: Software filters can block access to content according to a label with a particular rating. Such ratings would describe the contents of the Web site according to a particular standard. In your opinion, to what extent do you believe that content on the Internet should be rated so that it can potentially be automatically blocked from view?

X12: Given the volume of material on the Internet and the subjectivity of rating, content ratings are not practical.

X13: Content ratings give me more control.

FX4: Perceived Severity in the Internet (1=Not Serious; 3=Serious)

X14: In your opinion, what percent of the content on the Internet is objectionable?

X15: How frequently are you, yourself, exposed to content on the Internet that you find objectionable?

FY1: Needs for Restrictions (1 = Strongly Disagree; 5 = Strongly Agree)

Y1: There is a need to restrict adult's access to objectionable content on the Internet.

Y2: There is a need to restrict minor's access to objectionable content on the Internet.

Y3: The government should pass a law making it a crime for commercial distributors to post content on the Web that is considered "harmful to minors".

Y4: The government should pass a law requiring software filters to be installed on all computers connected to the Internet in schools and libraries that receive government funding for Internet connections.

Y5: The government should pass a law requiring software filters to be installed on all computers connected to the Internet in schools and libraries, regardless of whether they receive government funding for Internet connections.

Y6: It should be required by law that content on the Internet be rated according to a particular standard so that it can potentially be automatically blocked from view.

Y7: It should be a criminal offense for anyone to post content to the Internet without first rating it and rating it accurately.

FY2: Acceptance of Software Filters

(1 = Not mandatory in publicly-accessed computers; 5 = Mandatory in publicly-accessed computers)

Y8: Choose the policy below that best matches your preference for the installation of software filters on computers connected to the Internet in public libraries?

Y9: Choose the policy below that best matches your preference for the installation of software filters on computers connected to the Internet in public venues, such as airports, copy centers, coffee houses and hotels, where patrons typically pay for Internet access?