ICT expansion and the digital divide in democratic freedoms: An analysis of the impact of ICT expansion, education and ICT filtering on democracy

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1. Introduction

Information and communication technologies (ICTs) are central to information access and participation in social and political life (Bennett and Fielding, 1997; Becker, 2001; Harwit and Clark, 2001; Snellen, 2001; Drezner and Farrell, 2004). These technologies facilitate the rapid accumulation and dissemination of information, group interaction (Norris, 1999), communication and collaboration. They allow citizens to engage in debate on political matters, and become familiar with political opinions and events that affect their communities (Jankowski and van Selm, 2000; La Porte et al., 2001; Oates, 2003). The use of ICT for communication and collaboration is viewed as an opportunity for otherwise disenfranchised citizens to participate in political life and to challenge the dominant order. One well-cited example is that of the Zapatista rebellion in the state of Chiapas, Mexico (Cooper, 1994; La Botz, 1995; Gilbreth and Otero, 2001). This movement consisted mainly of impoverished Mayan citizens who contested the state’s political transition towards neo-liberalism. Because the majority of the state’s media resources sided with the ruling elite, they refused to reproduce Zapatista material. The Zapatistas needed to find other media through which they could articulate their interest and influence the political process. Through the Internet, they contacted newsgroups, indigenous rights groups, and human rights organizations and quickly made the world aware of their situation. Soon the story of the Zapatista made international headlines and neglected segments of the Mexican population received increasing attention, while the ruling elite came under intense pressure and scrutiny from the international community.
Dahlgren (2005) argues that the Internet extends and pluralizes the public sphere in a number different ways including structures, representation, and interaction. ICTs not only foster the expression of individual interests, but also enhance public dialogue and collaboration among constituents with divergent interests.

Some even believe that these ICT initiatives are creating a new type of political actor called the “digital citizen” (Katz, 1997). While anecdotal evidence is used to argue that ICT expansion has significantly influenced the expansion of freedom and democracy globally, there are few systematic studies on this issue (Kampen and Snijker, 2003). The existing literature is mostly comprised of case studies of individual countries or journalistic reports on specific regions of the world. This paper will fill this gap in literature. Our study uses archival data from 133 counties in different stages of ICT expansion. We use 2SLS estimate to investigate three important relationships: (1) ICT expansion and democracy; (2) literacy and ICT expansion; (3) ICT filtering and its impact on the future development of ICTs. This will allow us to analyze the extent to which ICT is influencing democracy worldwide. The rest of the paper is organized as follows: Section 2 presents the theoretical basis of the concepts of freedom and democracy that we are using in our study. Section 3 discusses our research hypotheses and methodology. Section 4 provides analysis of the findings. Finally, Section 5 discusses issues for future research.

2. e-Democracy framework

2.1. Defining democracy

At the most basic level, democracy denotes a form of government in which all constituents are able to participate by standing for election to public office and electing others to represent their interests. This also includes the right to challenge and/or call to account an existing government for actions that violate public trust. In a recent comment on the nature of democracy, the Nobel laureate Amartya Sen asserted that “democracy has complex demands, which certainly include voting and respect for election results, but it also requires the protection of liberties and freedoms, respect for legal entitlements, and the guaranteeing of free discussion and uncensored distribution of news and fair comment” (Sen, 1999). Norris (2001) in regards to the representative democracy points out to three major characteristics: (1) its pluralistic competition among parties and individuals for all positions of government power; (2) its participation feature that allows citizens equal opportunities in the selection of parties and representatives through free, fair and periodic elections; and finally (3) its civil and political liberties to speak, publish, assemble, and organize, as necessary conditions to ensure effective competition and participation. These characteristics focus particularly “upon how representative democracies function through free and fair elections, as the primary mechanism for holding governments accountable for their actions” (p. 7).

Balkin (2004) argues that central to free expression and democracy is access to information. Recent research shows that citizens who have access to ICT are more likely to participate in the political process (Weare, 2002). In this regard, the role of the state in promoting democracy is to foster the freedom of expression and access to information. Theories of political mobilization also assert that open access to information enables citizens to monitor electoral campaigns and government actions (Berry, 1984; Bimber, 2001). However, information also enables governments to identify citizens who participate in the political process, and this can be problematic in societies where democracy is immature or does not exist (Lynch, 2003; Yu, 2004).

2.2. ICT and e-democracy

Numerous studies illustrate the ways in which national and local governmental bodies are employing ICTs to enhance democracy (Dertouzos, 1997; Sussman, 1997; Cigler and Burdett, 1998; Bennett and Fielding, 1997; Bimber, 2001). Mudhai (2003) argues that ICTs have been perceived as a driver of the “third wave” of democratization. Balkin (2004) points out that the digital revolution brings features of freedom of expression to the forefront of our concern and makes possible for widespread cultural participation and interaction. He identifies cultural participation as a means of citizens’ participation in the production of culture, and in the development of the ideas and meanings that constitute them and the communities and sub-communities to which they belong. ICTs have enabled citizen participation in the democratic process by providing e-democracy (Cliff, 2003; Coleman, 2003; McCullagh, 2003; Morrisett, 2003; Rushkoff, 2003; Norris, 1999, 2001). ICT tools and services such as the Internet and mobile SMS have enabled citizens to not only participate in democratic process, but also mobilization. The wide spread and usage of the Internet in organizing and mobilizing people around the world have helped individuals and groups to debate and influence issues relevant to political life and increase civic and political participation (Suarez, 2006; Weber et al., 2003; Gilbreth and Otero, 2001; Norris, 2001; Bennett and Fielding, 1997; Dertouzos, 1997; Sussman, 1997).

ICT tools and services are widely used as a source of information and mobilization in political life. For example, authorities in Thailand sent SMS messages to over 25 mobile cell phone users encouraging them to participate in election (Thai election, 2006) or in the recent US presidential election about 24% of Americans regularly learned about the presidential campaign from the Internet (The Pew, 2008). These tools and services were also widely used as a means of mobilizing people in political discourses or monitoring the election outcomes. Suarez (2006) points out that SMS had a crucial role for mobilizing people for mass demonstration against government demands for the truth in 2004’s Madrid terrorist attack. It had also a
crucial role in mobilizing people during the election campaign. In Iran’s presidential election (2005) the massive usage of SMS sent by citizens in boycotting the election or to support other candidates frustrated the hardliners who monitored the election and threatened SMS users for revenge (Iranian Judiciary, n.d.). These tools and services were also used as a means of monitoring tool for election outcomes around the world. For example, Sierra Leone’s election was faced with the challenge of monitoring election outcome in a country that lacks infrastructure and reliable Internet access to transmit election data by conventional means, the election monitoring group used SMS to transmit election data and particularly from their rural areas where there is no ICT infrastructure established (Sierra Leone, 2008). The same monitoring feature of SMS was used in Ghana’s election 2008 after the violence and fraud experienced in Kenya, Zimbabwe, and Nigeria (Ghana, 2008). ICT tools and services are also used for organizing groups and individuals to express their grief and protestation against different social, political and global issues (Norris, 1999; Postmes, 2002; Suarez, 2006). Backus (2001) defines e-democracy as processes and structures that encompass all forms of electronic interaction between the government (elected representatives) and the citizens (electorate) (cf. Savic, 2006).

Clift (2003) argues that e-democracy is the use of ICTs and strategies by “democratic sectors” within the context of political processes from local communities, up to the global stage. Some researchers argue that e-government is more responsive, and connects citizens to meet challenges of building a more sustainable society and world (Clift, 2004; Terry; 2005; Savic, 2006). However, there are many challenges in building appropriate infrastructure for citizen engagement and collaboration. Other researchers are arguing that while communication technologies facilitate the distribution of political documents and provide a virtual space for citizens to discuss and engage in local political processes, this does not necessarily result in wide spread participation (Cavanaugh, 2000; Watson and Mundy, 2001; Frissen, 2002; Hoff et al., 2003; Hill and Hughes, 1998). Riley (2003) points out that UK Government hopes to use the Internet and in particular e-voting in order to bring youth into the democratic process since their participation in elections was regarded as very low. In other societies, such as Iran and China, mobile telephone and Internet use for political activity has risen dramatically in the last decade, but these governments have responded with stricter controls on ICT (Sohmen, 2001; Lacharite, 2002; Lynch, 2003; Yu, 2004). Further, a troubling dimension of Internet usage concerns the propagation of hate speech and terrorism (Gerstenfeld et al., 2003). A challenge for researchers involved in ICT and the political sphere is to understand how ICT expansion is affecting different groups in the ‘global village’. So far, studies of the impact of ICT on democracy have focused on examining specific local social experiments. While there is a general feeling that ICT has had an impact on democracy globally, systematic studies examining this issue are scarce (Kampen and Snijkers, 2003).

2.3. Components of e-democracy

This research adapts Clift’s (2003) e-democracy conceptual model as depicted in Fig. 1. There are five components that construct the e-democracy model namely: ICT, e-citizens, government, civil society and media. e-Citizens in this model are individuals that use ICTs to participate in democratization process. This participation can take many different forms. e-Citizen can use ICTs to interact with social groups, government agencies, media and private sectors as well as the ability to use, create and disseminate information, and demand for a more open and democratic society and/or organize social action in form of e-petition, organize social rallies and participate in the debates and policy dialogues that are shaping global, national and local governance in the emerging information age (Lenihan, 2002). Morrisett (2003) points out that ICTs can be used to enhance the democratic process in form of e-government in which citizens are able to effectively impact the
decision-making process in a timely manner within and between institutionally, politically or geographically distinct networked communities.

The main objective of civil society, such as NGOs, women’s groups, trade unions, human rights groups and political organizations are to use ICTs in the pursuit of ‘good governance’ (Mercer, 2004) and democratic development. For example, political groups are able to run online advocacy and political campaigns (Clift, 2003).

Government in this model represents e-government paradigm in which it provides citizens, civil society, private sector and media with extensive access to information electronically to support the functions that a government performs (Lennihan, 2002).

ICTs facilitate new forms of e-government based policymaking process that enshrine some of the important norms and practices of e-democracy (Chadwick, 2003). The potential for linking e-democracy in civil society with e-government at the local and national levels is far from straightforward but nevertheless achievable. Media is another important component of our e-democracy model. Bentivegna (2006) argues that ICTs signify the power to destabilize the control of the production and circulation of information held by the traditional media. The increase in the weblogs and the proliferation of text messaging, e-mail exchange, news groups, net meetings and so on have provided e-citizens with space for the creation of ideas, promoting gender equality and respect for human rights. The explosion of ICT tools and services has also improved communication and interaction among people across the globe and assisted opening up new possibilities for political participation (Drezner and Farrell, 2004; Yu, 2004; Doostdar, 2004). Balkin (2004) argues that the Internet has enabled people to shape the public opinion by routing around traditional mass media. Sites such as MySpace, Facebook, YouTube, Photobucket are the examples of the power of the Internet in social networking. There are more than 100 million personal profiles on MySpace and Facebook has over 35 million profiles online (Laudon and Traver, 2008) the same phenomena happens with YouTube. YouTube reaches over 73 million people visitors per month just in US (Quanctcast, 2008). For example, MySpace and Facebook were media vehicles used by US Candidates in the 2008 US presidential election for mobilizing people especially young people. During his presidential campaign, the US President Obama had and still has his website, in both the English and Spanish languages, as well as his own YouTube channel. He was actively present in other social networking sites such as Facebook, Flickr and MySpace (DigitalNatives, 2008). These social networking sites are important sources of communication and in particular for the younger generation where approximately 67% of Americans between the ages of 18 and 29 are actively participate in these communities (The Pew, 2008).

3. Research approach

Our research is motivated by three general questions: (1) what is the impact of ICT expansion on freedom and democracy around the world; (2) what is the impact of education on ICT expansion; and finally (3) how systematic filtering has affected the expansion of ICTs. At the center of the model is the dependent variable political rights and civil liberties (PRCL). Our intention is to investigate how changes in the variable ICT network expansion (ICTs) correlates with changes in PRCL. The UN Universal Declaration of Human Rights defines PRCL as the rights to free communication, religious and political participation, and the right to engage in economic activity. However, many scholars equate PRCL with constitutional democracy (the right of individuals to elect their governments) and freedom of the press (Pettit, 1999; Sen, 1999; Rose, 1999; Joyce, 2003). Some also argue that constitutional democracy is essential as it provides the basis for and protections of civil liberties and political rights (Lundstrom, 2005; Berggren, 2003; Gwartney and Lawson, 2006). In this study, we do not limit our investigation to countries with constitutional democracy nor do we include the issue of economic freedom. This is beyond the scope of our study. In this research, we focus on understanding the impact of ICT expansion on political rights and civil liberties globally.

Within the context of this study, PRCL is a complex measure of a country’s adherence to the basic principles outlined in the UN Declaration on Human Rights. Freedom House, an independent non-governmental international organization, which runs regular surveys, compiles data on this measure and ranks countries on various dimensions of PRCL (see Table 1A Appendix). The variable ICTs is a measure of ICT network, ICT uptake and ICT intensity (see Table 2A Appendix). Data on this complex variable is collected from the International Telecommunications Union (ITU), an agency of the United Nations organization, and provided to researchers. Variable filtering (FILTER) is a measure of the level of media freedom exercised by citizens of each country. This variable constructed by aggregating two indices published by Freedom House and Reporters Without Border (RWB). The final variable, education (EDU) is a measure of adult literacy and educational enrollments for primary through tertiary levels. To investigate the model we posited three hypotheses:

**H1:** The expansion of ICT networks (ICTs) is positively correlated with democracy (PRCL), as ICT expansion increases the level of democracy as measured by PRCL will also increase.

**H2:** The increase level of education is positively correlated with the expansion ICTs.

**H3:** Filtering and state censorship of ICT networks is negatively correlated with the expansion of ICTs.

3.1. Data collection

For this study we gathered two types of archival data from several sources; (1) rankings of political rights and civil liberties from Freedom of House (www.freedomhouse.org); media freedom rankings from Freedom House and Reporters
Without Borders (www.rsf.org). The latter was also the main source of data on the degree of filtering and state censorship applied on ICT networks. (2) ICT expansion and information usage data were collected from the International Telecommunications Union (ITU). The ITU compiles, annually, statistics on ICT investments, infrastructure capacity, traffic, and individual uses of the Internet and telecommunication devices and costs. (3) Data on adult literacy were collected from the UN human development database and ITU. We collected data on all countries that we were able to find complete records of ICT networks (ICTs), education (EDU), political rights and civil liberties (PRCL) and press freedom measures. Our dataset covers 133 countries for the period between 1995 and 2003.

The data are provided for individual items and a composite democracy index. A rating scale from one to 100 is used where one indicates the lowest rating of democratic freedom and 100, the highest. On the individual components, Freedom House rates each country’s political rights (PR) and civil liberties (CL) on a scale from one to seven, where one represents the highest degree of freedom, and seven the lowest. Countries that rate an average score of less than three (combined PR and CL average) are classified as “free”, those with a rating between 3 and 5 “partly free” and a score between 5.5 and 7 are considered “not free” (see Table 1). Freedom House defines the level of freedom of press of each country by dividing the levels into three broad categories of environments: legal, political and economic. The legal environment examines the level of influence laws and regulations have, on the media content, as well as the government’s ability and inclination to use these laws and their legal institutions to restrict or allow the media to broadcast. The political environment refers to the degree of political control over the news content. The economic environment includes the media structure such as ownership, transparency, costs, etc. Each country’s press freedom rating is based on these three categories, the higher number, the less free, it is considered. A score of 0–30 categorizes a country in the free-press group, 31–60 in the partly-free, and 61–100 in the not free-press group.

### 3.2. Analytical methods

To analyze the impact of ICTs on freedom and democracy as defined by hypotheses H1 through H3, a two-stage least squares (2SLS) estimate was applied on the panel data with endogenous variables PRCL and ICTs, and exogenous variables education (EDU) and filtering (FILTER). Since the ordinary linear regression may produce biased and inconsistent estimates when there are relevant explanatory variables omitted from the model, or when the covariates are subject to measurement error, a 2SLS estimate can help us to overcome this problem. The endogenous variables, in the context of this paper, are the dependent variables of other equations in the system in which each dependent variable is associated with its own error term. In other words, all dependent variables are considered endogenous to the system and are assumed to correlate with the disturbances in the system’s equation.

Based on the theoretical model the following 2SLS regression model was constructed where the subscript refers to country i and year t:

\[
\begin{align*}
\ln PRCL_{it} &= \beta_0 + \ln ICTS_{it} + \varepsilon_1 \\
\ln ICTS_{it} &= \beta_1 + \beta_2 \ln EDU_{it} + \beta_3 \ln FILTER_{it} + \varepsilon_2
\end{align*}
\]

### 4. Findings from analysis

Before running the 2SLS regression we tested the panel data for multicollinearity and estimated the Inflation Factor (VIF). Multicollinearity occurs when the independent variables are highly correlated; high multicollinearity may cause a wide swing in the estimate of parameters due to small changes in data (Shirazi, 2008). Our test shows a VIF value of 2.80 which is far from the critical value of 10 (moderate multicollinearity) or 30 (severe multicollinearity). As Table 2 indicates the P-value for all the variables show a value of zero to reject null hypothesis of \( P > |t| > 0.05 \). The model fit statistic, \( R^2 \), for endogenous variables ICTs and PRCL are 0.7151 and 0.3886, respectively.

The reader will notice that in Table 2, ICTs shows a positive value for the regression coefficient along with positive correlation with PRCL.

The same relation is true in regards to variable EDU and ICTs (positive coefficient, strong t-value and positive correlation). Thus the results from the regression support the claims described in hypotheses H1 and H2—that ICT infrastructure has a positive impact on democracy (as measured by political rights and civil liberties), and the increased level of education (as measured by adult literacy and gross enrollment) has a positive impact on ICT expansion. On the other hand the variable FILTER shows a negative coefficient along with negative t-value and negative correlation with ICTs. Again, our regression analysis confirms Hypothesis H3.
Hypothesis 1: In our research model, we theorized that since communication networks facilitate social interaction by permitting open and efficient access to information, it is reasonable to expect that ICT will have a significant impact on open discourse and political life. Our findings confirm that ICT is positively correlated with PRCL. Consequently, all other things being equal, greater expansion of ICT infrastructure should lead to higher levels of democratic freedom.

Hypothesis 2: In our research model, we theorized that education is positively correlated with ICT infrastructure expansion. Further, prior studies have shown that education and democracy are strongly correlated (Dewey, 1952; Page, 1997; Nie et al., 1997; Arnot and Dillabough, 2000; Print et al., 2002; Starkey, 2002; Annette, 2003; Osler, 2005a,b). However, while there are many studies that investigate the impact of ICTs on education (Adams, 2000; Aviram and Comay, 2000; Laurillard, 2000; Aviram and Talmi, 2005), only a few studies have investigated the impact of education on the expansion of ICTs (Caselli and Coleman, 2001; Kiiski and Pohjola, 2002; Baliamoune-Lutz, 2003). Our findings suggest an important mediating role for education between ICT expansion and democracy, since increases in education are positively correlated with ICT expansion, which in turn is positively correlated with democracy.

Hypothesis 3: In our research model, we theorized that filtering and state censorship of ICT is negatively correlated with ICT infrastructure expansion. Our findings confirm that filtering of ICT inhibits its expansion, and since ICT expansion is positively correlated with PRCL, we argue that state controls and censorship of ICT networks has a direct negative impact on democracy and freedom of expression. Further, ICT filtering and other forms of information censorship violate the fundamental rights of citizens to free and open communication and interaction (Selian, 2004).

Fig. 2 shows the relationships among variables for all countries in our analysis: (1) graph 1 indicates that countries with a greater level of political rights and civil liberties enjoy greater access to ICTs; (2) graph 2 shows a positive correlation between ICT expansion and the increased level of education; and (3) graph 3 shows the negative correlation between filtering and ICT expansion. Further analysis of our data shows that those countries that implement extensive state censorship and filtering of the content of ICTs are those that have the least developed ICT infrastructure as explained in the next section.

4.1. ICT and the democratic freedoms divide

The 2SLS regression analysis also allows us to draw some conclusions about the digital divide in democratic freedoms during the period of study. Our analysis also allows us to generate an index ranking all 133 countries with regard to the degree that their policies for ICT use are free and open; we call this the ICT freedom index. Of the 133 countries we analyzed four main groupings emerged:

(a) Front-runners: countries with high democracy performance and high ICT expansion.
(b) Above potential: countries with both ICT and democracy indices above the world average.
(c) Average: countries with both democracy and ICT expansion around the world average.
(d) Under-performers: countries with both democracy and ICT performance below the world average.

In general, countries with higher levels of ICT infrastructure tended to enjoy higher levels of democracy and freedom of expression. It is not surprising to see that the top democratic nations (such as Scandinavian countries, the UK, Ireland, the Netherlands and others in Europe, along with Canada and the US in North America, and Australia and New Zealand in Oceania) are those nations with highly developed ICT infrastructure whose citizens enjoy the highest degree of e-democracy.

As indicated in Fig. 3, we can observe a transitional shift from the category of under-performers to a higher category. For example while 54% of countries were located in the under-performers category in 1995, this value decreased to 47% in 2003. The biggest shift was related to the front-runners category. While 14% of countries were located in this category in 1995, this value increased to 23% in 2003. Among the newcomers in this category, we see countries from the former Eastern block such as...
as Lithuania, Estonia, along with other European countries such as Spain, Portugal, Malta and Cyprus. From Asia, those nations with highly developed ICTs such as Japan, Hong Kong and South Korea are placed in this category.

It is important to note that most of the countries located in the low performers category, such as Saudi Arabia, Iran, Tunisia and China, impose heavy and systematic censorship on Internet and other ICT media (OpenNet Initiative Report, 2004, 2005). In addition, there are a number of countries whose ICT infrastructures are highly developed but rank below the world average on democratic freedoms. These countries include some of the Middle East countries of the Persian Gulf region such as Bahrain, Kuwait, Qatar, United Arab Emirates as well as Singapore in Asia.

5. Limitations and conclusions

This research has some limitations resulting from the choice methodology and the data we analyzed. Our research was broad and focused on the macro level; we did not investigate the micro level. We were interested in investigating the general impact of ICT on freedom and democracy. As such, we did not examine any case studies of individual countries to understand the nature of the ICT impact and responses to it. In-depth field studies are needed to understand how specific ICTs are influencing freedom of expression and democracy in each country. These studies can reveal which ICTs are making the greatest contribution to the expansion of such freedoms in each country. They can further reveal the unique barriers that community members face when accessing an application. As has been noted by several in-depth studies of ICTs, access does not translate to usage. A variety of barriers, including gender relations, affect if and how a technology is used (Morawczynski, 2008). Furthermore, studies are needed to understand the impact on freedom and democracy of filtering and censorship practices.

Fig. 2. Spline plots showing the impacts of ICT on PRCL and education and filtering on ICT.

Fig. 3. Four categories of ICT freedom.
in the specific countries where they occur. However, in this study we have demonstrated that there is a very high correlation between ICT expansion and democratic freedoms. We have also demonstrated that filtering has a significantly negative impact on democratic freedoms and that there is a wide gap in 'digital democracy' among countries and regions (Milner, 2006). In general, ICT infrastructure expansion has had a positive impact on democracy and freedom of expression. New ICTs, such as the Internet, enable new dimensions of expression and democratic participation (Gimmler, 2001; Klein, 1999; Lynch, 2003): These technologies have also changed the nature of interaction. Individuals can now more easily engage in discussions with individuals, and not be constrained by time and space. The explosion of websites, weblogs, e-mails, and SMS has also improved communication and interaction among people across the globe and assisted opening up new possibilities for political participation (Drezner and Farrell, 2004; Yu, 2004; Doostdar, 2004). It is also important to note that these new “digital activities” mediated by ICT not only include interpersonal communication, political organization and promotion of free speech, but also ‘hate speech’, religious fundamentalism, fraud and terror (Roman, 2005; Barzilai-Nahon and Barzilai, 2005; Gerstenfeld et al., 2003; Weimann, 2005). Several examples have been noted in the media, which illustrate that ICTs also provide a meeting place for radical hate groups to collaborate. In some cases, the result is terrorist activity that undermines the democratic freedoms of other citizens. One such example are the July 7, 2005 London bombings. There were assertions that the London bomb plot was heralded on the web (Lyall, 2006). This example illustrates that ICTs can be used to both enhance, and undermine democratic freedoms. Some governments have responded by filtering Internet sites and threatening to ban some forms of communication (Zittrain and Edelman, 2003; Harwit and Clark, 2001; Lacharite, 2002). However, these practices negatively impact democracy and freedom of expression. For example, when millions of young Iranians to sent SMS messages in support of, or against specific candidates during June 2005 presidential election, clerics and hardliners appealed to the Ministry of Justice and obtained a ban on SMS messaging (Iranian Judiciary, n.d.). Such negative practices are prevalent in countries such as China, Saudi Arabia, Iran, Syria and Singapore. The filtering of websites in many of these countries also affects some groups more than others and silences voices. A specific example is the unequal access to the Internet that women face in the Middle East. A review of the OpenNet Initiative's documents show that the filtering of sites related to women's rights is the fourth most prevalent practice in this region. Further, Internet filtering and censorship is not only done by local governments, but also some larger ISPs in the region that are actively involved in the practice (Harwit and Clark, 2001; Rheingold, 1993; Sohmen, 2001). Our analysis shows that such filtering of ICTs has an especially negative impact on political rights and civil liberties.

Appendix 1

Table 1A. Democracy components.

<table>
<thead>
<tr>
<th>Electoral process</th>
<th>Political participation</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Political rights</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head of State and/or Head of Government elected through free and fair elections</td>
<td>Individuals have the right to organize into political parties and to seek electoral office in an open and fair system</td>
<td>Freely elected representatives determine the policies of the government</td>
</tr>
<tr>
<td>Legislative representatives are elected through free and fair elections</td>
<td>Is there a realistic possibility for the opposition to increase its support or gain power through elections?</td>
<td>The government free from pervasive corruption</td>
</tr>
<tr>
<td>Are there fair electoral laws, equal opportunity to campaign, fair polling, and honest tabulation of ballots?</td>
<td>People's political choices are free from domination by military, foreign powers, totalitarianism religious hierarchies, economic oligarchies, or other dominant groups</td>
<td>The government accountable to the electorate between elections, and does it operate with openness and transparency</td>
</tr>
<tr>
<td></td>
<td>Ethnic, religious, and other minorities have reasonable self-determination, self-governance, autonomy, or participation through informal consensus in the decision-making process</td>
<td>For traditional monarchies that have no parties or electoral process, does the system provide for consultation with the people, encourage discussion of policy, and allow the right to petition the ruler?</td>
</tr>
</tbody>
</table>
Table 1A (continued)

<table>
<thead>
<tr>
<th>Civil liberties</th>
<th>Freedom of expression</th>
<th>Rule of law</th>
<th>Personal autonomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a free and</td>
<td>There is freedom of</td>
<td>There is an independent</td>
<td>There is personal autonomy. Citizens’ right to travel,</td>
</tr>
<tr>
<td>independent media and</td>
<td>assembly, demonstration, and open</td>
<td>judiciary</td>
<td>choice of residence, or choice of</td>
</tr>
<tr>
<td>other forms of free</td>
<td>public discussion</td>
<td></td>
<td>employment are protected. System is free of extensive</td>
</tr>
<tr>
<td>cultural expression</td>
<td></td>
<td></td>
<td>political indoctrination</td>
</tr>
<tr>
<td>There are free religious</td>
<td>There is freedom of</td>
<td>The rule of law prevails in civil and criminal matters. Police is under direct civilian control</td>
<td></td>
</tr>
<tr>
<td>institutions, and there</td>
<td>political or quasi-political</td>
<td></td>
<td>Citizens have the right to own property and establish private businesses. Private business activity is not influenced by government officials, the security forces, or organized crime</td>
</tr>
<tr>
<td>free private and public</td>
<td>organization including</td>
<td></td>
<td></td>
</tr>
<tr>
<td>religious expression</td>
<td>political parties, civic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>organizations, ad hoc issue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is academic</td>
<td>There are free trade unions and peasant organizations or equivalents, and there is effective collective bargaining</td>
<td>There is protection from police terror, unjustified imprisonment, exile, or torture, whether by groups that support or oppose the system and there is freedom from war and insurgencies</td>
<td></td>
</tr>
<tr>
<td>freedom, and the educational system is free of extensive political</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is open and free</td>
<td>Professional and other</td>
<td>Population is treated equally</td>
<td>Are there equality of opportunity and the absence of economic exploitation?</td>
</tr>
<tr>
<td>private discussion</td>
<td>private organizations are free</td>
<td>under the law</td>
<td></td>
</tr>
</tbody>
</table>

Source: Freedom House.

Table 2A. ICT measurement characteristics.

<table>
<thead>
<tr>
<th>ICTs</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Networks</td>
<td>(a) Adult literacy rates</td>
</tr>
<tr>
<td>• Main telephone lines per 100 inhabitants</td>
<td>(b) Gross enrollment ratios</td>
</tr>
<tr>
<td>• Waiting lines/mainlines</td>
<td>• primary education</td>
</tr>
<tr>
<td>• Digital lines/mainlines</td>
<td>• secondary education</td>
</tr>
<tr>
<td>• Cell phones per 100 inhabitants</td>
<td>• tertiary education</td>
</tr>
<tr>
<td>• Cable TV subscriptions per 100 households</td>
<td>(c) Intensity</td>
</tr>
<tr>
<td>• Internet hosts per 1000 inhabitants</td>
<td>• Broadband users/Internet users</td>
</tr>
<tr>
<td>• Secure servers/Internet hosts</td>
<td>• International outgoing telephone traffic minutes per capita</td>
</tr>
<tr>
<td>• International bandwidth (Kbs per inhabitant)</td>
<td>• International incoming telephone traffic minutes per capita</td>
</tr>
<tr>
<td>(b) Uptake</td>
<td></td>
</tr>
<tr>
<td>• TV equipped households per 100 households</td>
<td></td>
</tr>
<tr>
<td>• Residential phone lines per 100 households</td>
<td></td>
</tr>
<tr>
<td>• PCs per 100 inhabitants</td>
<td></td>
</tr>
<tr>
<td>• Internet users per 100 inhabitants</td>
<td></td>
</tr>
<tr>
<td>(c) Intensity</td>
<td></td>
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