

A Social Capital framework to assess ICTs Mediated Empowerment of Environmental Community Organizations in Western Australia

Subas P. Dhakal¹

¹ School of Sustainability, Murdoch University WA

Abstract: The potential of Information and Communication Technologies (ICTs) in empowering generally under-resourced community organizations has increasingly been acknowledged in recent years. While organizational empowerment refers to the capability to fulfil its mission by overcoming resource-scarcities, measuring the contribution of ICTs towards organizational empowerment remains an exigent task. Two different theories, 'resource dependence' and 'social networks' provide a framework to examine how harnessing social capital leads to organizational empowerment. It is in this context that this work-in-progress paper will explore the implications of ICTs adoption on organizational social capital as a proxy indicator of ICTs mediated empowerment. Based on survey responses from 81 Environmental Community Organizations (ECOs) in Western Australia, the findings indicate: (a) the capability to maintain social capital is strongly correlated with the capability to acquire human and financial capital; (b) the trend of access to ICTs (more than one-tenth ECOs not having an access to the Internet) as well as ICTs adoption (less than one-third and one-tenth ECOs hosting websites and posting blogs respectively) is generally weak; and (c) ICTs tend to benefit ECOs already with higher social capital. Apart from illustrating the usefulness of a social capital framework to gauge ICTs mediated empowerment, the findings also exposed the extent of organizational divide amongst ECOs. This paper therefore acknowledges that access to and adoption of ICTs without the necessary skills and support mechanisms will impede empowerment and suggests ways to make ICTs mediated empowerment genuine.

Keywords: Environmental Community Organizations, ICTs Mediated Empowerment, Social Capital, Western Australia

Introduction

Despite being under-resourced and volunteer-dependent, community organizations are often considered a reliable partner by the state agencies and the private sector in order to address economic, environmental and societal challenges (Lyons 2001, Anheier 2005). Consequently, although community organizations are not recognized as leaders in adoption of Information and Communication Technologies (ICTs), there has been a growing emphasis on pragmatic as well as policy level initiatives to enable these organizations from the effective utilization ICTs. Gurstein (2000) specified these initiatives as Community Informatics (CI) – 'an approach concerned with enhancing civil society and strengthening local communities for self management and for environmental and economically sustainable development, ensuring that many who might otherwise be excluded are able to take advantage of the enormous opportunities the new technologies are presenting' (p. 2).

It is apparent that CI envisages ICTs as tools to strengthen community organizations and eventually contribute towards ensuring economic, environmental and social well-being or *sustainable development*. In doing so, CI deems digital divide – a symbol of perceived disadvantage of those who either are unable or do not choose to make use of ICTs (Cullen 2001) as disempowering. With the continued rise in availability and access to ICTs, the potential of ICTs in empowering community organizations has been acknowledged globally (Burt & Taylor 1999, Kvasny & Lee 2003, Weare et al 2005, Kavanaugh et al 2007) as well as in Australia (Denison 2004, DCITA 2005). However, the notion of empowerment has multiple facets and incorporates processes as well as outcomes (Perkins & Zimmerman 1995) making the task of its measurement difficult. Hence, this work-in-progress paper utilizes a social capital framework to assess ICTs mediated empowerment of Environmental Community Organizations (ECOs) in Western Australia (WA).

The paper begins with a brief introduction of ECOs, followed by an overview of the two key notions: (a) empowerment; and (b) social capital. Then, findings of the survey designed to gain

broader understanding of the implications of ICTs adoption on social capital are described. Also presented is the conclusion and discussions on making ICTs mediated organizational empowerment more meaningful.

Environmental Community Organizations (ECOs)

Community organizations have become a vital component of Australian environmental policies and programs geared towards minimizing if not mitigating consequences of unsustainable development. It is estimated that around 5,000 community organizations; such as, 'catchment groups', 'care groups', 'friends groups', and 'societies' amongst others are specifically engaged in various environmental activities across the country (Youl et al 2006). Whether it is protesting against unsustainable development or caring for local wetlands/bushland, community organizations that operate for the public benefit to protect, care for, and aware/educate the community about the environment are referred to as – Environmental Community Organizations (ECOs). The functioning of ECOs is based on the notion and practice of volunteering where community members provide time and energy to yield desirable sustainable development outcomes. However, the significance of volunteers' contributions are often under-appreciated by the state agencies, making the business of recruiting new volunteers and retaining existing ones difficult for ECOs (Safstrom & O'Byrne 2001). Moreover, a recent policy shift towards regional-level environmental governance has reduced the availability of funding opportunities for the locally operating ECOs (Paulin 2007). Needless to say, obtaining adequate human and financial capital has remained a primary obstacle towards empowering ECOs.

Empowerment

The main idea behind the notion of empowerment is that, the capability to make choices in order to gain mastery over individual or organizational affairs is valuable (Rappaport 1984). Empowerment includes processes – that leads to empowerment as well as outcomes – that demonstrates the state of being empowered (Perkins & Zimmerman 1995). Since this paper concerns community organizations, it is essential to distinguish between individual and organizational empowerment before discussing the processes and outcomes. Individual empowerment emphasizes on the psychological elements of person's attributes which encompasses intrapersonal, interactional and behavioural components (Zimmerman et al 1992). Organizational empowerment stresses on the structure and practices of organizational relationships and attributes which includes intra-organizational, inter-organizational and extra-organizational components (Peterson & Zimmerman 2004). In case of ECOs, intra-organizational component incorporates process that relies on the interactions amongst the leaders, members and staff (if any) in order to identify organizational resources (or the lack of it). Inter-organizational component incorporates processes of maintaining relationships with partners and local or regional networks towards appropriate exchange of resources. Extra-organizational component demonstrate the outcomes (from the optimum utilization of resources through intra and inter organizational processes) with implications beyond ECOs, such as, policy level changes.

It is clear that empowerment necessitates continuous positive feedback mechanism where organizations are able to acquire enough inputs (from the environment it operates in) and yield outputs of sufficient value (to the community and the state) so that the ECOs can keep functioning until their missions are fulfilled. And there are two prominent theories that help explain why and how organizations acquire and or exchange resources to fulfil their missions. The first one is Resource Dependence Theory (RDT) which assumes that the availability of essential resources to fulfil organizational missions is scarce and for this reason, organizations establish social ties with other organizations in order to secure the essential resources they need (Pfeffer & Salancik 1978). Second one is the Social Network Theory (SNT) which assumes that the relationships between organizations are more important than attributes of individual organizations and for this reason, organizations establish social ties with each other in order to influence the flow of resources in their favour (Wasserman & Faust 1994). RDT and SNT are complimentary to each other in a sense that they both highlight the utility of social capital towards organizational empowerment.

Social Capital

The notion of social capital has emerged as one of the dominant topics across disciplines in recent years (Halpern 2005). The central idea behind the notion is that social ties are valuable, that is, social ties enable various actors to get on with each other and undertake collective action. However, social capital remains an ambiguous concept with multiple descriptions and dimensions and some of these ambiguities are rapidly appraised next.

One of the early proponents of social capital in recent decades, Pierre Bourdieu (1986) described social capital as the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationship of mutual acquaintance or recognition. Robert Putnam (1995), who is often credited with popularizing social capital in recent decades, portrayed social capital as features of social organization such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit. Similarly, an advocate of the network theory of social capital, Nan Lin (2001) characterized social capital as resources embedded in social networks accessed and used by actors for actions and actors access social capital through interactions, to promote purposive actions. Last but not the least; a proponent of socio-technical capital, Paul Resnick (2001) suggested that of the two networks without and with developed interaction patterns, the latter could accomplish its objectives much more effectively and efficiently, even if, both networks comprised of actors with access to similar resources. Resnick characterized social capital as a residual or side effect of social interactions and enabler of future interactions.

The common thread amongst various descriptions of social capital above is the importance of interactions in order to maintain network ties. The nature of ties can be distinguished according to the intensity of interactions; strong ties (with close family and friends) and weak ties (with acquaintances). It was Granovetter (1973) who highlighted the importance of weak ties by suggesting that while strong ties provide more intense social support, weak ties increase access to diverse information, resources and jobs. Building on Granovetter's assertion, several authors have differentiated social capital into three tiers: (a) Bonding; (b) Bridging; and (c) Linking (Gittel & Vidal 1998, Putnam 2000, Woolcock 2002). Bonding represents horizontal (usually strong) ties between like-minded actors. Bridging represents vertical (usually weak) ties between socio-demographically different actors. Linking also represents vertical ties but between actors with differing levels of power or status.

Organizational Social Capital (OSC)

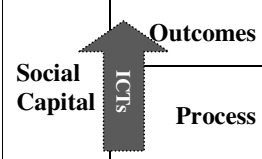
Organizations are more or less social entities created and sustained by interactions enabling people to attain collective goals which wouldn't be possible through individual efforts alone (McAuley et al 2007). An investigation of the pattern of interactions amongst relationships within an organizational network is one of the primary agendas of the organizational theory (Pfeffer 1982). Nahapiet & Ghosal (1998) suggested that the quantity as well as the quality of interactions within networks is an important attribute of organizational social capital. Comprehending social capital from the network perspective further rationalizes the assessment of social capital metaphor in the context of organizations because networks are comprised of clearly visible actors (nodes) and their social ties (Clark 1982, Lyon 2000). Since organizations are embedded in a network of social ties, social capital of organizations constitutes a distinctly collective asset that might be mediated by the individuals, such as leaders or staff, but is uniquely organizational (Pennings & Lee 1999).

This paper characterizes OSC as 'resources embedded in a network of ties that is built and maintained through interactions at the intra and inter organizational level'. Since social capital is underpinned by the outcomes of interactions (Bridger & Luloff 2001), they are often considered as difficult to build and even harder to maintain (Provan et al 2005). Consequently, while some ECOs have been quite successful in utilizing social capital to fulfil organizational missions (Oliver 2001); many others have folded due to the lack of capability to maintain social capital (Curtis & Lockwood 2000, Carr 2002). And this is where the adoption of ICTs, particularly the Internet, has the potential to contribute.

Interestingly, ECOs experimented with ICTs in the nineties when electronic networks like LandcareNet and CoastNet were initiated to specifically strengthen ECOs. While the lack of resources as well as the skills (in an age prior to the Internet revolution) led to the demise of LandcareNet (Curnow 1996), CoastNet never really took-off, at least partially, because of the barriers like cost, time

and the workload involved in accessing online services in that era (Minter 1995). Since then, handful number of studies has examined ICTs adoption amongst ECOs (Denison et al 2003, Barraket 2005, Burgess & Bingley 2007) but, aspects of ICTs mediated empowerment have been mostly overlooked so far. That is why; this paper proposes a social capital framework (Table 1) to assess ICTs mediated empowerment of ECOs in WA.

Table 1: A social capital framework

Empowerment	<i>Intra-organizational</i>	<i>Inter-organizational</i>	<i>Extra-organizational</i>
 <p>Social Capital → Process → Outcomes ↑ ICTs</p>	Identification of resources (or the lack of it)	Acquisition of essential resources	Utilization of resources in decision-making processes
	Interactions amongst leaders, members, and staff	Interactions with local/regional networks and partners	Interactions with peak/umbrella bodies and governmental agencies

It is however important here to acknowledge that multiple contexts, definitions and dimensions associated with the notion of social capital reifies rather an abstract concept. Social capital is intangible and unlike financial capital or human capital, it does not consist of resources held by individuals or by organizations but of processes of interactions leading to desired outcomes (Bankston III & Zhou 2002). Hence, social capital is construed here as a metaphor that encapsulates intensity and intention of inter as well as intra organizational interactions.

Methodology

Study area and sample size

The Perth Region is spread over an area of 770,000 hectares, about half of which is the Perth metropolitan area (the capital city of WA) with a population of approximately 1.5 million. Perth Region NRM (Natural Resources Management) is a peak body responsible for managing various environmental issues in the region (PRNRM 2009). Although it is estimated that about 400 ECOs are active in the region (O'Byrne 2006), a comprehensive list of such organizations do not exist (other than an out-of-date directory published by Swan River Trust in 1996). A conservation directory maintained by Swan Catchment Council (SCC)¹ listed approximately 150 community organizations in the region and their contact details (retrieved October 10, 2007 from <http://www.swancouncil.org.au>). However, the list also included organizations that were not necessarily established with environmental motives e.g. churches, community centres, childcare centres and were screened. A total of 116 organizations met the criteria of ECOs (as defined earlier) and any one leader (chair or vice chair or secretary and so on) of each ECOs were requested to participate in the survey following the ethics approval process.

Survey instrument and response rate

An online survey would have been an obvious choice of data collection in relation to the nature of this study. However, pre-survey consultations revealed that several organizational leaders either lacked skills to complete an online survey or didn't have access to ICTs. Hence, mail based self-administered survey was chosen as the preferred method. In order to improve the response rate of mail based survey, highly acclaimed protocol Tailored Design Method (TDM) was utilized to design and disseminate the survey instrument (Dillman 2000). The survey titled 'ICTs and ECOs' was conducted from June to August in 2008. 83 ECOs returned the survey, of which 81 were usable, a response rate of 68.9%. The response rate was in line with a desirable rate of 50 % or above for the nonprofit organizations (Hager et al 2003).

¹ Swan Catchment Council (SCC) is now known as Perth Region NRM

Research Question

Building on few extant survey based studies (ACOSS 1996, Burt & Taylor 1999), a survey was developed to gain a broader understanding of nexus between social capital and ICTs adoption amongst ECOs within Perth Region. This paper particularly aims to investigate:

- Whether or not ICTs mediated social capital empower ECOs?

In order to explore the research question, descriptive statistics, frequencies, cross-tabulations, correlations and tests of statistical significance were carried out using Microsoft Excel and SPSS 16.0 software.

Findings

Characteristics of ECOs

Based on the self-reported names, ECOs were categorized into five groups; a) 'catchment' groups, b) 'care' groups (bushcare, coastcare, landcare, rivercare) c) 'friends' groups, d) 'conservation/preservation' groups, and e) 'others' (educational centres, foundations, societies). As indicated in Table 2, the majority (61.7%) ECOs were 'friends' groups and nearly 41 % had incorporated status. On average, ECOs were established 14.2 years earlier, had 73.3 members, 37.1 volunteers and employed 0.5 staff. Interestingly, nearly 63 % and 56 % ECOs had less than 20 members and 20 volunteers respectively and none of the 'friends' groups employed any waged staff. On average, 'conservation/preservation' groups reported higher number of funding sources (mean=3.25, sd=0.5) and 'catchment' groups and 'conservation/preservation' groups were engaged in more number of activities (mean=5, sd=0.707 and mean=5, sd=0.816 respectively). Nearly 77% ECOs reported receiving funds from local/state government agencies.

Table 2: Organizational attributes

ECOs	(N=81)		Mean value					
	Frequency (%)	Incorporated Frequency (%)	Age	Mem.	Vol.	Staff	# of Activities Involved	# of Funding Sources
Catchment	5 (6.2%)	3 (60%)	16.2	14.0	32.0	0.4	5.0	2.8
Care	7 (8.6%)	4 (57.1%)	11.9	31.7	79.6	0.4	4.0	2.7
Friends	50 (61.7%)	14 (28%)	11.3	17.0	16.6	0.0	3.2	2.2
Cons/Pres	4 (4.9%)	3 (75%)	15.5	38.8	41.3	0.3	5.0	3.3
Others	15 (18.5%)	9 (60%)	24.2	309.3	86.1	2.1	4.1	2.8
<i>Total</i>	<i>81 (100%)</i>	<i>33 (40.7%)</i>	<i>14.2</i>	<i>73.3</i>	<i>37.1</i>	<i>0.5</i>	<i>3.6</i>	<i>2.4</i>

ICTs adoption

As indicated in Table 3, the majority (87.7%) had organizational access to the Internet and used email. Less than one-third ECOs had websites. While very few ECOs posted blogs, none used videoconferencing or podcasting.

Table 3: Trend of ICTs adoption

ICTs	Yes (%)	No (%)
Access to the Internet	87.7	13.3
Using Email	87.7	13.3
Hosting Website	30.9	69.1
Instant Messaging	11.1	88.9
Blogging	7.4	92.6
Subscribing to Listservs	24.7	75.3
Using Mobile/SMS	22.2	77.8
Videoconferencing	0	0
Podcasting	0	0

13 out of 25 ECOs hosted websites through other organizations; such as environmental networks or nonprofit organizations. Moreover, cross tabulation between websites and type of ECOs revealed that 76.08 % ‘friends’ groups did not have websites whereas 40 % ‘others’ had websites. This difference was found to be statistically significant [$\chi^2 (8, n=81) = 23.285, p = 0.003$].

Intensity of Interactions

A question in the survey asked, ‘During the past twelve months, how often did your organization interact with the following?’ a) with leaders of your organization, and b) with members of your organization, c) with partner organizations, d) with local/regional networks, e) with peak/umbrella bodies, and f) with local/state government agencies. As indicated in Figure 1, on a scale of 0 to 3 (0=no interaction; 1=few times a year; 2=few times a month; and 3=few times a week), ‘catchment’ groups generally reported the higher intensity of intra and inter organizational interactions, particularly compared to ‘friends’ groups. Kruskal-Wallis test (nonparametric one way analysis of variance) detected significant differences in mean rank between interactions of ‘catchment’ groups and ‘friends of’ with leaders [$\chi^2 (4, n=81) = 11.544, p = 0.021$] and local/state governmental agencies (the main funding source) [$\chi^2 (4, n=81) = 13.559, p = 0.009$].

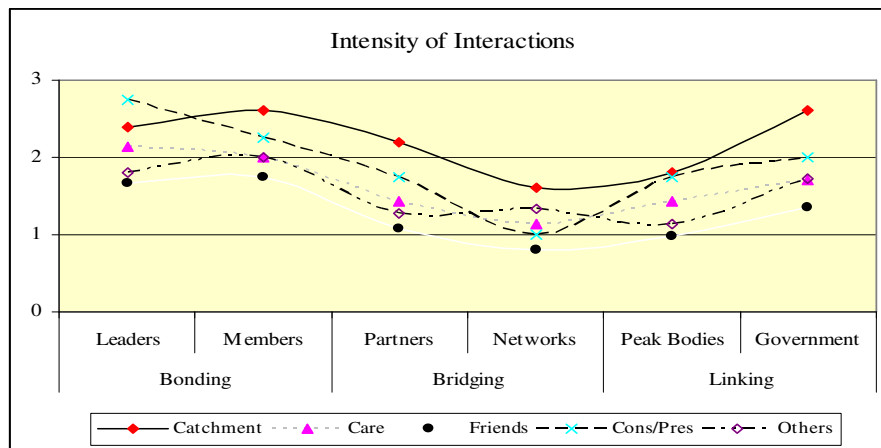


Figure 1: Mean plot of bonding, bridging and linking social capital

Mode of Interactions

In order to explore the association between organizational interactions and ICTs adoption, the survey collected data on mode of intra-organizational interactions (with organizational leaders and members) and inter-organizational interactions (with partner organizations and local/regional networks as well as with peak/umbrella bodies and local/state government agencies), via a) face to face, b) post, c) phone/fax, d) mobile/SMS, e) email, and f) did not interact. Since several responses also reported email as the only mode of interactions, ‘only email’ category was added for the purpose of data analysis.

As depicted in Figure 2, face to face was the preferred mode of intra organization interactions and email was the preferred mode of inter organizational interactions. Moreover, while nearly one-third ECOs used ‘only email’ to interact with local/regional networks and peak/umbrella bodies, ‘mobile phones/sms’ was the least preferred mode.

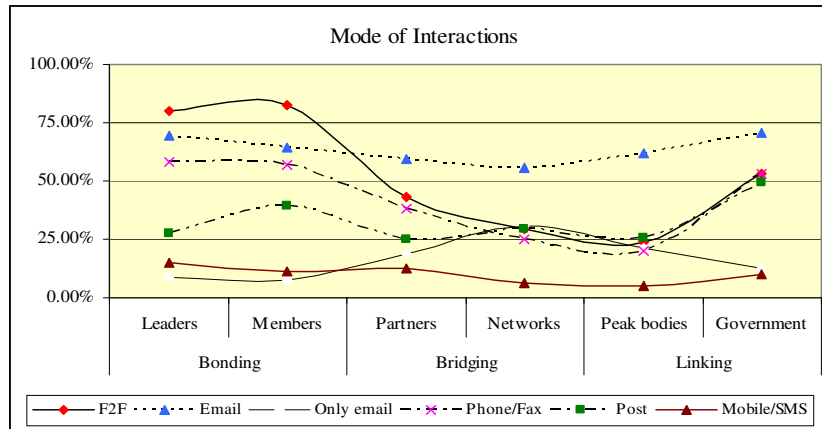


Figure 2: Pattern of ECOs' interactions

ICTs and Social Capital

In order to explore whether the adoption of various ICTs (Email; Website; Instant Messaging; Blog; Listservs; and Mobile/SMS) were associated with the intensity of organizational interactions, Mann-Whitney *U* tests were carried out.

Table 4: Mann-Whitney *U* tests between Adoption of ICTs vs. Interactions

Adopted ICTs [^]		Interactions with:					
		Leaders	Members	Partners	Networks	Peak Bodies	Government
Email (N _{yes} =71 N _{no} =10)	<i>M</i> Rank Yes	26.55	36.45	32.30	30.00	27.00	31.55
	<i>M</i> Rank No	43.04	41.64	42.23	42.55	42.97	42.33
	<i>z</i>	-2.241	-0.710	-1.316	-1.666	-2.180	-1.451
	<i>p</i>	0.025**	0.478	0.188	0.096*	0.029**	0.147
Website (N _{yes} =25 N _{no} =56)	<i>M</i> Rank Yes	33.49	37.67	37.72	37.23	35.12	37.94
	<i>M</i> Rank No	57.82	48.46	48.34	49.44	54.18	47.86
	<i>z</i>	-4.645	-2.073	-1.977	-2.275	-3.653	-1.876
	<i>p</i>	0.000**	0.038**	0.048**	0.023**	0.000**	0.061*
Blog (N _{yes} =6 N _{no} =75)	<i>M</i> Rank Yes	40.27	39.99	40.13	40.95	39.36	40.31
	<i>M</i> Rank No	50.17	53.67	51.83	41.5	61.50	49.67
	<i>z</i>	-1.072	-1.490	-1.235	-0.067	-2.405	-1.003
	<i>p</i>	0.284	0.136	0.217	0.967	0.016**	0.316
Mobile/SMS (N _{yes} =18 N _{no} =63)	<i>M</i> Rank Yes	37.08	38.81	39.21	36.37	36.84	37.84
	<i>M</i> Rank No	54.72	48.67	47.28	57.19	48.56	52.06
	<i>z</i>	-3.032	-1.704	-1.356	-3.493	-1.675	-2.418
	<i>p</i>	0.002**	0.088*	0.176	0.000**	0.094*	0.016**
Instant Message (N _{yes} =8 N _{no} =73)	<i>M</i> Rank Yes	40.15	39.90	40.38	40.65	39.18	40.16
	<i>M</i> Rank No	48.50	51.06	46.69	44.19	57.63	48.63
	<i>z</i>	-1.026	-1.385	-0.759	-0.426	-2.283	-1.032
	<i>p</i>	0.305	0.166	0.448	0.670	0.022**	0.302

** $p \leq 0.05$, * $p \leq 0.1$

[^] No significant mean rank differences were detected between Listservs subscribers and non-subscribers

It is evident from Table 4 that the differences in mean rank of interactions between adopters vs. non adopters of ICTs are significant in many cases. In particular, ECOs with websites had higher mean rank of intra as well as inter organizational interactions than ECOs without websites.

Organizational capabilities

A question in the survey asked, 'Please indicate your opinion on the strength/weakness of organization's capabilities' with options to rate five statements; a) accomplish its environmental objectives, b) adopt and utilize ICTs, c) attract and retain members/volunteers, d) maintain relationship with relevant stakeholders, and, e) raise adequate funds to support its activities. The opinions were rated according to the Likert scale; very weak (0), weak (1), neither weak nor strong (2), strong (3), and, very strong (4).

'Friends' groups in general reported weaker capabilities across the board compared to 'catchment' groups. Almost 73% ECOs indicated either strong or very strong capability to accomplish environmental objectives. More than 40% ECOs reported either very weak or weak capability to attract and retain volunteers as well as to raise adequate funds. Similarly, more than 66 % ECOs indicated either strong or very strong capability to maintain relationships. However, 36% 'friends' group indicated either very weak or weak capability to adopt and utilize ICTs whereas 60 % 'others' group indicated either strong or very strong capability.

In order to explore the prospect of organizational future, a question in the survey asked, 'Based on your experience so far, how likely is it for your organization to keep functioning until its objectives are accomplished?' with three options to tick on; a) Unlikely, b) Unsure, and c) Likely. The majority (70.4%) ECOs indicated 'likely' to keep functioning. A closer look at the responses revealed that all 'catchment' and 'conservation/preservation' groups were likely to continue whereas 38 % 'friends' group were either 'unsure' or 'unlikely' to continue.

Table 5: Spearman Rho correlation between organizational capabilities and prospect of empowerment

Capability to:	ENV	PHY	HUM	SOC	FIN	EMP
Accomplish environmental objectives (ENV)	1.00					
Adopt and utilize ICTs (PHY)	.261*	1.00				
Attract/retain members/volunteers (HUM)	.503**	.269*	1.00			
Maintain relationship with stakeholders (SOC)	.564**	.300**	.622**	1.00		
Raise adequate funds (FIN)	.413**	.414**	.559**	.522**	1.00	
Likely to keep functioning (EMP)	.494**	.251*	.472**	.693**	.672**	1.00
** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level						

Nonparametric correlation (Spearman Rho) test detected strong correlation between capabilities to maintain social capital and acquire human as well as financial capital ($r_s \geq 0.5$). Similarly, moderate correlations ($r_s \leq 0.49 \geq 0.24$) were detected between the capabilities to adopt ICTs and maintain social capital, raise financial as well as human capital. Similarly, the capability to adopt and utilize ICTs was moderately correlated with the future prospect of ECOs.

Discussion and Conclusion

While the exploratory nature of this work-in-progress paper was limited in scope, it did contribute towards filling a gap about the trend of ICTs adoption amongst ECOs in the Perth region of WA. The intent of the paper was to assess whether or not ICTs adoptions mediated social capital of ECOs, and if so, to what extent ICTs mediated social capital contributed towards ECOs' empowerment.

First, the findings suggest that ECOs that have adopted ICTs were in a better position to supplement organizational social capital. The email seemed to foster inter-organizational interactions more than intra-organizational interactions. However, ECOs with websites having higher 'inter' as well as 'intra' organizational interactions suggest that ICTs tend to benefit organizations already with higher social capital. Second, while the utility of organizational social capital to overcome resource-dependence cannot be overlooked; the main limitation of the study was the inability to grasp qualitative aspects of organizational empowerment (ICTs mediated or otherwise).

Assessing empowerment is theoretically as well as pragmatically a challenging task. Revisiting the viewpoint of Rappaport (1984) that "we must not reify empowerment in the measurement of the end product, or the process, or in a particular intervention or means by which it

comes about. The way it is measured is not the thing in itself. Nevertheless, each measurement, intervention, and description in a particular context adds to our understanding of the construct” (p. 4) is particularly noteworthy mention here. Kole (2001) suggested that attempts to measure ICTs mediated empowerment must be set in the context of ICTs and society nexus. The discipline of community informatics itself views purely techno-centric solution to the societal problems as a fallacy and instead embraces ICTs as one of the several tools (not the only tool) available towards empowerment. In this milieu, moderate association between ICTs adoption and acquisition of essential human and financial capital, at least partially, mirrors ICTs mediated empowerment.

Although community organizations have traditionally invested fewer resources in ICTs, recent trend, especially in the developed countries, indicate that these organizations are better positioning themselves to benefit from ICTs (Finn et al 2004). Hence, the trend of ICTs adoption amongst ECOs in WA was nonetheless disappointing. Nearly 12 % ECOs lacking access to the internet (and almost all being ‘friends’ groups) as well as less than one-third and one-tenth ECOs hosting websites and posting blogs respectively point to organizational divide - the lack of ICTs capability of community organizations (Kirshenbaum and Kunamneni 2002, Manzo and Pitkin 2007, McNutt 2008). In addition, no reported use of podcasting and videoconferencing suggest that complex and evolving nature of ICTs may not necessarily be the tools of empowerment for smaller community organizations (Merkel et al 2007). Although further qualitative investigations would be necessary to comprehend organizational digital divide in details, the findings certainly present a strong case for community informatics initiatives with emphasis on mechanisms to enhance skills and technical support towards genuine empowerment of ECOs.

Based on theories of resource-dependence and social networks, this paper proposed a social capital framework to examine ICTs mediated empowerment of community organizations engaged in environmental activities. Although the survey based research had limitations in that no qualitative measures of empowerment were collected, it nevertheless highlighted the significance ICTs mediated social capital for ECOs. Depending on the scope of objectives and activities, it might well be the case that not all ECOs need to adopt ICTs. Yet, as ICTs become increasingly ubiquitous in an organizational context, ECOs that are either not able to or not willing to keep up with the ICTs trend could be at risk (if not already) of further digital disempowerment. It is not to suggest here that ECOs that have not adopted ICTs cannot be empowered, instead, ECOs that have adopted ICTs have an additional choice towards empowerment. The general conclusion of the paper is consistent with the networked society stance (Castells 2000) which relates the lack of ICTs adoption with disempowerment (Floridi 2001, Hacker et al 2009). After all, what is community informatics, if not for empowering community organizations?

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Annex: Survey Instrument

1. What is the full name of your organization?

2. What is your current position in this organization?

3. When was your organization established? (Please indicate the year)

4. How many of the following are currently involved in your organization? (If none, please indicate '0')

i. Members: _____

ii. Volunteers: _____

iii. Waged Staff: _____

5. Which of the following activities is your organization involved in? (Please tick all that apply)

- Environmental education/awareness
- Conservation of biodiversity (e.g. birds, mammals, wild flora)
- Improvement of coastal/river health (e.g. water quality monitoring)
- Protection/restoration of ecosystems (e.g. bushland, wetlands)
- Management of soil erosion/soil salinity (including improved farm management practices)
- If other, please specify: _____

6. How does your organization financially support its activities? (Please tick all that apply)

- Governmental grants
- Non-governmental grants
- Membership fees/donation
- If any other, please specify: _____

7. Is your organization affiliated with any of the following? (Please tick all that apply)

- Peak or Umbrella Bodies (Swan Catchment Council, WA Conservation Council, etc.)
- Local or Regional Networks (BushCare Network, Environmental Weeds Action Network, etc.)
- Electronic networks (Landcare online, Environmental Education Network, etc.)
- Not affiliated with any of the above

8. Has your organization engaged in partnership (either in the past or at the present) with any other organizations? (Partnership = two or more organizations working together for a specific purpose)

No

Yes → **9. If yes, please list two of the most important partner organizations:**

i. _____

ii. _____

10. Does your organization have access to the Internet?

- No
- Yes → **11. If yes, where do you access the internet?** (Please tick all that apply)

- Organization's office
- Home of organization's leader/member (including yours)
- Community centre/public library
- If anywhere else, please specify: _____

12. Has your organization already adopted or is planning to adopt any of the following Information & Communication Technologies (ICTs)? (Please tick all that apply)

	Already ▼	Planning to ▼	Don't Know ▼
Hosting a website	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Instant Messaging (e.g. MSN, Yahoo)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Podcasting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Posting weblogs (blogs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subscribing to email listserv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Videoconferencing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. During the past twelve months, how often did your organization interact with the following?
(Please tick all that apply)

	Few times a week ▼	Few times a month ▼	Few times a year ▼	Did not Interact ▼
Leaders of your organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of your organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Partner organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local/regional networks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Peak/umbrella bodies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local/state government agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. During the past twelve months, how did your organization interact with the following?
(Please tick all that apply)

	Face to Face ▼	Post ▼	Phone/ Fax ▼	Mobile/ SMS ▼	Email ▼	Did not Interact ▼
Leaders of your organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of your organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Partner organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local/regional networks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Peak/umbrella bodies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local/state government agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Please indicate your agreement/disagreement on the following benefits of adopting Information & Communication Technologies (ICTs) e.g. email, website, etc.

ICTs help to:	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
Access/disseminate information efficiently	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>
Publicize local environmental concerns <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Raise funds through additional means <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Recruit members/volunteers <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Supplement other ways of interaction <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

16. Has your organization's ability to benefit from ICTs (e.g. email, website, etc.) been compromised by any of the following causes? (Please tick all that apply)

- High cost associated with ICTs (e.g. purchasing computers, internet access)
- Lack of ICTs specific financial support
- Lack of technical support (e.g. maintenance, trouble shooting, software upgrade)
- Lack of skills to use ICTs within your organization (skills of leaders/members/volunteers)
- Other organizations not using ICTs
- If any other, please specify: _____

17. Please indicate your opinion on the strength/weakness of organization's capabilities:

Capability of your organization to:	Very Weak	Weak	Neither Weak Nor	Strong	Very Strong
Accomplish its environmental objectives	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>
Adopt and utilize ICTs (i.e. email, website, etc.) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Attract and retain members/volunteers <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Maintain relationships with relevant stakeholders <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Raise adequate funds to support its activities <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

18. Which of the following best describes the current stage of organization? (Please tick only one)

- Recently formulated organizational objectives for the first time
- Accomplished some of the objectives and actively working on the remaining ones
- Not accomplished any of the objectives and has been inactive for a while
- Accomplished all of the objectives and has been inactive for a while
- Recently undergone or is planning to go through organizational restructuring process

19. Based on your experience so far, how likely is it for your organization to keep functioning until its objectives are accomplished?

- Likely
- Not sure
- Unlikely

20. Approximately, how long have you been in the current position?

- Less than 2 years
- Between 2 - 4 years
- More than 4 years

21. On average, how much time do you spend on the organization related activities?

- Up to 10 hours/week
- Between 11 - 20 hours/week
- More than 21 hours/week

22. Are you involved (as a leader, member or volunteer) in any other organization(s)?

- Yes No

23. What is your gender?

- Male Female

24. What is the range of your current age?

- 30 or below
- Between 31 - 40
- Between 41 - 50
- Between 51 - 60
- Above 61 - 70
- 71 or above

25. What is the highest level of your educational qualification?

- Secondary school
- TAFE/Trade/Apprenticeship
- Bachelors
- Post-graduate