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ICTs IN DEVELOPING COUNTRIES

Research, Practices and Policy Implications

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To my parents Chitta Ranjan Dey and
Sukti Dhara Bhowmick Dey and
my wife Aditi Dey
Bidit Dey

To my parents Fathy and Nadia and
my wife Mahinour
Karim Sorour

To my family
Raffaele Filieri

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Contents

List of Tables and Figures

Tables

Figures

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Preface

It has been suggested that the use of ICTs (Information and Communication Technologies) can provide developing societies with access to information and thereby contribute to their welfare. Hence, it is becoming increasingly important to understand the adoption, use and subsequent impact of ICT in developing societies. The topicality of this issue has drawn significant attention from researchers and practitioners leading to a wealth of scholarly works in this field. However, there is a dearth of literature that corroborates multi-disciplinary perspectives in order to achieve a holistic understanding. Accordingly, this book aims to address two major deficiencies in current scholarly work – a lack of multi-disciplinary perspectives to the topic and the shortage of literature discussing cases and evidences from various developing societies. Addressing these gaps in the extant literature, this monograph aims to achieve the following benefits for researchers and practitioners:

1. To be able to appreciate various theoretical and disciplinary perspectives towards ICT deployment for development studies.
2. To be able to identify and assess the dynamics and kinetics of ICT adoption, use and resulting impacts in developing societies.
3. To be able to critically evaluate the advantages and challenges of using ICTs in developing societies.
4. To be able to analyse the use of ICTs from a global perspective paying particular attention to cultural and contextual variables and peculiarities in different societies.
5. To draw the relevant policy implications for commercial and not-for-profit entities in developing societies.

With a view to achieving the aforementioned outcomes, this monograph aims to critically assess the adoption, use and impacts of various forms of ICTs in developing societies in light of relevant conceptual underpinnings and practice-based case studies. Considering the paucity of such literature in this field as stated above, this book offers a rich and cogent examination of digital divide and ICT for development which is of benefit to a wide-ranging audience from both academia and practice. The book brings together a team of contributors of international

standing to discuss and analyse the successes, difficulties and paradoxes of ICT use in developing countries and complements the current knowledge in this field. Considering the multifarious nature of this research stream, we have included academics from a wide range of disciplines such as business management, law, information systems and social science. Hence, the content of the book is expected to have a rich diversity both in terms of contextual information and disciplinary perspectives.

In achieving the aforementioned benefits, the book is divided into the following main themes:

- Key theories and concepts pertaining to ICT for development studies.
- Challenges of using ICT in developing societies.
- Benefits and impact of using ICT in developing societies.
- Practical imperatives for ICT-enabled development projects, government organisations and commercial entities.
- Contribution to policy formulations.

The book has three major sections, namely,

Section I: Conceptualising digital divide and ICT for development: critical evaluation of some of the key theories and concepts used to conceptualise ICT for development

Section II: Dynamics and kinetics of the adoption, use and appropriation of ICTs in developing societies: cases from around the world.

Section III: Policy and practitioner implications.

Section I Conceptualising digital divide and ICT for development

This section comprises two chapters. Bidit Dey and Faizan Ali offer a critical review of academic literature and project reports to argue that a bottom-up approach to ICT intervention in developing countries would be more effective. They also highlight the importance of contextual understanding and socio-cultural appropriation of ICT applications and projects in this regard. The authors postulate that the newly emerged bottom-of-the-pyramid (BOP) marketing concept could be juxtaposed and linked with ICT for development studies to encourage more private sector and commercial initiatives to support the ongoing public sector and donor-driven not-for-profit endeavours. This in particular could be a significant development to overcome the sustainability problems

encountered by many ICT-led projects which often also fail to make a balance between development initiatives and entrepreneurial pursuits. The other chapter in this section by Sanjay Bhowmick identifies and analyses structuration theory as a major conceptual construct for ICT for development research stream. This chapter echoes the tone of the first chapter by highlighting the importance of understanding and considering social structures and systems during the design and implementation of ICT-led projects. While the use of structuration theory is increasingly becoming popular in wider ICT for development studies, the discussion by Bhowmick enriches and reinforces the concomitant theoretical underpinnings.

Section II Dynamics and kinetics of the adoption, use and appropriation of ICTs in developing societies

In light of the conceptual underpinnings constructed in the first section, this section identifies and analyses the dynamics and kinetics of technology adoption in developing societies. While some fascinating examples of successful technology adoption and subsequent impact of socio-economic practices are presented in this section, the paradoxes, difficulties and challenges in those initiatives are also discussed in greater detail. Hillol Bala, Akshay Bhagwatwar and Moshtaq Ahmed in their contribution offer a useful insight into the use of ICT in organisational context in the Kingdom of Swaziland. Cultural factors influencing Chinese consumers' adoption of smartphones have been critically assessed by Raffaele Filieri. The success stories of some ICT-led interventions and concurrent challenges in the South African context have been examined by Liezl Coetzee. A co-authored chapter by Bidit Dey and Ben Binsardi take us to the issues pertaining to remote Bangladeshi villages where farmers' use of mobile telephones were monitored and analysed. This section also sheds light on organisational and communal use of ICT and resulting impacts. However, ICT's contribution to development goes far beyond facilitating economic and agricultural activities. The use of social media in framing people's democratic practices and creating opportunities for the freedom of speech is becoming a topical issue in both developed and developing societies. Faheem Hussain and his colleagues present a case study on political microblogging in Bangladesh to highlight the actual and potential impact of ICT in shaping a people's movement. The chapter also critically examines the regulatory frameworks that have significant ramifications on the actual use and impact

of ICT. The fact that the fragile infrastructural and controversial regulatory structure can potentially impede ICT-led projects' successes is further emphasised by Meera Sarma in her chapter that also weighs the potential of open source software in the Indian context.

Section III Policy and practitioner implications

This section provides future directions and policy implications for both private and public sector initiatives. Based on secondary data, Anupam Das, Syeed Khan and Murshed Chowdhury offer a comparative analysis between two Asian countries, Bangladesh and South Korea, to assess the diffusion of ICT against the backdrop of government policies and non-governmental initiatives. Subhajit Basu suggests that the future of e-government narratives should be based on a bottom-up approach. Similar suggestions, albeit based on context-specific practical issues, are echoed by Karim Sorour and Loay Abdul-Mageed.

Overall, there is a common tone among all the authors – and that is if ICT is to make an impact in socio-economic development, it needs to be used and appropriated in accordance with contextual variables. Furthermore, developing societies vary in terms of their socio-cultural, political and economic issues which warrant context-specific examination of ICT use. There are also numerous challenges in ICT implementation as identified by the authors. These challenges can only be overcome if a bottom-up approach to implementation and evaluation is undertaken. Hence, from theory to practice, from concept to impact and policy formulations, there is scope for further research – assessed and analysed by the authors. Thereby, this book is a unique addition to ICT for development research stream and would provide useful direction to current and future scholars and practitioners.

Bidit Dey
Karim Sorour
Raffaele Filieri

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Section I

Conceptualising Digital Divide and ICT for Development

1

A Critical Review of the ICT for Development Research

Bidit Dey and *Faizan Ali*

Introduction

In recent years, community and development informatics researchers (cf. Bayes, 2001; Hassen and Svensson, 2014; Heeks and Jagun, 2007) have endeavoured to assess the community use of information and communication technologies (ICTs) and their development implications. They argue that it is possible to reduce the global and regional inequality in accessing ICTs to achieve wider development objectives. However, scepticism regarding the success of ICT-led initiatives and concerns regarding their actual and potential challenges have also been voiced in academic literature (Fors and Moreno, 2002; Kuriyan et al., 2008; Mariscal, 2005; Parmar et al., 2007), and hence the assessments of the impact of ICT intervention on development remain inconclusive, indicating the need for further studies (Donner, 2006; Rashid and Elder, 2009; Thapa and Sæbø, 2014). Nevertheless, due to the multidisciplinary nature of ICT for development research, various theoretical avenues have been explored to investigate the adoption, use and impact of ICT in developing societies. From personal computers to mobile telephones, from telecentres (kiosk-based information centres) to social media, various forms of ICT applications and their contextual use and subsequent socio-economic impacts have been monitored by researchers from information systems (IS), development economics, social science and consumer studies over the years. This chapter critically analyses the conceptual and practical aspects of ICT for development (ICT4D) and offers insights and direction for future studies.

Digital divide: a contentious issue

ICT4D research is closely interwoven with the concept of the 'digital divide' – an issue that has turned out to be more than mere political rhetoric. According to Gunkel (2003), the term 'digital divide' became popular after being used by the then US vice-president Al Gore in 1996 to explain the problems in the US education sector resulting from an unequal distribution of information technologies. It was also used to refer to the uneven access to ICTs such as the Internet (DiMaggio et al., 2001). Although there is a steep increase in the number of Internet users across the world, it still accounts only for roughly one-third of the world population (ITU, 2011).[1] The vast majority of the people that remain on the other side of this divide are mostly based in developing countries. Hence, the digital divide persists even after almost 20 years since the term was coined.

The digital divide can be defined as a lack of technological access or ownership. It is the difference between the haves and have-nots of today's information age (Munster, 2005). A definition provided by the Organisation for Economic Cooperation and Development (OECD) (2001) extends this notion by acknowledging the fact that the divide can exist between individuals, households, companies and regions. Likewise, Rao (2005) argues that the digital divide can have multiple dimensions: it can exist between countries and between two communities within a country. Different factors such as gender difference (Coopers, 2006), historical, socio-economic and environmental issues (Çilan et al., 2009; Cullen, 2003; Henten et al., 2004; Kraemer, 2005; Law, 2004; Mutula, 2005; Pick and Azari, 2010; Rhodes, 2005) have been identified as the reasons for the digital divide. Min (2010) further adds that digital divide can be caused by individuals' lack of skills and interest in accessing and using the Internet. Similar predictions are also voiced by Brandtzæg et al. (2011), who find the formidable variability in people's nature and their purpose in using the Internet leads to digital divide in European nations. The difference of access (Goldfarb and Prince, 2007) and capabilities/skills (Ferro et al., 2011) for using ICTs therefore can be complex and multifaceted and is not always driven by economic disparity. Hence, Cullen's (2003) definition of 'digital divide' as the disadvantage of those who either are unable or do not choose to make use of these technologies in their daily lives appears to be reasonable and comprehensive.

Dewan and Riggins (2005) postulate that any form of digital divide would need analysis of two major areas – inequality in access to ICTs and inequality in the ability to make use of them. While the first one is widely

attributed as the main form of the divide, it is also important to comprehend the latter, as users' expertise may vary and so do the nature of their needs, demands and purposes of using certain technological applications (Dey et al., 2013). Only access to ICTs may not ensure optimum and effective use as people may lack expertise, support and experience. All these various issues have made the digital divide a more complex phenomenon that is also very difficult to measure (James, 2004; Vehovar et al., 2006). Fink and Kenny (2003) elaborate on the issue by identifying four possible areas that need to be investigated to identify and measure the digital divide: gaps in access to the use of ICTs, gaps in the ability to make use of ICTs, gaps in the actual use and gaps in the impact of use.

Thus, there appears to be a disagreement between academics and practitioners with regard to how to define and measure the digital divide and also how to narrow it.

Narrowing the digital divide: a myth or reality

People's use of ICTs extends far beyond the dominion of personal computers and involves technologies such as digital television, mobile telephony and game consoles. The most significant breakthrough in ICT came during the second half of 1990s with the growing popularity of personal computers, the rapid diffusion of the use of the Internet and the adoption of mobile phones. Despite the relative supremacy of the developed countries in the innovation and diffusion of ICT, intriguing evidence of leap frogging by developing and emerging nations (like India) provides encouragement to ICT4D research. However, the debate surrounding the digital divide issue is far from over. Research addressing the digital divide tends to examine two related questions: first, whether or not the digital divide can be narrowed and, second, how the digital divide can be narrowed and to what extent it is possible.

Both of these questions help us to conceptualise the ICT4D research by importing theories from other mainstream disciplines (such as IS, behavioural science and economics). According to Avgerou (2010), the perspectives used in ICT4D literature have two broader categories: progressive transformation and disruptive transformation. While the former is based on the assumption that ICTs have real potential to contribute to socio-economic progression, the latter voices doubt regarding the same. We make a more simplistic classification of the academic literature on ICT4D albeit broadly agreeing to Avgerou. We identify two major themes – optimistic about bridging the digital divide and doubtful and/or cautiously optimistic.

Optimistic about bridging the digital divide

A significant part of the academic literature on ICT4D expresses high optimism regarding the success of ICT-led projects and the subsequent potential for narrowing the digital divide. Current scholarly works use empirical evidence to suggest that ICT-led interventions in various spheres of development activities such as farming (Dissanayeke and Wanigasundera, 2014; Lio and Liu, 2006), small and medium enterprise development (Hassen and Svensson, 2014), education (Hallberg et al., 2014) and rural land management (Mooketsi and Leonard, 2013) have achieved formidable success and could potentially reduce the digital divide. Singh (2005) and Wong et al. (2004) reflect upon the fast diffusion of ICT tools in big emerging countries like India and China. Singh (2005) argues government initiatives such as the reduction of Internet tariff rates would substantially increase the number of Internet subscribers in India. Likewise, Islam and Rahman (2006) are pretty upbeat about the projects undertaken through government and non-government initiatives in Bangladesh. More recent works show a rapid diffusion of the Internet in Chinese rural societies which in turn aids the education, communication and entertainment of Chinese villagers (Oreglia, 2014).

The growth in the telecommunication industry and the increase of teledensity in different middle- and low-income countries can be identified as key factors that enable them to catch up with their developed counterparts (Fink and Kenny, 2003). Lu et al. (2003) argue that the proliferation of wireless Internet via mobile devices (WIMD) has created enormous opportunities for consumers and businesses to transcend time and place, increase accessibility and expand social and business networks. Internet connectivity through mobile telephones is increasingly gaining popularity in developing societies leading to more and more people gaining access to Internet services. Similar optimism is echoed by Chigona et al. (2009) as they have identified the use of mobile telephony as a viable means for providing Internet and wireless technology access to disadvantaged communities. The huge uptake of mobile telephones in developing countries is a significant development in this regard.

Doubtful and/or cautiously optimistic

Not all researchers are optimistic in the same way. There is growing concern among researchers regarding the effective use of the huge funds allocated to implement ICT-enabled projects. The information generated by some of the ICT-enabled projects (like Gyandoot in India) can

hardly provide any significant value to rural lives (Parmar et al., 2007). According to Cullen (2003), technology does not always offer a solution to social and economic discrepancies within societies. New technologies may co-exist with the old and in doing so can enhance the digital divide. For example, both smartphones and traditional mobile telephones are currently available at different price ranges. People in lower-income brackets may only afford traditional handsets and potentially end up on the wrong side of the digital divide. There is also doubt about the appropriation of the funding allocated for ICT-enabled projects. Kuriyan and Kitner (2009) argue that the introduction of telecentres in rural India and Chile has benefited local elites but has done little to narrow the rich–poor gap. Prioritising development initiatives is always a major concern for low-income countries. Mutula (2005) postulates that resources utilised to bridge the digital divide could be directed to meet the basic demand of the poor population. However, he has been optimistic about the outcomes of the effective use of ICTs. The question is still asked whether or not ICTs should be regarded as a solution to development problems.

Despite being optimistic about the performance of the third-world countries in bridging the digital divide, Fors and Moreno (2002) are sceptical about considering ICTs as a panacea for development-related problems. Effective and efficient use of ICTs requires a number of prerequisites to be fulfilled. For example, Mariscal (2005) could not find any satisfactory evidence of the digital divide narrowing in Mexico despite the expansion of telecommunication networks. He attributes this to the insufficient social and physical investment to support IT access in Mexico. Carmody (2012) argues that the fact that mobile telephones create new jobs and encourage informal businesses does not necessarily address more crucial and perennial development issues such as social welfare and the creation of a knowledge society. Other researchers flag their concerns without being too pessimistic. Fink and Kenny (2003), however, caution that excessive pessimism about the 'growing digital divide' may drive policy makers to embark upon too ambitious plans. The arguments questioning the deterministic role of ICTs still continue as researchers like Nikam et al. (2004), Kirlidog and Aydemir (2005) and Leaning (2006) express concerns regarding the appropriation of western-born ICTs in developing societies. Heeks (1999) takes a middle position between the two extreme opinions – high optimism and absolute pessimism. He believes that appropriate use of ICTs in developing countries is a big but not impossible task.

Upon reviewing the literature on ICT-enabled projects in India, Walsham (2010) found no conclusive evidence to suggest that ICTs are a

magic solution; rather, he argued, they need to be viewed as an integral part of holistic development programmes. Dewan and Riggins (2005) also advocate that research on the digital divide ought to investigate how ICTs are used by different individuals, organisations and societies, as narrowing the digital divide requires more than just adoption. Reijswoud (2009) seconds this notion by stating that the discussion of the digital divide should focus on the adaptation of ICTs. For example, the effective use of computers in an African context will require users' ability to cope with humidity, power fluctuation and dust. People may choose to adopt ICTs and still may lack the expertise to make the best use of them. The issue of appropriation and adoption of ICTs in relation to the needs and requirements of a society is discussed in detail in the next chapter.

The dichotomy and differences exhibited in the scholarly works suggest that we critically review some of the ICT-led initiatives.

Critical review of some of the ICT-led projects

Vivid descriptions of different ICT-enabled projects and their success stories are available in a number of academic and donor agency reports. Lien (2004), for example, reports on the apparent success of a project initiated in Vietnam to facilitate farmers living in remote mountainous areas. To address the farmers' agricultural information needs (i.e. market information, including daily updates on the prices of agricultural commodities in the market), the project set up knowledge communes in remote Vietnamese villages. A microwave-radio telephone system installed in the remote region of Tumaca, Columbia, along with community access points resulted in better trade and market opportunities (Lio and Liu, 2006). The International Institute of Communication Development (IICD) and Manobi, an African telecom company, have initiated a collaborative programme to help the farmers of Burkina Faso, Ghana, Mali, Uganda and Zambia to have access to market price information via text messages, Wireless Application Protocol (WAP) or the mobile Internet as well as personal computers and personal digital assistants (PDAs).[2]

In January 2003, Manobi initiated a similar project in Senegal in partnership with two telecommunication companies (Alcatel and Sonatel) and the Canadian International Development Research Centre. The project aimed to support the livelihoods and improve the safety of Senegalese fishermen by giving them access to up-to-date market prices, weather reports and other information services via mobile phones using

WAP and Short Messaging Services (SMS). The pilot project experienced problems due to differences in languages of different tribes and ethnic groups. The project was expected to reduce the fishermen's transaction cost by providing real-time access to market price.[3] Abraham (2007) found significant correlation between the use of mobile telephony and the increase in the productivity and profitability of fishermen in the southern Indian state of Kerala. By using mobile telephones, fishermen can get regular updates on prices and demand in the nearest markets. Kenya Agricultural Commodity Exchange Limited (KACE) also developed a Market Information System (MIS) to provide the farmers with access to better markets and prices for their produce.[4] The components of the KACE MIS are Market Information Points (MIPs), Market Information Centres (MICs), SMS, Interactive Voice Response (IVR) and Regional Commodity Trade and Information Systems (RECOTIS). B2Bpricenow.com in the Philippines enables farmers, fishermen and small and medium enterprises to access market prices and trade products. The project has been adopted by a number of government agencies, a local bank and an NGO – Philippine Rural Reconstruction Movement (PRM). Financial and technical supports were provided by Infodev and Unisys, respectively.[5] The market price can be accessed via websites or mobile telephones. By providing transparent and timely market information to buyers and sellers, the project aims to enhance efficiency in the agricultural market.

The use of mobile telephony could be a better option for rural people in developing regions due to its cheaper and easier access (Veeraraghavan et al., 2009). Bayes (2001) wrote one of the classic scholarly works on mobile telephones' actual potential in rural development. He identified that the Village Phone Program (VPP) of Grameen Bank of Bangladesh helped lower transaction costs in the production of goods. Gonofone, a New York-based company, came up with a concept to take mobile telephony to rural Bangladesh. The initial plan was to use the extensive microfinance network of Grameen Bank to reach unreachable rural communities. Eventually, in 1997 the VPP was launched through a joint initiative by Grameenphone, Grameen Telecom and Grameen Bank. Grameenphone is the largest mobile phone service provider in Bangladesh today. The number of Village Phone Operators in Bangladesh reached about 150,000 in 2005 (Islam, 2005). Grameen Telecom and Telenor own 38% and 62% of the equity of Grameenphone, respectively. While Grameen Telecom is a not-for-profit organisation, Telenor is a private sector commercial enterprise. Rashid and Rahman (2009) and Bayes (2001) were optimistic about the value of the VPP project. However, a

more recent article (Dey et al., 2013) argues that the VPP has become obsolete in rural Bangladesh due to the rapid diffusion of mobile telephones and cheaper tariff resulting from intense price competition. The VPP project was replicated in Rwanda with very minimal success. Despite being hopeful about the socio-economic impact of using mobile telephony by Rwandan villagers, Futch and McIntosh (2009) could not find any evidence that the Rwandan VPP could become profitable.

Garforth and Lawrence (1997) argue that the role of extension services is to encourage adaptation of technologies, to support farmer-to-farmer extension and to influence collective as well as individual behaviour. Birkhaeuser and Evenson (1991) examined the role of technology in the provision of extension services. Black (2000) suggests that information technology holds the potential to support farmer-to-farmer and professional advisor-to-farmer (and vice versa) exchange of information, which further ascertains the notion that agricultural information problems (like lack of market price information) could be resolved through ICT interventions although the importance of other factors including trained extension workers (Belay and Abebaw, 2004; Meera et al., 2004) and infrastructural facilities (Kalusopa, 2005) cannot be ignored.

However, research by Howell and Habron (2004) found that farmers in the USA demonstrated a preference for traditional means of communication and sources of information (i.e. printed literature) as opposed to the use of the Internet. Similar concerns are expressed by other researchers (Kalusopa, 2005; Vanclay, 2004). They argue that agricultural systems and practices are embedded within socio-cultural settings, and hence, success of any extension service or technological intervention depends on its compatibility with the local culture and context.

Theorising ICTs for development

Constructive criticism about ICT initiatives and their appropriation is also interwoven with the question of how and to what extent the digital divide can be narrowed. A significant volume of academic research is aimed at addressing this issue. It explores different theoretical avenues. Due to the myriad roles of ICTs in social and economic development and their multiple implications, different theories have been used by researchers who also come from a wide range of backgrounds. ICTs can play important roles both as an industry sector to drive economic growth and as an enabler to help achieve other goals in areas such as education, health and governance. Hence, the digital divide can be narrowed through either one or both of the following – commercial

proliferation of ICTs and their use in development activities. We can identify three different types of academic literature on ICT4D by reflecting on Donner's (2006) suggestions:

- ICT applications (mobile telephony as a dependent variable): This stream of literature deals with the adoption or diffusion of ICT, which depends on other variable factors (like infrastructure, government regulations, literacy and per-capita income).
- ICT impact (mobile telephony as an independent variable): This stream of literature assesses the use of ICT and its subsequent impact on economic and social growth.
- ICT interrelationships (emergent or ensemble approaches): This group deals with the appropriation of mobile ICTs and analyses of different projects.

In conjunction with the classification of United Nations Development Programme (UNDP), Donner (2006) has also found two different research themes within each of the aforementioned research approaches. One group deals with the commercial aspects of the diffusion of mobile ICTs (which he defines as non-ICT4D literature) and the other relates it to socio-economic development (ICT4D[6] literature). This trend is also observed in the research pertaining to ICTs more generally (not only for mobile ICTs). For example, research on the Internet diffusion and its barriers are investigated both in ICT4D literature (Crenshaw and Robinson, 2006; Willis and Tranter, 2006) and in non-ICT4D literature (Hermeking, 2005). A separate stream of literature takes sociological perspectives towards the diffusion and adoption (Lenhart and Horrigan, 2003) and impact (Jackson et al., 2005) of ICT use. The interrelationship between social and demographic factors and users' intention to use and adopt are the prime focus in this group of research works. However, they also consider ICTs as viable means for social mobility and economic development.

During the first workshop on the mobiles for development (m-development), organised by the Institute of Development Policy and Management of Manchester University, Heeks and Jagun (2007) identified a myriad of socio-economic implications of (mobile) ICT intervention. The discussants emphasised that it was equally important to identify both social and economic impacts of mobile telephony. Jagun et al. (2008) echoed that argument while investigating the use of mobile telephony by Nigerian micro-enterprises. Impact assessment is identified as the main challenge by Heeks (2008) and his development informatics

cohorts. However, there is still scant evidence of convincing and conclusive impact assessment of ICT intervention. Gomez and Pather (2011) argue that the emphasis should be shifted from 'impact' to 'outcome' and that ICTs' contribution to intangible social benefits in the form of social cohesion, empowerment and self-esteem should also be assessed. Thereby Gomez and Pather suggest a paradigm shift in the ICT4D literature, which also warrants revisiting theoretical and methodological tools and applications. As we know, social and economic impacts cannot be generated overnight; it is not possible to measure them by the number of computers installed, by the number of Internet connections subscribed to and/or by the number of mobile telephones sold.

Even after a decade of research, it is important to remember that many of the ICT-enabled projects are either in their infancy or they have innate problems with sustainability issues. Their failure should not undermine the potential of ICT in socio-economic development. Equally, detached stories and anecdotal evidence should not be considered as strong testimonies for ICT-led successes. It is important to see the bigger picture – social and contextual issues that may have contributed to those successes.

Heeks (2006) presents the chronological stages of the informatics life cycle. They are development, adoption, use and impact. These stages are closely linked with the ICT4D value chain (Heeks and Molla, 2008) that identifies different stages of the evolution of ICT-enabled initiatives and corresponding assessment studies. It starts with the initial studies about the 'readiness' (in terms of infrastructure and awareness) of a community or a nation for the implementation of ICT-enabled projects. Later studies gradually explore the 'availability' (about the supplies of hardware and applications) and the 'uptake' (demand, usage and use divide) of existing ICT uses in different social settings. The final stage of the analysis is to assess the 'impact' of ICT use in the form of effectiveness, efficiency and equity. Considered from the point of view of the stages approach, this thesis is mainly concerned with 'uptake' – ICT adoption and use.

ICT4D researchers have used a number of theoretical frameworks to investigate the adoption and diffusion of ICT. Choudrie et al. (2010) have used diffusion of innovation and theory of planned behaviour and Meso et al. (2005) and Miller and Khera (2010) have used the technology acceptance model (TAM) to investigate the role of different variables influencing disadvantaged communities' adoption and acceptance of ICT tools and applications.

Parmar (2009) has developed a conceptual framework combining the theory of planned behaviour and the diffusion of innovation to theorise the development and adoption of ICT-enabled projects. He has identified three major areas of ICT4D research – exploratory research (using the theory of planned behaviour, this stage identifies social and subjective norms and psychological determinants of the acceptance of ICT applications), creative design research (theories involving effective content development) and evaluative research (to assess ICT intervention). Pritula et al. (2010) expand the scope of research from easy access to easy use of ICT applications, as they argue that access alone does not suffice for the effective use of ICT applications. It also depends on users' convenience, skills and other favourable contextual factors. In the wider IS literature (DeSanctis and Poole, 1994; Orlikowski, 1992; Suchman et al., 2002) the contextual understanding of the use and appropriation of ICTs has been discussed at sufficient length and this has lent theoretical impetus to subsequent authors. Accordingly, scholarly works on ICT4D broadly apply structuration theory (Dey et al., 2013b) and activity theory (Karanasios, 2014). TAM, being one of the most popular IS constructs for technology adoption, has also been applied in ICT4D research. Dey et al. (2013a) suggest a modified version of TAM to investigate mobile telephone adoption in developing countries. However, there is limited evidence of TAM being used in ICT4D. More recently works by Donner (2008) have attempted to merge adoption and impact with adoption and appropriation for mobile ICTs.

There is another research stream that explores the potential for commercial ICT ventures (who sell ICT-enabled services) in rural development. Guided by the Bottom of the Pyramid (BOP) model (Prahalad, 2004), a group of researchers have attempted to investigate the role of mobile telephony-based projects (De Angoitia and Ramirez, 2009; Rashid and Rahman, 2009) and information kiosks (Kuriyan et al., 2008) in supporting rural livelihoods and resolving information problems. It can be argued that more academic research in this area will be beneficial, as private sector initiatives can create product demands and business opportunities that in turn contribute to the welfare of disadvantaged communities (Dey et al., 2013). For instance, the rapid diffusion of mobile telephones in developing countries has created opportunities for small- and medium-size enterprises (Donner and Escobari, 2010). Dey et al. showed how village tea stalls become a trading hub for mobile telephone top up services. Further emphasis on marketing, entrepreneurial and managerial aspects of ICT4D initiatives could potentially be

a paradigm shift in this research stream as the success of ICT-led initiatives such as mobile money system (M-Pesa) cannot be ensured only by charity and altruism (Gajjala and Tetteh, 2014). It would be beneficial for ICT4D research to widen its perspectives and explore opportunities to collaborate with marketing and consumer research.

Evidence of the appropriation of ICTs in accordance with local contexts is presented by a number of researchers (e.g. Donner, 2008). Hence, the adoption and appropriation of ICTs require further investigation into the interrelationship between ICTs and society.

Gap in the current literature and future of ICT4D

The developing countries need to create a synergy between the uses of technology and social contexts. Because of their western origin and high price, in the developing countries ICTs are cascaded down from the upper end of the society. However, Fors and Moreno (2002) believe that a counter strategy of bringing the use of ICTs from bottom to top can be more effective for developing countries. In this regard they have identified the following three major areas:

1. *Basic needs*: ICTs can be used in providing basic needs (like food, health and education) of the mass of the population.
2. *Empowerment*: Empowerment is the way to enable weaker and powerless people to regain power. Access to information about employment opportunities, market prices and government programmes can all be part of empowerment.
3. *Rural-based development*: In order to ensure uniform distribution of ICT, the rural populace have to be brought within its reach. Rural radio in Sri Lanka is an initiative using radio as an interface between the rural poor and the Internet.

Through a large-scale, international focus group study Jarvenpaa and Lang (2005) found that the purposes of technology use vary due to differences in cultural orientation. The purpose of the use of technology in individualistic societies (western countries) may not be the same as the purpose of the use of technology in collective societies (Asian countries). Kirlidog and Aydemir (2005) and Hermeking (2005) relate the use and adoption of ICTs with social science theories of Hofstede and Hall. The rural societies of the developing countries, predominantly having high-context cultures,[7] rely more on oral communication. ICTs mainly originated in the western countries and require a considerable

level of written communication. ICTs with much oral communication like telephones, mobile phones and radio can be more appropriate for high-context societies like those in Asian countries. Despite the higher penetration of radio and television, they do not always offer interactive communication means to the rural community (Nikam et al., 2004). Mobile telephones and the Internet can play a vital role as interactive media and thereby hold the potential to resolve the information problems of disadvantaged communities.

Locally developed content and the use of local languages are suggested as means for enhancing the success of ICT intervention. However, there is scant evidence of academic research on how those applications are embraced by the targeted communities. Hall et al. (2009) found that local software (with *Devanagari* interface) in Nepal failed to make the desired impact due to lack of usability and poor translation. As the keyboards do not have *Devanagari* letters, the users find it difficult to type. A lack of understanding of the context-specific phrasing caused poor and inappropriate translation.

Lee et al. (2002) undertook a research to identify the value structure of mobile Internet usage in Korea and Japan. According to their research findings, people's attitude towards adopting a technology depends on their perceived values (functional, emotional, social and monetary) that the particular technology can offer. The research outcomes also suggest that cultural factors need to be considered to identify mobile Internet users' values. In Korea, emotional value is more likely to affect satisfaction, while functional value is highly influential on users' satisfaction in Japan. Due to the introverted characteristic of the Japanese populace, social value does not seem to affect satisfaction in Japan. Contrarily conspicuous consumption and social endorsements are key aspects of Chinese consumers' adoption of technologies. Agerfalk and Eriksson (2006) have identified two facets of the implementation of a technology: instrumentality and its social goal. They argue that a technology's social acceptability depends on its social goal. If a technology's social goal contradicts a particular society's values, its acceptability tends to be diminished. Sohaib and Kang (2014) in their research have found that cultural environments have profound influence on people's interactions with Internet technology.

It is equally important to comprehend 'how ICT can do' as much as 'what ICT can do'. Furthermore, the deterministic role of ICT needs to be reconsidered as well. Technology is not a panacea in itself; it only becomes effective through its interaction with human actors in a given context. Hence, future research should be directed to examine the role

of cultural and other contextual variables that may influence the operations and sustainability of ICT-led projects. ICT4D research should look into the socio-cultural dynamics in developing countries and analyse their interactions leading to the success or failure of the ICT intervention.

That would also require more innovative research methods to be applied. For instance, more use of action research (Thapa and Sæbø, 2014) and triangulated qualitative methods (Dey et al., 2013) has been suggested in the current literature to enrich the diversity of research methods.

Conclusion

It is not unusual for a multidisciplinary area like ICT4D to get inputs from a number of different academic areas. The selection of an appropriate theoretical framework depends on research objectives and researchers' perspectives, and accordingly we can see various theoretical and conceptual paradigms adopted by ICT4D researchers. From the review of literature, it appears that a bottom-up approach to the development of ICT-led initiatives is an imperative for achieving greater and more sustainable successes. Furthermore, ICT4D projects need to be assessed not only in terms of their short-term contribution to the socio-economic welfare of disadvantaged communities, but also in terms of their social and cultural appropriation. There is also a dearth in academic literature that assesses the role of commercial and entrepreneurial ventures initiated by ICT adoption and diffusion. While the initiatives undertaken by not-for-profit organisations play a role of pivotal importance in fostering development objectives, the entrepreneurial drives of the bottom of the pyramid communities and the concurrent influence of other contextual variables cannot be ignored. This is why the VPP programme failed to sustain, and its replication in other countries could not yield similar success. While the conceptual part of ICT4D research ought to be bolstered through the inclusion of theories from social and cultural studies and consumer research, the methods and applications of future research also need further considerations.

Currently, a number of academic periodicals are dedicated to publishing ICT4D research, and there is a wealth of scholarly works that have generated a huge response amongst academics and practitioners. However, none of these periodicals has emerged as a leading journal in related mainstream academic disciplines such as development economics, IS and consumer research. This is another important area that ICT4D researchers should consider in the near future.

Notes

1 http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2012/MIS2012_without_Annex_4.pdf
2 http://www.uneca.org/aisi/picta/pictabulletin/pb55.htm
3 http://www.manabi.net
4 http://www.kacekenya.com
5 http://www.infodev.org
6 In this chapter we choose to use 'ICT4D' to maintain consistency.
7 A culture where context conveys lot of information and that has lesser emphasis on formal written communication.

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2

Structurational Explication of Technology Adoption in ICT4D: A Throwback to Giddens

Sanjay Bhowmick

Introduction

Adoption of ICT for development (ICT4D) has received much political attention particularly after being linked to the Millennium Development Goals. It has also received corporate attention with several bottom-of-the pyramid initiatives by corporates. It has consequently been of high research interest in the Information Systems (IS) management field. In turn, research in the IS field has taken various theoretical perspectives to explicate the process of ICT introduction and adoption aimed at economic development in underprivileged communities (cf. Avgerou, 2008; Heeks, 2008). A theoretical perspective prominently embraced by this research stream is Anthony Giddens' social theory of structuration (Giddens, 1976, 1979, 1982, 1984). In this engagement, IS research has not only embraced but also modified Giddens' theory of structuration, deploying it to understand how technology evolved in the hands of the user (Donner, 2007; Orlikowski, 1992, 2000), resulting in the propounding of Adaptive Structuration Theory (AST) (DeSanctis and Poole, 1994). Perhaps the choice of structuration theory to understand development processes is apt since development of a community is to a large extent social in nature, that is, social interaction forms the cornerstone and the platform on which community development plays out. In the wake of a technology push worldwide, however, much of the structurational explication of technology evolution seems to leave a gap in the socialised understanding of processes involved in ICT4D. This gap arises from centring explanations for ICT4D on the technology evolution aspects while insufficiently capturing the importance of the agent or user in the technology–user engagement. It is reflected in what has been called ICT4D 2.0 by Heeks (2008) and in the social embeddedness research

stream in ICT diffusion (Avgerou, 2008) that suggest a 'productivity paradox', that is, a lack of productivity increases despite apparent ICT diffusion (Mann, 2004). It has also shown up in the scepticism of some research accounts about the developed world's ability to contribute meaningfully to ICT4D in developing societies (Brewer et al., 2005) due to the failures of several ICT4D interventions (Heeks, 2008).

This gap in understanding stands out when examining what is not explained by the current positions taken by the structuration view of technology in IS literature. For instance, why does a practice that the designer-manufacturer-supplier of a technology expects to set in – introduced through specific features of the technological product – not get adopted? Social processes are central to ICT adoption and are also at the centre of structuration, and hence, application of the social theory of structuration to understand ICT4D seems appropriate. However, Giddens' own criticism of the applications of structuration theory and particularly of empirical enquiries that have drawn on and extended the conceptual framework of structuration theory, often aggressively, is pertinent: '. . . on the whole I do not feel overly sympathetic towards the ways in which most authors have employed my concepts in their work'; he further emphasises in *The Constitution of Society* that 'the (structuration) theory should be utilised only in a selective way in empirical work and should be seen more as a sensitising device' (Giddens, 1989, p. 294).[1] This chapter employs a faithful interpretation of Giddens' structuration theory to better understand the conceptual gap in the ICT4D literature mentioned above.

A return to Giddens' social theory of structuration

The process of new technology adoption has generally been well researched (Baron et al., 2006; Davis, 1989; Venkatesh et al., 2003). When examining technology adoption in less-developed markets, one finds, more often than not, the introduction of western concepts, practices and technologies into a non-western milieu. In recognising an interactive structure for the bottom-of-the-pyramid market (Prahalad, 2006), the ICT4D social embeddedness literature focuses on how technology evolves as the user adapts to it. The co-creation literature that emerged from development agnostic discourse (Grönroos, 2011; Prahalad and Ramaswamy, 2004) was more vigorously applied to the development arena with contextualised data (Dahan et al., 2010; Donner, 2006). The primary concern in much of the literature of ICT4D was on how

suppliers of technology could modify their technology and products to suit the 'needs' of the user market. However, suppliers of the technology/products as well as the socially embedded discourse in the literature still worked from the premise of being in a superior position vis-a-vis the user – as being knowledgeable in the technology/functionality – and so more effective in deciding what the users' needs were with western-style development as the goal. Thus technology appropriateness was of central concern. The emphasis on the evolution of the technology as structure in the ICT4D discussion, thus, largely missed the importance of the user-agent's role in the direction the interaction and, hence, the 'development' would take. Structurational explanation extended to this process focused on technology as structure, necessitating a decentring of the agent, and reflected a turning away from Giddens.

Putting the agent back in focus

There is ample disagreement on what constitutes development, particularly whether economic improvement alone could be considered the development goal. This is a narrow view of development that subsumes into an economic straitjacket the complex emotion of ontological security that Giddens posits as being threatened in the modern world through 'manufactured risks'. The ontological security needs to be 'actively regrounded' by the agent in personal ties with others by actively building trust (Giddens, 1989). This necessitates fuller attention to the importance of the social agent in the development–technology interaction.

In structuration, structure exists as 'instantiated in (agentic) action' (Giddens, 1984, p. 377). The agent has a lot to do with the interaction as some of the extant literature in the ICT4D arena also presents (Donner, 2008). However, the structurational explanation in IS that is adopted in the ICT4D literature underemphasises the role of the user-agent by underestimating what Giddens calls 'power' in structuration. To appreciate 'power' in the Giddensian sense, it is necessary to appreciate the nuances of the 'duality of structure' and the 'knowledgeability' of the agent in structuration. The following sections briefly outline the Giddensian concepts of the duality of structure, agency and knowledgeability, as also the concept of unintended consequences, and then the aspect of power in structuration theory, to explicate why ICT4D failures might be anticipated and, indeed, a productivity paradox may occur, by a structuration perspective using a straightforward Giddensian interpretation.

Duality of structure, agency and knowledgeability, and unintended consequences in structuration

The central concept in Giddens' structuration theory is the 'duality of structure', that structure is both enabling and constraining (Giddens, 1976, 1979, 1984). Fundamentally, this means people make and remake or confirm social rules and norms (structure) with what they do by using those norms in their action. Human agency and structure are inextricably linked with each other. Thus, Giddens emphasised the enabling aspect of structure, that it 'is not to be conceptualised as a barrier to action, but as essentially involved in its production' (Giddens, 1979).

Rules–resources framework

Giddens likens this interpretation of the structure of a social system to the rules and syntax of language which agents reproduce as the language structure just by using those rules/syntax of language while communicating meaning. The agent thus reproduces the rules and syntax of language unintentionally, that is, the structure of language gets reproduced or affirmed as an unintended consequence of conveying meaning through the use of the language. This is the recursive quality of language (Giddens and Pierson, 1998). Similarly, an individual recursively reproduces social structural rules while carrying out a social act. In Giddens' words:

> When I utter a sentence I draw upon various syntactical rules (sedimented in my practical consciousness of the language) in order to do so. The structural features of the language are the medium whereby I generate the utterance. But in producing a syntactically correct utterance I simultaneously contribute to the reproduction of the language as a whole. This view rejects the identification of structure as a constraint: structure is both enabling and constraining. (Giddens, 1982, p. 37)

The path dependence operates through the agent's 'knowledgeability'. Even if an actor or agent is taken as initiating interaction or engagement, 'at the same time all action exists in continuity with the past, which supplies the means of its initiation' (Giddens, 1979, p. 70), as structure encompasses the rules of engagement that sediment as memory traces the agent draws upon. The ability of the agent to engage with structure through action is due to what Giddens calls the knowledgeability of the agent/actor, the 'tacit and discursively available knowledge' that actors have (or believe in) about the circumstances of their action

and draw upon in action (Giddens, 1979, 1984). Simply said, according to Giddens, every human agent is knowledgeable in the practical consciousness and has a 'vast variety of tacit modes of knowing how to "go on" in the contexts of social life' (Giddens, 1976, 1982).

In the structuration context of ICT4D, the agent in a less-developed society is knowledgeable in the social interaction within his/her setting, and the agent's knowledgeability is indeed instrumental in his/her ability to recursively produce and reproduce the 'structure' as an ongoing process, even though it is reproduced as an unintended consequence of the action, reflexively. The agent acts through those rules and resources, that is, the structure, in everyday social interaction.

Decentring the ICT4D effort from a technology evolution perspective enables us to appreciate this aspect of agentic knowledgeability in structurational terms and how this knowledgeability would be instrumental in a community's social practices and in adapting to the introduction of any new gadget or technology. The power of the agency in having a choice of using a newly introduced artefact is tempered by his ability for continuous reproduction of existing norms. However, the agent's power also has the dimension of transformative capacity as Giddens reiterates in structuration theory.

Power as transformative capacity in structuration

Structuration involves knowledgeability of agents and reproduction of structural principles as unintended consequences of action by the knowledgeable agent. However, in the agent–structure interaction, the agent does not have to yield (to structure) as her/his knowledgeability incorporates choice in the ability to act otherwise. Giddens expounds on this in relation to power in structuration theory. He explicates power as the third element of structuration and elaborates as follows:

> I . . . see power as an elemental part of the logic of the social sciences . . . So it is agency, structure and power . . . It is the capability to do otherwise and that is the basis of power. (Giddens in: Giddens and Pierson, 1998, p. 84)

Power is often seen as related closely to conflict. Giddens argues that the concept of action is logically tied to that of power, where power is defined as 'transformative capacity', and relates power to interaction. While Giddens takes the conception of power as domination, he does not agree that it is necessarily bound with conflict. This has relevance

in the case of the resource-poor rural farmer negotiating the season's produce. Structurationally, power is seen both as transformative capacity and as domination, as a relational concept but only operating as such through the utilisation of the transformative capacity as generated by structures of domination (Giddens, 1979, p. 92). "The interplay of the two, i.e., 'domination' as a structure and 'transformative capacity' as agency, implies that power is understood as 'interaction where transformative capacity is harnessed to actors' attempts to get others to comply with their wants. Power, in this relational sense, concerns the capability of actors to secure outcomes where the realisation of these outcomes depends on the agency of others" (Giddens, 1979, p. 93). Power relations, according to Giddens, are always two-way, as 'involving reproduced relations of autonomy and of dependence' (Giddens, 1979, p. 93) with neither side entirely autonomous nor entirely dominated. Giddens calls this the 'dialectic of control', that is built into the very nature of social systems (Giddens, 1982). In the less-developed country, the rural farmer is knowledgeable about the dialectical relationship with the traditional middleman broker/buyer of the produce, and a new technology introduced that is alien to or ignorant of that knowledgeability suffers from correspondingly slow acceptance/adoption. That may well be because it is more likely a symbiotic and generative two-way interaction, rather than a 'successful adoption'.

ICT4D through a Giddensian lens

The rural farmer-agent in a less-developed community acts in his own social structure, that is, by the rules and resources that have been the environment of his daily life and that forms his social structure woven into what Giddens calls the 'longue duree' of institutional time (Giddens, 1979, 1984). The agent operates in keeping with memory traces of historically long association with this social structure. The introduction of a new medium in the interaction, that is, a technological gadget, may put a new degree of power in the hands of the agent. This new power as transformative capacity with the agent faces the established social structure that has been reproduced over time every time the agent (and other agents) has acted according to that structure of existing rules with existing resources. How a practice or social structure starts to form and, by extension, how changes in structure occur is under-researched in the structuration theory. Giddens leaves this question with merely elaborating agentic power as transformative capacity, discussing it in the context of the reproduction of the ongoing structure

or practice and in the context of modernity with social movements acting as 'levers of social change' (Giddens, 1989, p. 278). However, in the context of individual transformative capacity, Giddens discusses power more as the capacity of the agent to choose 'to do otherwise' – ostensibly while facing the more powerful – and to keep his existing rules of engagement, thus reproducing the existing social structure. While agentic power may be used 'to do otherwise' in resisting the new technology, it is when the agent chooses 'to do otherwise' using her/his power as transformative capacity and going against the established social structure that the question of change would arise.

Modernity and change

The duality of structure is manifested in the social practices of knowledgeable agents that recursively organise the structured properties of the social systems they populate, not only within the existing rules–resources framework but often modifying them with alternative rules and resources (Whittington, 1992). Structure, that is, the rules of engagement sediments through action over time. The structure, instantiated in action, thus is enabling or constraining with the individual agent acting with or against it. When the agent acts along established rules with existing resources, the structure is reproduced as an unintended consequence of agentic action. When agents act against the established rules/norms, over time, the rules of engagement could change and a new social structure could be produced and then get reproduced as that is repeated, again as an unintended consequence of action.

It is social interaction rather than interaction with artefacts – technological gadgets or technology – that is the source of the reproduction of the Giddensian structure. An artefact/technology being modified by the supplier to goad the user-agent to ostensibly use enhanced power to change his/her social structure and give rise to new rules of engagement in their social life is a strategy emanating from the seller's own social structure dictating the selling action. The user-agent may use the new artefact to reproduce the existing structure or break from it to transform it. This is the power as transformative capacity (of the knowledgeable agent) that structuration theory points to, and this is the fountainhead of change in social practice, that is, through the choice the agent has. Although not elaborated in structuration theory, Giddens offers power as the transformative capacity of the agent, rather than reproduction of the structural properties of the environment, as the clear route to change. However, Giddens discusses change in structuration in the

context of large scale movements or evolutionary social movements, as levers of change as mentioned above. In that sense, a Giddensian interaction by way of structuration that brings about change is not an individual effort of one but continued agentic action over time that produces and reproduces a modified social practice as a new structure. This may relate to the long time that seems to be needed for the adoption of change to new technologies and products and even from development schemes by development agencies introduced in 'less-developed' regions. The lack of long-term sustainability of development initiatives observed only evidences the strength of the social structures sedimented over time, a confirmation of Giddensian social structuration. However, with change being seen more rapidly in the world, a consequence of modernity over the last three centuries, social structures are becoming less stable with heightened aspects of danger and risk and threats to life's ontological security and to trust in social interaction (Giddens, 1990; Giddens and Pierson, 1998). With modernity's edge being felt through the threat to a secure life, generally, economic security has become a matter of singular concern to the poor. In this present day, environment of uncertainty, wider democratic institutions and social equity awareness, economic incentive is therefore more likely to engender a change in agentic action that encourages a reorganisation of existing social practice today more than in earlier times. In this context, it is telling that a change of an ICT initiative from the Internet-mediated scheme to an SMS-based mobile phone system (insightfully called Warana Un-wired) found much greater uptake among farmers of a sugar cooperative in Warana in Western India because the lower cost and the higher convenience was seen as less invasive to the community's social practice (Veeraraghavan et al., 2007).

The centrality of the 'social'

Lasting changes to structures of social interaction required for economic development need long-time horizons. The Indian multinational ITC's 'e-choupal' initiative conceived in the late 1990s is a case in point. Though it started small, it had a synergy with the company's strategy of diversifying into hotels and foods and FMCG (fast moving consumer goods, e.g., personal hygiene products), away from its mainstay businesses – tobacco, a sunset sector, and paper, a traditional sector, subject to commodity cycles. Much has been written about ITC's e-choupal initiative bringing latest market information and crop advice to farmers through a computer and internet connection at a kiosk to empower

farmers who traditionally sold their produce through an agent-led auction at the nearest 'mandi' (wholesale/market yard). In terms of the sociology, it is of fundamental importance to note that the kiosks were run by chosen educated and trusted opinion leaders and mostly housed at their homes. This substantially preserved the village social structure. Further, the erstwhile middleman between the farmers' produce and the market was also retained as a commission agent with incentives for his income as the company used the channels set up for taking farm produce from the villages to markets to also supply consumer goods (from tooth paste to tractors) to the villages in a reverse flow. Over the 15 years since the inception of e-choupal to the present, the company set up large retail-cum-storage warehouses for the two-way trade, that is, for the farmers to sell through and the various agricultural and non-agricultural consumables for the farmers to buy at. A fundamental synergy also operated in that suitable farm food produce was directed to the company's motels and hotels for consumption. While it is difficult to gauge if this initiative, as part of the company's overall activities, has reached economic break-even, the company's new FMCG initiative that is tied to this effort is expected to break even earlier than envisaged in 2017 (Mukherjee, 2012). However, in sociological terms, it is pertinent that the company had taken a 20-year horizon for the e-choupal initiative and also synergistically tied it to other related business initiatives. The penetration and coverage of the e-choupal initiative – 40,000 villages in 16 states in India as of December 2011 (TNN, 2011) – is indicative of the possible success the company could derive in business terms. The success, however, rests on the furtherance of endogenous change in social structure defining the village communities' interaction with the world, and the long-time horizon afforded could well be the key to delivering ICT4D. It is the village communities' actions to pursue economic stability for themselves, within the existing social structures and perhaps often in the face of clashing norms, and using agentic power as transformative capacity that will shape the new social fabric with new social and economic interdependencies in a structurational way over time.

In theorising structure further, Giddens elaborates on the signification, legitimation and domination structures that are present in social interaction (Giddens, 1982). In terms of behaviour in civil society (not concerning law and order or military struggle), the higher the legitimation and signification aspect of the social structure, the less is the possibility or, indeed, the need for a structure to evolve as one of domination. Therefore, development initiatives through new-for-the-community

technology need to interact with existing signification and legitimation structures adopting high interactive communication strategies to encourage adoption. In this respect, for instance, the poor and near absurd translation of words into the local language (e.g., in offering local Bangla language functionality on mobile phones in Bangladesh by some hand set manufacturers) reflected a dissonance with the signification structures of the Bangladeshi farmer community and fared poorly in the legitimation dimension as reported by Dey et al. (2013). The e-choupal initiative of ITC with important local participation helped score highly in the existing signification and legitimation structures in the village communities. Along with the freedom given to farmers to sell their produce anywhere, with incentives to sell to ITC, it concurrently allowed for a structure of low domination, building the trust that is usually deficient in the investment-profit-investment cycle of today's commercialised social structure that a corporate initiative implies.

In the light of Giddensian structuration, the question then is, how and over how much time must ICT4D designers of a new technology adapt the technology to user needs or follow users as they either change their own social structure or change the technology/artefact to suit existing social structures? In most cases of ICT4D interventions, it is a mix of all these processes. The way users change the intended use to suit their practice is most contextually visible as several empirical research accounts have shown, for example, Dey et al. (2013) and Donner and Tellez (2008). In any case, rather than the artefact being the structure in interaction, it introduces potential for agents to shape new structure or rules of practice in society that in turn shape agentic action and the interaction in a structurational way. The agent acting within the existing structure and, with altered resources – perhaps with a new artefact – transforms the immediate transaction rules, thus making a dent in the existing social structure. Over time with others following suit, that structure is modified. The technology, like any artefact, forms part of the resource environment and is a characteristic of modernity (Giddens and Pierson, 1998). The social interaction, rather than the technology artefact or the gadget is the instrumental aspect of ICT4D initiatives, and impact and adoption of such initiatives will depend upon the focus on the social rather than the technical. An exploration based on the original structuration theory helps simplify the understanding of technology uptake in ICT4D through an appreciation of the capabilities that the user world brings.

An interesting perspective emerges when we remind ourselves that the technology product designer-seller community also interacts in a

social milieu within the investment-profit-investment social structure of modern times (Giddens, 1990) There is likely much scope, beyond this piece, to explore the interaction of the two sub-cultures. This may also bring suppliers looking for smoother adoption of technological artefacts to explore ways to match their innovations to – or, indeed, be led by – an understanding of the users' social norms that have sedimented over time.

Concluding remarks

This chapter did not purport to evaluate the effectiveness of ICT initiatives for development. The objective of this chapter was to enhance understanding of the structurational explication of ICT4D, which often is subsumed in a technocentric discourse on the one hand and results in a rejigging of the social theory of structuration on the other. Bringing society and social interaction back in focus in the discourse and calling on an original Giddensian understanding of social structuration obviate the need for the theoretical adaptation of the concept to study ICT4D or, in fact, technology adoption in general. The social theory of structuration in large part explores universal social structures and movements. Positioned in context, it can yet guide the understanding of ICT4D processes through the concepts of duality of the social structures that enable as well as constrain agentic action in an autonomy–dependence dialectic. The continuity of traditional social structures and, hence, a rejection of a change, can ensue depending on the way the dialectic moves with the introduction of a technology artefact. On the other hand, the understanding of change is suggested through the agent's power as transformative capacity to initiate change in the traditional social structures of the agent's past or mould the newly introduced technology into the fold of the traditional social structures.

Note

1 The use of structuration theory in accounting, for instance, where Macintosh and Scapens (1990) and Scapens and Macintosh (1996) interpret structure as the accounting practice rules was stoutly challenged by Boland (1993, 1996) as taking artefacts as Giddensian structure. Aggressive modifications in interpreting structuration theory may be because Giddens' 'vast output is not easily summarised' (Whittington, 1992, p. 694). To understand text messaging language structurationally in IS, for instance, would be to consider the technology that enables text messaging as an artefact, and the (English) language syntax and usage as forming the structure that enables the users to communicate, on the one hand, and also constrains use (i.e., unintelligible grouping of

words or grouping of words contrary to current usage) on the other. However, the users' making of new shorthand expressions such as gr8 for 'great' or ttyl for 'talk to you later' constitute new rules of engagement that produce a new structure and, when followed by several people over time, change the (English) language structure to reproduce the new structure of phone texting language (started due to imposed character limit but now widely used as a new medium of expression).

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Section II

Dynamics and Kinetics of the Adoption, Use and Appropriation of ICTs in Developing Societies

3

Impacts of Information and Communication Technology Implementation on Regulated Financial Services: The Case of Swaziland

Hillol Bala, Akshay Bhagwatwar, and *Moshtaq Ahmed*

Introduction[1]

The impact of information and communication technologies (ICTs) at the individual level as well as at the organizational and societal levels is evident from the large stream of research in various domains (Bala and Venkatesh, 2013; Dewan and Kraemer, 2000; Gillwald and Stork, 2007; Mithas et al., 2012). In recent years, ICTs have become an integral part of public sector organizations as well, impacting decision-making in government policies, financial systems, and governance regulations (Cordella and Bonina, 2012). While prior research in this regard has focused primarily on contexts relevant to western countries, many African nations have recently experienced rapid adoption of ICTs geared toward improving the social connectivity of people as well as in computerization of traditional public sector organizations (Cordella and Iannacci, 2010). Although the use of ICTs in African public sector organizations is still low as compared to their counterparts in western countries, ICTs are rapidly gaining recognition among African governments and policy makers as a tool for expediting economic growth and development (Gillwald and Stork, 2007). Leaders and government officials in African nations have started recognizing the importance of ICTs and experimenting with ICT implementation strategies to maximize the benefits for different stakeholders (Gillwald and Stork, 2007). Recent initiatives for ICT, such as those of the European Commission for Africa, New Partnership for Africa's Development, and International Monetary Fund, are indicators of rising interests in ICT-related developments in Africa (Gillwald and Stork, 2007; International Monetary Fund, 2011). Given the rising importance of ICTs in African nations, a study of the

peculiarities of the social and cultural structure of these nations and the impact on both the pre- and post-implementation phases will have interesting implications for future ICT projects in developing countries.

Recently, there has been a focus on ICTs that could help improve public sector financial management in African countries. Centralized financial management systems (CFMSs) represent a genre of specialized information systems (IS) that track financial events and financial information for a group of financial organizations that agree to share this information (Rodin-Brown, 2008; Williams and Williams, 2009). Such systems provide an integrated way of managing financial operations to support important financial decision-making.

In public administration, the use of CFMS implies computerization of public financial management processes, from credit management, loan management, and budgeting to accounting (Williams and Williams, 2009). Consequently, CFMSs provide an advantage to public sector banks, insurance, and other financial institutions by providing an integrated view of financial data. Many African countries are currently in the process of reforming their public sector financial systems by using approaches, such as CFMS (Heidenhof et al., 2002). Prior literature has noted that the existing practices related to public sector financial management in Africa are weak and incapable of efficiently monitoring public expenditures, credit facilities, use of public funds, and investments (Heidenhof et al., 2002).

In recent years, African countries have experienced financial growth and increased adoption of ICTs in the government as well as private sectors (International Monetary Fund, 2011). A critical point to note is the similarity in the economic, political, and cultural environments that most of these African countries share. While there is no doubt that the adoption of new and advanced ICTs is going to play a vital role in the economic progress of African countries, there is a wide array of factors related to the cultural and social structure of these nations that pose challenges to ICT adoption. The adoption process of new ICTs, the challenges posed, and the post-implementation impact in these nations differ from the traditional processes and impacts that have been previously studied in IS literature. In this chapter, we present a case study of CFMS implementation in the Kingdom of Swaziland. We focus on the post-implementation impact of CFMS and reactions to changes in social habits and institutional routines that were influenced by the system.

The rest of the chapter is organized as follows. We first present an overview of the socio-economic climate of the Kingdom of Swaziland. We then present the case study of the implementation of a CFMS in

Swaziland, known as the Central Deduction Administration System (CDAS). We then discuss the effects of CDAS on the economic and social environment of Swaziland as well as the individual- and organizational-level reactions to such effects. Finally, we provide an analysis of the case study from various perspectives and discuss the implications for research and practice.

Background

Overview of Swaziland and the socio-economic climate

Swaziland is a small landlocked country in Southern Africa, surrounded by Mozambique on the east and by South Africa on the other three sides. It has a population of approximately 1.1 million people (2014), making it the largest monarchy in the African continent (Moor, 2011). The currency of Swaziland is the Swazi Lilangini (SZL). Farming is the dominant occupation in the nation, which faces a multitude of challenges due to frequent droughts, conventional irrigation facilities, and sub-par agricultural financing (Samuel, 2008). With more than 90 percent of its imports accounted for by South Africa, Swaziland depends heavily on South Africa for food supplies, machinery, and motor vehicles (Central Intelligence Agency, 2012). Swaziland has been facing many financial difficulties for more than a decade. The real gross domestic product (GDP) growth has remained close to 3 percent over the last decade and has gone down to 0 percent in 2013 (International Monetary Fund, 2012). In addition, approximately 40 percent of the people are unemployed while close to 70 percent of the people live below the poverty line, making less than $1 per day (Central Intelligence Agency, 2013). A gloomy economic climate, high unemployment, and the pursuit of a high standard of living have forced the people of Swaziland to depend heavily on borrowed money for their expenses and needs (International Monetary Fund, 2008).

In addition, the Swazi society faces many health-related challenges. HIV/AIDS has spread widely in the country. The HIV prevalence rate in Swaziland was 26.5 percent in 2012 with close to 5,500 deaths every year (Central Intelligence Agency, 2013). For the 15–49 age groups, it is estimated that 42 percent of the population is HIV infected (African Economic Outlook, 2011). The impact of HIV/AIDS is seen in the health expenses and life expectancy of people. With approximately 18,000 new cases of HIV expected every year, the life expectancy of Swazi people has dropped drastically to 33.2 years, the lowest in the world (Rosenberg, 2010). The high prevalence of HIV/AIDS had led to a sharp increase

in medical expenditures (Corporate Research Consultancy, 2011). Swazi people are aware about health insurance policies and their benefits, but the prevailing notion among a majority of the people is that insurance policies are only for large organizations and rich people, thus leading to a large percentage of the population opting out of any health insurance (Corporate Research Consultancy, 2011). A primary reason for such negative notions is the experience of Swazi people related to cancelation of their insurance policies due to non-payment of premiums during the last decade. Consequently, a majority of the Swazi population that lives below the poverty line or belongs to low-income groups has opted out of any medical or health insurance policies. As a result, Swazi people are left with no option but to rely on micro-lenders and usurious rates for any urgent money needs (Corporate Research Consultancy, 2011). These moneylenders charge high interest rates and often ask for collateral before they lend.

The Swaziland financial system

Swaziland has four major commercial banks – Swazi Bank, Standard Bank, First National Bank, and Nedbank. The Central Bank of Swaziland regulates these banks. Over the last two decades, all the commercial banks have witnessed a steep decline in private sector lending, money supply, and bank deposits (Coppock et al., 2010). The relatively small size of the financial industry and rising costs of banking services have led to the rise of many credit cooperatives, microfinance institutions, and non-banking financial institutions (NBFIs). These institutions are an easy source of money for people who do not qualify for bank loans or who do not want to pay for the high cost of banking services (International Monetary Fund, 2008). In 2008, more than 266 cooperatives and NBFIs were operating in Swaziland. By 2008, the total assets of all the cooperatives and NBFIs in Swaziland had exceeded the assets of the commercial bank by a significant 23 percent (International Monetary Fund, 2008).

Methodology

We conducted a case study to understand the implementation process and impacts of CDAS in Swaziland. Data – both qualitative and quantitative – were collected during the course of the CDAS implementation from its inception to post-implementation during 2009–2012. In addition, data related to the non-compliant deductions by various financial services organizations were gathered from government records.

Data collection procedure

During the course of CDAS planning, development, and implementation, we collected data using multiple approaches: semi-structured interviews, documents provided by the organizations and key informants, and other publicly available information (e.g., press releases, financial statements, and trade press articles). One of the authors was involved in the process of interviewing top management and employees in various financial organizations and government agencies. This author was part of the implementation team as well. The purpose of these interviews was to understand the reasons for implementing CDAS and gathering requirements for CDAS. Extensive notes were taken during these interviews. In addition to these interviews, various documents from financial organizations and the Swazi Government were collected and analyzed to unearth information related to the financial sector in Swaziland.

Data analysis

Following the guidelines of positivist case study methodology (Yin, 2014), we conducted a case analysis to understand the dynamics of CDAS implementation in Swaziland. Both qualitative and quantitative data analyses were conducted. For qualitative data analysis, the interview notes, documents, and secondary data sources were reviewed by one of the authors who identified relevant information. After this initial review was completed, the other authors went through the relevant documents and information. Following the norms in qualitative data analysis, the authors discussed the materials among themselves to develop a final set of themes that emerged from the analysis. For quantitative data analysis, we conducted descriptive statistical analysis using the data extracted from the documents that were gathered during the data collection process. We developed charts to understand the impact of CDAS in Swaziland.

Case study

The direct payroll deduction process

In July 1998, the Swaziland Government introduced direct payroll deduction to provide easy access to credit facilities for their employees. Traditionally, Swazi banks did not provide unsecured loans to government employees. However, payroll deductions provided a risk control mechanism for micro-lenders and cooperatives to provide credit

facilities and a secured collection repayment method. Consequently, payroll deductions were widely accepted, enabling the employees to build or buy new houses, pay school fees for children, and also spend on ways to improve their standard of living. The first direct payroll deduction item code was introduced in 1998. The item code represents a category of loan that can be issued to Swazi people for which direct payroll deduction is permitted. In the next decade, the number grew to 150 item codes. While the item code has provided employees access to a variety of credit facilities, it also eventually resulted in poor financial decision-making and exposure of the Swazi Government employees to a higher risk of indebtedness.

Excessive payroll deductions

The Government of Swaziland passed the Employment Act in 1980 to introduce many legislations related to personal wages and to regulate the part of the salary that an individual can use for loan and interest payments (Government of Swaziland, 1980). Article 56 of the Employment Act clearly specified the salary limit that any employee may assign to a third party, which was one-third of the basic salary (Government of Swaziland, 1980). Any employee who had more than one-third of basic salary assigned to third parties was considered to be over-indebted. Article 56 also specified that salary deductions of more than one-third of an employee's basic salary are non-compliant with the Employment Act. Commercials banks and microfinance institutions were trying to comply with these restrictions. However, due to the lack of a central registry for the payroll system, it was becoming difficult for these institutions to monitor the amount of current deductions from an individual's salary, to determine an individual's current employment status, and to ascertain whether an individual had taken additional loans from a NBFI that might not have adhered to Article 56. This made it increasingly difficult for financial institutions to issue loans that complied with Article 56.

The Swazi Government was experiencing significant issues in payroll deductions. For example, the government payroll system was trying to survive without a Central Registry system for a long time. Without a mechanism for checking deductions in advance, many employees over-committed themselves, and the government was left with claims for deductions that exceeded the maximum amount that could legally be deducted from an employee's salary. Financial institutions and micro-lenders suffered, with claims for payroll deductions often being rejected and lenders unable to recover loans. This manual system of payroll deductions placed a huge administrative burden

on the government and resulted in numerous disputes with government employees and financial institutions. As there was no "minimum take-home pay" policy enforced, an increasing number of government employees received zero net pay. As a result, the government was facing numerous court cases over excessive deductions or non-adherence to the Employment Act. Over-indebted employees were also becoming demotivated in government service, which affected overall government service performance.

There was a need for a Central Loan Registry system that would allow the government's payroll unit and third parties to effectively deal with deductions directly from the system through mutual understanding and enforcement of policies. The system was needed to address the challenges of the payroll system, such as the inability to check the extent to which an employee is already in debt before a loan is advanced, and ensuring that the total deductions are within the statutory limits set out by the law. As such, a system to improve control over the source of deductions and prevent possible exploitation was needed. Figure 3.1 below shows the percentage of over-indebted government employees since 1995. The over-indebtedness of government employees is noticeable even as far back as 1995, when 5 percent of the employees were over-indebted. The situation further deteriorated over time. Over-indebtedness had reached nearly 20 percent by the time NBFIs started operating in the Kingdom of Swaziland.

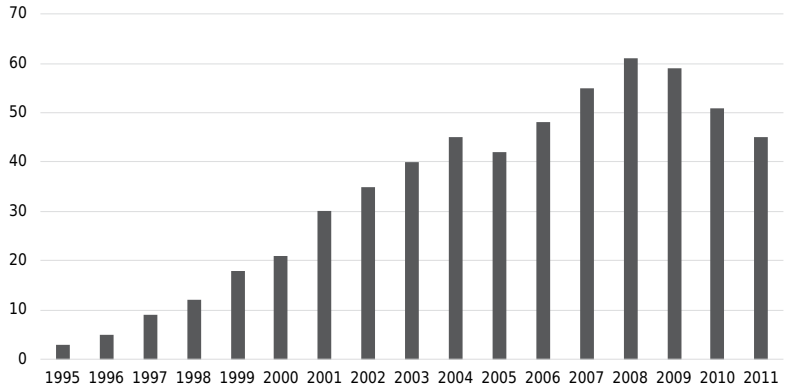

Figure 3.1 Percentage of total government employees over-indebted from January 1995 to October 2011

Source: CDAS project documentations

Implementation of the Central Deduction Administration System (CDAS)

After a successful tendering process, ITorg (fictitious name) – an ICT consulting firm – was hired in July 2009 to initiate CDAS with the primary goal of providing a mechanism to enforce the 1980 Employment Act. CDAS assisted over-indebted employees in preventing non-compliant deductions. CDAS was deployed in October 2009. ITorg was given the contract to analyze, design, develop, implement, and maintain CDAS. CDAS gave micro-lenders and other financial institutions 24-hour live access to a credit-checking facility that would allow the institutions to know the amount of a staff member's salary available for deductions. To enable this, CDAS included a wide array of checks and controls that prevented employees from making deductions that exceed government limits.

ITorg completely managed the operations of CDAS, thus providing the Government of Swaziland an integrated, turnkey solution. One of the major advantages that CDAS provided was its integration with existing government IT systems. Consequently, the government was no longer required to make individual payments to numerous financial institutions. Through CDAS, all individual payments were centrally managed via its integration with other government IT systems. As a result, CDAS reduced the burden of payroll administration without significant cost to the government. (The system is funded by a small levy on the deductions as they are passed onto financial institutions.) In addition, CDAS also incorporated security features such as a secure server, strong password control, and data encryption. Also, in addition to preventing fraudulent use of employee names, CDAS also incorporated photographs of all government employees. For government employees, CDAS provided the following facilities:

- In order to determine if an employee is over-indebted or qualifies for more loans, CDAS enables the employees to apply for debt review that helps assess their financial position.
- For over-indebted employees CDAS blocks any new deductions until the employee's debt situation improves. Consequently, the employee does not have access to additional credit.
- CDAS assists over-indebted employees in restructuring their debt, of which the creditors are informed. With the help of CDAS, the employee is able to become debt-free in a few years (depending on the amount of initial debt).

Post-implementation impacts and issues

After implementation of CDAS, the Treasury allowed ten micro-lenders to use CDAS. After the initial success with the ten lenders, the Treasury gave instructions in January 2010 to all third parties, including cooperatives, insurance companies and medical schemes, that they should be consolidated under CDAS. However, after reconsideration, the decision was postponed and only insurance companies, medical schemes, and the Swazi Bank were asked to comply and be consolidated under CDAS. Cooperatives were allowed to continue as before without having to comply with the 1980 Employment Act and without being charged a fee.

Initially, the government was able to consolidate all insurance companies and medical schemes under CDAS. However, in June 2010, one of the biggest insurance companies went to the media and forced the government to allow them to continue non-compliant deductions. The government agreed and the insurance company was removed from CDAS. Following this incident, one of the medical insurance companies followed suit and was also released from CDAS by the government. Gradually, all remaining insurance companies and medical schemes using CDAS also decided to slowly stop using CDAS.

Initially, CDAS had a positive impact on the employee debt situation. As noted in Figure 3.1, in January 2008, the number of over-indebted government employees reached its peak of over 60 percent. In the preceding years, the percent of over-indebted employees had kept growing. However, the situation improved after micro-lenders adopted the CDAS system. By January 2010, the percent of over-indebted employees dropped by 9 percent. Gradually, by October 2011, 45.49 percent of government employees were over-indebted, a significant reduction since its peak of 60 percent in January 2008. At CDAS's implementation in 2009, the total over-indebted deduction amount was about SZL 29 million, which was then reduced to SZL 20 million in spite of an increase in the number of employees and their salaries. In summary, while CDAS was able to achieve its primary objective of enforcing the Employment Act and reducing non-compliant deductions, a large number of non-compliant deductions were still being added on a monthly basis by cooperatives not using CDAS.

Findings from the case study analysis

CDAS had a significant impact on micro-lending, resulting in a huge drop in monthly collections from government employees by micro-lenders.

In this section, we summarize major impacts of CDAS on micro-lending and other financial practices in Swaziland.

Comparison of CDAS versus non-CDAS deductions

Figures 3.2 and 3.3 show a comparison of total deductions by micro-lenders (CDAS users) and cooperatives (CDAS non-users), respectively. Till the implementation of CDAS in early 2009, the deductions by micro-lenders were going up rapidly (Figure 3.3). The deductions went down from approximately SZL 38 million in January 2009 to SZL 25 million in October 2011. However, the non-compliant deductions by

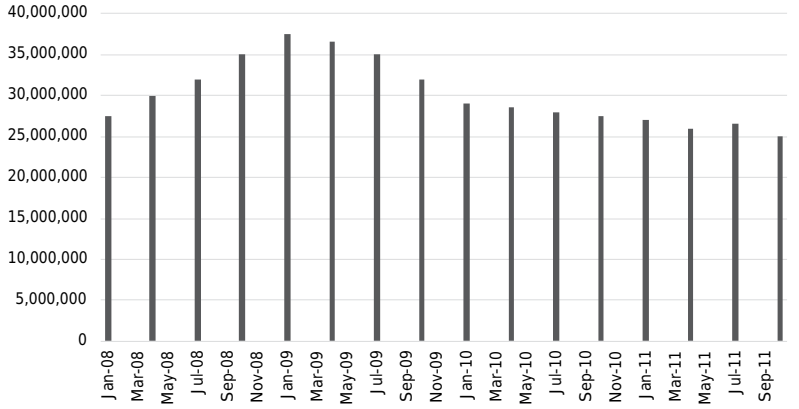

Figure 3.2 Total deductions by micro-lenders (CDAS users)

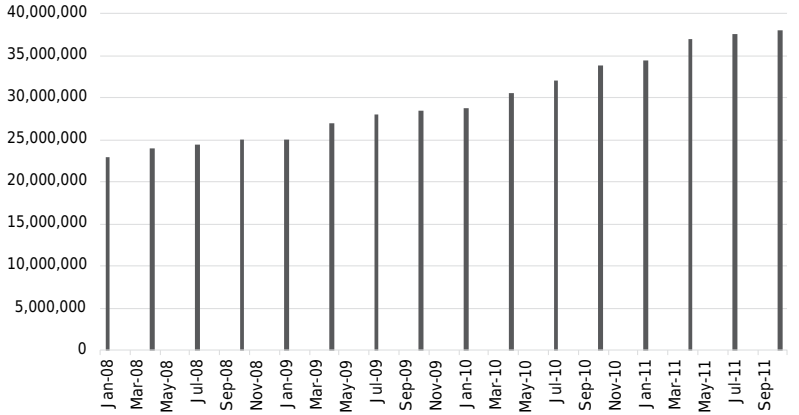

Figure 3.3 Total deductions by cooperatives (CDAS non-users)

cooperatives that declined to adopt CDAS kept growing since January 2001. The deductions by cooperatives were at SZL 25 million in January 2009 when the deductions by micro-lenders were at peak. After declining to use CDAS, the non-compliant deductions by the cooperatives grew rapidly to SZL 38 million in October 2011. It is evident from this comparison that while the adoption of CDAS by micro-lenders was proving to be beneficial in reducing employee debts, the impact was neutralized by cooperatives that opted out of CDAS.

Figures 3.4 and 3.5 show the comparison of deductions put in place by various organizations in Swaziland in January 2009 and October 2011, respectively. After CDAS implementation, the share of micro-lenders in payroll deductions reduced from 46 percent to 27 percent. However, the deductions by cooperatives that opted out of CDAS use rose from 31 percent to 41 percent during this period. The bank loan deductions also soared from 1 percent to 7 percent. It is evident from the comparison that while CDAS successfully reduced non-compliant deductions for micro-lenders, the government employees were still borrowing money from other financial institutions that had not yet adopted CDAS. The cooperatives added SZL 16.03 million new non-compliant deductions during the period from January 2010 to October 2011. This increase in non-compliant deductions had a negative impact on normalizing the government payroll and enforcing compliance across the industry.

Salary advances

In order to compensate for the increased cost of living and the expectation of a better standard of living, Swazi people started borrowing money

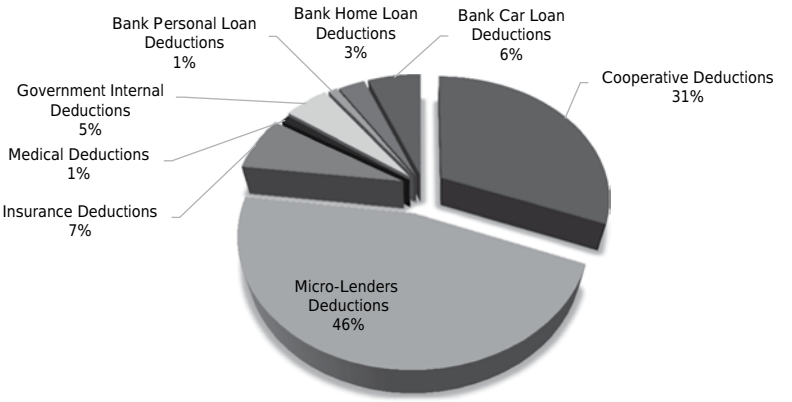

Figure 3.4 Comparative deductions in January 2009

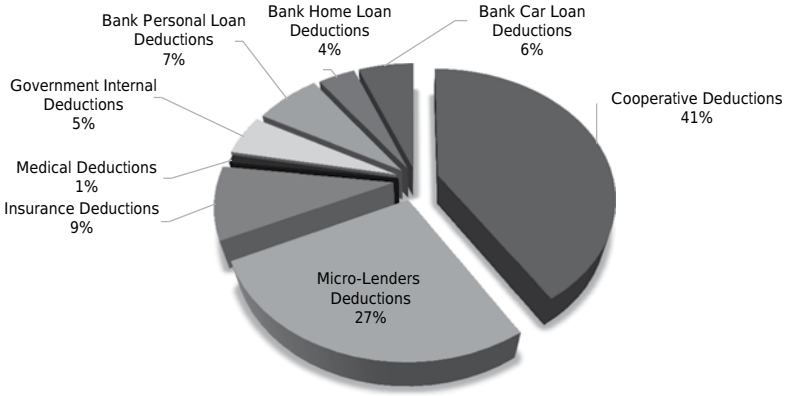

Figure 3.5 Comparative deductions in October 2011

from various sources. In order to enable the government employees to meet their needs and luxuries, the treasury also allowed employees to get salary advances. Figure 3.6 shows the growing salary advances from January 2009 through October 2010. Most of these salary advances were not compliant with the Employment Act.

Post-implementation compliance issues

While CDAS turned out to be an effective mechanism for reducing non-compliant deductions for organizations that adopted it, the impact was neutralized by non-compliant deductions made by organizations that either did not adopt or opted out of CDAS. This led to the following situations:

- Some government employees were applying for new loans through cooperatives, NBFIs, and other institutions that did not use CDAS even though they did not qualify to receive loans. Consequently, new loans that did not comply with the one-third rule specified in the Employment Act, were taken;
- As an alternative to loans, employees were able to get salary advances. This was especially useful for employees who were not affiliated to a cooperative or when loan applications were rejected; and
- Due to the complications with CDAS adoption, the recovery period to achieve the desired level of debt-to-income ratio was lengthened.

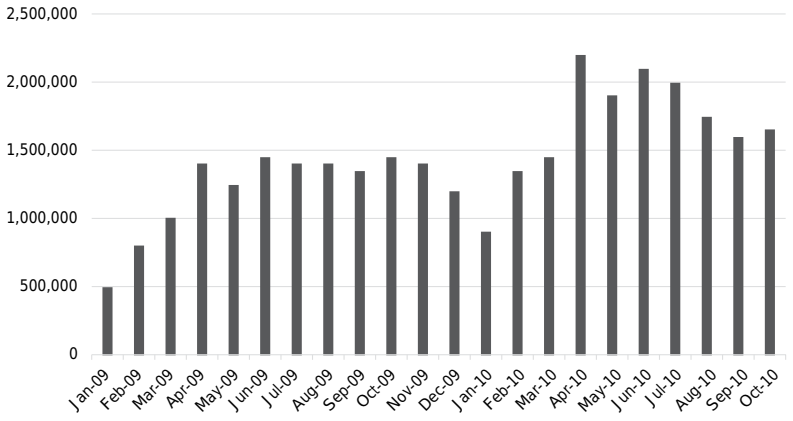

Figure 3.6 Trend of monthly salary advances from January 2009–October 2010

Cooperatives – the nature of ownership and stakeholders

In order to understand why cooperatives were hesitant and later declined adoption of CDAS, it is critical to understand the nature of their ownership and stakeholders. Most cooperatives in Swaziland are founded or owned by government employees. Similar to other Swazi workers, these employees are over-indebted as well. Consequently, these employees are aware that if the cooperatives that they own, or have a stake in, adopt CDAS, they would not be able to borrow more money. In addition, many of these employees are either part of the government, have influence in government decision-making processes, or are among the people responsible for making the decisions. As a result, to ensure that the rules enforced by the CDAS do not have an adverse effect on their financial situation and to maximize the interest of the cooperatives, these employees are reluctant to have their cooperatives adopt CDAS. By doing so, the employees ensure that there is an easy loan granting agency that they can leverage for their purposes. As these employees have an influence or participation in the government decision-making process, they have also ensured that legislation forcing the cooperatives to adopt CDAS is not passed.

Non-complying cooperatives and their impact on the financial market

As of 2012, all financial institutions including micro-lenders, insurance companies, and banks, with the exception of cooperatives, have adopted CDAS. In addition, the Swazi Government has also made

efforts to ensure that financial institutions that comply with CDAS can reschedule their loans to ease employee installment or repayment. Such financial companies are leveraging the available window to consolidate other debts and lower the installment payments by increasing the repayment period. This process has allowed the financial institutions to recover previously granted loans and, as a result, to also stabilize the loss of their customer base. However, with the cooperatives declining to adopt CDAS, a major challenge these financial institutions have started facing is losing their customers to cooperatives. During the period prior to CDAS adoption, the Swazi people had become accustomed to a higher standard of living using borrowed money. Consequently, the cooperatives have turned out to be an attractive option for borrowing more money. Getting a loan from the cooperatives is easier and quicker since the cooperatives do not use CDAS to check compliance with the Employment Act. In contrast, the likelihood of loan applications being rejected by financial institutions that use CDAS is high, given the poor debt situation of the employees. Consequently, for CDAS to be effective, it has become critical for the Swazi Government to ensure that in the long term, all financial institutions use CDAS instead of just a fraction of the financial institutions. However, contrary to this goal, the market for CDAS is declining further.

Lack of government control

The CDAS implementation faced many roadblocks from the various constituents of the government from the time the project was initiated. However, considering the possible positive implications of the system, these constituents eventually agreed to the implementation plan. After the implementation, the discussion on CDAS adoption, especially by the cooperatives, has not gained much momentum in the government. Essentially, the government has not been actively persuading agencies that have resisted or opted out of CDAS, to use the system. As a result, the success of CDAS is seriously challenged by the lack of government control over the cooperatives and by the government employees who have continued to borrow excessively. The Swazi government has been indecisive in spite of the potential losses many financial institutions might face due to the imbalance created by the institutions that have started opting out of CDAS. It is critical for the government to take measures ensuring that CDAS is adopted by all financial institutions. While the focus of the government has been centered, in a majority of cases, on micro-lenders that made poor financial decisions in the past,

the focus needs to shift to third-party deduction code holders such as the cooperatives.

Implications

Organizational-level impacts of ICT

The CDAS case provides insights into the different impacts of ICT on individuals and organizations. It is evident from the case that at the individual level, CDAS initially achieved the desired goals of arresting further non-compliant deductions for over-indebted employees. In addition, CDAS also provided the individuals opportunities for loan restructuring that could have helped them pay down the debt in a reasonable period of time. However, at the organizational level, CDAS failed to achieve the expected level of success. In fact, for organizations that adopted and kept enforcing the rules imposed via CDAS use, the implications were negative. CDAS allowed such organizations to recover defaulted loans from government employees through restructuring. This also implied that these organizations could not lend more money to that employee until the employee was eligible according to the Employment Act. Since a large number of government employees were over-indebted, the organizations that adopted CDAS could not issue more loans. Further, the organizations such as the cooperatives that opted out of CDAS were still allowing their employees to borrow money. This resulted in a loss of customer base and severe financial losses for those organizations that adopted CDAS. Consequently, in the long term, the implications were negative for the organizations that adopted CDAS. Ideally, CDAS would have been more effective if its implementation was enforced by the government at the national level, possibly barring all organizations from granting loans via alternative non-compliant means. It is important to note that for a centralized system to be implemented at the national level, there needs to be a common understanding and buy-in from all partners at the beginning of the system's inception. It is also crucial to involve all stakeholders during all stages of the system's development and implementation. For CDAS, the government's neglect of third-party stakeholders such as cooperatives led to a chaotic situation where some organizations were benefiting from the system while others were losing business. A common understanding on the timeline of CDAS system adoption by all stakeholders and a follow-up by government agencies to track the progress of adoption could possibly resolve such conflicts.

Implications for other African nations

The CDAS case and its outcomes have several implications for other African nations, such as Botswana, Namibia, and Lesotho, which share similar economic and cultural environments and organizational structures. The post-implementation challenges faced by CDAS can be primarily blamed on the Swazi Government's passive role in the enforcement of the system's usage. As a result, even after more than two years of CDAS implementation, the practice of excessive borrowing continues in Swaziland. Financial entities that adopted CDAS had to struggle to keep their customer base and started losing money. African nations that share a similar governance structure can benefit from the lessons learned from this case study and should plan any ICT implementations accordingly. It is critical for government agencies in these countries to have a complete understanding of the stakeholders of financial institutions in their country and have knowledge of the potential risks resulting from situations such as those that arose during CDAS implementation in Swaziland. In addition, it is crucial for governments to play an active and commanding role in the decision-making processes related to conflicting situations where interests of certain financial institutions might be at risk. The governments also needs to play a proactive role in reacting to any negative outcomes of an ICT implementation, which could help address these issues as well as give organizations a sense of confidence that the ICT would be beneficial for their businesses in the long term.

Conclusion

Much prior research has focused on ICT implementations in western and developed countries. However, there is a dearth of research that focuses on ICTs in other parts of the World, particularly in the African nations. Given the rising importance of the African nations, it is crucial to understand the peculiarities of the social, political, and cultural structures of these nations and the possible implications for traditional ICT implementation approaches. We looked at the case study of CDAS implementation in the Kingdom of Swaziland and its impacts on the socio-economic aspects of the nation. While CDAS promised many positive fallouts for the Swazi economy, immediately after the implementation cooperatives declined to adopt it, resulting in unfavorable outcomes. Going beyond the technological aspects, we focused on the socio-cultural aspects and the political decision-making that played a critical role in CDAS implementation and use. Many African nations have

similar political, economic, and cultural environments. Consequently, we believe that ICT implementation projects in other African nations can leverage the lessons learned from this case study. We expect that our work will offer insights on ICT implementations in different cultural contexts and engender interest in conducting ICT implementation research in different parts of the world.

Note

1 An earlier version of this chapter was presented at the 18th Americas Conference on Information Systems, August 9–12, 2012, Seattle, WA.

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4

How Young Chinese Consumers Choose among Different Smartphone Brands: The Importance of Socio-cultural and Marketing Factors

Raffaele Filieri

Introduction

In the twenty-first century, smartphones appear to be viewed as a necessity for the majority of consumers across all dimensions of age, gender or education level (Persaud and Azhar, 2012). In the last few years, smartphone penetration has grown such that smartphones have become life companions for many customers who use them multiple times each day to perform a wide range of activities, such as checking emails, chatting with friends, browsing the internet, managing businesses, purchasing products and booking services, and so forth.

Smartphone use is expected to increase exponentially in the years to come; with growing access to advanced technology, both the use of and desire for new applications are increasing, and more than 30% of mobile owners globally use smartphones (Fergusson, 2012). China is the world's largest smartphone consumer market and the second highest in the world for smartphone penetration rate with 66% of Chinese people owning smartphones (Nielsen, 2013). Despite the increased significance of this emerging market, no previous research has empirically investigated Chinese consumers' preference for smartphone brands; this study is designed to address this gap.

A smartphone is more than a simple mobile phone as it adds new functions such as an Internet connection, a camera, and a large data storage capacity. Although Apple Inc. is considered the company that invented the smartphone with its iPhone model, nowadays the global market is populated by several competing brands, such as Samsung, Nokia, BlackBerry, Sony, HTC, LG, Xiaomi, Huawei and many more. In the presence of such trends, there is a growing need to understand the

ways in which Chinese consumers choose from among different smartphone brands and the circumstances under which one brand may be chosen instead of another one.

A smartphone belongs to the family of high-technology products, 'products that are the result of technology and which require substantial shifts in behaviour of at least one member of the product usage channel' (Gardner et al., 2000, p. 1053). Existing theories for explaining consumer behaviour in relation to high-technology products focus mainly on consumer adoption of high-tech products. Examples of these theories include the Technology Acceptance Model (TAM) (Davis, 1989), the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and Innovation Diffusion Theory (IDT) (Rogers, 2003). These theories are effective in explaining why consumers decide to adopt (purchase) a new technology (i.e., a smartphone) instead of an existing one (i.e., a mobile phone) (Park and Chen, 2007; Chen and Chen, 2009; Joo and Sang, 2013; Kim et al., 2014); however, they may not be effective in explaining why consumers choose a specific high-technology brand over alternatives available in the marketplace. The aim of the present study, therefore, is to address this gap by developing a new conceptual framework which will be effective in explaining the factors that directly influence consumer choice of smartphone brands. Thus, this chapter contributes to the international marketing literature on branding high-technology products in China and Chinese consumer behaviour with a focus on smartphone brands.

Despite the exponential growth of smartphone technology and its rapid adoption by vast numbers of consumers, to date no research has investigated the factors that influence a consumer's choice decision regarding smartphone brands similar to previous studies that analysed antecedents of consumer purchase intentions for mobile value-added services (Wang and Li, 2012) or analysed the marketing opportunities offered by smartphones and consumer attitudes towards mobile advertising (Jun and Lee, 2007; Merisavo et al., 2007; Hein et al., 2011; Gao et al., 2013).

To summarize, the purpose of this study is to explore the factors that drive Chinese consumers' preference towards smartphone brands. In view of the lack of research on this topic and the need to develop a new theoretical framework to explain consumer smartphone brand choice, this exploratory study has adopted a qualitative method of investigation consisting of interviews exploring the Chinese consumer's preference among smartphone brands.

Emerging markets and smartphone brands

With a huge population and a growing number of middle class consumers who have high purchasing power, emerging markets are becoming ever more attractive as prime targets for multinational companies. As many western consumer markets have matured, and there has been little or no growth, global brand managers are frequently turning their attention to fast-growing countries in Africa, Asia and Latin America. How such companies enter and compete with local players in emerging markets represents a key challenge. It has been stated that there is a need to obtain fresh insights to help further our understanding of brand management and consumption in emerging markets (Burgess and Steenkamp, 2006). This study focuses on an emerging market, namely China, and attempts to understand the drivers of consumers' choice of smartphone brands.

Although smartphones have become fundamental accessories in many people's everyday lives, very little is known about consumers' product choice of smartphone brands. Even less is known about Chinese consumers' purchase intentions for smartphone brands. There are several reasons to focus on the Chinese market: first among the emerging markets, it is the one that is driving the smartphone industry as the world's largest smartphone consumer market, it is the second country in the world for smartphone penetration rate, and 66% of Chinese people own a smartphone (Nielsen, 2013).

A smartphone is a high-technology product, which can be defined as 'products that are the result of technology and which require substantial shifts in behaviour of at least one member of the product usage channel' (Gardner et al., 2000, p. 1053).

Existing theories for explaining consumer behaviour with high-technology products mainly focus on consumer motivations to adopt a new technology. Examples of these theories include the TAM (Davis, 1989), the TRA (Fishbein and Ajzen, 1975), the TPB (Ajzen, 1991) and the IDT (Rogers, 2003). These theories have been used extensively by scholars to predict consumer technology adoption behaviour even in the context of smartphones (Park and Chen, 2007; Chen and Chen, 2009; Joo and Sang, 2013; Kim et al., 2014). For instance, Park and Chen (2007) integrate IDT and TAM to explain the determinants of smartphone adoption by medical doctors and nurses; similarly, Chen and Chen (2009) use the same framework to investigate employee adoption of smartphones in a delivery service company, highlighting the importance of factors like self-efficacy and perceived ease of use for the

behavioural intention to use the technology. Joo and Sang (2013) also use TAM to measure the impact of factors such as perceived ease of use and usefulness (and their antecedents) on Korean consumers' intentions to use a smartphone, while Ting et al. (2011) have investigated the factors that drive dependency on smartphones in Malaysia. These studies found that the aforementioned factors explain users' adoption of technologies. TAM suggests the adoption of factors such as ease of use, usefulness, self-efficacy; IDT includes relative advantage, compatibility, testability, complexity and observability. However, we believe that these factors do not fully explain why consumers choose a specific high-technology product brand over the alternatives available in the marketplace.

From the review of the academic literature, we can clearly see that the existing literature is mainly focused on mobile phone choice or smartphone adoption and no study, to date, has investigated why and how consumers choose from among different smartphone brands. As discussed above, a smartphone is a very different product when compared with a standard mobile phone; as a result, factors that can affect the choice of mobile phones might not be the same for smartphones.

To summarize, this research will explore the factors that influence Chinese consumers' brand choice for smartphone products by using a qualitative approach based on face-to-face interviews.

Methodology

To date, no research has explored the factors that affect consumer choice regarding selection of a particular smartphone brand over alternatives available. Since the nature of the study is exploratory with the aim of building a new theoretical framework to explain consumers' choice of smartphone brands, a qualitative methodology based on in-depth interviews was chosen as the most appropriate approach (Glaser and Strauss, 1967).

The in-depth interview method was adopted as it can yield a deeper understanding of the participants' own perceptions, opinions and feelings about brand choice, from which understanding researchers can inductively develop an empirically grounded theory (Glaser and Strauss, 1967; Kvale, 2007). This method would permit us to gain an in-depth understanding of Chinese consumers' underlying motives and attitudes towards smartphone brand choice, which will help to develop a theoretical model uncovering the antecedents of smartphone brand choice in the Chinese smartphone market (Kvale, 2007).

The sampling technique was based on a convenience, purposive sample, and participants owning a smartphone were recruited from

among students, colleagues, friends and acquaintances. A total of 25 face-to-face interviews were conducted within a period of six months, mainly in Chinese (Mandarin and Cantonese). In order to take into account the influence of price on consumer decision making (Karjaluoto et al., 2005), the participants selected had different levels of income (personal or family) from less than 10,000 Renminbi (RMB) (Chinese currency) to over 20,000 RMB per month. The total number of interviews was judged as sufficient for reaching theoretical saturation as additional interviews were adding no new insights (Strauss and Corbin, 1998; Kvale, 2007). Interviewees were Chinese students in the age bracket of 18–25, the majority of them from affluent families with a monthly salary of over GBP 2,000, were born in the South or South-East of China, and are studying for their degree.

The interview protocol adopted was semi-structured, and questions ranged from general questions asking participants to give a personal historic overview of their usage and ownership of mobile and smartphone brands over the years (including reasons for changing the brand as well as the meanings they associated with the smartphone and the brand) to more specific questions referring to the motivation for purchase of the last smartphone brand (i.e., *What does this smartphone brand mean to you? Why have you decided to purchase a smartphone? Why have you chosen this specific brand? What is your opinion of this brand?*). Interviews lasted between 40 and 55 minutes and were recorded digitally and later transcribed and translated into English. The translation was sampled and checked independently by a native Chinese speaker with professional qualifications in the English language.

Codes were generated from consumer behaviour theory, and open and axial coding were adopted to analyse the data (Strauss and Corbin, 1998). Open coding was used to shed light on the properties and dimensions of concepts in the dataset.

In order to check the *validity* and *reliability* of the index and subcategories obtained, the researcher contacted three academics who did not participate in the interviews to test the inter-rater agreement.

Results

Although consumers may have different motivations in purchasing a particular smartphone brand, we consistently found that some factors occurred in most of the interviews.

The findings suggest three broad categories of antecedents of Chinese consumer choice of smartphone brands, which were classed in order of

importance for the respondents (based on the number of times mentioned): (1) brand/marketing, (2) socio-cultural influences, (3) product features. The dominant themes refer to the marketing influence dimension and include factors referring to the brand such as brand image, brand loyalty, brand popularity and the design and appearance of the smartphone product. The second in order of number of times mentioned refers to the socio-cultural influences dimension and includes factors such as social influences (friends and family) and 'mianzi' considerations, the individual's reputation and social position in others' eyes. The least mentioned factor referred to was the product dimension and this includes factors such as the safety and ease of use of the operating system and ease of access to social media applications for social networking.

Brand choice influencers

Social influence

China is a collectivist society (Hofstede, 1980), namely Chinese individuals prioritize social well-being before individual well-being. The collectivist orientation is reflected in the Chinese family and kinship system (Yau, 1988). Chinese society has historically concentrated on group orientation and harmony in managing all interpersonal relations; as a result, Chinese consumers tend to value group decisions, order and security in their purchase behaviours (Zhang et al., 2012).

Since traditional Chinese culture rests on kinship and family bonds (Yau, 1988), people rely on word-of-mouth communication to obtain credible product information with the belief that only 'bad' products or services need advertising (Gong et al., 2004).

From the interview data, it emerges that friends and family are a primary source of influence on smartphone brand choice decisions. Chinese consumers often rely more on face-to-face and electronic word-of-mouth, respectively, from their friends, family members or expert reviewers in professional websites because they are sceptical of traditional advertising messages. Moreover, it seems that friends' and family's advice and opinions are so influential that consumers tend to purchase the same products and brands without collecting much information about product features and functionality. Most of the participants would tend to ask their friends for suggestions or ask them how they feel after using a particular smartphone brand, and then adopt their recommendation and go straight away to the shop. If most of their friends think highly of, or own, a specific smartphone brand, Chinese consumers will trust them and take action based on their friends' recommendations:

> If most of my friends are using the same one, the one should be very good. (R3)
>
> Every time I would like to purchase something, I will have to ask my friends for suggestion and recommendation. (R9)

Brand popularity

Through interviews, we were able to identify a new concept referring to brand value, namely brand popularity. Chinese consumers tend to choose popular brands, those brands that are widespread in society. According to interviewees, a brand that is popular in the society is also associated with high quality because Chinese consumers think that the more popular a brand is in society, the higher will be its quality. Interviewees clearly articulated this concept in the discussions, and respondents stated that they believe that a product/brand that is used by many people must necessarily be good.

The importance of the level of popularity of a brand may derive from the Chinese respect for social norms and group orientation. Group orientation is concerned with a sense of community, solidarity and harmony in society where individuals co-exist among others (Tran et al., 2008). In summary, the more people purchase the same brand, the more it becomes popular in the social grouping or in society, which in turn exercises a strong influence on Chinese consumers' brand associations and preferences. In fact, the more widespread a brand is among their social circles, the more it is perceived to be of high quality, thus influencing consumer choice:

> If it is popular and most people are using it, there should be some reasons behind that so many people are buying it . . . I will think this brand has a good reputation because a lot of people are buying the same brand. (R9)

Brand image and loyalty

Brand image and loyalty are components of the customer-based brand equity construct, which is also composed of other assets (liabilities), including perceived quality and brand awareness (Aaker, 1991; Keller, 1993; Cobb-Walgren, Ruble, and Donthu, 1995). Chinese consumers in interviews highlight the former factors as critical criteria that they consider when they have to choose from among different smartphone brands. Keller (1993, p. 3) defines brand image as 'an overall perception of

a brand derived from the brand associations held in consumer memory', while brand loyalty is defined as 'a deeply held commitment to rebuy or repatronise a preferred product or service consistently in the future, despite situational influences and marketing efforts having potential to cause switching behaviour' (Oliver and Rust, 1997, p. 392). In this study we have found that brand image has a strong influence on Chinese consumers. From our interviews, we acknowledge that the image portrayed by the brand, together with brand loyalty, are both highly significant to Chinese consumers. A specific smartphone brand has the function of signalling socio-economic success; for this reason consumers will be more likely to consider a brand with a very positive reputation. Loyalty was particularly evident among Apple iPhone users:

> . . . because I like this brand, then I have a desire to buy it. Comparing iPhone with Samsung, I prefer to buy iPhone. It is because of the popularity and image of Apple brand. (R16)
>
> I like all kind of Apple products which is another important reason for me to choose iPhone. If there are a lot of brands to choose, I am sure that I would like to choose Apple without any hesitation because I like this brand and what it represents. (R12)

Design of the smartphone

Design is an increasingly important criterion in relation to the functional features as the smartphone has to look good (Luchs and Swan, 2011). Bloch (1995, p. 16) defines product design from a formal point of view as 'a number of elements chosen and blended into a whole by the design team to achieve a particular sensory effect. Designers make choices regarding characteristics, such as shape, scale, tempo, proportion, materials, color, reflectiveness, ornamentation, and texture.' Design is also viewed as a conscious effort to produce a product, service or experience that combines both functionality and aesthetics (Mohr et al., 2010, p. 234). Nowadays, design of a new product must combine the criteria of being useful and aesthetically pleasing.

Based on our findings, smartphone innovative design has reached the top of the list in the criteria that Chinese consumers consider before purchasing a specific smartphone brand. In this study, in terms of the design, participants referred to four key aspects of a smartphone's design: screen size, colour, weight and aesthetics. These represent the most important aspects that Chinese consumers pay attention to when they select from among different smartphone brands. Regarding aesthetics, there was

agreement about the fact that an 'ugly smartphone' was believed to be symbolic of a lack of style. As participants explained, even though different people have different aesthetic standards, a smartphone design should look nice and attractive to be considered by Chinese consumers. It was said to be a *good feeling* when holding the smartphone, which makes users feel fashionable and even more confident:

> The first eye sight for a product is the appearance, so, the design of a phone is important, and the appearance and design of the phone should be consistent with the overall image and perception of myself. (R11)

Mianzi

Culture is defined by Hofstede (1991) as collective programming of the mind which distinguishes the members of one group or category of people from another. Collective programming of the mind is different in different countries, where people share similar values within a certain national environment. In China, Chinese people follow the teachings of Confucius (*Kung Fu Tzen*), an ancient Chinese philosopher, whose influence spread out of China to other East Asian countries (Fang, 1999). One of the notions deriving from Confucianism is the notion of 'face', which implies maintaining one's public dignity and standing (Lee, 1990). The word 'Mianzi' is derived from Confucianism, and it means consciousness of glory and shame; it represents the individual's reputation and social position in others' eyes (Hu, 1944). Mianzi stands for 'the kind of prestige that is emphasized . . . a reputation achieved through getting on in life, through success and ostentation' (Hu, 1944). Chinese consumers try to maintain their reputation (face) in front of significant others.

The findings of this study indicate that buying a specific smartphone brand can enhance face or enable Chinese consumers to not lose face in relation to others. Chinese consumers are afraid of losing face, experiencing social withdrawal, or feeling inferior to their friends. Buying a cheap or unpopular smartphone brand is a risky decision (Gao, 1998). Interviewees clearly stated that they could feel embarrassed and humiliated in front of others if they were using a cheap smartphone brand or, interestingly, a Chinese brand. According to respondents, purchasing an expensive and popular smartphone brand enables them to gain or maintain face, which means it enables them to save face and be accepted and recognized by others. Owning an expensive smartphone fosters feelings of proudness and vanity in Chinese consumers. By owning an expensive and well-reputed smartphone brand, the Chinese consumer believes she

or he can increase the amount of mianzi, which is a function of his or her social status.

> If I am not using that kind of Smartphone, I may feel upset and may lead to isolation, and if it is only myself who is not using it, I will feel a sense of inferiority. And if I use the same good Smartphone as my friends, it would be more comfortable and it will be easier to socialise with them. (R1)

Smartphone features

Smartphones are equipped with multimedia features, which include a digital camera, operating system, apps, interactivity tools, storage, games and mp3 player among others. With regard to the functions and features, only a few participants declared that they selected a specific smartphone brand because of its features. Therefore, interviewees on the whole took the view that excellence of a particular brand of smartphone in one or more features (e.g., a high performing camera) does not outweigh the benefits or attractiveness of a brand that is popular among or recommended by their friends.

In terms of the specific functions, interviewees declared that they were interested in social communications functions such as the ease of access to social communication apps (e.g., Wechat, Sina Weibo, Qzone), which is in line with a recent McKinsey survey revealing that the country has by far the world's most active social media population (Chiu et al., 2013), while others mentioned simple functions, such as personal notes, camera, music and calendar, which can be found in a normal mobile phone. This shows that, in the first instance, consumers favoured some brands not for their perceived quality, expected performance or for the innovativeness of the smartphone functions, but rather on the basis of the smartphone's capability to access social media and put them in contact with significant others (family and friends).

Some respondents, especially the iPhone users, also mentioned the ease of use of the phone's operating system and the usefulness of its applications. However, these were not deciding factors in choosing one smartphone brand over another; rather they were discovered only after the decision had been made.

> I have tried to use iPhone's IOS system, it is simple to use without such complex processes when you download . . . while with other smartphones some applications and software need to be taken from some website and there you can get some virus . . . while the iPhone or the Macbook will rarely get viruses, therefore I decided for a higher quality and safe Smartphone. (R3)

Discussion

China has become the world's largest consumer market for smartphones; therefore, it is paramount that marketers understand what drives consumer choice in this country.

As distinct from previous studies that focus on mobile phone products from Western countries (Wilska, 2003; Karjaluoto et al., 2005; Petruzzellis, 2010) or that attempt to explain the factors driving new technology (smartphone) adoption through IDF and TAM theory (Park and Chen, 2007; Chen and Chen, 2009; Joo and Sang, 2013; Kim et al., 2014), this study has been carried out to develop a new theoretical framework to explain Chinese consumer choice in relation to smartphone brands.

The results of this study highlight that Chinese smartphone brand choice is affected by a number of drivers including marketing influences, such as brand image and popularity, design and appearance of the smartphone; socio-cultural factors, such as friends and parents' advice and mianzi considerations; and finally product considerations, in terms of smartphone features.

The results of this study advance the international marketing literature for branding high-technology products in China by providing a new theoretical framework that promises to be more effective than existing technology acceptance models (e.g., TAM, TRA, IDF) and the brand equity framework (Aaker, 1991) in predicting Chinese consumer choice of smartphone brands.

With this study, we have demonstrated that a high-technology product such as a smartphone is considered a status symbol among Chinese consumers; it symbolizes belongingness to a specific social class or group, and it is used to create distinction between one social group (wealthy consumers) and another (less affluent consumers). Comparing the results with previous studies of Western consumers (Wilska, 2003; Karjaluoto et al., 2005), where the mobile phone symbolized a part of the personal identity of Finnish consumers, it is clear from the results of this study that Chinese consumers' motivations towards smartphone brand choice are more socially oriented, in that a smartphone is purchased to fulfil their need for social integration, harmony and social inclusion. Among Chinese consumers, a smartphone brand mainly symbolizes belongingness to a collectivist culture, and it is used to enable the individual consumer to be more integrated with this collective.

As such, for Chinese consumers it is paramount that a smartphone brand is well-known and widespread in society, is fashionable, is used by their friends and is able to communicate the owner's social status and lifestyle.

This study's findings are also different from those of Joo and Sang (2013) who found that Korean adult users of Apple's iPhone are affected primarily by motivations based on instrumental and goal-oriented use, while young Chinese consumers are directed by both the need for social inclusion and pressure to conform. Thus, social status considerations, ostentatious consumption, and brand image and popularity are important for these Chinese consumers, who are strongly influenced by their social environment and by their culture rather than by individual considerations about what the phone can do for them.

Brand considerations are key in Chinese consumer choice of smartphone brands. This study enabled us to conceptualize a new construct which might be used to measure brand equity, namely brand popularity. The concept of brand popularity is different from brand awareness, which is the closest construct available in branding literature. Brand awareness refers to the assessment of a consumer's capability to recognize a brand or logo among other competing brands or to recall it (Keller, 1993). However, brand popularity is a different concept and refers to a consumer's assessment of how many people are already using the brand, namely how widespread a brand is in a particular society or social grouping. According to our findings, Chinese consumers have high levels of awareness of brands available in the market and most smartphone brands are well-known, in that consumers can recall and recognize them; however, a product is popular only when many people are buying and using it. The importance of brand popularity may derive from the Chinese respect for social norms and group orientation. Group orientation is concerned with a sense of community, solidarity and harmony in society where individuals co-exist with others (Tran et al., 2008). Chinese consumers have a profound respect for social norms, which makes them decide to consume the brands or products that are more popular not only among their peers but also in the society in general. Therefore, what is trendy and popular in the social community or family a Chinese individual belongs to tends to have a strong influence in Chinese consumer preferences towards a specific smartphone brand. The need to conform seems to be stronger than an individual's evaluation of benefits and needs in relation to a high-technology product such as a smartphone.

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5

Global Tools Enhance Local Exchange through Community Currency in an Alternate Economy

Liezl Coetzee

Introduction

This chapter discusses the way in which Information and Communication Technologies (ICTs), traditionally renowned for enhancing *global* reach, can be used to build and strengthen *local* trading using web-based community currencies. An example of such an online community currency is the Community Exchange System (CES), which was developed in Cape Town, South Africa, and is currently used by 712 exchanges in 70 countries (CES Website, 2014).

The Internet has long stimulated discussion around the idea of an alternative economy based on reciprocal exchange. To date, however, the benefits of this gift economy have been largely virtual. Examples of gifted 'goods' include contributions to the development of open source software, Wikipedia, sharing of knowledge, files and reciprocal comments on blogs and in online networks. Yet, despite the dramatic changes in social interaction facilitated by online networking, and the evolution of what could be called a 'high-tech gift economy', the potential of the Internet to really revolutionise economic systems has been limited, as the gifting involved did not extend beyond the realms of cyberspace.

In contrast to this global, virtual, gift economy that has developed online, the CES provides an online trading platform where real goods and services can be shared amongst local communities.

The chapter proposes that web-based community currencies can provide an alternative to the current economic system, allowing for a relationship-centred approach to exchange that can be likened to a type of gift economy, centred on the principle of reciprocity. What Polanyi (1944) referred to as the 'great transformation' of the 20th century,

characterised by a shift in emphasis from human relationships to market price mechanisms, may thus be reversed in the 'network society' (Castells, 1996), in which principles of reciprocity and gift exchange are re-embedded in 'relationship economics' (Deragon, 2007).

In comparing an alternative money system like the CES to the emergence of a 'gift economy', the chapter draws on Mauss' 1990[1923–1924] conception of the 'gift' as essentially *reciprocal*. By providing an online record of exchanges, the CES serves as a collective memory of 'gifts' exchanged between members. Like gift economies, community currencies are founded on relationships. By taking traditional 'money' – created by banks as interest-bearing debt and hence, by its nature, inducing scarcity – out of the equation, the system aims to encourage a more abundant 'giving' economy.

The research contributing to my MPhil thesis, on which this chapter is based, involved a combination of a literature review, participant observation in online social networks and the CES, and consultation with CES users through a combination of interviews and an online survey.

Reciprocal gift e-conomy

The concept of 'gifting' has received much attention in Western anthropology, particularly since Mauss's theorising on *The Gift* in the 1920s. Mauss 1990[1923–1924] emphasises the role of reciprocity[1] as critical to gift exchange. His tripartite formula for 'total prestation' involves the obligations to (1) give, (2) receive, and (3) repay.

Reciprocity in gift giving and receiving emphasises the relationship between giver and receiver. A gift economy is one driven by social relations rather than price according to Bell (1991), who examines ways in which people can increase the benefits of their exchanges in gift as well as commodity economies. He notes that benefits in a gift economy are derived from improving the 'technology of social relations' by increasing the range and diversity of one's social network. By contrast, benefits in commodity economies are derived from improving the technology of production. Gift economies are thus driven by *social relations* while commodity economies are driven by *price* (Kollock, 1999). Such a focus on 'the relation', rather than the object, as the central unit of analysis in gift exchange is highlighted by Strathern (1994), who views people as 'social' rather than 'psychological' beings, motivated more by building and maintaining relationships than acquiring material goods. In such relationship-focused economies the concept of 'production' expands to include activities commonly considered outside the realm of

the (market) economy as they are not done in exchange for payment[2] and acknowledging these as equally deserving of reciprocal exchange as those more commonly exchanged in a market/commodity economy.

The pervasiveness of consumer culture in modern society can easily create the impression that the human experience is all about acquisition. Polanyi (1944) disputed this assumption, arguing that while meeting the basic material needs of its members is the focus of every society, modern capitalist societies are unique in their intense focus on greed and material. By contrast, pre-capitalist societies more typically emphasised aspects such as family, clan, religion, and honour.

Polanyi argued that the most basic human characteristic is not material acquisitiveness, but rather the need to relate to other humans, and to feel part of a larger community. Like Aristotle (1944), he emphasised the essentially *social* nature of man as more fundamental than the desire for material wealth (McQuaig, 2005). Polanyi emphasised the constitutive elements that define us as social beings, claiming that the atomistic individual motivated by self-interest is a social artefact. "Society is not something between men, nor over them, but is within them. . . . so that society as reality. . . . is inherent within the consciousness of each individual" (Polanyi-Levitt and Mendell, 1987, p. 24).

The Great Transformation

According to Polanyi (1944), the 19th century market economy was distinctively 'economic' in the sense that it chose to base itself on the motive of individual gain, which had never before been raised to the level of justification of action and behaviour in everyday life.

What Polanyi described as the 'Great Transformation' of the market involved the systematic destruction of the social relationships essential for human sustenance, to be replaced by atomistic individualism. While it claimed to promote greater freedom, the emphasis on individualism served to strengthen the market, which comes to provide an alternative form of sustenance to isolated individuals severed from their social support system.

Polanyi (1944, p. 3) warned that the self-regulating market "could not exist for any length of time without annihilating the human and natural substance of society; it would have physically destroyed man and transformed his surroundings into a wilderness. Inevitably, society took measures to protect itself, but whatever measures it took impaired the self-regulation of the market, disorganised industrial life and thus endangered society in yet another way." Maintaining the unnatural

equilibrium required by the artificial separation of human interference and the self-regulating market required what Polanyi referred to as a 'double movement' whereby the inhumane effects of the market left to its own devices was mitigated by legislative measures enacted by states, as well as protective labour, civic, social, and political movements. This 'double movement' – with the explosive spread of the market economy on the one hand and checks to its expansion by legislative measures enacted by national states as well as protective labour, civic, social, and political movements on the other (Polanyi-Levitt, 2004) – was actively implemented by the very proponents of the free market, inducing an inherent schizophrenic tendency to economic activity.

By the end of the 20th century the process of *market-led* globalisation, accelerated by the development of ICTs, led to the emergence of a new organisational logic based on 'networking' (Castells, 1996). Hettne (2004) likens the significance of the resulting transformation of the global economic system to that described by Polanyi, referring to a 'Second Great Transformation' further deepening and expanding the market system on a global scale. The First Great Transformation was seen to disrupt traditional society and provoke various kinds of political interventionism via the resulting social disturbances. By contrast, the current process of market expansion and its social repercussions are occurring on an unprecedented global scale unmitigated by state regulation.

While the waning role of the state as protector of society against the forces of free market capitalism can indeed be considered a cause for concern, the development of ICTs has led to another development that may be a potential alleviating factor, namely the empowerment of the general population. Although initial critique of computer mediated communication included concern over its potential isolating factors (see Ronnel, 2001), the rapid proliferation of essentially *social* software appears to indicate a trend towards greater connectedness, following a century of increasing isolation *prior* to the new technologies.

Relationship economics in a network society

The last quarter of the 20th century saw the emergence of a new force that has revolutionised human interaction with the outside world. The advent of ICTs, and the continuing evolution of how they are being put to use in connecting people to the world and each other, has led to what Castells (1996) refers to as *The Rise of the Network Society*. Castells describes the new economy that has emerged over this period as informational, global, and networked.[3]

By transforming the processes of information processing, ICTs impact all realms of human activity enabling the establishment of endless connections between different domains. While tools provided by the early Internet, including email and user groups, initiated the revolution towards more sociable media, the development of the World Wide Web in 1989 and the subsequent proliferation of social media in what has become known as 'Web 2:0' have demonstrated the power of technology to transform the basis on which humans interact.[4]

The networked society has important implications for what is rapidly becoming a new approach to economics, emphasising the value of *relationships*, shown by Polanyi to have been consciously suppressed through the past two centuries of market capitalism.

In recent years, the term 'Relationship Economics' has become increasingly popular in referring to trends in social media and their impact on exchange. Deragon highlights the value of relationships and the quality of transactions as fundamental to the Relationship Economy. "The 'system' with which we build relationship capital creates economic rewards that come in many different forms. As the Relationship Economy matures, finding opportunities to achieve monetary gain will be limited to those who understand these core factors that create value – the quality and quantity of relationships formed in the social networking space, and the mediums used to facilitate those relationships" (Deragon, 2008, p. 65).

The high-tech gift economy

The Internet has long been argued to provide the technology required for the formation of what might be called a gift economy (Greco, 2001). Rheingold (1991) described the exchange system fostered by the Internet as "a kind of gift economy where people do things for one another out of a spirit of building something between them, rather than a spreadsheet-calculated quid pro quo".

Barbrook (1998) argues that, despite its military origins, the Internet was in essence constructed around the gift economy as early developers shared ideas and that the free exchange of information has thus been firmly embedded within the technologies and social mores of cyberspace since its origin. While the commodification of information through a tightening of intellectual property rights has increasingly become a concern of politicians and corporate leaders in the developed world over the past decades; online networks geared to information sharing have simultaneously sprouted in cyberspace. "[A]t the 'cutting edge' of the emerging information society, money-commodity relations play a

secondary role to those created by a really existing form of anarcho-communism . . . In the absence of states or markets to mediate social bonds, network communities are instead formed through the mutual obligations created by gifts of time and ideas" (1998, p. 5).

To date, however, the benefits of the gift economy espoused by Internet researchers have been largely virtual, exchanging gifts of knowledge, information, ideas, and comments. Commonly cited examples include the development of free and open source software and alternative licencing practices to promote freedom of information (Barbrook, 1998; Ghosh, 1998; Raymond, 2000). Despite dramatic changes in social interaction and exchanges facilitated by online networking and the evolution of what may be referred to as the 'high-tech gift economy', some feel the full potential of the Internet to revolutionise economic systems is not being reached.

> I want to see somebody set up a barter network where I could trade poetry for turnips. Or not even poetry – lawn cutting, whatever. I want to see the Internet used to spread the Ithaca dollar system around America so that every community could start using alternative labor dollars. It is not happening. And so I wonder, why isn't it happening? (Lamborn Wilson, 2004)

Lamborn Wilson recognises that technology cannot change the essence of a society and, despite its potential to connect, can in fact alienate people to such an extent that they mistake technological and symbolic action for social/political action. Some basic limitations of the gift economy relate to (a) its accessibility (or lack of) for a large proportion of the human race and (b) its dependence on the 'money-economy', without which it cannot exist.

To overcome such limitations, we need to look at how the Internet does or can impact on the most fundamental means of exchange of everyday goods and services off(and on)line: money.

Money 2:0

This section provides an overview of the concept of 'money', which is defined as an 'information system' or collective 'memory' device for recording transactions. This is followed by a look at community currencies and, particularly, the impact of the Internet on such 'people-centred' means of exchange.

Money = Debt = Interest = Scarcity

Modern money is created as bank credit that must be borrowed into circulation. Greco (2001) shows how conventional money exists as bank deposits, reflecting balances in accounts, which are secured by interest bearing debt. This debt then provides a means of creating entirely new funds. In the film *Money as Debt*, Grignon (2006) shows that the amount of money created in this manner – out of nothing, backed by nothing, as (interest-bearing) debt – is significant, comprising over 95% of all money in circulation.

Money created as interest-bearing debt is designed to maintain its value based on scarcity and, by definition, inadequate supply. As banks only create the principal amount to be lent out, and not that required for the interest to be repaid, borrowers are forced to compete with each other for an insufficient amount, and the debts of some can only be repaid through the ruin of others (Kinney, 2004).

Kinney identifies three side effects of charging interest on money as competition, the need for perpetual growth, and wealth concentration. This sentiment is echoed by Eisenstein (2009), who describes the essence of interest as follows: "That is the essence of interest: I will only 'share' money with you if I end up with even more of it in return. On the systemic level as well, interest on money creates competition, anxiety, and the polarisation of wealth."

Kinney (2004) notes that charging interest was prohibited on both moral and legal grounds for more than 20 centuries. The prohibition of interest (usury) ended during the reign of King Henry VIII, who first legalised interest in Britain in 1545, after his break with Rome. "For most of history, all three 'religions of the Book' (Judaism, Christianity, and Islam) emphatically outlawed usury, intended here as any interest on money" (2004, p. 5).

Money as memory

The origins of money can be traced back, beyond traditional theories of its birth in barter networks, to the origins of human exchange proposed by Mauss (1923, 1990) to lie in the (reciprocal) gift. This leads to a personalised conception of money, whereby markets can be seen as "a form of symbolic human activity rather than as the circulation of dissociated objects between isolated individuals". (Hart, 2005, p. 3).

In tracing the origins of the modern economy and the money that sustains it back to the gift rather than barter, Mauss supported the idea of money as personal credit. In this sense, money may be seen as a means of collective memory used to keep track of proliferating

connections with others (Hart, 2005). This correlates with the root of the word 'money', named after the goddess of memory, Juno Moneta, at whose temple in Rome coins were once minted. Moneta's name was derived from the Latin verb *moneo*, meaning to remind (Hart, 2005). Tracing the origin of the word to 'moneta', Hart argues that one of money's chief functions is *remembering*, referring to it as a 'memory bank' (Hart, 2000), which he describes as "a store allowing individuals to keep track of those exchanges they wish to calculate and, beyond that, a source of economic memory for the community" (Hart, 2007, p. 15).

The Information Age with its abundance of interactive electronic tracking tools presents new possibilities when money is seen solely as a way of keeping track of exchanges. In a world where money resumes its role as the collective 'memory' of individual debts, Hart believes that people will voluntarily enter into circuits of exchange based on special currencies. As digitalisation encourages a growing separation between society and landed power, appropriation of 'money' by 'the people' becomes a natural step in society's drive to a more equitable world in which "we can make our own money, rather than pay for the privilege of receiving it from our rulers" (Hart, 2005, p. 9).

Community currency online

> The origin of the word 'community' comes from the Latin 'munus', which means the gift, and 'cum', which means together, among each other. So community literally means to give among each other. Therefore I define my community as a group of people who welcome and honor my gifts, and from whom I can reasonably expect to receive gifts in return. (Lietaer, 1997, p. 2)

In the context of currencies, the term *community* can be used to describe any association of individuals, groups, or businesses agreeing to use an internal payment mechanism. Under this definition, a community need not be defined by geographical proximity, as demonstrated by the emergence of Internet-based communities in which transactions take place in cyberspace and participants are scattered all over the world.

Based on his explorations of the work of Lietaer (2001), Rheingold (1997) expected the Internet to lead to "a radical change in the future of money, if [its] technical mechanisms are used to support the creation and maintenance of 'local currencies' – a medium of exchange that many communities around the world are beginning to experiment with".

The development of ICTs has the potential to impact community currencies by enabling (a) the organisation of grass-roots communities of interest transcending barriers of distance, language, and culture; and (b) the development of new non-monetary, non-political ways of exchanging goods and services (Greco, 2001).

Local mutual credit trading systems[5] have traditionally operated offline, posing obstacles in terms of administration as well as establishing sufficient 'connectedness' between members to facilitate easy exchange. The Internet has revolutionised the potential of such systems in a number of ways, including (Squires, 2009):

- Reduced administrative burden of record keeping
- Search engine functionalities for goods and services offered and required
- Communication tools providing the ability to instantly connect with others' wants and offerings
- Networking tools to build community between users, in turn strengthening the network and the types of services exchanged
- A web-based system allows for transparency, as users have instant access to each other's trading records and account balances
- Expanding geographical scope as different local exchanges can be networked in a web-based trading platform

Rushkoff (2009) emphasises the fact that "[m]oneys are programmed", showing that the way these moneys behave and their impact on society are the result of certain biases embedded into their design. Realising this, a growing number of citizens and businesses are turning to the use of complementary currencies, which Rushkoff (2009, p. 2) describes as "alternative, net-enabled, bottom-up money systems that let them accomplish what money loaned out by the Fed just isn't letting them do anymore". Rushkoff argues that Internet-enabled complementary currencies can revive the *decentralised* marketplace with networks providing a way to verify transactions and develop trust. He emphasises the fact that many of the tools we use are the result of programmes, proposing that "[w]e are proving more likely to treat our money as software, and to write our own" (2009, p. 3).[6]

The following section examines an example of an online mutual credit clearing money system that has been thus programmed to function as the means of exchange between local communities networked across a global, web-based platform.

Community Exchange System (CES)

The CES was initiated by the South African New Economics (SANE) Network, an organisation modelled on the New Economics Foundation, which encourages complementary currencies as a means of promoting local economic activity. Initial proposals were to establish a paper-based LETS (Local Exchange Trading System)[7] group. Founding member Tim Jenkin had recently designed a web-based trading system for a Cape Town hiking club, which was taken up by the SANE Steering Committee as platform for the proposed system. The currency was called 'Talents' and its value based on the South African Rand, though this was merely as a reference for pricing as the Talent would not be 'tied' to the Rand and was expected to deviate from it over time.

The CES was launched as a pilot project in February 2003, with 11 participants – all members of the Steering Committee. Membership, and with it the number and range of offerings, began to increase after a public meeting was held and Talents were introduced at a few public markets. The system gained momentum as membership approached three hundred, and the South African CES was renamed the 'Talent Exchange', with the motto 'Your Wealth is your Talent' (Jenkin, 2004).

The system quickly spread to exchanges around South Africa and, in 2005, went global when a LETS group in Australia asked to become part of the CES (*CTTE Newsletter*, March 2005), rapidly followed by more groups in Australia, New Zealand, the USA, and Europe. These groups each function as separate exchanges with their own local currencies, all linked via a common platform that enables inter-group trading.

In 2008, a split occurred between the CES and SANE, who were both responsible for managing the Cape Town Talent Exchange (CTTE). While membership of this exchange was by this time sufficient to sustain trading despite managerial difficulties, a number of initiatives that relied on SANE's involvement were abandoned, particularly in terms of community building and efforts to promote the system in disadvantaged communities.

How (and to whom) it works

The CES home page can be found on http://www.ces.org, providing links to numerous public information pages, and requiring members to register or log in. There is no membership fee, but members pay a levy per trade,[8] which accumulates in a CES administration account. Members get a T5,000 credit and debit limit, which allows new users to start 'buying' through the system without having 'sold' anything. While this system of creating currency by issuing an initial 'debt' is reminiscent of the

creation of conventional currency, a key difference is that no interest is charged on these debits, thus avoiding the intentionally scarce nature of interest-based money which, by design, can never be in sufficient supply to cover the debts by which it is created.

Beyond the login page, the site can be regarded as an online 'bank' or 'clearing house' (similar to online banking services offered by commercial banks) as well as a site providing membership lists, 'offerings' and 'wants' directories, and trading statistics. Users can update their account, profile information, offers and wants, browse and respond to others' offerings via phone or email, or send an order directly through the site. Sellers enter transaction information into a transaction form on the site and account balances are immediately updated. As the site expanded first across South Africa, and later globally, a remote trading facility was introduced to allow for exchange with members of other networks, both nationally and globally.[9]

At the time of writing (September 2014), a total of 5,484 members had registered on the CTTE since its origin in 2003. Membership spans across the city of Cape Town, across different socio-economic groups, although certain demographic groups, particularly what may be considered 'alternative types,' do appear to dominate.

The types of offerings found on the CES provide some insight into the types of people it attracts. Similar to experiences of community currencies around the world, a large proportion of offerings relate to alternative healing therapies and treatments, as well as holistic workshops and what some may consider predominantly esoteric pursuits. It is however not restricted to these types of offerings, with a number of users citing more 'practical' offerings such as accommodation and consumable items such as food and clothing. Some use the system to trade in used household items, while others offer services they engage in professionally, including various IT skills, copywriting, proofreading and editing, and financial advice. By mid-September 2014, a total of 57,450 trades had taken place on the CTTE, amounting to a total of 14.2 million Talents exchanged and an average trade value of 257 Talents per trade. The average number of trades per month peaked at 603 in 2007, corresponding with membership growth at this time. Over the past year since September 2013 a total of 5,021 trades have taken place, with an average value of T216 per trade.

Although the CES is essentially a web-based platform, among the primary objectives of its creators was to reform the monetary system in a way that would benefit those lacking access to Internet technologies. For this reason initiatives were launched in three low-income

communities,[10] where many new users signed up. This initiative initially included CES offices where users could come in to access the online system, as well as Talent markets organised by CES management (hoping that community members would later take over these initiatives). These were however later abandoned, and many of the new members were thus unable to continue accessing the system. Although mediation through some community members who do have Internet access continues to allow the system to function in these areas, activity declined significantly. Many more 'well-off' members introduced the system to their employees/labourers by, for example, paying part Talents for services such as gardening or domestic work, thus expanding the system across the socio-economic spectrum.

One of the most significant constraints to community currencies noted by Greco (2009) is lack of sufficient size preventing them from competing with more versatile national currencies. Since its origin, the CTTE has expanded at an average rate of 39 new members per month, with most significant growth in 2009 at 63 new members per month, decreasing rapidly thereafter to only 24 per month in 2013, and 13 new members per month between January and August 2014. The reduced growth rate should be considered in the context of concerted efforts made in earlier years to promote the exchange through outreach initiatives in historically disadvantaged areas. These initiatives appeared successful in attracting new members, but few remained active users. User statistics show that only 61% of registered members have actively traded on the system since the start, and only 13% have accessed their accounts between January and September 2014, with the reduction in activity directly corresponding to diminished inputs from coordinators lacking the time and other resources to actively promote the system. The assortment of offerings remains limited[11] as does reach across the supply chain and acceptance amongst mainstream businesses.

While growth in CTTE membership has slowed down since 2010, the CES continues to grow rapidly around the world, with the number of networks using the system having increased by almost 600% between February 2009 and September 2014. Growth was initially most evident in the USA and Australia but in recent years has been particularly noticeable in Spain, which is currently the most active country with 212 local exchanges registered on the system.

While growth in membership could add to the currency's value by increasing the variety of offerings, thus making the Talent more useful, it also comes with practical constraints as the advantages of 'local' trading diminish. During consultation with CTTE members, the issue

of geographical distance was noted to limit the feasibility of exchange, as travelling long distances across the city to obtain something for Talents often makes buying it for cash at a nearby store more economical. Distance is also a factor when it comes to partaking in markets and meetings. In an attempt to localise the exchange further, sub-areas were introduced and local area co-ordinators assigned to promote activity within these areas (*CTTE Newsletter*, July 2004). To date, trade within these sub-areas remains limited. It is hoped that by continuing to grow the network and maintaining the intended emphasis on more locally based exchange, sub-areas will eventually reach the critical mass to function more independently as a greater variety of offerings becomes available in these areas.

An important factor to consider in assessing the sustainability of the system is the extent to which members balance 'purchases' with 'sales'. Of the 3,349 CES members who have traded on the system since 2003, 65% have sold, while 90% have bought goods/services through the exchange. While 15% of sellers had not bought anything on the exchange, 39% of buyers had not sold anything.

In September 2014, 40% of traders had a positive balance and 55% a negative balance, while 6% had what is considered the 'ideal zero' balance. While 457 traders had exceeded the T5,000 debit limit, only 88 had more than the official T5,000 credit limit. The difference between excess credit and debits amounted to T724,153 which may be considered a quantification of the extent to which the system is being abused by some members taking far more than they give back.

Of particular concern is that the 'negative balance' of people who have exceeded their debit limits over that of those exceeding credit limits *increased* more than tenfold fold since August 2009, with the number of traders exceeding the T5,000 debit increasing almost seven times over the five year period. Thus, the degree to which some are taking significantly more than they are putting back appears to be increasing, which could have serious implications for future sustainability.

Building community – on and offline

Ayley and Ayley (2005) believe that many local currencies fail because the founders do not place sufficient emphasis on facilitating the development of personal contacts and one-to-one relationships essential for the community building required for such currencies to thrive. They argue that the corporatisation process has reinforced a view of trading in which monetary exchange is seen as primary and personal relationship, if it exists at all, as secondary.

> Conditioned by this situation, it is easy to focus on the 'trading' aspect of local currencies, and forget that it is people who are making those trades, and it's also personal relationships that underpin people's willingness to trade with one another. Successful systems usually provide ongoing opportunities for social connections between members, fostering a sense of community and the personal contacts that facilitate trading. (Ayley & Ayley, 2005, p. 3)

One way to encourage the personal interaction required to build relationships is through the facilitation of social gatherings where members can meet. Such interaction forms the basis of future trading and exchanges as people become aware of each other's offers and needs.

While regular social gatherings may be feasible for networks with members within reasonable geographical proximity, this becomes more complicated when the 'community' is spread over a vast area, as becomes increasingly possible with a web-based platform. This section looks at measures that have been taken by the CES to build community online and offline.

In recent years there have been a number of attempts by the CES to utilise the Internet's potential for online networking. A CES group was created on Facebook in 2007. Following active interest for about a year, discussions petered out towards the end of 2008. By this time, increased effort was going into the introduction of group features and a discussion forum on the CES site itself, as well as the creation of the www.communityexchange.ning.com network, which administrators felt would replace the Facebook group. Membership remained static at under 500 for much of 2009, until an active effort was made to revive the group as part of this research, following which it increased to almost 6,000 members by September 2014. Early discussions in this group related to ways whereby the CES payment system could be more closely integrated with Facebook applications. Although this suggestion drew interest and support, it was not pursued further, and the relationship to the CES is limited to a link to its log-in page.

By June 2010, the Communityexchange.Ning group consisted of 462 members from around the world. Although this group grew slower than the Facebook group, discussions were more in-depth. In addition to its role as a discussion forum, the .Ning site provided links to log into a designated CES site as well as to registering new exchanges and new users on existing exchanges. Members can also join or set up groups for their respective exchanges within the .Ning network, which it is hoped will encourage more local community building. Due to limited use, this platform was, however, abandoned in 2011.

When questioned about their perceptions of the CES's attempts to use online networking tools, only 34% of 180 survey respondents indicated that they had followed or participated in discussions on any of these forums, with only 3% doing so regularly. Many indicated that they were not aware of these online networking platforms used by the CES, while others questioned the value of belonging to yet more such forums. Time was cited by some as a hindrance to joining more online networking sites, while others critiqued the concept of online networking as opposed to building stronger offline connections.

Recognising the need for face-to-face interaction as a key element in building community, attempts were made in earlier years to have at least one 'Market Day' per month (Jenkin, 2004). While earlier markets were organised by SANE members, the hope was that, once the system grew and sub-areas became more active, members would take over this initiative. This has not happened to the extent intended, and as the pressure on volunteer administrators became too much, coinciding with the split between SANE and the CES, markets diminished and, when held, tended to attract only a small core group of traders.

As an additional means to promote 'real-life' interaction, an attempt was made to introduce Talent-only shops where members could bring their goods to trade, and buyers could come to spend their Talents. The pilot for this initiative opened in October 2005 using SANE premises in what was thought to be a central and accessible location (*CTTE Newsletter*, October 2005). Again it was hoped that members would eventually take the initiative to open more such shops in their sub-areas. The split with SANE in 2008 resulted in the loss of these premises and no attempts were made to open another.

To encourage the use of Talents amongst those with no or limited access to the Internet, a parallel paper-based system was designed for use at markets as well as for individual exchanges between members. A range of documents that can be printed out is provided for this purpose, including trading sheets and trading slips. Trades thus recorded can then be captured into the system by area coordinators or others with Internet access acting as mediators, thus extending the Internet's benefits to those without access. The role of such mediators extending access to Internet technologies is highlighted by Geser (2001, p. 15), who believes that "the Internet may well have an extensive impact on the whole of mankind, because even highly marginal population segments profit at least indirectly from it: by having relationships to sympathetic users".[12]

Looking ahead: the future of web-based, reciprocal communities and alternative economies

This section provides a summary of research findings that may be used to speculate on the future of systems like the CES, particularly related to the use of a web-based platform, community building and reciprocity, and the potential of such a system to form the basis of an alternative economy.

The web-based system used by the CES overcomes many of the difficulties associated with traditional community currencies by allowing easy and instant access and reducing administrative burdens, while simultaneously expanding the geographic scope of the currencies. It does, however, also raise concerns regarding inequitable access to the system in a country like South Africa where only about 10% of the population have Internet access. Furthermore excessive emphasis on the online platform used by the exchange could result in a concurrent decline in emphasis on *local*, offline community-building efforts essential for the 'community' element of the currency to survive.

While some find the site's interface cumbersome, this is an area that can potentially be improved, thus facilitating easier access and use of the site, which could motivate more members to more actively participate in the system. Room for improvement exists in terms of making more use of ongoing new technological developments in the online as well as mobile communications domains, which could be harnessed to more effectively promote the system in an effort to better integrate it with mainstream society.

The 'community' element of the CES appears in some ways to exist more in ideological terms than in practical manifestation. While numerous members consulted as part of this research were enthusiastic about the community concept, closer investigation of the CTTE shows this community to be somewhat fragmented. Rapid growth across a sprawling city, with members from vastly different backgrounds joining with very different motivations, contributes to the scattered nature of the community in question. The lack of close community cohesion diminishes the degree of mutual trust between members, which in turn impacts on the degree of reciprocity inherent in exchange.

The potential for more proactive online and offline community-building initiatives exists, but in both cases this requires a level of dedication hard to sustain by small core group of volunteer managers. This said, it is possible that through effective harnessing of the power of rapidly evolving technologies, the sense of community could be enhanced.

For this to occur, appropriate synergies between online and offline networking forums is essential as increased focus on one (online networks) at the expense of the other (offline events) could further alienate those already distrustful of the web-based platform.

In assessing the potential for a community currency, such as the CES, to become a viable alternative to the mainstream economy, the state of the prevailing monetary system must be considered. As this system, based on interest-bearing debt, induces artificial scarcity and inequitable distribution of resources, finding alternatives appear essential. Following recurring and escalating crises in the global economy during 2008–2009, alternatives are increasingly sought by the agro wing segment of the population, as evidenced by the rapid growth of the CES network globally.

While the CTTE showed remarkable initial growth for a currency of its kind (largely facilitated through its web-based platform along with concerted drives to spread the system in its early days), such growth does not always take into account the crucial element of community building essential for such a currency to survive. This results in lack of mutual trust and reciprocity between members, exacerbated by evidence of some abusing the system to obtain services without reciprocating, which has important implications for sustainability.

The future success of the CES and similar systems will depend on the degree to which such currencies can be more effectively integrated into mainstream society in a manner that allows daily needs to be met, thus reducing dependence on conventional money. In increasing its mass-appeal, however, it is just as important not to lose the community element such currencies are designed to stimulate.

Conclusion

This chapter proposed that the idea of an Internet-enabled 'gift economy' can be extended beyond the realms of cyberspace, by looking at the emergence of web-based community currencies. 'Gifts' are defined as essentially reciprocal, and a 'gift economy' as one based on relationships. By defining money as 'memory' or information, it is argued that a mutual credit currency serves as the community's collective memory of 'gifts' given and received.

The CES was examined as an example of a web-based community currency – with particular reference to its original CTTE network. Despite concerns regarding reciprocity and sustainability, the CES provides an ideal example of a way whereby theories on the Internet-enabled gift

economy can move from cyberspace into the real world of food gardens, lift clubs, and massage treatments.[13] In addition to providing a searchable online directory of offerings and wants and a 'memory' of exchanges, the Internet also provides tools for building a community online. While use of these tools has been limited to date, increasing interest in alternative economics could result in the rapid growth of this and similar systems fostering real-life local exchange through web-based global payment systems linked with online social networks.

Notes

1 The American Heritage Dictionary of the English Language (2000) defines reciprocity as: "a mutual or cooperative interchange of favors or privileges. Something is reciprocal when it is performed, experienced, or felt by both sides."

2 Examples of such 'non-economic' activities include voluntary work and charitable acts as well as unpaid activities (traditionally often considered as women's responsibilities) such as housekeeping and rearing children.

3 "It is informational because the productivity and competitiveness of units or agents in this economy (be it firms, regions, or nations) fundamentally depend upon their capacity to generate, process, and apply efficiently knowledge-based information. It is global because the core activities of production, consumption, and circulation, as well as their components (capital, labour, raw materials, management, information technology, markets) are organised on a global scale, either directly or through a network of linkages between economic agents. It is networked because, under the new historical conditions, productivity is generated through and competition is played out in a global network of interaction between business networks." (Castells, 2000 (1996): 77).

4 The intrinsically social emphasis of the new technologies is demonstrated by Wikipedia (a prime example of new, participatory, information sharing mechanisms) in its definition of Web 2.0: "'Web 2.0' refers to what is perceived as a second generation of web development and web design. It is characterised as facilitating communication, information sharing, interoperability, User-centred design and collaboration on the World Wide Web. It has led to the development and evolution of web-based communities, hosted services, and web applications. Examples include social-networking sites, video-sharing sites, wikis, blogs, mashups and folksonomies" (Wikipedia_Web 2:0, 2009).

5 Mutual credit systems (MCS) are based on 19th century French social-anarchist Proudhon's idea of mutual banking (see Dana, 1896). All members of such a system open an account with a central administration unit, which records transfers in 'units' between these accounts. Transactions are facilitated by members running down balances or going into debt, thus 'creating' money according to transaction need. In a well-administered system, all accounts sum to zero. The system operates as a pure accounting system of exchange (Black, 1970; Fama, 1980; White, 1984) without an initial stock of cash (Schraven, 2001: 6). The most renowned of such systems operating as

Mutual Credit System Currencies is the LETS developed by Michael Linton (Cohen-Mitchell, 2000).

6 Confirming Rushkoff's belief in alternate moneys programmed by the people for the people, a variety of Internet-based currencies, including specialised software to facilitate alternate forms of exchange have proliferated in cyberspace in recent years. Some examples of these include: Open Money/Community Way (http://www.openmoney.org/cw/); QQ coin in China (http://www.businessinsider.com/virtual-currency-in-china-is-a-2-billion-economy-2009-7); Ripple (http://ripple.sourceforge.net/); Cyclos (http://project.cyclos.org/); Drupal (http://drupal.org/project/marketplace) & Community Forge (http://communityforge.net/); Friendly Favours (http://www.favors.org/FF/); Ven (Hub-Culture) (http://www.hubculture.com/groups/hubnews/news/96/); Freeconomy (http://forum.justfortheloveofit.org/); CuroMuto (http://www.curomuto.com); Universal Currency (http://www.ucci.biz/); Google open source virtual currency (https://docs.google.com/Doc?id=dfjcf7w4_10ddst9xd9&hl=en); and The Community Exchange System (www.ces.org).

7 Local Exchange Trading Systems (LETS) also known as LETSystems are local, non-profit exchange networks in which goods and services can be traded without the need for printed currency. LETS networks use interest-free local credit so direct swaps do not need to be made. In LETS, unlike other local currencies, no scrip is issued, but rather transactions are recorded in a central location open to all members. As credit is issued by the network members, for the benefit of the members themselves, LETS are considered mutual credit systems. Michael Linton originated the term 'Local Exchange Trading System' in 1982 and, with his wife Shirley, for a time ran the Comox Valley LETSystems in Courtenay, British Columbia. The system he designed was intended as an adjunct to the national currency, rather than a replacement for it, although there are examples of individuals who have managed to replace their use of national currency through inventive usage of LETS (NationMaster Encyclopedia).

8 This levy was initially set at 4%, but was reduced to 2% as membership and trade volume grew.

9 While the web-based platform technically expands access to offerings in other exchanges, less than 20% of respondents to an online survey of CTTE members have actively traded with members of other exchanges. Thus, although the potential scope of offerings is increased, it does not appear as though this is yet having a significant impact on members' experience of the exchange.

10 Khayelitsha, Masipumalele, and Delft.

11 As with many similar exchanges across the world, membership of which predominantly comprises what may be considered alternative communities, a large proportion of offerings on the CES exchange involve holistic healing treatments.

12 Examples of mediators extending the power of the Internet to those without access cited by Geser (2001) include opposition groups in Burma communicating their messages orally to people in Thailand border villages, which then feed it into the net, as well as the Zapatista National Liberation Army (EZLN) in Chiapas (Southern Mexico). While the Zapatista communities themselves are indigenous, poor, and often cut-off not only from computer

communications but also from the necessary electricity and telephone systems, they have had a mediated relationship to the Internet through volunteering intermediaries from various Western countries. This has involved handwritten reports passed on to reporters for typing or scanning into digital format for online publication (Cleaver, 1998). In his assessment of the use of the Internet by the South African Treatment Action Campaign (TAC), Wasserman (2005) notes that while the TAC uses traditional media to promote its cause, it also uses a website and email to communicate with supporters and establish links with solidarity networks.

13 Or poetry, turnips, and lawn cutting as Lamborn Wilson would have it.

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6

Appropriation of Mobile Telephony at the Bottom of the Pyramid

Bidit Dey and *Ben Binsardi*

Introduction

The use of mobile telephones can provide rural communities in emerging markets with access to information and thereby can enable them to enhance their quality of life (Heeks and Jagun, 2007; Chigona et al., 2009). This argument, although it emanates from the development informatics literature, concurs with Prahalad's (2004) Bottom of the Pyramid (BoP) concept at a time when multinational companies' current and potential interactions with the world's poorest communities have gained significant research attention (Karani, 2006; Subrahmanyam and Gomez-Arias, 2008; Rashid and Rahman, 2009).

However, mobile telephony (or any other technology) in itself is not a magical solution (Williams and Edge, 1996). If technology is to make an impact, it has to be appropriated in a particular context (Madon, 2004; Donner, 2008; Walsham, 2010; Dey et al., 2011). Technology appropriation entails recursive and non-linear interaction between users' situated capabilities and technological applications (Orlikowski, 1992). Intriguing evidence of the dynamic nature of technology adoption and appropriation, for instance, can be observed in some information systems and non-linear marketing literature (Suchman et al., 1999; Esbjornsson and Juhlin, 2003; Oksman and Turtiainen, 2004; Dhir et al., 2012), which encourages further investigation in other contexts, such as Bangladeshi villages, with a view to obtaining a better understanding of technology use by poor and disadvantaged communities. Furthermore, Burgess and Steenkamp (2006) argue that developing societies can be natural laboratories in which theories and assumptions about their underlying mechanisms can be tested, generalisations derived and boundary conditions identified. The current chapter aims to showcase the use of

ethnographic methods in analysing the appropriation of mobile telephony by communities disadvantaged by resource constraints, such as Bangladeshi farmers, who do not have the same needs and skills as people in developed countries. It reports on a fieldwork study that required the first author to stay in Bangladeshi villages for four months.[1]

Technology appropriation – a dynamic and iterative process

The concept of appropriation has close association with the social shaping of technology (SST) theory, which considers the design and use of technology as functions of social and cultural phenomena (Williams and Edge, 1996). Human beings are not always dictated to by technological applications, as they may redesign, redefine, change or decline their use (MacKay and Gillespie, 1992). The Duality of Technology approach proposed by Orlikowski (1992) and Adaptive Structuration Theory (DeSanctis and Poole, 1994) provide further theoretical insights into the concept. It is understood from these works that technology appropriation is an active process that involves the development of individuals' capacities, which occurs during the use of the tool/artefact/application to support a person's activities and subsequent development.

Subsequent scholarly works (Carroll et al., 2003; Isaac et al., 2006; Bar et al., 2007; Dey et al., 2011) have developed a number of conceptual models of technology appropriation. All these models argue that technology appropriation is not independent of contextual variables and it involves dialectic and iterative routes. The next section discusses another stream of literature that presents empirical evidence of the situated use and socio-cultural appropriation of technology and adds some interesting dimensions to the theoretical understanding.

Situated use and cultural appropriation of technology

Appropriation can often involve inventive means and can lead to uses that deviate from the designers' original intentions. For example, to get better network coverage, villagers in Burkina Faso often climb hills (Hahn and Kibora, 2008). SMS (Short Messaging Service) is used as a cheap and convenient means to adapt and appropriate mobile telephony (Horstmanshof and Power, 2005). This is a serendipitous phenomenon, as the original design intention of SMS was to make the most of a spare channel in the mobile phone broadcast system in order to notify

users that they had received voicemails or to provide account information without disturbing them (Horstmanshof and Power, 2005).

People also associate meanings and perceptions with the use of various technologies. For instance, the *beeping* or *miscall* mechanism is used by mobile phone users in the developing world to avoid costs (Chakraborty, 2004; Zainudeen et al., 2006; Horst and Miller 2006; Rashid and Elder, 2009). Terminologies gradually become part of our vocabulary (e.g. 'to google': Jamison and Hard, 2003). Mobile telephony can be perceived as a fashionable product and as a means to ensure safety and security (Campbell, 2007). In contrast, the shared use of mobile telephones is not uncommon in financially constrained and collective-oriented eastern societies (Sinha, 2005; Cheneau-Loquay, 2008). Mobile telephones may also be a source of annoyance in public places such as mosques (Kriem, 2009). In Bangladesh, young bachelors make calls to random numbers in an attempt to find partners (Chakraborty, 2004).

Interestingly, most of the aforementioned scholarly work on the social and cultural appropriation of technology has applied qualitative tools. Positivist research may be less than capable of capturing the dynamic and iterative nature of appropriation, which leads to the process of gradual integration of technologies into users' lives. People's skills, knowledge, perceptions and attitudes are not independent of social, cultural and environmental factors. Hence, users have to be studied in their own settings for a better comprehension of their interaction with technology. The strategy of this research has been designed on the basis of this understanding.

Research strategy

The research strategy aims to undertake a close observation of rural life and culture in the context of a developing country, namely Bangladesh. Accordingly, staying close to the farmers in their own social and cultural settings would provide the opportunity to grasp the ways they use and appropriate mobile telephony. Observing them in their own settings would also enable us to develop a clearer understanding of the subtle social, cultural and spatial factors that give rise to farmers' information needs and influence their behavioural intention to use mobile telephony. Following earlier statements, ethnographic investigation was therefore considered an appropriate and viable method to achieve these research objectives.

There are several reasoned justifications for the use of ethnography as a research strategy. Relevant literature reveals that ethnography has

generated remarkable interest in the field of information systems (Avison and Myers, 1995; Spinuzzi, 2000; Venkatesh et al., 2001) and consumer research (Jamal and Chapman, 2000; Agafonoff, 2006; El-Amir and Burt, 2010). Furthermore, Venkatesh et al. (2001), for example, used ethnography to conceptualise the development of innovative use of technology in the home environment. Webster et al. (2010) investigated the ways in which consumers transform ordinary products to meet their everyday needs through the use of personal observation and videography. Unlike surveys, which offer information in a less interactive fashion, ethnographic studies enable a researcher to seek clarification of the responses and to test tentative interpretations. In relation to mobile telephony, Tenhunen (2008) and Horst and Miller (2006) investigated how cultural appropriation results from the reproduction of social relationships through the use of mobile telephony. Their ethnographic observations identify kinship and cultural patterns as significant determinants for the appropriation of mobile telephony in developing societies.

In this study, a concentrated ethnographic immersion was combined with triangulation methodology. The reasons for using the concentrated immersion was to achieve relatively speedier engagement because relevant literature (O'Brien et al., 2000; Millen, 2000; Elliott and Jankel-Elliott, 2003) reveals the difficulty in engaging with respondents on a long-term basis, as they might consider it as an encroachment on their privacy. Additionally, following Tashakkori and Teddlie (2003) and Martinez et al. (2003), a triangulation methodology could produce more robust results by combining several research tools such as in-depth interviews, focus group discussions and hang-out interviews (Dengbuppha et al., 2006) to complement the ethnographic immersion.

Research design

Two different regions in Bangladesh, Shaturia and Joyag, were selected deliberately for the fieldwork, which continued for four months (a purposive sampling design). They were selected because of the existence of local non-governmental organisations (NGOs) and telecentres within these areas. The organisations and telecentres facilitated access to farmers who did not have their own mobile telephone sets. Five groups were formed in each of the regions, and each group had five members. All of the group members worked personally in the field. The group members were selected hierarchically to ensure that both large landowners and small sharecroppers were represented (a stratified sampling design). In a nutshell, a stratified purposive sampling was implemented.

The reasoned justification for using this sampling design was to observe the farmers' initial responses to the use of mobile telephones, the sorts of problems they encountered and how they managed to overcome them. This was why farmers who did not have mobile telephones were chosen and then given mobile telephone sets. Each group was given a mobile telephone set with connectivity. Eazyfone Ltd supplied five Nokia 8290 sets. In addition, five Nokia 1200 sets with a Bengali interface were purchased.

This equipment costs 2,500 Bangladeshi Taka (BDT) per unit, which is equivalent to £20 (GBP). These costs are within the lower price range for mobile telephones in Bangladesh. The initial connection came with a minimal credit, but the group members had to pay for subsequent top-ups. This group use of mobile phones was arranged for two reasons: to make the intervention cost-effective and to observe how the group members interacted to learn how to make effective use of the technology. The handsets were rotated among the group members so that each farmer had two consecutive weeks of hands-on phone use. At the end of two weeks, the farmers in the group met to discuss their experiences of using the mobile phones, covering topics like usability and usefulness, difficulties and innovations. All ten groups used their sets simultaneously, so the entire process took ten weeks altogether.

The investigator (the first author) stayed in the locality and observed the rural setting, including the physical environment, culture, practices and lifestyles. Video recordings and diary notes were used to capture these observations and the investigator met with the farmers' groups every two weeks. The regions were visited on alternate weeks. To implement a triangulation methodology, informal discussions, in-depth interviews with particular group members and focus group discussions (FGDs) were all undertaken during these two-week periods.

The farmers were also asked to demonstrate their expertise in using mobile phones by reading or typing text messages, identifying the symbols and texts on the screens and saving phone numbers. These practical demonstrations helped both to evaluate the ability and expertise of the farmers, if they had any, and to evaluate any innovative uses of the technology. Eight FGDs, thirty-five interviews (not all fifty farmers continued using the mobile telephones or attended formal interviews), ethnographic observations and informal discussions provided substantial and meaningful data for this research. FGDs with the farmers' groups were implemented to analyse the farmers' agricultural information needs, their methods of cultivation, the problems arising in the agricultural processes, their communication practices and their perceptions of

different technologies, mobile telephony in particular. In-depth interviews with individual farmers were conducted to examine the farmers' experiences of using mobile telephony, the purposes they used it for, their perceptions of the usefulness and difficulties in using mobile telephones, the way they overcame those difficulties, their familiarity with terminologies and tariffs, and their skills and abilities in using mobile telephone functions.

All recordings were digitised and then translated from Bengali (by the first author, a native Bengali speaker) and transcribed using the *Transana* software package. The transcripts were then coded in the *NVivo* software package. Thematic coding was used to analyse the data. Data analysis involved both bottom-up and top-down approaches. For example, difficulties and benefits of using mobile telephones were categorised by using open coding (bottom-up approach). Existing models (Carroll et al., 2003) and research findings (Donner, 2008) were used to develop codes for appropriation (top-down approach).

Findings

Difficulties

Language was a major impediment to farmers' use of the mobile telephony. Most handsets sold in Bangladesh only support English. The majority of the farmers have education up to secondary school level and are not proficient in English. The farmers were not familiar with the terms used in the mobile industry, like 'messaging', 'hash', 'network coverage' and 'user busy'. On eight occasions, it was found that they had difficulties in making sense of these specialist terms. This lack of understanding of technical terms is related to an underlying 'mobile computer illiteracy'. For example, a user needs to understand that the phone does not work if it runs out of charge. This happened to a couple of farmers in the sample who did not realise that their sets had run out of charge. While these difficulties are not major in nature, they can cause anxiety.

After realising that the English interface limits farmers' ability to use mobile telephony, the Bengali interface was introduced to the farmers.[2] The introduction of the Bengali interface nonetheless presented problems of its own. Many of the words used in the interface have double meanings. For example, the 'select' button is translated to '*Nirbachon*' in Nokia's Bengali interface. In Bangladesh, '*Nirbachon*' is widely used as a synonym for 'election' as in 'national poll'. Due to inappropriate

translation, the meanings of Bengali words used in the interface have become ambiguous. For example, the word 'contact' is translated as '*Shamparka*', which normally means 'relation'. Three of the farmers responded in the following ways:

> Typing in Bengali requires skills in the use of mobile phone keypads, since sixty-one characters (including the short forms of vowels) are to be typed using ten keys. This is certainly more difficult than typing twenty-six English letters using nine keys, assuming that the user can read and write both languages.

Benefits of using mobile telephones

Most of the farmers used the mobile phones. It appears that they persisted in their use because they valued the outcomes. These outcomes were both economic and non-economic (social and emotional).

Social communication was the dominant use, but use was also made of the phones in farming. It is important to appreciate that farming families organise their work and lives to achieve both social and economic goals. In a country like Bangladesh, which has poor landline infrastructure and a weak transport system, mobile telephony provides an easy and cheap means for social communication. However, social communication often involves more than purely social issues. Farmers contact their relatives and friends to discuss their financial problems and agricultural issues.

Q: What are the purposes you used the mobile phone for?
A: I called my relatives and I also contacted people about farming and non-farming economic activities.
Q: Which relatives did you contact?
A: I contacted my sister and my maternal uncle. Both of them are based in Shaturia.
Q: What sort of issues did you discuss with your relatives?
A: Household things. . . . I also discussed farming. You can see the cucumber plants are not growing fast. Also the leaves of the paddy plants are getting white. I have shared my experience with them about these.

The farmers used mobile phones to learn about sources and prices of fertilisers. They also used the phones to contact NGO workers and agricultural extension workers (known as block supervisors) to seek advice on pests and plant diseases.

The use of mobile telephony provided psychological comfort to the farmers. In rural Bangladesh there is a popular practice of borrowing mobile telephone services from friends and neighbours. Some of the elderly farmers in this research used to borrow mobile telephones from their neighbours and younger family members. Possession of their own mobile telephones gave them independence and enhanced their self-esteem. They also derived comfort from being connected with their friends and family members.

The mobile telephone was a source of enjoyment and pleasure for some of the farmers and their family members. Five farmers registered similar opinions during interviews. One farmer demonstrated his skills in playing games on the mobile telephone. Mobile telephony also generated great enthusiasm among the children, who were keen to play with the sets and explore different functions.

Not all farmers actually appreciated these benefits. For example, one farmer explained that he did not need to use a mobile telephone, as he lived next to the village bazaar and could get agricultural information by visiting the shops in person. His daughter made use of the phone instead, as it was kept at home most of the time.

Appropriation

Often, the farmers were asked to show how to make calls to verify whether or not they actually knew how to operate a mobile telephone. The farmers mostly tackled their difficulties in two main ways. The first of these involved learning from experience or with the help of friends and family members. The second was improvisation – making sense of different applications, adjusting their lifestyle to use both the artefact and the applications and/or innovating new means. The farmers' use of mobile telephones also involved some changes and adjustments.

The way the artefacts were kept and carried: It was found that the farmers did not like to carry the mobile telephone sets when they were in the field. Bangladeshi rural people do not wear trousers or shirts. They wear a special dress known as the *lungi*. This is like a female skirt that needs to be wrapped around the waist. *Lungis* do not have any pockets. Hence, carrying mobile phones is not convenient, although one group used a string to hang the set around the neck. In most cases, the farmers were also scared of dropping or losing their mobile phones in the field and so preferred to leave them at home. Effectively, the mobile telephone was used as a fixed device, thereby changing the original nature of its use. It is also found that in rural societies shared use of mobile

telephony is popular. One mobile telephone set is shared by all family members and sometimes by the neighbours as well.

Making use of complementary tools: Where farmers had difficulty utilising certain features of mobile telephony, they sometimes found means to overcome these problems by continuing to use old-fashioned procedures. Thus, instead of using the save-and-retrieve facility of the phones, seven farmers recorded these numbers in diaries and retrieved them when necessary.

Using features that did not require technical literacy: The colours of the keys and the icons on the menu enabled the farmers to understand what and how to select (e.g. they knew that by pressing the green button, they could make or answer a call). Making sense of the applications through pictures and colours saved the farmers from the need to read and understand either the English or the Bengali menu.

Creating new ways of using the technology: Like other price-sensitive users in developing countries, the farmers in this research made considerable use of the *miscall*. This involves dialling a number and hanging up before the call is answered. The 'missed call' message will let the recipient know that a call has been made and by whom. In particular contexts, this allows the person who has made the call to communicate information to the recipient without paying the usual tariff. *Miscall* became popular among the farmers for two reasons: one is financial constraints and the other a lack of expertise in sending and/or receiving text messages. The farmers did not send *miscalls* to everyone. Whether or not it was considered acceptable to send a *miscall* to someone depended on the social, financial and cultural relationship with the other person. For example, one farmer used to send *miscalls* to his eldest son who worked in the city and was expected to pay for his father's mobile phone use.

Adjusting farmers' life and work practices to adapt to mobile telephone use: One farmer's wife told us that her granddaughter used to check the mobile telephone set every morning before going to school. She later realised that the granddaughter was checking the time on the mobile telephone. In some cases, the mobile phone started to replace normal modes of communication. One farmer used the voice call to request his friend to purchase a bag of fertiliser on his behalf from the bazaar. Previously he would have visited the bazaar to get the fertiliser.

The environment and infrastructure also respond to the gradual increase of mobile phone use. Thus rural tea-shops have added mobile top-up to the services they provide. The shops are not authorised dealers for any mobile telephone company, but they send top-up requests to the nearby authorised dealer through text or voice messages. They

charge extra to cover their messaging cost and a service fee in addition to the top-up amount. Without the provision of this service, topping up mobile phone credit in remote village areas would be extremely difficult.

Discussion and conclusion

It is important to remember that marketing research should be grounded in theories to organise and analyse the findings for their contribution to the field of knowledge. The findings of this research offer evidence of the appropriation of mobile telephony that involves adoption and adaptation through dynamic, iterative and dialectic processes. The majority of the farmers accepted mobile phone use, despite financial constraints and technical difficulties. Such use brought direct or indirect benefits to their social and occupational lives. Consequently, the findings offer substantial support to the BoP marketing concept (Prahalad, 2004; Karani, 2006; Rashid and Rahman, 2009). Furthermore, the findings also show the possible ways in which village farmers can use mobile telephones through social support and/or inventive measures such as *miscalls*.

The use of mobile telephony and social systems and practices influence each other, as suggested by Orlikowski (1992) and Suchman et al. (1999). The fact that top-up facilities are now offered at the village tea-stalls shows the high demand for mobile telephone services in remote areas and how local businesses/facilities adapt to meet such demands. It was also noticed that some farmers used the phones more like fixed devices, as they kept their sets in their homes. Difficulties in carrying the sets and the fact that some of the farmers' wives made more use of the phones led to this measure, which was not uncommon in many village households in Bangladesh, which has poor landline infrastructure. Hence, the appropriation of mobile telephones within certain social, cultural and spatial environments has been presented and analysed in this chapter.

The findings concur with some previous ethnographic research (Horst and Miller, 2006; Dhir et al., 2012) and contribute to the current understanding of the cultural appropriation of mobile telephony at the BoP. As Denzin (2001) argues, consumption is beyond acquisition. The current paper presents a detailed account of the consumers' interaction with mobile telephony and suggests that marketing researchers also need an understanding of technology appropriation both for home and host country markets. Quantitative models of technology acceptance and adoption (such as TAM, TPB) can hardly provide such a detailed account of the process of technology use and appropriation.

Future research

This chapter provides useful guidelines for international marketing researchers. BoP market offers business prospects for mobile telephone companies. A good understanding of cultural sensitivities is essential for reaching this segment. Hence, this chapter recommends better comprehension of social and cultural dynamics, a lack of which may lead to product and marketing myopia (as in the case of the Bengali interface designed by Nokia, which failed to make the sets more usable). Future research can apply similar methodologies to investigate people's use and appropriation of mobile telephony in other situations (e.g. the fishermen in South India, small traders in Nigeria, farmers in Vietnam).

Notes

1 The fieldwork was conducted for the first author's doctoral research.
2 The five groups who had Nokia 1200 were able to try the Bengali interface. It was observed that the use of Bengali in mobile telephony was not widespread in Bangladesh when the fieldwork was conducted in 2007/08.

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7

Political Microblogging: A Case Study of Twitter in the 'Shahbag Movement'

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Introduction

While debates ensue over the role of New Media and social networks in the Arab Spring, the sudden surge in online participation has been noticeably evident, with Twitter, alongside Facebook and blogs, gaining spotlight as a tool that contributed to the momentum of events. In countries where Twitter has been introduced, agitated citizens expressed, shared, and disseminated their sentiments into web space by Twitter. Leo Mirani, one of the scholars, mentions that it is wrong to rule out the possibility of Twitter spreading information and, thereby, contributing to the creation and sustenance of movements (Mirani, 2010). Therefore, in order to further explore the role of Twitter within people-led political protests, especially in societies with a growing economy and a fledgling democracy, this research was initiated. The Shahbag Movement of Bangladesh was taken as a case for study because of the contemporariness of the issue, which was initiated in early February 2013. This movement was to ensure a free and fair trial of the people accused of crimes against humanity during Bangladesh's liberation war in 1971. Online activists, mainly through blogs and Facebook, initially organized the Shahbag Movement and later, Twitter came into the scene (*BBC News Editor*, 2013). The goal of the study is to explore the emergence of Twitter in the context of Bangladesh's evolving political scenario in 2013, with specific focus on the characteristics of Twitter use, which created the platform for contribution. We look into the tweeting patterns of Twitter users who are microblogging with the hashtag #Shahbag.[1] We observe the macro level picture of the kinds of tweets Twitter users generate, such that it allows for insights into the kinds of communications being conducted. These are categorized into directed and undirected

communications so that it becomes possible to draw conclusions about the defining characteristic of the interaction dynamics. Moreover, the research explored the major disconnects between official ICT policies and the related impacts on digital freedom of Bangladeshi citizens.

Background

ICT infrastructure

Bangladesh has one of the fastest growing and affordable mobile telephony markets in the world (Hussain, 2012). The total number of mobile access paths/SIMs comprises 65% of the whole population (BTRC, Web). In terms of Internet penetration, only 20% of the total population (approximately 30 million) has net access, primarily through mobile data services. According to Bangladesh's ICT regulator, majority of the users access social networking sites (including Facebook, Twitter) via GSM and CDMA services (BTRC, Web). Freedom House, in its yearly study on global net freedom, identifies Bangladesh as a 'partly free' country when it comes to Internet freedom (Bangladesh, 2013). The present government has the political mandate for ensuring universal access to ICT and related services. Officially, it aims for a knowledge based network society under the 'Digital Bangladesh by 2021' program launched in 2009 (Bangladesh, 2013). This policy for access to information for the citizens has significant disconnections between official ICT Access policies/acts and the applied regulations, which turned out to be repressive on Internet service providers and net users in many cases.

New media, democracy, and the Shahbag Movement

As evident from the previous subsection, emerging economies like Bangladesh are following the example of developed societies to diffuse ICT for greater citizen-based applications. Such collective and collaborative efforts create a platform for interactive and transparent dialogue among people, a prelude to greater democratic practices. Garrett (2006) justifies such online collective participation by suggesting that it is the reduction in participation barriers that allows users the privilege of not having to be selective about what they subscribe to. Furthermore, he notes that it feeds the need of individuals to gain relevance with a larger community whose members rally around a common cause. He also identifies the ease of access to publishing as a reason. Ghannam states: 'These social networks inform, mobilize, entertain, create communities, increase transparency, and seek to hold governments accountable'

(Ghannam, 2011). Shirky argues that there is no one role taken by New Media within the political sphere, relying completely on the particular political and social contexts which entertain the use (Shirky, 2003).

In Bangladesh, such New Media-infused people-led initiatives which empowered its citizens to practice their much coveted democratic rights were first witnessed with the Shahbag Movement. With the notion of 'Digital Bangladesh', the government tried to narrow the gap of the digital divide and allow access to information for all. The private sectors also played a crucial role in providing cost-effective ICT access for the people. This empowerment and access to information paved the way for greater citizen inclusion online and as a result, the Shahbag Movement happened. This movement, facilitated by blogs and social networks in Bangladesh, began in February 2013 when a domestic war crimes tribunal sentenced Abdul Quader Mollah, leader of the country's largest political Islamic party Jamaat-e-Islami, to life imprisonment for crimes committed during the country's 1971 war of independence with Pakistan. Tens of thousands of protesters gathered for several weeks around the Shahbag intersection in Dhaka, where different social, cultural, and political forces joined them (Anam, 2013). The protested deemed the delivered sentence as a lesser punishment and demanded death sentence for the convicted war criminal. During this movement, in addition to the traditionally popular blog sites and Facebook, for the first time we witnessed the use and proliferation of Twitter in Bangladesh. People started using it both inside and outside Bangladesh to rally others for Shahbag and to broadcast the related news to the outside world.

Political microblogging (Twitter)

Microblogs are concisely written statements whose worth lies in their succinctness and brevity that is shared in a known and recognized network (Jansen et al., 2009). For the purpose of this chapter, these microblogs are referred to as 'Tweets', with reference to the mode of sharing being used, that is, Twitter. Jansen et al. justify the introduction of this jargon into the lexicon because of the relative popularity of the phenomenon (Jansen et al., 2009). These statements are not always made in the form of a two-person interaction, and these can be less personal in general, but their immediacy in outreach and permanency, for having been archived in the Internet database in the form of documentation, increase the potency of the statements (Hennig et al., 2004) The feature of blogging or microblogging is a verified medium of online political engagement (Rojas, 2009). Microbloggers who participate in political

discourse online have been granted the nomenclature of 'netizens' by Kuebler and 'techno activists' by Kahn et al., who further say that they are engaging in what they term as 'democratic self-expression' (Kahn and Kellner, 2004; Kuebler, 2011). This could refer to the online expression as a show of democratic rights or as being marked by its democratic feature. Howard (2011) defines this phenomenon as cyber activism.

Vulnerable citizens in digital Bangladesh

While the advantages of New Media and the related tools such as Facebook and Twitter have been identified by the Bangladeshi populace for effective mobilization, wide-scale applications of such options for criminal activities have resulted in massive loss of properties and breakdown of law and order in Bangladesh as well. In 2012, local miscreants, organized through social networks and text messages, accused a minority Buddhist person of defaming the Prophet Muhammad on Facebook and attacked the temples. Hundreds were injured and several houses were vandalized during this attack (*The Daily Star*, 2012). Similar attacks against the Hindu minorities happened in 2013 in Shanthia, Pabna. A fake account on Facebook was used here too as a pretext for that preplanned looting (*BD News*, 2013).

The government failed in both cases to track down the criminals misusing the ICT tools, leaving the common people unprotected against these online-based crimes. The incompetency of the government mechanism was evident in other cases too. YouTube was banned for nine months due to an anti-Islamic movie *Innocence of Muslims* (Abdullah, 2012). The government, in spite of strong protests from different local and international experts and civil society organizations, amended the already strict ICT Act 2006 as well. It was done right after the Shahbag Movement. According to different experts, this change was made as the government found itself to be ill-prepared to deal with online activism powered by New Media, thus leaving the common people vulnerable against further legal exploitation. Our research shows that according to the constitution of Bangladesh, every citizen has the right to freedom of expression, Article 39 (Islam and Hussain, 2011b). This right was entirely compromised by the newly amended sections 56 and 57 of the f.

Significance of this research

The existing literature presents a multitude of opinions about the potential role and use of Twitter for online sociopolitical participation,

without being able to agree upon an indisputable conjecture. Studies related to the role and use of Twitter in online political participation and its related offline impacts do not adequately scrutinize Twitter's inception mechanisms within a political landscape, especially in developing society settings. We believe the role of Twitter within a landscape comprised of sociopolitical activism can be explained most effectively only if the phenomenon is studied from its inception. This translates into observing the characteristics of the proliferation of Twitter usage. In our opinion, by clearly distinguishing the characteristics of the initial proliferation, it would be possible to gain insights into the subsequent stages of evolution of Twitter use. Moreover, it will help us to gather valuable knowledge regarding the impending impacts of the role of Twitter. On the other hand, the literature reflects the confusing state of Digital Freedom in Bangladesh. On the one hand, the government is working on a long-term plan for microlevel ICT integration for citizen services. A major focus has been on ICT infrastructure development to ensure better access to information. On the other hand, the policymakers and law enforcement agencies are coming out strongly against any public dissent made online. Numerous websites are being shut down, YouTube and Facebook have been blocked for a long period of time, and online activists are being harassed by government machinery. Amid such a backdrop, this chapter explores the probable consequences of such self-contradictory government actions. We specifically focus on the recently amended ICT Act, its new punitive measures, and its impact on Bangladesh's fledgling online citizenry.

The Shahbag Movement was chosen because, for the first time in Bangladesh (a young democracy with a growing online population), Twitter had gained prominence in online political participation. According to Alexa (2013), an Amazon-owned company specializing in providing web information, Twitter is among the top 20 most visited sites in Bangladesh, and was ranked at 19 in the month of April. Its relatively recent rise in popularity can be understood when this rank is compared to the Alexa ranking for Facebook – the company categorized Facebook as a list-topper. Our research would also contribute to the global effort in coming to a common conclusion about the role of Twitter in political movements, which are contextualized within developing countries or emerging economies.

The present political party in power, the Bangladesh Awami League, for the first time in the country's history, has introduced and is following up on a long-term ICT integration strategy in different critical domains at national as well as local levels. However, in practice, there have been

numerous examples of ICT regulatory and policy disconnects, which have resulted in large-scale uncertainties in Bangladesh. Previous studies show the challenges faced by mobile telephony and other ICT service providers due to government policy (Hussain, 2011). In addition to the big and small business entities, the relatively young netizens of Bangladesh are now facing many challenges related to ICT practice and legal framework. Especially in the last two years (2012–2014), the country witnessed several events, which highlighted the growing importance of New Media in mobilizing the citizens and the government's inability to facilitate such growth. During the same year, we saw for the first time, the indiscriminate implementation of a draconian ICT Act, mainly to suppress the multiplicity of opinions in the digital space. The policymakers also took a heavy-handed approach to controlling online content. Facebook and YouTube sites were the regular targets of blocking without any notifications (Abdullah, 2012). Such actions, ironically, contradicted the incumbent's effort to create space for a vibrant digital society. Instead of getting empowered by the newly available ICT tools provided by private businesses and government projects, people started becoming more vulnerable in the absence of any viable legal safety net that could protect them online.

Hence, we chose to conduct an exploratory research on the characteristics of Twitter proliferation during its stage of inception, and we believe our research will contribute to the global literature on the role of Twitter or New Media in political movements, which are contextualized within developing countries or emerging economies. Our work should moreover assist the local and regional policymakers in formulating better, inclusive policies for digital freedom and online activism in this new, interactive era of the information age.

Methodology

Our data collection and analysis process was conducted in two segments. In one segment we gathered information on abuse, arrests, and harassments of online activists in Bangladesh from local newspapers and online journals. In addition, we conducted open-ended expert interviews with seven legal experts, Internet Service Providers, New Media Activists and ICT industry leaders. These interviewees requested us to keep their profile anonymous. The experts have shared information regarding the two dimensions of threat for users due to freedom of expression in Bangladesh, limit of content, and violation of users' rights.

We specifically asked for their opinions on the impact of the newly amended ICT Act on users' rights and digital freedom in Bangladesh.

The other segment dealt with microblogging data. We have studied real world data that can provide information on the characteristics of the interactions in Twitter during the political mobilization in Shahbag, Bangladesh. We wanted to explore whether, during the Shahbag Movement, people were engaged in active online dialogue on politics, and if new groups were formed. To answer these, a data crawl was conducted so as to gather all relevant information about the Shahbag-related content in Twitter.

Data collection timeline

Expert elicitation and newspaper analysis for ICT Act–related violations and arrests were conducted in the second half of 2013 and the first quarter of 2014. Twitter data collection was conducted over a period of 73 days, from February 5, 2013, the date when the Shahbag Movement was initiated, to April 20, 2013. April was chosen as the month to take the first set of results to allow the movement, which had started on February 5, adequate time to swell. This would also have a positive impact on the volume of user-generated content accumulating in the Twitter database, thereby providing the research with a wider data set and ruling out the risk of inductive generalization, while it could be purported, that the research ran the risk of a decline in the rates of online participation, and hence content creation. Thus it can be seen that April is indeed a justified choice for data collection. The dates April 2, April 13 and 14, and April 18 and 19 of 2013 were strategically chosen because of their affiliation with offline political events that may have been mirrored in the volume of online content generation and intensity of online interaction. The date April 2, 2013, was assumed to be reflective of sentiments regarding the arrest of four top bloggers in the country who had been proactive in the Shahbag Movement. The arrestees were termed 'atheists' by a newly formed right-wing Islamist group, who called off a long march on April 5, 2013 (Smith, 2009). The data set from April 13 and 14, 2013, was assumed to reflect the reactions to the secular Bengali New Year, which was on April 14, 2013, especially since the date has a history of contention with conservative Islamic forces. We chose April 18 and 19, 2013, as a time that was relatively not adjacent to any offline political events, because one objective of the research was also to gauge the longevity of the occurrence of online participation of Twitter, when inhibited from direct correlation to offline political events.

Twitter data analysis tools

NodeXL, a data mining application that comes in the form of an add-on for Microsoft Excel, has been utilized to collect data for analysis using the Twitter Search Application Programming Interface (NodeXL, 2013). Data was collected about all Tweets containing the hashtag #Shahbag and entered into a database. The crawl was executed on the specified dates of April 2, April 13, and April 18 of 2013, and each entry recorded as a time-stamped record so as to allow for verification. The data entry for each record corresponds to the information about each node, where a node is a Twitter profile operating as a social actor. The nodes are identified by their Twitter user id. The information gathered includes the interaction between the node and another Twitter user, where the nature of the relationship is described as linear.

Gephi, graph visualization software for constructing network illustrations, was used to map out the database of records collected through NodeXL (Bastian et al., 2009). The graphs generated in Gephi are real-time, showing the interactions between the records as dependent on shifting variables. This is why Gephi's visualization software was preferred over conventional graphing applications. Gephi was also used because of its add-on features, which allow for many different types of graph visualization layouts. The graph visualization layout chosen for this research is called Force Atlas 2 (FA2), a beta version of Force Atlas (Parviainen, 2011). This is a force-directed layout following a model of specialization such that nodes repel each other to construct a spread-out dispersal of data points. In order to research the role of Twitter in online participation, the FA2 visualizations were scrutinized to see the nature of the connections and interactions as well as to observe community formations.

Twitter interaction parameters

Degree represents the total number of interactions one has had with others, and the interactions could be either 'Retweets' or 'Mentions'. 'Retweet' is the markup tool used by a Twitter user to share a 'Tweet' updated by another Twitter profile to his followers. 'Mention' on the other hand is the Tweet directed by a user to another user's profile, using the '@' markup tool. This is available for viewing to the followers of both the users. *Degree* is further categorized as '*Indegree*' and '*Outdegree*'. 'Indegree' is the sum of the total number of 'inward' interactions of a user, or the total number of interactions directed at him or her; 'Outdegree' is the opposite – the total number of interactions a user

initiates to another; and Singleton tweet is a type of communication which uses a related #hashtag and does not address or influence any follower directly.

In Twitter, the number or nature of degrees alone is not enough to measure the level of influence any particular user or group has across the network. To gauge such user property, the concept of '*Betweenness Centrality*' is used (Bastian et al., 2009). This measurement aims to shed light on how many times a particular node is mentioned in online dialogue and how much it is shared and retweeted. Both of these interactions are also dependent on how much the node is sharing and tweeting by itself. This is relative to the distance between a particular node and another, such that it is an approximation of how often a node appears on shortest paths between nodes in the network. Thus the node through which the maximum number of shortest paths from all vertices to all others has passed through has the highest Betweenness Centrality.

In order to detect community formations, modularity-based communities were taken into account because this research further aimed to measure the level of influence of tweets within the communities. Modularity-based communities either consider the node with the highest number of edges as the most active user and construct the rest of the community around it or create a focal point consisting of several nodes with similar edge weights.

Findings and discussions

In this section, we present the key findings from our data analyses, address our proposed research questions, and discuss the impacts and implications. As mentioned in the Introduction, our research questions are:

- *What is the nature of Tweeting in Bangladesh within the political landscape of Shahbag?*
- *Is Twitter being used to mobilize people or simply used for sharing ideas?*
- *Are new communities or online spaces being created for dialogue?*
- *Are the ICT policies and regulatory bodies ready to deal with New Media and Net Freedom in politics?*

The nature of communication

The Force Atlas 2 visualizations of April 2, April 13–14, and April 18–19, 2013, project similar representations of data such that the inferences

made were repetitive. Therefore to prevent redundancy, only the visualizations of April 13–14 were taken into consideration. To understand the graph, the range of the degrees was between 5 and 20. This helped to find the most prominent users.

According to the automated graphical presentation by Gephi, we found 152 nodes (Twitter users) active on April 13 and 14. Their Indegree and Outdegree further characterize the nodes, with the former shown by color name in Table 7.1 and the latter shown by the order of the nodes in the table; for instance, 1 is the highest Outdegree and 100 is the lowest Outdegree.

According to Table 7.1, the data set '1' and 'Green' means that the user/node is tweeting the information more but retweeting or direct messaging less. If the node or user has an Outdegree of '10' and is 'Blue', then it means that the user is tweeting less and receiving more information. When subjected to such classifications, only 3 nodes appear in relatively darker colors ('Blue'), while 15 nodes are relatively with higher numbers of Outdegree. This means that there is a greater prevalence of

Table 7.1 Top #Shahbag networks (April 13–14, 2013)

Number/Outdegree	**Color/Indegree**
1	Green
2	Yellow
3	Blue
4	Green
5	Blue
6	Yellow
7	Yellow
8	Blue
9	Green
10	Yellow
11	Green
12	Green
13	Yellow
14	Yellow
15	Green

Blue: highest numbers of Indegree; Green: moderate number of Indegree; Yellow: low numbers of Indegree.

1<Outdegree>100 (1 is the highest number of Outdegree and 100 is the lowest number of Outdegree).

Outdegree than Indegree. However, it is difficult to find out who the most influential users are, that is, who are the users being tweeted to, mentioned, and retweeted the most. Therefore it became necessary to take into consideration the category of Betweenness Centrality, which unearths the hyperactive nodes.

In Table 7.2, numbers represent Betweenness Centrality and colors represent Outdegree. Outdegree is filtered, so that any user or node with an Outdegree lesser than the average will be filtered out, so as to adhere to our inference from Table 7.1 that there is a higher occurrence of Outdegree than Indegree. The FA2 visualization shows 60 nodes. Nine darker nodes appear since they possess a higher Outdegree, but among them only one is large in size with another user following next. Four other influencers emerge, but they have a much lower Outdegree than the highest number. This means that although they have a low Outdegree, they are, nevertheless big influencers. In order to better understand this phenomenon, we also investigated to find who the influential nodes are among those engaging in more dialogue.

Table 7.3 is a representation of the visualization of top opinion makers online, where the numbers are considered to represent Betweenness Centrality and color is used to represent Indegree. The nodes are filtered to 2, such that people with Indegree less than 2 are erased from the picture. Such sorting resulted in 28 nodes available for further analysis. Four nodes are the darkest, showing that they have the greater Indegree. Two

Table 7.2 Top broadcasters with #Shahbag (April 13–14, 2013)

Numbers (Outdegree)	**Colors (Betweenness centrality)**
1	Blue
2	Green
3	Green
4	Light Green
5	Green
6	Green
7	Yellow
8	Green
9	Green

Blue: highest Outdegree; Green: moderate Outdegree; Yellow: lowest Outdegree.

1<Betweenness Centrality>100 (1 is the highest number of Betweenness Centrality and 100 is the lowest Betweenness Centrality).

nodes appear as the most influential nodes, with the highest Betweenness Centrality, since they are the biggest in size.

These two nodes are most likely the content generators. This furthermore justifies our conclusion that it is possible for nodes like 'Blue' to be influential only in the sphere of dialogue.

Community detection

Table 7.4 shows five major communities we found within the Tweetsphere discussing #Shahbag. The two major communities (group 1 and 4) have been named 'Green' and 'Blue' for identification; have communication edges with only two of the smaller communities (group 2 and 3), namely the red and the purple ones. None of these four communities shares edges or communicates with the 'Yellow' community (group 5), which we found to be a standalone group. In Table 7.4, we assigned the level of Betweenness Centrality to represent the size of the nodes. We have found the nodes with higher Betweenness Centrality to be part of the larger communities.

Table 7.3 Top opinion makers with #Shahbag (April 13–14, 2013)

Numbers (Betweenness centrality)	**Colors (Indegree)**
1	Blue
2	Green
3	Green
4	Green

Blue: highest Indegree; Green: moderate Indegree; Yellow: lowest Indegree.

1<Betweenness Centrality>100 (1 is the highest number of Betweenness Centrality and 100 is the lowest Betweenness Centrality).

Table 7.4 Top five communities with #Shahbag (April 13–14, 2013)

Groups/communities	**Colors**	**Nodes/users**
Group 1	Blue	20 (one significant user)
Group 2	Red	4 Users
Group 3	Purple	5 Users
Group 4	Green	10 (one connected user)
Group 5	Yellow	33 (one significant user)

Fewer and newer online opinion makers

Our temporal analysis of Twitter data on #Shahbag discovered that users with greater influence are primarily the ones who are generating and disseminating new content and working as connection hubs with higher degrees (Tables 7.1 and 7.2). The Internet and related communication media strive to ensure a level playing field for content generation, sharing, and communication, even in the context of developing society (Tongia et al., 2005). In the case of Shahbag also we have observed the emergence of new citizens or sources (even though a bit less in numbers than expected) amid the 'democratic' environment of New Media, reflecting the absence of mass participation in the online media, to generate content to the world about the current status quo of the country's politics.

Further analysis on these key users indicated in Tables 7.2 and 7.3 has found them as individuals, communicating their own thoughts or sharing the ideas they deem important. This shows how a free space for dialogue resulted in sharing more ideas and generation of content. Interestingly, we did not find the representation of any major online or traditional media outlets (local and international), any political parties, NGOs, or any social icons among the users with a high Betweenness Centrality value. As time progresses, more people from the mentioned stakeholder groups are likely to join. However, the present state of political Tweetsphere in Bangladesh certainly depicts the emergence of newly empowered entities, a positive indicator of a young, increasingly connected society which is ready to challenge the government and its policies. This shows how a new community or space is being created for dialogue between different stakeholders as a connected society is being created.

Connected communities exert greater influence

In order to understand the significance of the influence generated within communities during the Shahbag Movement, it is important to analyze the community formations within. We observed a few commonalities within the different communities, between which interconnection is the primary one. In Table 7.4, the FA2 visualization representation shows that the concentration of high-influence users (possessing higher Betweenness Centrality) belongs to the 'Green', 'Blue', and 'Purple' communities, which are connected with the most communicating edges. On the other hand, the community members of group 5 have a higher internal connectivity, but have almost no influence over the entire network. This highlights the importance of being connected with the

wider audience and stakeholders to get one's message effectively disseminated, resulting in a strong desire for their demands to be fulfilled as more supporters emerge. Therefore it sheds light on the future implications of political microblogging using Twitter in Bangladesh. Optimally there should also be a prevalence of edges between communities (unlike group 5), to indicate that different communities share connections either in the form of broadcast or dialogue. These connections can also operate as the channels used to merge different schools of thought.

Online communication and interaction online resulted in mass participation and mobilization of citizens, for instance, the event in Ramu (a negative incident) and the Shahbag Movement (a positive incident). The huge pressure exerted through Shahbag forced the government to reassess the war crimes tribunal verdict, a clear victory for the online activists addressing our first research question. On the other hand, these communications also resulted in deaths, arrests, and more instability in the country, as the government was not ready to accept greater mobility through the online media. This was the time when the present government, which planned to turn Bangladesh into a 'digital' country by ensuring the Millennium Development Goal (MDG) goals of educated citizens and a globally interconnected nation was achieved with higher access, used the ICT Act for the first time after its implementation to create more instability and initiate action against the citizens. To address the third proposed research question we need to look into the results of the amended ICT Act.

Amended ICT Act and user harassment

The ICT Act of 2006 is the main legal reference used by the government to address online freedom of expression (Islam and Hussain, 2011a). It has already been termed 'draconian' by legal experts and became worse with the newly introduced amendments, effective from August 19, 2013. For instance, the bloggers of February 2013 were arrested under Article 57 of the ICT Act 2006, for posting blogs on sensitive religious issues (*BD News Editor* 2013). Section 56 of this ICT Act provisioned three years' prison time, and/or up to US$ 125,000 fine for hacking. Section 57 deals with online expressions and violations on social, political, and religious issues. Violations found under Section 57 are now punishable with a minimum of seven years' imprisonment to a maximum of 14, and the violators may need to pay fines up to US$ 125,000. Most importantly, after the new changes, no warrant is needed for arresting the alleged criminals, and offenses under this Act are now non-bailable (Islam et al., 2011). Furthermore, Article 39 under Chapter 2 of the Bangladesh

Constitution states that freedom of speech and thought is an essential right (Islam et al., 2011) and that the executive legislative body of government is separate from the judiciary. However, the police or regulators can pass cases for censorship and surveillance without supervision from the ICT ministry.

Our research shows that the ICT Act 2006 was first used for arrests in April 2013. Police detained four prominent, pro-Shahbag Movement bloggers for hurting religious sentiment under Section 57 (*The Daily Star*, 2012). As a reaction to the Shahbag Movement, the government banned numerous blog sites and Facebook pages without any room for appeal and arrested several bloggers. We have also observed that Twitter users enjoyed, and are still enjoying, a relatively free environment to communicate and network on issues related to Shahbag. In addition, an acting editor of a pro-opposition newspaper was arrested in the same month for defaming religion under the Sections 56 and 57. In June 2013, a university teacher was sentenced to jail for threatening to kill the Prime Minister on Facebook. Between August 2013 and January 2014, there have been at least eight more arrests, again in relation to the violation of Section 57, which included NGO activists, a university teacher, and journalists (Bangladesh, 2013). With the present communication policies in place, such a free reign of Twitter is not going to be sustainable. As the population of Twitter users in Bangladesh increases and information broadcast on Twitter achieves a greater social value in the context of the country (as shown in this chapter), Twitter too will inevitably be forced to fall under the regulatory radar.

Likewise, the vulnerability of Twitter users remains high, especially since the microblogged content is generally public in nature and by intention. Such openly available user information has been exploited before to silence the political movements in Iran and China (Mohammed and Sahar, 2012). Any citizen's rights to access information and to communicate freely (whether outward, as a form of broadcast, or inward, as a form of dialogue) need to be recognized and protected by the Government of Bangladesh, and this regulatory safety net should encompass people's access via Twitter, Facebook, blogging, and other forms of ICT based communication.

Conclusion

Our research explored and analyzed the ways New Media, and specifically Twitter, started being widely adopted in Bangladesh, especially through the lenses of the Shahbag Movement. Analyses using online

data mining applications and visualization software showed: the emergence of new, individual opinion makers within the Bangladeshi microblogging domain, indicating a slow yet positive trend of citizen participation on major sociopolitical conversations and the prominence of online communities that are better connected. Furthermore, the findings in this chapter reflect the sense of insecurity prevalent among the Bangladeshi online users in freely expressing their opinions and ideas. We found that indiscriminate arrests, site-blocks, and newly amended punitive measures have created significant hindrance to developing a truly participatory digital space for communication. We believe the default public nature of the Tweetsphere (which makes the communication open for all) increases the risk of such state-sponsored harassment, arrests, torture, and defamation of the microbloggers by any state with poor governance. We hope our findings will assist the related stakeholders to better understand the challenges and opportunities of the nascent digital society of Bangladesh, both in the areas of evidence-based policy formulation and New Media based applications development.

Note

1 A hashtag is a word preceded by a 'hash' in order to connect it to a particular theme (Larsson & Moe, 2010).

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8

Development and Use of Open Source Software in India

Meera Sarma

Introduction

The information technology (IT) landscape in India has been dominated by proprietary software over the years, influencing various aspects of technological developments. However, recently, a growing number of government agencies and software companies are moving away from using proprietary software towards other valuable alternatives such as open source software (OSS). The proliferation of OSS in India has led to the development of various forms of technological dialogues and the creation of universally accessible resources that are developed by communities for the benefit of the society.

This chapter introduces the concept of ethical hacking and the development of OSS. It explains the concept of OSS and its roots in hacking and describes the OSS movement in the Indian context. It discusses the reasons why the open source model of software development is necessary for countries such as India, whose software industry has been immensely successful and is emerging as an international power. It specifies the motivation for adopting OSS by individuals working in the Indian IT industry as well as non-government organisations (NGOs), examines the impact on knowledge creation and sharing and highlights the challenges in the OSS environment in India. The chapter concludes by discussing the implications of the OSS environment for innovation and sustainable development for bridging India's digital divide.

Definition of terms

FOSS: Free software and OSS are used collectively as the two movements share many commonalities. For analysis, the free and open

source movements are considered as a single entity. But there is one difference.

Free Software (FS): Introduced by the Free Software Foundation (FSF) (www.gnu.org), the emphasis is on copying, modifying, using and giving software; the objective is more ethical, with the emphasis on freedom.

Open source software (OSS): Open source on the other hand has a more pragmatic view. Introduced by the Open source foundation (www.opensource.org) the objective is more technological, with the intent to create better software, better marketing strategies and acceptance by the industry.

Note: Shareware and Groupware do not form a part of FOSS.

OSS development

The rapid integration of information and communication technology (ICT) in all spheres of society has dramatically changed socio-economic relationships and has served as a stimulus in developing and supporting not only organisations but also global economies. ICT applications have revolutionised businesses by opening up global markets, providing employment and integrating national economies. But at the same time, ICT has created a gulf between developed and developing countries popularly known as "the digital divide". In this context, OSS is envisaged as the catalyst in bridging the digital divide and creating communities that believe in open source products and freedom of knowledge (Raisinghani, 2003). In the last few years OSS has received particular attention as free and open source projects are characterised by innovative coordination, strong interpersonal relationships and flat organisational structure apart from continuous technical improvisations.

OSS is often defined as a philosophy, with the adoption of an altruistic rationale, shared ideals, near-complete absence of monetary transactions, a common belief system and collective action (Ghosh, 2003). As a concept and paradigm, OSS challenges traditional software development prototypes used by companies. The open source movement has impacted communication, which in turn has impacted work groups and the structure of the organisation itself. Some distinct aspects of the OSS movement are the flexible boundaries of the work groups, unconstrained by the organisation, the existence of globally dispersed virtual communities and the incorporation of development techniques that are in direct contrast to the development techniques employed in close source environments.

There is a growing concern for enhancing creativity and productivity in knowledge-based organisations in technology oriented industries. In this regard, OSS is considered as a successful model for sustainable development. The openness and flexibility of OSS promotes development and presents a unique opportunity to bridge the technological gap at acceptable costs. In recent years OSS projects have attracted commercial collaborators and government agencies that subsist within closed boundaries.

OSS has become an increasingly interesting phenomenon that has had a remarkable impact on the software industry. Its evolutionary development process, ideology and knowledge standards present opportunities for governments and private and public sectors, but, most importantly, it provides a unique opportunity for developing nations to enter the mainstream of global ICT, by implementing OSS (Wong and Sayo, 2004).

This research area is particularly interesting because the success of OSS has demonstrated the viability of an alternate form of software and questions the economies of conventional software development. Apart from being a contemporary subject, OSS also raises interesting questions on the processes and practices that arise as a result of its use. Very little is known about how OSS communities coordinate and develop software in different environmental settings or about the software processes, work practices and organisational contexts that are critical to their success (Bonaccorsi and Rossi, 2003; Bonaccorsi et al., 2006; Credé, 1997; Hippel and Krogh, 2003; Newman, 1999; Norris, 2000). Academic communities, public and private domains that would like to understand the utility and effectiveness of OSS would require grounded models of processes and practices of OSS development groups to allow them to successfully invest their limited resources.

Prior studies on OSS

Emergent work on OSS has focused largely on understanding only certain socio-behavioural aspects of the OSS movement. There is little or no comprehensive elaboration on the complete framework of social networks and cognitive processes and very little empirical data that examines the antecedents of OSS ideology. Extensive research has been carried out on the motivational aspects of OSS; for example, researchers (Lakhani and Wolf, 2003) have studied the extrinsic and intrinsic motivational factors of individuals contributing to the creation of OSS. Other scholars such as Yunwen Ye and Kouichi Kishida (Ye and Kishida, 2003)

have analysed the motivation behind the participation of volunteers that contributed to the success of OSS. Vast literature is also available on the usability of OSS and the OSS movement. Nichols et al. (2001) have conducted a usability study of the open source Greenstone Digital library software, within the social context and have discussed the characteristics of the influence of OSS development on the resultant software products. This study has identified developer knowledge, developer bias, interaction style and documentation as the underlying causes of issues in the usability of OSS. While some other researchers (Shah, 2006) have tried to understand voluntary participation and contribution in software development communities, Nicholas et al. (2001) have identified two types of participating groups – one group driven by the need to create better software and improvise on it with the desire to benefit from the potential and subsequent improvements and another group that undertake tasks largely unrelated to their own needs. Efforts have also been made to understand the utility of OSS in government sectors. For example, an analysis of the use of OSS in the US Department of Defense (Bollinger, 2003) has suggested that OSS plays a critical role in the area of infrastructure support, software development, security and research and has also suggested that banning OSS would have a negative impact on the ability of sensitive and security focused groups and would make the Department of Defense vulnerable to cyberattacks. What is recommended by this study is the creation of a safe OSS list, development of generic, infrastructure and security and research policies to promote the broader and effective use of OSS.

In the context of the digital divide in India, very little literature is available on the role of the OSS. One of the few studies available suggests the integration of a wide range of free compiler and developer tools in the system to ensure the availability of software to the masses (Raisinghani, 2003). This study deals with the problem that the lack of graphic user interfaces would make it difficult for beginners to use a particular OSS, such as Linux, but recommends that the use of other free software with the existing open software would meet specific requirements, making it available to academic sectors too. Country specific studies have also been carried to understand the implications of OSS at the macro level; for example, a study of free software in Europe examines OSS from an economic and social perspective (Palmer, 2001) and recommends the extensive use of OSS as it would offer a sustainable approach with higher dynamics and increased efficiency, pivotal in making Europe a leading force in the Information Age.

Ethical hacking and OSS

For organisations, the best way to evaluate threats from intruders would be to employ computer security professionals to break in to computer systems to improve the security. Such testing processes are referred to as 'ethical hacking' (Palmer, 2001). Ethical hackers use the tools and techniques of intruders but do not engage in the destruction of the system or misuse of data. They simply evaluate the security of the systems, report on vulnerabilities and provide instructions on how these vulnerabilities can be remedied (Palmer, 2001).

The core elements of the early 'hacker ethic' emerge from this point and include the creative use of technology, the inclination towards reverse engineering and a curiosity to explore systems (Taylor, 2005). As generations of hackers have evolved, they have diverged and have taken on different interpretations of what it is to be a hacker, that is, the hacker identity.

The open source movement is shaped by the original hacker values. Raymond (Raymond and Enterprises, 2012) dates the origin of the hacker culture to 1961, in the MIT computer laboratories, where the name 'hackers' was first used. He emphasises that the 'programmer culture', known later as the' hacker culture', gave rise to interactive computing and, more importantly, established a new tradition of software programmers who push the limits of the doable. In this context, open source developers channelise their interest in the creation of software artefacts and have evolved a complex process that is not only reliable and flexible but also ensures the quality of the end product. They are governed by an unwritten set of rules, at the heart of which is the 'hacker ethics', that is, to promote free software. (Mackenzie et al., 2002). Moody, in his book entitled 'Rebel Code' (Moody, 2002), suggests that OSS development can be characterised by attributes such as freedom, openness and community. Pekka Himanen, in his book 'The Hacker Ethic' (Pekka, 2001), also identifies factors such as freedom, passion and openness as central to the hacker community.

OSS in India

OSS plays a significant role in developing countries such as India. The impact of OSS is realised in its adoption by individuals, government organisations, businesses and educational institutions. In India, government organisations have introduced policies for the use and

development of OSS. India's growth in the software sector suggests that it is becoming more successful in the global software market, with a need for drives to enhance the potential for software development.

The most significant reason for the adoption of OSS in India is the reduction of costs. These include (a) Licence costs, the costs of purchasing licences or purchase of software. There are also costs attached in the upgrade of licences when commercial software is upgraded to newer versions. (b) Service costs, that refer to the cost of the acquisition of internal and external support for the maintenance of software. This cost is particularly significant for organisations acquiring and using specific software for the first time. (c) Distribution costs that occur during the distribution of software within the organisation as some licences prevent the distribution of software. Using OSS presents significant advantages in this respect as they can be easily shared and are not governed by copyright agreements. The other important factor is performance improvement – organisations using OSS use it for operational ease and maintenance. Scalability is another factor. Organisations use OSS for scaling up their operations, which are facilitated by the lack of copyright and the ease of distribution of OSS. Organisations are also attracted to OSS for their security features, particularly for the use of desktop. Finally, the absence of vendor lock-in, that is, organisations are not locked in with a single vendor, is yet another factor that attracts organisations in developing economies, such as India, to adopt OSS (De, 2009).

Implications of the adoption of OSS

As this area of research is relatively new, we suggest that the distinct identification of the behavioural factors that trigger FOSS development, production of evidence to illustrate how specific behavioural patterns in OSS development influences its effectiveness, is critical for developing countries such as India. The resultant understanding of the behavioural factors that foster OSS productivity could be utilised in understanding if socio-behavioural environments that promote the growth of free and open source could be artificially created in transition countries.

At the 'micro level', grass root OSS groups could be created; for example, The IT@School project of Kerala suggests that adoption of OSS is feasible and productive. The project involved training teachers and students to create small developer groups to use OSS and to develop OSS further. The project resulted in benefits to education apart from cost savings.

At a 'meso level,' it is possible to generate value through capacity building in the software sector, using OSS. This can occur through the development of IT skills in the software sector as well as the adoption of OSS business models in the private sectors. OSS would enable developers in building software skills through ethical hacking and could also improve the development of basic skills through the inclusion of OSS in the educational sector. Such an initiative could lead to the adoption of the OSS business models by private firms, and through the enhancement of developer skills, would enhance the brand value of the IT industry in India, creating a better market for software and hardware exports, while keeping the cost of investments low.

At the 'macro level' OSS needs to be strategically introduced through the creation of an enabling environment. This can occur through the development of policy frameworks, OSS advocacy, localisation of OSS at the state level and making IT skills available. If government departments across India adopt OSS, the benefits can be leveraged effectively. The adoption of OSS has to be driven by policy developments, where software acquisition by government departments must consider OSS based technologies as a viable alternative and requests for software licences and products should include OSS products and services. OSS needs to be

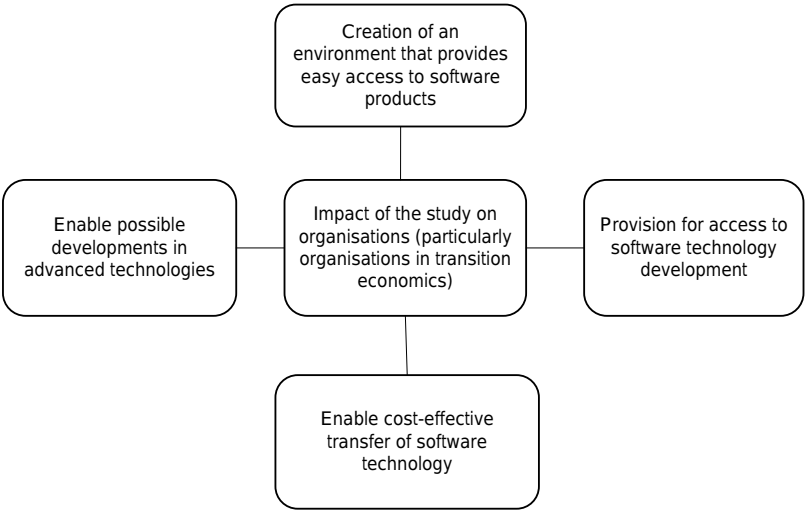

Figure 8.1 The implication of OSS at the organisational level

viewed not just as a product choice but as a strategic initiative for the production, flow and development of high quality IT.

OSS implications at an organisational level

The potential impact on organisations, through the use and development of OSS is as seen in Figure 8.1.

Through examining OSS development at an organisational level, it is possible to focus on the provision of OSS services for software development, advances on related technologies, provision for support and maintenance through easy access to software products and enabling cost effective transfer of software technologies. For the success of OSS, at an organisational level, the IT infrastructure and skill development within the organisation needs to be high.

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Section III

Policy and Practitioner Implications

9

Effects of ICT Development on Economic Growth in Emerging Asian Countries

Anupam Das, Syeed Khan, and *Murshed Chowdhury*

Introduction

One of the prominent characteristics of well-performing developing economies is the large-scale economy-wide diffusion of information and communication technologies (ICT). ICT diffusion, through increased Internet and mobile cellular phone subscriptions, can positively affect economic growth (Sassi & Goaied, 2013; Khayyat et al., 2014; Shahiduzzaman & Alam, 2014) in three different ways. First, it can assist economy-wide technology diffusion and innovation. Second, it can improve the quality of decision making by economic agents. And finally, it can raise the output level by creating demand for goods and services and by lowering costs of production (Vu, 2011). Waverman et al. (2005) argued that an average of 10 additional mobile phones per 100 people would increase per capita GDP growth by approximately 0.59 percent in the low income countries. Although the development of ICT infrastructure has been a major challenge, there is a considerable rise in the number of Internet and mobile users in many developing countries in Asia. The number of mobile subscriptions in most of these countries has gone up from a mere 0 to 50 per 100 inhabitants from 2000 to 2012. In few cases such as China, India and Sri Lanka, these numbers are as high as 80.76, 69.92 and 91.63, respectively (ITU, 2014). Interestingly, the number of mobile subscriptions in many Asian countries such as Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand exceeds their respective total population.[1] Table 9.1 shows the rising trend of mobile subscriptions in Asian emerging countries from 2000 to 2012. Overall, the developing countries from this region have seen the fastest growth in ICT with 6 out of the 25 top performers on ICT Development Index coming from the Asia-Pacific region.

Table 9.1 Mobile phone subscribers (per 100 people) in selected emerging countries from Asia

	Year												
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Bangladesh	0.2	0.4	0.8	1.0	2.0	6.3	13.2	23.5	30.2	34.4	45.0	55.2	62.8
China	6.7	11.2	15.9	20.7	25.6	29.8	34.8	41.0	47.8	55.3	63.2	72.1	80.6
India	0.3	0.6	1.2	3.0	4.7	8.0	14.5	20.2	29.5	44.1	62.4	73.2	69.9
Indonesia	1.8	3.1	5.1	8.5	13.7	20.9	28.0	40.4	60.0	68.9	87.8	102.5	114.2
Korea	58.3	62.9	69.7	72.1	78.2	81.5	85.0	93.3	95.3	99.5	104.8	107.7	109.4
Malaysia	21.9	30.9	37.1	44.7	57.6	75.6	73.9	87.1	101.5	108.5	119.7	127.5	141.3
Pakistan	0.2	0.5	1.1	1.6	3.2	8.1	21.5	38.3	52.7	55.5	57.3	61.8	67.1
Philippines	8.3	15.3	19.0	27.3	39.1	40.5	49.1	64.5	75.4	82.3	89.0	99.1	106.5
Singapore	70.1	74.4	80.1	84.1	91.2	97.5	103.8	125.2	132.3	138.7	145.4	150.1	152.1
Sri Lanka	2.3	3.5	4.8	7.1	11.2	16.9	26.9	39.3	54.2	79.2	83.6	87.6	91.6
Thailand	4.9	12.0	27.4	33.5	41.4	46.5	60.9	80.2	93.4	99.5	108.0	116.3	127.3

Source: ITU (2014)

Concomitant to these changes, developing and emerging countries from South East and South Asia have also experienced remarkable economic performance in recent years. Average growth rates of the developing countries from this region are 8.8 percent and 6.6 percent, respectively (World Bank, 2014). While the existing literature provides sufficient evidence on the positive contribution of the ICT in enhancing economic growth in developed countries (Kraemer & Dedrick, 2001; Colecchia & Schreyer, 2002; Jalava & Pohjola, 2002, 2008; Yousefi, 2011), the relationship between ICT and economic growth in developing countries is far from conclusive.[2] The purpose of this chapter is to analyze the role of ICT development on growth in Asian countries. Specifically, we examine the impact of mobile phones and Internet penetration on GDP growth in 11 outperforming countries from this region,[3] which are characterized as emerging and most outward looking in terms of policies adopted toward better management of productions and markets. Selection of these countries is motivated by their average growth rates and vigorous ICT policies to achieve microeconomic efficiency, growth, and advancement toward development.

From the methodological perspective, this investigation was conducted using the following steps. In the first step, we provide two case studies to shed light on individual country-specific strategies and outcomes that are related to ICT policies. Country-specific studies were conducted to examine the heterogeneous institutional and policy level changes made by the countries that play a crucial role in expediting the process of ICT-related diffusion and management of ICT growth. Hence, these case studies help us understand specific ICT-related activities rather than just analyze broad econometric results. Specific activities are difficult to capture in a panel data analysis because of data limitations. To ensure our countries were heterogeneous enough to make common policies generalizable, we selected one country (Korea) from the high ICT user group and another (Bangladesh) from the moderate ICT user group (see Table 9.2 for common policies for different groups of countries). Second, we constructed a panel dataset over the period from 2000 to 2012 to evaluate the overall impact of ICT on economic growth of the 11 selected Asian countries. Third, the well-known Fisher panel unit root test was applied to check for stationarity of macroeconomic variables. Finally, we used the system-generalized method of moments (*system*-GMM) technique, which is an information-efficient means for obtaining consistent coefficient estimates (Blundell & Bond, 1998).

The rest of the chapter is organized as follows. Section 2 discusses the existing literature on the relationship between ICT development and

economic growth and the common ICT policies of the emerging Asian countries. Section 3 presents two specific case studies. Section 4 provides a discussion on the econometric methodology used in this chapter. Section 5 presents and analyzes the empirical results. Section 6 provides the conclusion.

Literature review

The ICT-growth nexus

Despite the conventional belief that ICT investment affects output positively, the role of ICT in enhancing economic growth is not clear in the literature. Researchers have used different estimation strategies and different countries to examine this relationship. Unavailability of sufficient time series data has always been a problem for researchers to conduct country-specific studies. This is particularly true for developing countries since the earliest data on ICT is only from the late 1980s. Hence, researchers have had to wait until recently to have an acceptable sample size in order to undertake time series estimations. Using a Granger causality framework for six ICT leading countries from Europe (Sweden, Iceland, Denmark, Finland, Luxembourg, and Switzerland), Khalili et al. (2014) found unidirectional causality running from ICT to economic growth in the long run over the period 1990 to 2011. Shahiduzzaman and Alam (2014) found that ICT investment had a significantly positive impact on output, labor productivity, and technical progress in Australia, although the contribution of ICT capital has slowed down in recent years.

Because of the insufficient data points, most of the research work had to use different panel techniques in order to study the ICT–growth nexus in developing countries. Kraemer and Dedrick (1994) found a positive relationship between ICT investment and economic growth in a panel of 12 Asia Pacific countries from 1984 to 1990. Similar results were found by Pohjola (2001) for a set of 23 OECD countries. A number of research papers claimed that the growth effect of ICT in developing countries is statistically insignificant. Lee et al. (2005) employed an augmented neoclassical model and found a positive contribution of ICT investment in developed and newly industrialized countries (NIEs), but an insignificant relationship in developing countries. Similarly, Dewan and Kraemer (2000) could not establish the beneficial effects of ICT investment in developing countries. Such an insignificant nature of the relationship may be due to the fact that the rapid accumulation of ICT eliminates unskilled workers and excludes poor people from the labor

market in developing countries (Aghion & Howitt, 1998). Hence, the aggregate macroeconomic effect was not discernible.

Dimelis and Papaioannou (2010) used the GMM approach and found that the growth contribution of ICT was stronger in developing countries than that of developed ones between 1993 to 2001. According to their results, 1 percentage point growth in ICT investment caused 0.24 and 0.12 percentage point growth in output per worker in developing and developed countries, respectively. In a similar study, Yousefi (2011) used a panel of 62 countries and found a positive impact of ICT investment on economic growth in high-income and upper-middle-income countries from 2000 to 2006. The size of the estimated coefficients varies from 0.22 for high-income countries to 0.35 for upper-middle-income countries. ICT investment could not produce any statistically significant growth impact in lower middle-income countries.

One important caveat of the existing literature is a lack of data on private sector investments in ICT. Hence the literature mainly focused on public sector initiatives. Recent studies have attempted to overcome this limitation by using the data on ICT penetration as a proxy for ICT development. Different indicators including the number of personal computers and Internet, in-land telephone, and mobile phone subscriptions have been used to measure the penetration of ICT. For a set of 102 developed and developing countries, Vu (2011) found that the marginal effect of ICT penetration on growth in 2000 was 0.02, 0.03, and 0.08 for personal computers, mobile phones, and Internet users, respectively. Sridhar and Sridhar (2007), however, employed a dataset of 63 developing countries from 1990 to 2001 and argued that a one percentage point increase in the number of mobile phone subscriptions could increase the growth rates of GDP by 0.025 percentage points, while a single percentage point rise in the subscription of landlines could increase GDP growth by 0.016 percentage points.

For the last one decade, there has been a tremendous rise in the number of mobile phone and Internet subscriptions in developing countries. During the same period, the total number of land-phone users has gone down significantly. Therefore, instead of land-phones, subscriptions to mobile phones and the Internet were used as measures of ICT development. In a recent study, Sassi and Goaied (2013) conducted a regional study using the data from 17 countries from the Middle East and North Africa from 1960 to 2009 and argued that the ICT penetration (Internet, telephone, mobile) had a significant and positive causal effect on economic growth.[4]

Most of the papers discussed above do not take into account the simultaneity issue that may arise from econometric estimations on ICT development and economic growth. While ICT development can affect the economic growth of a nation, the reverse causality is also a possible outcome. Statistical methods can produce dubious results if reverse causality is not taken into account. In summary, the existing literature has two major shortcomings: (1) improper selection of the dataset and (2) methodological deficiency. Our study aims to overcome these issues and analyze the ICT–growth nexus for a set of emerging Asian countries, which not only experienced high rates of economic growth but also undertook vigorous ICT policies in the last two decades. Some of the important policy measures of these countries are explained below.

ICT policies in emerging Asian countries

Most of the emerging countries from Asia have undertaken ICT policies in the last 15 years. While South Asian countries introduced ICT policies in the late 1990s or early 2000s, countries from the South Eastern region pioneered these policies by the early 1990s. By the late 1990s or early 2000s, developed countries had already started enjoying the benefits of the rapid diffusion of ICT (Dahl et al., 2011). During the same time, the use of ICT in emerging countries at different levels was very limited. For example, in the year 2000, the number of Internet users in the Netherlands and United States were 47.38 percent and 43.08 percent of the total population, respectively, while the same number for India was only 0.53 percent (ITU, 2014). The governments of the developing nations immediately recognized the potential gains from ICT use for the purpose of economic development and formulated policies that laid emphasis on creating a reliable infrastructure to manage and operate the public and private sectors efficiently. In Table 9.2, we divide the countries into two groups, based on the level of ICT penetration. The first panel of the table presents the common policies implemented by moderate ICT user countries, while the second panel presents the common policies of the high ICT user emerging countries in Asia. It is evident from Table 9.2 that the countries took extensive measures for ICT penetration through decentralizing ICT growth outside the capital, extending mobile and Internet networks outside urban areas, providing financial incentives to help the ICT industry, bringing secondary schools within Internet connectivity, and creating policies to encourage large capital investment. New incentives, including tax breaks and reduction of duties, were created to develop the domestic software industry and import ICT products such as mobile phones.

Table 9.2 Common ICT policies in Asian emerging countries

Country	Year (initial ICT)	Year of revised ICT policy	Common ICT policies
			Moderate level of ICT use
Bangladesh	2002	2009	• Decentralize ICT growth outside the capital
China	2001	2011	• Ensure ICT literacy for all public service
India	1998	2012	• Accelerate the construction of broadband networks in rural areas
Indonesia	2001	2010	• Improve Internet and IP telephony services
Pakistan	2000	2012	• Provide financial assistance to ICT professionals for skill development
Philippines	1994	2011	• Encourage e-commerce, e-payments, and e-transactions
Sri Lanka	2005	2014	• Develop strong marketing, promoting, and branding countries' ICT production and their services in the global market
Thailand	1996	2011	• Financial incentives to help the players in the ICT industry to compete internationally • A framework for better protection of intellectual property • Government organizations should attempt to provide as much as information and services through mobile platform • Most schools will be serviced with broadband connectivity • Ensure that most universities provide global standard ICT education
			High level of ICT use
Republic of Korea	1996	2006	• By providing high bandwidth communications, a company's engineers, designers, and marketers could collaborate in real-time even if they work in different countries
Malaysia	1996	2011	• Through technology such as video-conferencing, sharing of multimedia documents, and email • Construction of high quality infrastructure, from information super highways to state-of-the-art telecommunications and high-speed broadband connections • Construction of broadband wireless cities
Singapore	1980	2006	• Accelerating the use of ICT in primary schools • Universities and government funded organizations are offering free ICT training or if not, with a minimal fee • Government gives large amounts of its annual budget to Internet connectivity of rural schools

Sources: Government of the People's Republic of Bangladesh (2009); Government of India (2012); Government of Pakistan (2012); Commission on Information and Communications Technology (2011); Ministry of Science and Technology (2011); UNCTAD (2006); Hong (2011); Amiri et al. (2013).

Within a few years, emerging economies achieved remarkable success in ICT diffusion. In China, the percentage of individuals using Internet increased from 1.78 in 2000 to 16 in 2007. During the same period, the subscriptions to mobile phones per 100 individuals increased from 6.66 to 41.02. After the initial success, most of the countries faced legal issues related to privacy policies of ICT use and business development through ICT. Under the circumstances, the countries revised their respective policies, in which they aimed to ensure cyber safety of consumers and build the infrastructure for real-time transactions to facilitate e-businesses. Other policies were created to enhance the level of ICT education in elementary schools. Despite inherent differences in the pace of digitization among different countries, ICT policies in emerging countries were able to achieve remarkable progress in the diffusion of ICT.

ICT policies in Korea and Bangladesh: country case studies

ICT development in Korea

The Republic of Korea is considered as one of the success stories of how ICT development transformed an agricultural economy into a big economic power. The development of the ICT sector in Korea can broadly be divided into five phases (RTR, 2006). In the first phase, Korea designed the first national information technology (IT) plan with the objective of building IT infrastructure to support key areas including public administration, defense, finance and education, which eventually facilitated the delivery of services such as issuance of certificates, public announcements, reports and statistics (RTR, 2006: 61). All these services were made available online reducing the processing time of public services. The main focus of the second phase of ICT development in Korea involved a massive government investment to build the Information Super Highway, which enabled the citizens to enjoy high-speed Internet services at a cheaper rate. In the third phase, Korea established a master plan, Cyber Korea 21, under the E-Government Initiatives. The World Bank Information Solution Group report states that, ". . .CYBER KOREA 21 was one of the most important policies to cope with the changing environment as a result of the Asian financial crisis. Through these plans, Korea came one step closer to a knowledge-based society with the construction of an advanced information infrastructure, the introduction of various information systems in public services and in the private sector, as well as growth in the overall IT industry" (World Bank, 2004).

With the success of the earlier phases of ICT development, the fourth phase focused on the advancement of the already developed technology. The number of both broadband and mobile subscribers rapidly increased, while renewed efforts to build new technologies continued. Currently in the fifth stage, ICT has become an essential part of the Korean society. "The changing face of the ICT environment is leading toward a society where intelligent sensors and devices can network with each other and humans to create a "'ubiquitous world' bringing with it new opportunities for human development." (RTR, 2006: 65).

Digitization in Bangladesh

Bangladesh is currently lagging behind in the technological capacity of its government. However, recognizing the importance of ICT development and digitization, the current Government of Bangladesh has expressed a desire for digitization in the current development plan, 'Vision 2021' and outlined a plan to digitize the country by 2021.

The first ICT policy came into effect in Bangladesh in the year 2002. The prime focus of this policy was to build the infrastructure for ICT. However, only 8 out of the 103 policy directives were largely accomplished. While 64 were partially accomplished, 34 remained totally unaddressed (BEI, 2010). Since 2009, the present government, led by the Bangladesh Awami League, has pledged their commitment to building a 'Digital Bangladesh' and undertaken a series of projects to deliver efficient services to the citizens. Both mobile phones and the Internet are playing important roles in providing the desired services to the citizens. Key sectors, such as public administration, health and education have already experienced significant digitization in last few years. As the BEI (2010) report discusses, most ministries have completed the automation and infrastructure development projects successfully. In order to encourage e-commerce, the central bank of Bangladesh has introduced the online e-payment gateway. Mobile phones are used to obtain medical advice from doctors on a 24/7 basis in case of emergency and to disseminate health care information. Using the Internet services, health-related statistical information is now managed online. Both mobile phones and the Internet are now used to circulate public examination results. E-books have been made available online for all public schools. Students can now register online for participating in public examinations. Some public institutions even provide online admission systems to their students. Considerable internal automation has taken place in the education sector in the last five years. These projects include establishment of

computer labs in educational institutions, development of multimedia contents for students, and self-learning multimedia teachers' training materials (BEI, 2010: 19).

Unlike Korea, the role of the private sector in ICT development in Bangladesh is rather sporadic. A few non-governmental organizations (NGOs), however, have been making important contributions to poverty reduction with the help of ICT initiation. One example is the Village Phone (VP) program, which was developed by an NGO called the Grameen Telecom (GTC) in collaboration with the microcredit facilities of the Grameen Bank. In this program, mostly women villagers were provided with small loans to buy mobile phones that helped them to collect important information for their businesses and, thereby, reduced their dependence on middlemen and created a direct nexus with their clients (World Bank, 2009). Richardson et al. (2000) pointed out a number of benefits of the VP program on poverty reduction. First, it reduced both transaction and transportation cost. Authors estimated a gain in consumer surplus of 2.64 to 9.8 percent of mean monthly household income. Second, because foreign remittance is an important source of earnings in rural households in Bangladesh, the families were able to receive accurate information about exchange rates using mobile phones. Lastly, the VP program also raised the income of the households of the VP operators. Richardson et al. (2000) found that the rise in income was as high as approximately 40 percent in some households of the VP operators.

Similar to Korea and Bangladesh, all the emerging countries from Asia have either developed the ICT sector or are in the process of improving it. Hence, it is expected that such changes will eventually affect the growth rates of the total economy. Nevertheless, the existing literature has not addressed this issue. We aim to fill this gap by estimating the eventual growth effect of ICT development in a set of emerging Asian countries while accommodating other estimation-related methodological issues discussed in the literature review.

Methodology

Behavioral equation

The econometric framework used in this chapter is a modified version of the conventional neoclassical growth model proposed by Solow (1956), in which the real GDP (Y) is a function of labor (L) and capital (K). To accommodate the potential effect of ICT development, we introduce ICT stock (I) as an additional factor input. Hence, the production function takes the following form:

$$Y = f(K, L, I) \tag{9.1}$$

We use two different measures of ICT development: (a) total number of mobile phones (C) and (b) total number of Internet subscriptions (N). Therefore Equation (9.1) can be replaced by the following two equations:

$$Y = f(K, L, C) \tag{9.2a}$$

$$Y = f(K, L, N) \tag{9.2b}$$

Assuming Equations (9.2a) and (9.2b) to be linear, taking logs and differencing, the following equations explain the determinants of the GDP growth:

$$y = \alpha + \beta_1 k + \beta_2 l + \beta_3 c \tag{9.3a}$$

$$y = \gamma + \delta_1 k + \delta_2 l + \delta_3 n \tag{9.3b}$$

where lower case letters denote the growth of individual variables, and β_1 and δ_1 are output elasticities of investment, and β_2 and δ_2 are output elasticities of labor. β_3 and δ_3 represent output elasticities of mobile phone subscriptions and Internet subscriptions, respectively.

Output is generally a highly persistent series (Diebold & Rudebusch, 1989; Bond et al., 2001). To accommodate this, we incorporate the lagged growth rate (y_{-1}) as an additional regressor. Therefore, the behavioral equations take the following forms:

$$y = \alpha + \beta_0 y_{-1} + \beta_1 k + \beta_2 l + \beta_3 c \tag{9.4a}$$

$$y = \gamma + \delta_0 y_{-1} + \delta_1 k + \delta_2 l + \delta_3 n \tag{9.4b}$$

where both β_0 and δ_0 represent the coefficients of the lagged growth rate of GDP. The above equations are estimated using a panel of 11 emerging Asian countries for the period 2000 to 2012. Additionally, to accommodate the potential effect of population growth, we replace GDP growth (and lagged GDP growth) with per capita GDP growth (and lagged per capita GDP growth, *ypc*) in equations (9.4a) and (9.4b), and estimate the effects of ICT development on per capita GDP growth.

$$ypc = \alpha + \beta_0 ypc_{-1} + \beta_1 k + \beta_2 l + \beta_3 c \tag{9.5a}$$

$$ypc = \gamma + \delta_0 ypc_{-1} + \delta_1 k + \delta_2 l + \delta_3 n \tag{9.5b}$$

Table 9.3 Average growth rates in selected emerging countries from Asia from 2000–2012

Countries	Average GDP growth
Bangladesh	5.93
China	10.03
India	6.97
Indonesia	5.38
Korea	4.30
Malaysia	5.08
Pakistan	4.10
Philippines	4.82
Singapore	5.62
Sri Lanka	5.59
Thailand	4.23

Source: World Bank (2014)

While the selection of the time period is constrained by the availability of data, country selection is influenced by average growth rates since 2000 along with rigorous ICT policies in recent years. All these countries have an average growth rate of at least 4 percent from 2000 to 2012 (see Table 9.3) and therefore, following Das and Paul (2011), we categorize these countries as emerging.

Data on both ICT variables are collected from the ICT Statistics published by the International Telecommunication Union (ITU, 2014). Other variables have been collected from the World Development Indicators (WDI) published by the World Bank (2014). Investment is defined as the logarithmic difference of real gross capital formation. Conventionally, an economically active population is used as a proxy for the labor force.[5] The growth rate of this variable is used as a measure of the labor force growth.

Unit root test

Since Equations (9.4a), (9.4b), (9.5a), and (9.5b) have dynamic specifications, an instrumental variable (IV) technique should be employed to estimate these equations. This technique can be used with stationary (at levels) time series variables. However, the presence of unit roots in the time series macroeconomic variables (i.e., non-stationarity) has been widely discussed in the literature (see, e.g., Nelson & Plosser, 1982), in which case a panel cointegration technique is more appropriate than IV.

To find out the level of stationarity, we use the Fisher type test developed by Maddala and Wu (1999). This test assumes that all series are non-stationary under the null hypothesis. Unit root results are presented in Table 9.4.

It is evident from the unit root results that all variables are stationary at levels. Therefore, an IV technique that does not presume non-stationarity can be applied to estimate ICT's effects on economic growth in Asian emerging countries. In this regard, we use the *system-GMM* approach, which is an information-efficient means of obtaining consistent estimates.

Empirical results

Empirical results from estimating Equations (9.4a) and (9.4b) are presented in Table 9.5. All three estimated versions of the growth equation fulfill the Arellano–Bond criteria for valid specification. The Hansen Test does not reject the null hypothesis that the GMM instruments are valid and exogenous. In both models, the coefficient for investment is positive and significant at the 1 percent level. The magnitude of this variable is approximately 0.14 suggesting that, on average, approximately 14 percent of economic growth can be explained by capital formulation in emerging Asia. The lagged growth rate is not significant although this variable always possesses the correct sign. Therefore, output is not persistent in our model. The growth in labor force is significant and negative in the first model but insignificant in the second. Because labor force is proxied by the economically active population, the coefficient should be pondered with considerable statistical error.

Both measures of ICT development are positively significant. The coefficient for the growth in mobile phone is approximately 0.017

Table 9.4 Results from Fisher type panel unit root tests

Variable	Test statistics
Growth of GDP	103.32***
Growth of GDP per capita	85.60***
Investment	152.38***
Growth in labor force	54.34***
Growth in mobile phone	183.95**
Growth in Internet connections	135.82***

Notes: (1) *** implies significance at the 1% level. (2) Null hypothesis is that the series contains unit roots.

implying that 1.7 percent of the GDP growth can be explained by the mobile phone subscription in Asian emerging countries. The magnitude of the Internet subscription coefficient is 0.021. Similar growth impacts for both ICT variables are perhaps due to the fact that the Internet-using population is also using mobile phones for communication purposes. With a voluminous increase of smartphone usage, Internet and mobile phones go hand in hand in today's world.

In order to find out if population growth has any discernible effect, we estimate the econometric specifications with growth rate of GDP per capita as the dependent variable (as defined in Equations 9.5a and 9.5b). The results are presented in Table 9.6. While the coefficient for growth in mobile phone is again 0.017, Internet subscription coefficient is found to be 0.018. Therefore, no major changes in our estimates are apparent due to change in the economic growth variable. This shows the stability of the model specification.

A strong homogenous and significant effect of ICT development on the economic growth of these emerging Asian countries has been evident from the above discussion. In the face of a voluminous increase in ICT-related activities, governments could formulate

Table 9.5 System GMM results for a full panel of 11 emerging Asian countries

Dependent variable: rate of growth of GDP		
Explanatory variable	**Equation (9.4a) coefficient**	**Equation (9.4b) coefficient**
Constant	0.040*** (3.84)	0.037*** (3.47)
Growth of GDP (lagged)	0.243 (1.56)	0.243 (1.68)
Investment	0.137*** (3.89)	0.147*** (3.58)
Growth in labor force	–0.654** (–2.29)	–0.454(–1.65)
Growth in cellular phone	0.017** (2.35)	–
Growth in Internet connections	–	0.021* (2.01)
Arellano-Bond Test for AR(1)	–2.45** (*P*-value: 0.014)	–2.57*** (*P*-value: 0.010)
Arellano-Bond Test for AR(2)	–1.30 (*P*-value: 0.193)	–1.27 (*P*-value: 0.203)
Hansen Test of Over identification Restrictions	4.58 (*P*-value: 1.000)	9.85 (*P*-value: 1.000)
Number of groups	11	11
Number of observations	121	121

Notes: (1) ***, ** and * imply significance at the 1% level, 5% level and 10% level respectively. (2) *t*-statistics are in the parentheses. (3) Instrument variables: growth in food production index (lagged), growth in labor force (second lagged), investment (second lagged), growth in ICT variables (lagged), growth of GDP (second lagged).

Table 9.6 System GMM results for a full panel of 11 emerging Asian countries

Dependent variable: rate of growth of GDP per capita		
Explanatory variable	**Equation (9.5a) coefficient**	**Equation (9.5b) coefficient**
Constant	0.047*** (4.04)	0.044*** (3.44)
Growth of GDP per capita (lagged)	0.222 (1.29)	0.225 (1.40)
Investment	0.124*** (3.74)	0.133*** (3.37)
Growth in labor force	–1.488*** (–4.81)	–1.270*** (–3.84)
Growth in cellular phone	0.017** (2.62)	–
Growth in Internet connections	–	0.018** (2.23)
Arellano-Bond Test for AR(1)	–2.36** (*P*-value: 0.018)	–2.46** (*P*-value: 0.014)
Arellano-Bond Test for AR(2)	–1.24 (*P*-value: 0.214)	–1.21 (*P*-value: 0.226)
Hansen Test of Over identification Restrictions	6.87 (*P*-value: 1.000)	8.27 (*P*-value: 1.000)
Number of groups	11	11
Number of observations	121	121

Notes: (1) *** and ** imply significance at the 1% level and 5% level, respectively. (2) *t*-statistics are in the parenthesis. (3) Instrument variables: growth in food production index (lagged), growth in labor force (second lagged), investment (second lagged), growth in ICT variables (lagged), growth of GDP per capita (second lagged).

policies in order to achieve higher economic growth. As investment is highly significant, a certain portion of the investment can be guided toward ICT development, which will enable these countries to enjoy complementary growth impact from both investment and ICT development.

Conclusion

In this chapter, an attempt is made to examine whether the high diffusion of ICT in the emerging Asian countries leads to higher economic growth. The study begins with a critical analysis of various ICT policies adopted by this region. We found that most of these countries started to adopt ICT policies in the last 15 years and achieved remarkable success. Two countries, Korea and Bangladesh, were chosen for country-specific case studies. In Korea, policies covered government initiation of IT infrastructure development, massive government-led investment to build the information super highway, engulfing all government-related activities under the e-governance umbrella, and most importantly, building a

knowledge-based society by constructing an advanced information system led by both the private and public sector.

Formal development of ICT policies is rather a recent phenomenon in Bangladesh, which suffered from non-existence of the much-needed holistic and centralized approaches for a quicker and sustainable success of the sector. The present government has come up with such initiatives by launching the 'Vision 2021' in 2009 to digitize the country. The success of this vision is yet to be realized and hence not available for detailed research. However, key policies of Vision 2021 include digitization of the public sector. Key sectors of the government including health and education have already experienced significant digitalization.

We then conducted econometric analysis to reveal the impact of ICT development on economic growth of Asian emerging countries. Our results show a positive association between ICT diffusion and economic growth for this region. Approximately 2 percent of the total economic growth could be explained by the growth of mobile subscriptions. Internet diffusion also revealed similar growth impact for this region. Results remained similar and consistent even after adjusting for population growth. It can thus be argued that ICT development is imperative for economic growth in these countries. It has also been observed, especially from an analysis of the ICT policies of various countries, that government-led policy initiatives are key to the development of the sector. In future, if these countries want to benefit from the sector, a private–public partnership building along with guided investment toward this sector would be a key to success.

Notes

1 This simply suggests that one individual owns multiple cell phones, which makes the number of mobile phone subscribers larger than the total population.
2 See Andrianaivo and Kpodar (2011), Yousefi (2011) and Lee, Gholami and Tong (2005).
3 Bangladesh, China, India, Indonesia, Korea Republic, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, and Thailand
4 The results may suffer from sample selection issue as the number of Internet and mobile phone subscribers are on the rise from the late '80s or early '90s. Hence, we believe that any dataset starting from 1960 may produce spurious empirical results.
5 See Das et al. (2012). Economically active population is the number of people of working age (16–65 years old) who are either in work or are looking for work.

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10

Digital Divide, Digital Ethics, and E-government

Subhajit Basu

Introduction

Despite unprecedented increase in overall opulence, the contemporary world denies elementary freedoms to vast numbers – perhaps even the majority – of people. The important issue here is technological progress. Technology's influential relationship with society arguably reaches back to the beginning of human history. With regard to the history of technology, a number of authors believe that the development of human organisation from the Eolithic Age to the Information Age is directly related to the development of technology. As human dependency on technology has evolved, so have attitudes towards technology. In modern times, technology has tacitly been connected to the notion of progress. Arguably, in a global perspective adoption of a particular technology (it could be any technology) is a matter of affluence. Forerunner countries like the United States and western European countries are also leading nations with regard to economic performance. The more developed a country is in economic terms, the more the number of people who can afford and who need to rely on available technology in their daily business. In the last decade, we have seen that the wealthier economies have experienced a shift from industrial goods production to a service economy relying on the creation and processing of information and on knowledge workers who are skilled in the more advanced technology. The concept of the 'digital divide' is based on the hypothesis that there are both 'information-haves' and 'information-have-nots' in the Internet Age, and that the basis for that division may include any or all of such demographic characteristics as age, gender, income, education, ethnicity, region, and locality. From a public policy perspective, the questions about this hypothesis are (1) Is it true? and

(2) Does it matter? This chapter will critically analyse the digital divide from a socio-legal perspective.

The concept of access and the digital divide

In its simplest formulation the digital divide is thought of as the gap between those who have access to the Internet and those who do not. It is argued that this straightforward simple distinction between the 'information rich' and 'information poor' fails to consider the range of different positions. It lacks sufficient 'sociological sophistication'; hence, it is inadequate, and much of the surrounding debate remains conceptually oversimplified and theoretically underdeveloped. In reality the digital divide represents a multi-faceted problem (Celli and Dreifach, 2002) that encompasses a wide spectrum of disparities and differences based on race, gender, age, income, education, and type of household, geographic location, physical abilities, and the level of economic development. A more sophisticated formulation recognises that all types of access to the Internet are not similar. Instead, access must be qualified by the bandwidth available, and where, when, and for how long the connections are sustained (Pelletiere and Rodrigo, 2000). The debate regarding the effectiveness of using ICT to help achieve development goals arises not only around questions concerning the evidence in support of the relationship between ICT and development but also more substantially from inherent doubts about the relevance of ICT in achieving sustainable development and fears that investment in ICT will draw resources away from traditional development goals. Instead, ICT can be a powerful tool for development, both because of their inherent characteristics and the mounting empirical evidence that suggest they can, in fact, contribute a great deal to development goals.

In economic terms the Internet cannot be understood simply as a physical infrastructure network that lowers the cost of information transfers. It is also a network of people and information (Pelletiere and Rodrigo, 2001). This has three further implications. First, gaining access to information on the network requires more than mere physical access to the Internet. The idea that the Internet embodies a technocratic belief in the progress of humans through technology (Castells, 2001) has at its heart a faith in the higher education system. Insufficient knowledge about how to identify the information needed, inadequate searching and sorting skills, or general deficiencies in education can pose significant barriers to effective use of Internet-based information sources. Increasingly, the ability to purchase membership or pay for access is

becoming an important barrier to information and services. Second, the benefits of information flow and the associated costs of the system cannot be expected to balance automatically. While some use the network to buy, others use it to sell; while some provide information, other consume it; while some engage in fraud, others are victimised by fraud, and so on. Finally, many of the 'benefits' of the Internet continue to have physical manifestations: goods are delivered to the door, communication online leads to face-to-face encounters, and information delivered online leads to a different course of action 'offline'. These types of 'real world' results may have non-trivial costs just as they did before the onset of Internet use. Therefore, in order to adequately address the problems generated by the digital divide, it is necessary to highlight not only issues of access but also the incidence of costs and benefits associated with this access for individual users (Pelletiere and Rodrigo, 2001). It would, therefore, seem reasonable that we attempt to move beyond the prevailing notions of a dichotomous 'digital divide' and 'access to ICT' towards a more elaborate and realistic understanding of inequalities in the information age.

The potential benefit from the ICT revolution is well documented. However, the question is, what will the universal spread of information technologies do for the poor majority population of the developing countries? What will this spread do to the poor? It is important, therefore, not to conflate 'access to ICT' with 'use of ICT'. This presumption is at the heart of conventional notions of the digital divide and is reinforced by the determinist belief that access to ICT inevitably leads to use. We should recognise that access to ICT does not denote use of ICT. Similarly, 'use of ICT' does not necessarily entail 'meaningful use of ICT' or what could be termed as 'engagement' where the 'user' exerts a degree of control and choice over the technology and its content, thus leading to a meaning, significance, and utility for the individual concerned (Silverstone, 1996). The argument that the 'natural' diffusion (or 'trickle down') would reduce the widespread inequalities in the use of ICT, that it is only a passing phase of technological adoption, and that, in the long term, the only people not using ICTs will be 'information *want nots*' – who for ideological reasons choose not to engage with ICT despite being able to in practice (Van Dijk, 1999) – does not hold true for developing countries (Selwyn, 2003). Whether the global digital divide will be eventually bridged will depend on how the international community resolves the political issues of who governs the cyberspace and on what terms. It also depends on whether the stronger, developed countries would impose rules on the weaker, less-developed countries. Some

analysts regard the international harmonisation of laws as the only way to meet the challenges of global digital divide. A democratic platform and a predictable, transparent, and non-discriminatory regulatory environment are necessary for the development of a global information society. Hence, when devising the regulatory environment, members of the international community should pay special attention to the needs and constraints of the less-developed countries, the socially underprivileged.

E-government for development

The potential of e-government as a development tool hinges upon three prerequisites – a minimum threshold level of technological infrastructure, human capital, and e-connectivity – for all. However e-government readiness strategies and programmes will be effective only if, at the very minimum, all have functional literacy and education, which includes knowledge and having access to a computer and the Internet. Conceivably, e-government creates greater equality by offering common access to all resources for all citizens. It is argued that the key word in e-government is not electronic, but government. E-government should be regarded as an alternative and complementary approach to government administration and service delivery as well as a means to redefine the way it interacts with citizens and the private sector. Although there is no single established way, no 'best practice' that would lead to successful e-government, the development of e-governments is directly proportional to the IT infrastructure that is capable of supporting and enabling the execution of e-government. An e-government infrastructure, in general, comprises network infrastructure, security infrastructure, application server environment, data and content management tools, application development tools, hardware and operating systems, and systems management platform. However, many developing countries do not have the infrastructure necessary to deploy e-government services throughout their territory.

The success of e-government initiatives and processes are highly dependent on the government's role in ensuring a proper legal framework for their operation. The key concern for the developing countries would be to identify the legal issues. It would not be difficult to provide definitive guidelines for the developing countries as to what type of legal safeguards would be necessary to protect the interests of the government and to create binding and enforceable obligations on the government. However, the developing countries are in different stages or phases of e-government; they differ in their political aspirations and in their

structure of government, and so their requirements would differ and so would their course of action. The developing countries also face a few key questions in converting to or adopting electronic processes. To start with, the first question that would arise is the question of legitimacy. Legitimacy may express itself through expressions of authority to act, which is related to but not the same as saying that an action is not illegal. In some settings, the legitimacy of government action would affect the enforceability of the action, either on the part of the government against a person subject to that government's rule or on the part of a private citizen against the government. Hence, legitimacy to act electronically can only be conferred by legislative measures and supported by an effective legal framework. This framework should be capable of identifying and addressing legal obstacles to e-government. Legal obstacles may include the differences that exist between traditional data collection requirements (i.e. sharing of information collected by and provided to various government agencies) and the ease of electronically collecting and sharing data. Legitimacy also raises questions on the standards of appropriateness – what kind of qualities should e-government action have or what standards should it meet in order to achieve the desired level of legitimacy. In certain situations, an electronic process would prove to be 'good enough' to meet its legal needs without regard to whether it is comparable to or as good as its prior process. At the other extreme, would be the situation where electronic conversion would require a complete re-engineering of their course of action in order to address the legal risks and issues that a particular system presents or that are not being addressed as effectively in their existing system.

An interesting finding is that the developing countries are very non-homogeneous with respect to technology availability and use, differing by two orders of magnitude. In a developing country, the gap between the educated elite and uneducated poor is wide. The educated population have the necessary resources and have the means to use information and communication technologies. The problem is that this 'digital divide' between those who already have access and those who would not have access for a long time may result in long-lasting and widening economic gaps. As a result, the provision of e-government services would be biased, favouring educated, urban residents. Whilst, in broad terms, the elements for success are already known, their interpretation and application must be invented locally. However, it cannot be stressed strongly enough that if a public administration does cross the 'digital divide', it opens endless opportunities that are practically inaccessible by any other means. There is also a perception that developed countries

may impose a new form of colonialism through e-government on the developing and least-developed countries by connecting their investment and cooperation with the forceful adaptation of specific models of governance or specific patterns of social and political organisation.

Digital ethics in bridging digital divide

The digital divide disempowers, discriminates, and generates dependency. The question is, how to deal with the problem of the digital divide? The politically intriguing idea of implementing a generic and adoptable model for 'bridging digital divide' clashes with the understanding that each country and region has its own peculiarities, constitution, and legal and political framework. The idea is simply unrealistic. It is not a matter of imposing legislative measures or strict regulations or empowering some controlling organisation. Globally all our networks, media consolidation, levelled means of production and access to digital information are moving so fast and being driven significantly by business or a business mentality. Net neutrality is not a given. Privacy is nullified by total information awareness database mentality. If everyone is seen and agrees to be defined as a 'customer' in every dimension of life, who is being served and not served? And who is doing the serving? Who is defining whom? What is really being sent, and what is really being received? How do we make this clear, and how do we learn from the exploitation in prior 'discovery' periods, with the discovery and expansion of the digitised world we are all in now? To what extent can an unequal society remain a just society? Genetics has bio-ethics; our wisdom also demands that we develop technology ethics.

Information society is creating parallel systems: one for those with income, education, and literacy connections, giving plentiful information at low cost and high speed; the other are those without connections, blocked by high barriers of time, cost, and uncertainty, and dependent upon outdated information. Hence, it can be seen that the digital divide is nothing but a reflection of the social divide. The question is, what is the best strategy to construct an information society that is ethically sound? Most people believe that ICT and its underlying ideologies are neutral. This technology has become so naturalised that it can no longer be viewed as anything other than being useful, even when it has the potential to change the critical developmental priorities of a country profoundly. I argue that investment in ICT will not produce growth in developing countries unless it is supported by complementary policies. ICT for development holds very important promises; yet this

is only a belief, and although some do argue that it is quite a credible belief, it still remains only a belief. The divide exists because there is an error both in focus and approach as policy makers in this field started from an erroneous approach and continued working with the logical framework of a previous social paradigm, where a part of society never participated in the decision-making process. I argue that since the digital divide is a problem affecting individuals rather than pre-established whole societies, solutions can be more effective if they are grassroots-oriented and bottom up. What we need is a more balanced approach between promotions of social goals through devices such as universal service obligations and recognising country specific needs (greater voice for developing countries in international regulatory agencies). It is more about proposing policies for promoting national e-strategies in developing countries, prioritising ICT in aid funding, improving connectivity, and building human capacity. One such way could be through technological "leapfrogging" which will enable the developing countries to catch up. As latecomers, developing countries can embrace existing technologies developed elsewhere and skip intermediate stages allowing them to save on considerable costs of development. However, now I feel that there is more to this argument. There is a fundamental duality: technology 'for development' and technology 'in developing' countries. The two streams represent diverse sets of objectives, which are currently being conflated and even used interchangeably. Developing countries need to promote their own technology, as premature standardisation can become impediments to technological innovations in these countries and can be counterproductive.

Information society, as we understand it, is dominated by an arguably narrow range of ideological viewpoints. It poses fundamental ethical problems, whose complexity and global dimensions are rapidly evolving. Technologies are not only tools, but also vehicles of affordances, values, and interpretations of the surrounding reality like hermeneutic devices. It is causing a new form of colonialism which I argue must be prevented, opposed, and ultimately eradicated. But unfortunately what we are witnessing is contrasting notions of cyber-colonialism, a colonising of cultures by a diverse array of western ICT ideologies. We know there is a 'divide' because we are being told so.

The concept of discourse analysis of colonialism was first developed in Edward Said's work *Orientalism* (Said, 1977). Said argued that the 'orient' is constructed by Western discourses as 'other', and represented as primitive, dependent upon Western expertise, and in need of being controlled. This is quite analogous to the way developed countries are now

dictating and dominating the 'information society' with its expertise of ICT in relation to the developing world. It is difficult to deny the role of these cyber superpowers and their control in the creation of a technological 'other'. The 'other' lacks what is assumed to be the more efficient collection, exchange, and distribution of information to which those with the necessary hardware, software, and technical skills have access. These disparities are far from a coincidence and are largely attributed to the unfair international economic system, which it can be argued benefits the developed countries at the expense of the less-developed countries. We are thinking about bridging the divide, but on whose terms? The question is, is the relationship exploitive where one party is likely to be advantaged more than the other as the relationship unfolds? Or is it reciprocal in that each party benefits to a similar degree? How do we determine this? It can be fairly easily demonstrated: if the developing countries continue to depend on the developed countries for expertise and control, can we say that we have managed to bridge the divide? Before the Internet, the global agenda and public debates within territorially defined political spaces were mainly set by Western transnational media agencies. They were tools used by the dominant centres of power to manufacture consent and shape the contours of public ideology for their own interests. In terms of ICT it is again a relationship which many in the developing world realise provides no option but to utilise the technology from within the operating ethos and intellectual structures fostered mainly by American techno-visionaries. So an *uneven* relationship exists. Have we superimposed the ideologies of the 'west' upon the 'rest'?

Information society is about individuals (an information only becomes useful and, hence, valuable if and only if the individual understands that information). So the usefulness and the value are ultimately dependent on what gets disseminated. It is clear that the digital divide is a multi-faceted social problem, requiring a multi-faceted intervention. Nearly all related studies agree that the fundamental solution lies beyond a mere consideration of information availability and infrastructure; they call for governments to interfere with the deep-rooted factors which have directly or indirectly caused this situation.

Conclusion

Information society is about individuals; information only becomes useful and, hence, valuable if the individual understands that information. Similarly, access to technology alone will not provide development for the millions of poor in a developing country; it is about usefulness of

that access. Paradoxically, across political and cultural contexts abundance of information provided by the Internet has not necessarily created an abundance of usable knowledge. Used wrongly, it could stifle diversity or reinforce current patterns of power and debate. A democratic platform and a predictable, transparent, and non-discriminatory regulatory environment are necessary for the development of a global information society. However, I argue that the fundamental solution lies beyond a mere consideration of information availability and infrastructure. The goal of development should be as Sen puts it 'promotion and expansion of valuable capabilities' (Sen, 2000). The technological power available is enormous. It is also growing relentlessly. Our moral responsibilities towards the world and future generations are therefore equally enormous. Unfortunately, technological power and moral responsibilities are not necessarily followed by ethical intelligence and wisdom. We are still like children, light-heartedly and dangerously toying with a marvellous universe. The fight against exclusion requires energetic action. Whether the global digital divide will be eventually bridged will depend on how the international community resolves the political issues of who governs the cyberspace. These issues will have to be addressed further in the years to come.

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11

Enabling Better Port Governance in Developing Countries: The Role of Information Technology

Karim Sorour and *Loay Abdul-Mageed*

Introduction

Corporate governance refers to "a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined" (OECD, 2004, p. 11). Nowadays, corporate governance has become very topical, thanks to the series of scandals that took place over the last two decades. To mention but a few of these scandals, one would refer to the following: Maxwell (1991), Barings Bank (1995), Enron (2001), WorldCom (2002), Parmalat (2003), Jones (2005). Moreover, the global financial crisis has recently placed corporate governance reforms at the top of policy makers' agendas both in developed and developing countries to avoid further corporate governance-related failures (Kirkpatrick, 2009). That said, in the case of developing countries, corporate governance reform can also occur as part of a broader structural reform. This can offer politicians better legitimacy to the liberalisation efforts they initiate, attract higher foreign direct investment and facilitate borrowing from international organisations such as the International Monetary Fund (IMF) and the World Bank (Reed, 2002; Sorour, 2014).

In the meantime, the seaports[1] industry has witnessed an immense change in the recent years, where their role as an interface between sea and land has changed to a more complicated role of being a main link within the global supply chains (Van Baalen et al., 2008). This, coupled with the cut-throat competition facing ports at both national and regional levels, puts enormous pressure on seaport authorities to improve their corporate governance. This is the only way they can

create an appealing environment for various stakeholders, such as investors, shipping companies, logistic operators and shippers amongst others, to choose one port rather than the other. Again the need for good ports' governance reform is higher in developing countries, given unsupportive public governance associated with relatively higher levels of opaqueness and corruption. Here, although ICT applications can be effective tools to enhance corporate governance in seaports, no previous research[2] has discussed this potential role that ICT can perform. As such the main objective of this chapter is to discuss how an ICT application, that is, the port community system (PCS) can enhance corporate governance in seaports with an emphasis on the context of a developing country. To achieve this objective, this chapter first discusses the nature and significance of the corporate governance challenges facing seaports, in general, and in developing countries, in particular.[3] Second, it identifies the seaports' stakeholders, their inter-relationships and potential conflict of interests. Finally, the chapter discusses how ICT can enhance port governance using the so-called PCS and clarifies how this system can address the governance issues identified earlier in the chapter.

Contemporary port governance challenges

Traditionally, seaports act as an interface between sea and land through which goods and passengers are transferred (Trujillo and Nombela, 1999, p. 4). However, the rise of "global supply chains" concept has changed this traditional role. The involvement of several different stakeholders (e.g. ocean carriers, customs, port authorities and operators) in the global supply chains had turned it into a complex network (Van Baalen et al., 2008). As such, seaports are now considered as main links in the global supply chains, regardless of any geographical, political and commercial boundaries (Robinson, 2002). Consequently, contemporary seaports have a new role as highly developed logistics centres where both national and international cargo transit activities, such as transport, storage and distribution, are carried out by various operators. In that sense, seaports have become a node in a group of organisations which include various operators who collectively provide value to customers. To achieve effectiveness, such organisational clusters need to efficiently cooperate in a highly coordinated manner (De Souza et al., 2003; Song and Panayides, 2008) within what is now called the "port community". Here, the port community concept is not limited to the traditional boundaries of the port area; on the contrary, it includes all activities in

the port area as well as any other activity carried out by a party (organisation or individual, public or private, commercial or administrative) involved in the processes of transferring goods or passengers through the port area (UNCTAD, 1992a, 1992b). This highlights the complexity of the port community as a system with several stakeholders, including internal actors (inside the port area) and external actors (outside the port area), and in addition to this, the complexity that stems from the fact that each actor has its own business objectives and priorities (Notteboom and Winkelmans, 2002).

A port community is a complex dynamic environment where the business processes involve several process steps, multiple organisations and numerous information exchanges (Van Baalen et al., 2000, 2008; Carbone and De Martino, 2003). It is also subject to frequent disruptions[4] that may affect the aforementioned business processes (Kleindorfer and Saad, 2005; Van Baalen et al., 2008). Thus, it can be best described as an ill-structured, loosely coupled network where the business relations between players do not show a clear hierarchy. Furthermore, port community members are autonomous with generally poor contractual agreements. Indeed, this would highlight an overriding corporate governance problem related to lack of necessary corporate governance structures that can help in minimising potential conflict of interests. Within this context, seaports need to extend and promote their relationships with other players in the port community. Unfortunately, this can hardly happen without strong corporate governance structures in place to make sure conflicts are at a minimum (Verhoeven, 2009) and to solve any coordination problems or congestion problems in the hinterland (van Der Horst and De Langen, 2008).

In addition, due to the lack of coordination and cooperation, port community members are reluctant to share information since they believe that this might undermine their competitive position (Heaver, 2009). It is important to highlight here that the corporate governance dilemma is not only about lack of coordination but also about the lack of transparency, where various stakeholders' interests are potentially in conflict, and where the port authority (governing body), as the regulator of the port community, needs to interfere to enhance transparency and coordination between various players within this unique community. Here, in the seaports industry, "Transparency is essential for sound and effective corporate governance . . . it is difficult for relevant stakeholders and market participants to effectively monitor and properly hold accountable the board and senior management when there is insufficient transparency" (BCBS, 2010, p. 28).

Finally, sustainable port development requires port authorities to have sufficient financial, commercial and managerial autonomy, and also to have a stable operational environment based on minimising conflict of interests between the port authority and various stakeholders as well as between stakeholders. It also requires securing huge financing for port expansion projects, which can only be readily available through the private sector or the banking system. Obviously, this can only be achieved if there is a robust corporate governance system in place (Blair, 1995), that can assure funders that their capital is protected (Verhoeven, 2009).

Port governance in developing countries: further challenges

As mentioned earlier, although there are common aspects of good corporate governance that are applicable everywhere, the corporate governance phenomenon is context-specific and, as such, it is important to acknowledge that developing countries have additional reasons that further aggravate the corporate governance problem and increases the need for corporate governance reform in various sectors of the economy (Sorour, 2014). According to Reed (2002) these reasons include (1) legitimising governments' liberalisation and privatisation policies devised for "developing more effective corporate structure[s] that will generate the conditions for growth and development" (p. 229). (2) As developing countries may have poor economic performance and consequently have debt negotiation problems with international organisations such as the International Monetary Fund (IMF) and the World Bank, they become obliged to undertake structural adjustment programmes to liberalise their economies, with corporate governance issues as a main element of such programmes (Reed, 2002, p. 144).

In fact, both of the above-mentioned reasons are valid in the port industry as many developing countries are liberalising the seaports sector aspiring to move to the fourth generation of ports,[5] which emphasises not only undertaking the traditional roles of cargo and container-handling activities (as in first-, second- and third-generation ports) but also primarily focusing on integration with the port community and with port logistic network as well as providing value-added services (UNCTAD, 1992a; 1992b). This would entail changing the ports' structure and higher involvement of the private sector,[6] making corporate governance reform the bedrock for a successful broader reform. Many funds, such as the Multi-Donor Trust fund for sustainable logistics by the government of the Netherlands and the World Bank, have been

established for funding port development to improve sustainable logistics in the developing World (Ernst, 2014). As such, funding bodies have an expectation that ports need to have good corporate governance to ensure that funds are spent in an appropriate manner. This would again highlight the special importance of port governance in the context of developing countries.

Moreover, it must be noted that the public governance in developing countries is another factor that exacerbates the corporate governance problem. According to Manning and Kraan (2006) public governance is the concept related to "the process by which a society organizes its affairs and manage[s] itself" (cited in UN, 2007, p. 2). According to Sorour (2011) this implies that the supply of public goods occurs in agreement with democracy, transparency and accountability principles (UN, 2007). As such, good public governance is "participatory, transparent and accountable. . . . [e]ncompasses State institutions and includes private sector and civil society organizations" (UN, 2007, p. 4). Standard setters such as the IMF and the World Bank considers public governance as the bedrock for successful and stable economies" (UN, 2007). Therefore, it is unsurprising to find arguments supporting that "[g]ood public governance also underpins good corporate governance" (UN, 2007, p. iii). Here, corruption is a good example of why developing countries could face more corporate governance problems. According to the Transparency International Organization, corruption is an incident that occurs when an individual with public powers uses these powers for private benefits (2010) [online].

While corruption affects various sectors of the economy, the seaports sector is a significant sufferer of corruption in developing countries. For instance Sequeira and Djankov (2010) documented that bribes represent about 14 per cent of the total shipping cost of a container transiting the port of Maputo in Mozambique, while it is almost 4 per cent of the cost when passing through the port of Durban in South Africa. This is rather unsurprising given that developing countries (e.g. Ports in Africa) suffer from "lack of communication between stakeholders . . . inadequate technology . . . poorly integrated supply chains . . . decentralised documentation processes coupled with bureaucratic clearance procedures" (African bank, 2010, p. 39). Indeed, this adds another dimension to our argument here that demonstrates that the governance problem is more challenging in developing countries.

Therefore, it is apparent now that seaports in developing countries need to work more on management and coordination of material, financial and information flows (Carbone and De Martino, 2003) underscored

by the objective of enhancing transparency and minimising conflicts of interest between stakeholders. Here, one tool that can help seaports to achieve the aforementioned objectives is the applications of ICT.

The rest of this chapter is an attempt to demonstrate how ICT applications may help seaports to enhance higher transparency and coordination levels between the various constituents of the port community and the supply chain, thus minimising the potential conflict of interests between them, with attention also being given to combatting corruption. The following section will look more closely at the actors of the port community and their relationships, clarifying how ICT applications affect port modernisation. Then the chapter will present one of the ICT applications in seaports, namely the PCS, and finally highlight how this system can help address the above-mentioned governance issues and help in combating corruption.

Seaports stakeholders: inter-relationships and conflicts

In a broad sense, stakeholders in a port community are diverse companies and can include freight forwarders, ocean carriers, hauliers, rail operators, terminal operators, regulatory authorities (e.g. customs), labour unions, environmental affairs parties and other policy makers and influencers. These stakeholders can have inter-organisational relationships that can be categorised into two forms, namely physical interaction and incorporeal interaction. The former type of interaction is related to the physical transport of goods, while the latter type includes supervisory, contractual or information exchange relationships (Martin and Thomas, 2001).

In the literature, business processes, actors' relationships and activities that take place in ports or terminals are widely described using the network notion (Frankel, 1987; Gambardella et al., 1998; Kia et al., 2000; Notteboom and Winkelmans, 2002). In addition, viewing the port or terminal as a community leads to a deep understanding of the relationships among actors which form the inner structures and give insight on how they work together (Henesey et al., 2003). Combining these two perspectives (network and community) a port community can be viewed as a networked organisation.

Networked organisations have distinguishable characteristics which include decentralised control (i.e. control is delivered from one member to another), distributed business processes (i.e. inter-organisational processes which cross organisation boundaries), different supply chains for different beneficiaries and sharing of information. In that sense, business

processes in the port community are a typical Networked Enterprise, for example:

- The ownership of control is changed according to certain events and flow of information; for instance, ownership of control changes from vessel to shipping agent and terminal operator after berthing.
- Business processes are inter-organisational; the three enterprises (vessel, agent, terminal operator) in the above-mentioned example are autonomous organisational entities.
- Producer–consumer chains, typical examples of such chains being truck operators and stevedores who provide resources to the vessel.

Accordingly, the port community is naturally dynamic; and therefore, active business processes are minimally disturbed by adding or removing a node or an entity. This indicates the necessity for agility in order to tolerate changes of economic conditions or to change business strategies. From this perspective, the relationship between stakeholders of the port community is shaped by a number of forces as summarised by Notteboom and Winkelmans (2002):

- Distributional forces which deal with costs and benefits sharing by stakeholders and the compromises between economic, ecological and the social value of ports.
- Efficiency forces which focus on output maximisation with input minimisation.
- Behavioural forces which deal with stakeholders interactions and how they enforce the community. For example, sometimes local influencers strongly defend their own concerns so that the individual welfare of the minority stakeholders becomes an effective steering power rather than the welfare of the community at large.

These aspects have a considerable effect on stakeholders' interactions whether in a formal interaction through contracting or in less formal situations. In essence, this demonstrates how important corporate governance can be within a port community to minimise the potential conflict of interest between various stakeholders.

ICT as a pillar for enhancing port governance

Seaports extensively employ ICT in their operations in the form of information systems that are used in almost every port with various levels

of advancement. The term "port information system" is employed to describe any type of information system that is applied in port operations. However, these information systems can be categorised as port management systems, container terminal operating systems and PCSs.

The port management information systems are the systems that specifically satisfy the requirements of port authorities to monitor and control all the activities carried out inside the port and to receive vessel arrival declarations or applications for port facilities utilisation. Those systems are also referred to as port administration support systems (Park et al., 2005). The container terminal operating systems are defined as "Computer systems available for organizing the container terminal itself" (Jeffrey, 1999, p. 39). Typically, it should provide the functions to manage transfer of containers through the terminal, to plan ship–shore operations (loading and unloading) and yard operations, to manage containers that are transported to the terminal via rail or road and to notify concerned parties (shipping agents or trucks operators) about the locations of containers (Choi et al., 2003). In order to increase the overall terminal efficiency, some modern terminal operating systems applications apply artificial intelligence techniques to coordinate operations within the terminal.

As discussed above, corporate governance within a port community is undoubtedly essential to minimise the potential conflict of interest between various port stakeholders. From an ICT perspective, this can be realised by viewing a port community as a virtual enterprise in which a variety of independent companies collectively serve the customer by providing service(s) through a single interface organisation (company). These individual companies that form the port community are considered as departments in the virtual enterprise and are tied together due to their common interest in maritime and logistics businesses. In most cases,[7] the interface company through which services are provided does not necessarily provide all the underlying services by itself. In fact, this structure hides most of the complexity of the multiple business processes, document exchanges and management activities that take place during the provision of the service.

The virtual enterprise emerges due to the electronic interconnections among the port community actors and the integration of their respective business processes. This would help to join business and services carried out by underlying organisation(s) to provide a compound service to the port customer through a one-stop shop.

The implementation of a one-stop shop concept on the Internet in the form of Web portals, which is simply a Web page that brings

information together uniformly from diverse sources, would facilitate the commercial transactions of the virtual enterprise by handling data input and output and orchestrating the associated business processes through information exchange. Within the port community, a typical online transaction involves several independent organisations with their respective information systems, various business processes, numerous document exchanges and different individuals. However, the commercial transaction is carried out through a pre-defined business process which is executed behind the one-stop shop through exchanging standardised electronic messages between concerned participants.

In this regard, controlled and coordinated behaviour of port activities can be realised by the rational application of ICT systems such as the PCS. Therefore, we suggest that port authorities in developing countries should direct more investments towards ICT projects to meet expected governance improvements.

In this chapter, we focus on PCSs that bind together multiple disparate information systems in order to link the activities of the firms operating in the port community. The successful implementation of PCSs depends mainly on the successful deployment of ICT infrastructures to provide communication and integration technologies essential for binding and linking information systems. Accordingly, we here perceive PCSs as ICT systems rather than merely traditional information systems.

The objective of PCSs implementation in ports is to decrease paperwork and to simplify the flow of information related to port operations and cargo clearance. The PCS is considered part of the Inter-Organisational Information System (IOIS) industry that has the capability to bind together multiple information systems operated by competing and cooperating firms that make up the port community and links their activities.

In the following sections, we introduce the rationale that raises the need for PCSs, and then we try to assess the effectiveness of PCSs as an ICT enabler for port governance.

The indispensability of PCSs to seaports stakeholders

As previously mentioned, the principal customers of port facilities are the firms and organisations that are concerned with cargo movement and storage. This collection of private and public entities creates a complex web of inter-reliant relationships to handle intra-community business. Accordingly, we can claim that the information on the assets of ports is heterogeneously distributed across individual organisations.

The main feature of that environment is the exchange of information related to consignments, payments and business transactions. The bottleneck in ports is that these flows of information increase rapidly in terms of volume and complexity, and it takes place using various disparate business processes, systems, databases and methods of information exchange. A further problem is that, due to legal obligations, shipping documents are often sent with the cargo, and therefore they cannot be processed before the arrival of the cargo.

In this regard, PCSs promise to overcome the problem of extensive information exchange, and to integrate operational data flow among the different entities so that relevant data and systems will be readily accessible by actors for business transactions processing. Using PCSs, it is expected that data and information will travel faster than the goods; however, this will cause a crucial problem with regard to port management in actual practice (Hakim et al., 2005).

From another perspective, ports are no longer handling just cargo, but they are becoming "information handlers" (Henesey, 2002). The embedding of ports in the global supply chain obliged ports to act as an "information hub" in the global chain. ICT infrastructures can be employed as mediators in such information hubs for supporting inter-organisational relationships (Christiaanse and Rodon, 2005). These ICT infrastructures include all the communication and integration technologies that facilitate the inter-organisation linking and binding of business activities. Modern ports play a crucial role in the global supply chain integration in that they serve as "electronic hubs" to facilitate and coordinate information sharing throughout the chain.

The PCS, acting as an electronic hub, have the potential advantage of achieving collective benefits that go beyond the firm level. New generations of PCSs should even go beyond the function of information sharing as they can serve a variety of supply chain processes with different application modules. However, the success of PCSs in ports depends to a large extent on the ICT capabilities of ports to design, develop and implement these inter-organisational systems (Van Baalen et al., 2008).

At this point, the inevitability to have a PCS is obvious. However, the question is to what extent PCSs meet the requirements to be an effective enabler for port governance. In order to answer such a question, we believe that it is worthwhile to start with exploring the "concept" of PCSs, and therefore we introduce in the next section various definitions of PCS that appear in the literature aimed at assessing their functionalities to enable port governance (transparency, accountability, anti-corruption, etc.).

What is a PCS?

According to Abdul-Mageed (2012), the form and characteristics of a PCS vary in each and every port depending upon the port function, location and hinterland. Furthermore, the functions and services that the PCS provides mostly depend on its initiator who principally drives the development of the PCS. Therefore, it is hard to give a general definition of a PCS because it differs for each port.

A relatively old definition of the PCS states that:

> Port Community Systems are centrally operated systems for transferring data and providing other services with the help of this data, which can be used by any party who is interested in information concerning sea born transport. A Port Community System avoids bilateral data transfer. (Grizell, 2001 as cited in Smit, 2004)

From this definition, we can infer that the main objective of the PCS is to avoid bilateral transfer of data. This is certainly valid for the objective of the early PCSs, where bilateral communications were a common pattern for exchanging transactions. Moreover, in the early PCSs, an industry IOIS was set up and controlled by individual companies, who established direct links with their partners (Bakos, 1991). While, with respect to system functionalities, this definition focuses merely on "transferring data" as the main function of the system, it does not provide any identification of the "other services" that could be provided by the data.

Another definition states that (Smit, 2004, p. 7):

> A Port Community System can be defined as an entity delivering information to supply chains operating in the port. The PCS is responsible for data supply, data control, data distribution and data conversion.

The concept of supply chain appears in this definition. However, it focuses only on information delivery and data responsibilities as functions of the PCS.

Furthermore, Rodon and Ramis-Pujol (Rodon and Ramis-Pujol, 2006, p. 1) defined PCS as:

> An electronic platform that connects the multiple systems operated by a variety of organizations that make up a seaport community.

They adopt the viewpoint that a PCS is not designed from scratch; it is rather an incorporation of pre-existing systems. Therefore, this definition focuses on the integration of pre-existing systems. In this perspective, they indicated that a PCS qualifies as a business sector information infrastructure (BSII) (Hanseth and Lyytinen, 2006). Accordingly, a PCS is an aggregation of shared, evolving and heterogeneous ICT capabilities using standardised interfaces (Hanseth and Lyytinen, 2006). A PCS is shared because it is established, managed and used by organisations in the same sector (i.e. the port community). It is evolving when new organisations join it or when new functionalities or services are amended to it. Also, it is heterogeneous since it links various processes, people, technologies and standards.

Finally, a relatively recent definition of PCSs states that:

> Port Community Systems (PCSs) can be defined as holistic, geographically bounded information hubs in global supply chains that primarily serve the interest of a heterogeneous collective of port related companies. (Srour et al., 2008, p. 3)

This definition reflects the new role of ports as an information hub in the global supply chain. In addition, the definition considers the broad view of the port community as well as the diversity and heterogeneity of its members, as indicated previously. This implies that PCSs are supposed to manage and promote general, private and public objectives that are often divergent, if not contradictory.

This definition does not specify any functionality of the PCS; however, it sets the goal of the PCS as a common framework to all actors involved in maritime transport in a local supply chain. PCSs bring diverse actors of the port community together in a transaction recordkeeping and information sharing platform. Therefore, these systems enhance the physical flow of goods since they avail the transaction data in advance of the cargo rather than with the arrival of the cargo.

It is difficult to define port electronic data processing systems since they differ from one port to another; however, one study indicated that principally various types of the Single Windows for the maritime community are (PORTEL, 2009):

- *Port Single Window (PSW)*: It is a B2G (Business to Government) system that provides local level information about the vessel to the authorities on a port level.
- *PCS*: It is a B2B (Business to Business) system with a commercial and logistic nature used to exchange messages in the port environment.

The study introduced a general definition of a port electronic data processing system that can be employed by both systems (PSW and PCS), which is: "an entity delivering information to supply chains operating in the port". These two systems differ mainly in that the PCS is used in some ports for commercial transactions while the PSW is used for administrative transactions. However, some ports use both systems indistinguishably for commercial and administrative transactions.

To this end, exploring various definitions of PCS that appear in the literature imply that PCSs were primarily developed without bearing in mind port governance. However, we believe that PCSs can be employed to enable port governance by amending some functionalities to facilitate transparency, accountability, anti-corruption and so on, and this is what we are going to introduce in the next sections.

The role of PCSs in enhancing port governance

PCSs that bring these diverse parties together in transaction recordkeeping and information sharing also serve to improve the flow of goods. Specifically, with the advent of modern ICT, the transaction data that once travelled with the cargo can now travel in advance of the cargo. This phenomenon coupled with the challenge of landside access at many of the world's ports (Chatterjee et al., 1997; Lipinski and Clarke, 2008) motivates the need to exploit the information flows for more than mere recordkeeping purposes. These information flows simultaneously serve to enhance the physical flow of goods; thereby overcoming the bottlenecks that so often occur at ports.

PCSs are complex in their nature because of the highly diversified stakeholders that operate in the same environment (i.e. the port community). A successful implementation of a PCS should be able not only to incorporate business processes of all concerned parties but also to maintain their autonomy. In addition, in order to realise and facilitate port governance, PCSs should be employed to diminish corruption and to enhance transparency and accountability within the port community. These principles need to be reflected in the operational framework of the PCSs.

Moreover, implementation of a PCS can not only significantly increase the efficiency of foreign trade but also lead to significant improvements in controlling the flow of goods. It reduces the preconditions for corruption and other negative phenomena. Practices of PCSs at major ports of the world indicate that the electronic exchange of data eliminates the subjective intervention of the human factor in the process of the regulatory control of international trade. Accordingly, this will enhance

transparency and accountability of port community administration, and thus reduce illegal trade activities and opportunities for corruption.

Implementation of PCSs is supposed to enhance governance both directly and indirectly. As previously presented, all parties involved in the cargo movement are supposed to be members in the PCS, and their respective business information is supposed to be accessible by the port community actors (i.e. port stakeholders). In such a situation, the PCS would help indirectly by improving the supply chain visibility by providing quality information (accurately, in a timely manner and securely) about physical flows, information flows and financial flows; and thus, the transparency of the decision-making processes would increase. We believe that information accessibility will enhance transparency and auditing activities, thereby putting more pressure on the port community actors that might bring about change in their behaviour.

On the other hand, the direct way in which PCSs help governance is manifested by the automation of cargo flow business processes. This would considerably diminish possibilities for corruption by removing human intervention at data collection and service providing locations; and therefore, there will be no employee to bribe. In addition, the availability of PCS as an electronic system allows employing anti-corruption software tools to monitor and control various events in the port community business processes. These tools would facilitate tracking suspicious events that might be illegal and, therefore, would prevent criminal actions.

Furthermore, deployment of ICT solutions in port business, such as the PCS, can contribute positively towards enhancing accountability. Here, accountability can be defined as "the unavoidable duty to explain the ways in which an individual or group has carried out, or caused to be carried out, the obligations placed upon him or them by law, a governing body or constitutional document. While the discharge of these activities/obligations may be delegated to others, the obligation to account for (i.e. remain accountable for) the actions cannot be delegated" (ICSA, 2014) [online]. As such, with enhanced transparency comes more accountability and better corporate governance. As with opaqueness, one is not equipped with information that can trigger asking questions. Therefore, we argue here that proper implementation of PCSs would enhance accountability within the port community as a natural consequence of enhancing transparency. PCSs can be used to publish information online, to audit and analyse business processes and decisions, to react to compensating non-accountable actions. That said, the prerequisite for realising these features is the presence of laws, rules

and regulations upon which the port community actors agree. These rules and regulations should be specific and clear to ease its implementation in the PCS. Developing countries need to review and update their laws and regulations in order to be able to provide accountable electronic services. This is a long process that needs the cooperation of all the members of the port community.

Conclusion and recommendations

We believe that ICT is not a magic bullet that can abolish poor port governance. To diminish corruption in ports, ICT tools and solutions should be used in the context of broader programmes of reform. Port business experts should first recognise problems and model the appropriate reforms and then work hand in hand with IT specialists in order to design the best technical solution that would efficiently realise the reform objectives. Successful cooperation between port business experts and IT specialists would create a new generation of PCS solutions that would have a significant governance role in a number of ways:

- Enhance transparency in the port community by intensifying the coordination among actors of the port community.
- Improve service delivery by employing user-friendly interface for electronic services.
- Enable gathering of comprehensive audit trail and tracking digital footprints, and hence increase the opportunity to retain actors accountable, and eventually increase the likelihood to detect corrupt practices.
- Provide an electronic platform that will act as an anti-corruption ethical environment by supporting a combination of means for encouraging and disseminating transparency traits and educating port users (clients) on what corruption is about and their legal and business rights.

Significant challenges still exist in incorporating ICT effectively as a governance tool in port business. ICT needs to be accompanied by changes in the management approach for the administrative processes to be effective. In addition, the surrounding political, social and technical infrastructure must be ready to support the use of ICT to its fullest potential. Technical infrastructure can still be a significant barrier for these changes to materialise. As such, this work should be complemented by further wider corporate governance reforms at national levels.

Notes

1 Port and Seaport are used interchangeably in this chapter.
2 Reviewing the relevant literature reveals that there are only few studies that address port governance in general (see for example Wang et al., 2004; Pallis, 2008; Verhoeven, 2009; Verhoeven, 2011).
3 It must be mentioned here that this chapter conceives corporate governance phenomenon as a context-based complex phenomenon (Aguilera and Jackson, 2003; Letza and Sun, 2002; Letza et al., 2004; Kirkbride et al., 2005; Ardalan, 2007; Mason et al., 2007; Letza et al., 2008); and as such, what would work in one context (country/industry) might not be suitable and fully transferable to another. Therefore, it is equally important to address the additional corporate governance challenges that face seaports in developing countries.
4 Disruptions might occur due to delays or administrative errors: for example, containers that are planned for loading onto the vessel are not available in the yard. Such a situation can be attributed to a disruption in the physical flow where the container might be routed to a wrong location or is delayed; or it can be attributed to a disruption in the information flow where the container is mistakenly listed or the container number has been mistyped (Van Baalen et al., 2008).
5 See Barros and Barros (2013) for an explanation of different generations of port development.
6 This change and liberalisation will potentially lead to adopting the landlord model of ports' ownership and operation, where the private sector has a major role in providing port services (Juhel, 2010).
7 See for example PORTIC (www.portic.net) at the Port of Barcelona, DAKOSY (www.dakosy.de) at the Port of Hamburg, and PORTNET (www.portnet.com) at the Port of Singapore.

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Index