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A Critical Review of the ICT for Development Research

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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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