ANALYZING THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY FOR DEVELOPMENT: LESSONS LEARNT FROM THE SIRCA II PROGRAM

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ABSTRACT
During recent years, we have witnessed revolutionary developments of Information and Communication Technologies (ICTs) and their impact on people's lives. The way in which such developments contribute to socio-economic development and empowering people depends highly on the absorptive capacity of different societies. While in developed countries, their IT-ecosystems have the capacity for enriching themselves through empowered actors and enhanced interactions and, in turn, for continuous growth; in developing countries, such eco-systems face challenges to produce similar results. However, the challenges faced, particularly by the countries in the Global South; in Asia, Africa and Latin America, can be transformed into opportunities if countries are able to leapfrog in the learning process and develop their human and institutional capacities. In this context, capacity-building programs on ICT for Development (ICT4D), such as Strengthening Information Society Research Capacity Alliance (SIRCA), are of the upmost importance to developing countries. In this introduction to the SIRCA special issue of The Electronic Journal of Information Systems in Developing Countries we discuss the evolution of ICT4D policy and research, explain the experience of the SIRCA II Program, and summarizes the lessons learnt from it.

Keywords: ICT4D; SIRCA II Program; Impact; Global South; Development

1. INTRODUCTION

After the 2007-2008 subprime mortgage crisis in the United States, the world entered into a severe financial and economic crisis. Almost one decade later, countries are still struggling to recover, and due to different contexts and adopted approaches, a globally uneven growth has been observed. According to the Gross Domestic Product (GDP), the world economy grew steadily at 3.4% in 2012, 3.3% in 2013, and 3.4% in 2014. However, the growth was unequal: while advanced economies grew at 1.2% in 2012, 1.4% in 2013, 1.8% in 2014 and a projected 2.4% in 2015, emerging markets and developing economies experienced continuous slowdown from 5.1% in 2012, through 4.7% in 2013 and 4.6% in 2014, to a projected 4.3% in 2015 (International Monetary Fund, 2014, 2015). A similar downward trend for developing countries and a modest growth for emerging economies is shown by the Global Competitiveness Index (Schwab & The World Economic Forum, 2014).

Within this macro-economic scenario, the Information and Communication Technologies (ICT) sector presents peculiar characteristics. In 2014, the spread of ICT infrastructure and ICT uptake by citizens and businesses showed an uninterrupted growth compared to 2013. All countries showed an increase in the number of Internet users and in the availability of digital content (International Telecommunications Union, 2014). According to the ICT Development Index (IDI), which measures and compares ICT development across countries, the world's IDI value stood at 4.60 in 2012 and 4.70 in 2013, an increase of 2.1%. The growth was observed in both developed countries; from 7.03 in 2012 to 7.20 in 2013, an increase of 2.4%; and in developing countries: from 3.67 in 2012 to

3.84 in 2013, an increase of 4.6% (Internatinal Telecommunications Union, 2014). However, according to the final quantitative assessment review of the World Summit on Information Society (WSIS) targets, while an extensive growth was observed in ICT networks, services, applications and contents, ICT access and use remain uneven (Partnership on Measuring ICT for Development, 2014).

In addition to the growth in ICT access and use, new disruptive technologies have emerged, such as cloud computing, mobile devices, Internet of Things (IoT), big data and data analytics. All such developments contribute to fundamental changes in the way processes, objects and people are connected, presenting significant opportunities for socio-economic development (World Economic Forum, 2014). For example, new personalized and smart services are leveraging on geo-referencing techniques and connecting context-aware devices with other objects, contributing to improvements in quality of life. According to Cisco Systems, developing the Internet of Everything (IoE) represent a US$19 trillion global opportunity to create value, US$14.4 billion for the private sector and US$4.6 for the public sector (Bradley et al., 2013).

Despite the growth of ICT, both in terms of the steady progress in ICT access and use in all countries of the world as well as new ICT capabilities, the impact of ICT to boost competitiveness of countries and the wellbeing of their citizens shows significant differences between countries. On the one hand, developed economies such as Finland, Sweden and Norway show how the development of a robust digital eco-system contributes to socio-economic development. On the other hand, despite significant efforts in deploying ICT infrastructure, particularly mobile technology access in developing countries (World Economic Forum, 2014) socio-economic development fostered by ICT remains largely dormant in such countries. Such differences rely on different factors, including ICT skills, ICT access, ICT use and how people interact with and influence the co-evolution of a country's ICT eco-system. For example, countries that possess more educated actors and an enabling environment are more likely to benefit from the higher usage of ICT. In turn, having a higher usage and a positive impact of ICT will enable societal actors to keep improving the eco-system to obtain greater benefits and, as a result, achieve greater impact (World Economic Forum, 2014). By contraposition in traditional logic, countries unable to engage such virtuous circle for their ICT eco-systems may experience weaknesses in ICT skills, access and use, and therefore lack capacity to fully benefit from the progress in ICTs.

In order to address the challenge of inadequate ICT skills faced by developing countries at different levels, efforts in human capacity building have been pursued by their governments and by donor organizations. As an example, *The Strengthening Information Society Research Capacity Alliance* (SIRCA II) Program (Singapore Internet Research Centre, 2013) was an initiative aimed at building the human capacity of young and emerging researchers interested in investigating problems related to ICT for Development (ICT4D) or ICT and Development (ICTD) in the Global South, i.e. in the countries of Africa, Asia and Latin America.

This Special Issue of the Electronic Journal of Information Systems in Developing Countries (EJISDC), devoted to the SIRCA II program, documents some of the research findings obtained by the SIRCA II researchers. The papers included in this Special Issue describe the impact of ICT4D policies and practices adopted by the countries in the Global South, by; analyzing the impact of a government initiative for bridging the digital divide among the youth in Argentina; assessing how the development of e-skills contributes to attaining employment in Uruguay; exploring how ICTs can contribute to economic development in Cameroon; and examining positive and negative effects of ICT-based jobs in the Philippines. The papers also show how ICTs can contribute to innovation in research methods, e.g. in delivering telemedicine services in India. Our introduction presents the

evolution of ICT4D policy and practice as a background to the papers in this Special Issue, and it introduces and assesses the SIRCA II Program, summarizing the papers, and outlining the lessons learnt.

The rest of the introduction is structured as follows. Section 2 presents some background concepts on the evolution of the ICT4D field, both in terms of policy and research. Section 3 presents the SIRCA II Program as the context of the research work presented in this Special Issue. Section 4 summarizes the papers included in this Special Issue and links them to different components of national ICT ecosystems. Finally, Section 5 draws some conclusions and introduces the expected future for the SIRCA Program.

2. BACKGROUND – ICT FOR DEVELOPMENT

The last decade showed an unprecedented global effort pursued by the United Nations (UN) system and UN Member States to address the most pressing development problems facing the world through the implementation of Millennium Development Goals (MDGs) (The UN General Assembly, 2000). In particular, governments committed themselves to achieving certain targets related to these goals, depicted in Table 1, by 2015.

GOAL	DESCRIPTION
MDG1	eradicate extreme poverty and hunger
MDG2	achieve universal primary education
MDG3	promote gender equality and empower woman
MDG4	reduce child mortality
MDG5	improve maternal health
MDG6	combat HIV/AIDS, malaria and other diseases
MDG7	ensure environmental sustainability
MDG8	develop a global partnership for development

Table 1: Millennium Development Goals (MDGs)

ICT was seen as a powerful tool to achieve the MDGs, and remarkable efforts were pursued on the usage of ICT to promote social and economic development. Strongly endorsed by governments, such efforts contributed to demonstrating how ICT can provide a platform to facilitate the fulfilment of such goals across all three pillars of sustainable development – economic growth, social inclusion and environmental sustainability (UNGIS, 2013). However, despite the progress made, inequalities in access to ICT platforms, information, knowledge, and technological progress remain vast and significant within and among countries.

Back in 1997, the UN Administrative Committee on Coordination (UN ACC) identified that the introduction and usage of ICTs must become a core element of the priority efforts of the UN members states to promote and secure sustainable development for all. The Committee issued a statement for "establishing universal access to basic communication and information services for all" (UN Administrative Committee on Coordination, 1997). Later, the 2000 ECOSOC Ministerial Declaration recognized that ICTs are "central to the creation of the emerging global knowledge-based economy and can play an important role in accelerating growth, in promoting sustainable development and eradicating poverty in developing countries as well as countries with economies in transition and in facilitating their effective integration into the global economy" (UN Economic and Social Council, 2000). In July 2000, the G8 summit conducted in Okinawa, Japan, reinforced the revolutionary nature of ICT – by impacting the way people live, learn and work; and reintroduced the principle of inclusion – "everyone, everywhere should be enabled to participate in and no one should be

excluded from the benefits of the global information society" through the Okinawa Charter on Global Information Society (G8, 2000). While the potential benefits of ICTs were repeated through many forums, the definition of the MDGs, in September 2000, defined the landmark for leveraging on their potential. In particular, the declaration of the MDGs, promised to ensure that the benefits of new technologies, particularly ICTs, are available for all (The UN General Assembly, 2000).

Related to ICTs, the MDGs posted a radical challenge, with a magnitude that can only be understood when quantified by figures. For example, by 2000, in a world populated by 6,127,200,000 inhabitants (United Nations Department of Economic and Social Affairs - Population Division, 2014), the number of Internet users were 360,985,492 (Internet World Stat, 2014), meaning that less than 1% (only 0.59%) of the world population were benefitting on a daily basis from the use of the Internet. In addition, one out of three persons had never made a phone call, less than one out of five had experienced the Internet, and most of the information available in Internet was in English, the language spoken by less than 10% of the world population (UNDP Evaluation Office, 2001). By that time, the international community was starting to recognize the transformative potential of ICTs to improve development agendas (UNGIS, 2013).

In January 2002, motivated by the pressing need of harnessing the potential of knowledge and technology for promoting the MDGs, the UN General Assembly endorsed the World Summit on the Information Society (WSIS). It was approved that WSIS should be conducted in two stages (UN General Assembly, 2002). The first stage took place in Geneva in December 2003. The Summit defined the common vision – "to build a people-centered, inclusive and development-oriented Information Society" and its key principles, including: improving access to information and communication infrastructure and technologies, as well as to information and knowledge; building capacity; increasing confidence and security in the use of ICTs; creating an enabling environment at all levels; developing and widening ICT applications; fostering and respecting cultural diversity; recognizing the role of the media; addressing ethical dimensions of the Information Society; and promoting international and regional cooperation (World Summit on the Information Society, 2003). Concrete statements were formulated defining a clear picture on how to leverage on the use of ICTs to create a more equitable, developed and sustainable society. Communication was recognized as a fundamental social process and a basic need. It was also highlighted that "education, knowledge, information and communication are at the core of human progress, endeavor and well-being". The 2003 Summit accepted that the main challenge was to harness the potential of ICT to promote the MDGs and that ICT should be seen as tools and not as an end (World Summit on the Information Society, 2003). Translating the common vision into implementable measures, an Action Plan (WSIS, 2003) was defined specifying 11 concrete action lines.

The second stage of the WSIS was held in Tunis in November 2005. The 2005 Summit reaffirmed the vision defined in 2003 and the commitments to achieve it. The Summit was seen as an opportunity to raise awareness of the transformative power of ICTs to benefit people's activities, interactions and lives. For example, the Tunis Commitment document highlights the potential of ICT to expand access to quality education, to boost literacy and universal primary education; the relevance of well-conceived investments in ICTs for increasing trade and better employment; and the role of ICTs as tools to promote peace and security, and to improve social cohesion, good governance and the rule of law, among others. The 2005 Summit called major stakeholders, including governments, the private sector, civil society and international organizations to work together on the implementation of the commitments. In addition, attention was brought to building the commitments focusing on financial mechanisms to bridging the digital divide, on Internet

governance and related issues, and on following-up on the implementation of the commitments.

Subsequently to the two WSIS in 2003 and 2005, annual meetings (WSIS Forums) were regularly conducted every year since 2006. The meetings provided opportunities to gather major stakeholders to renew their commitments, to showcase major achievements, and to discuss the lessons learnt. In particular, the forum conducted in 2013 was designed to review the process made after 10 years of the implementation of the WSIS action lines.

There are many efforts aimed at measuring the impact of ICTs. Concrete examples and analyses of how ICTs contribute to the fulfilment of MDGs have been documented (Partnership on Measuring ICT for Development, 2014). A study among 25 OECD countries conducted during 1996-2007 to test the effect of broadband infrastructure on economic growth showed that 10% increase in broadband penetration raises annual per-capita growth by 0.9% to 1.5% (Czernich et al., 2011). The Jordanian Ministry of Information and Communications Technology reported on the project conducted in 2009 to assess the impact of ICTs in the country. The report describes that ICTs contributed 14.1% to the GDP, including 9.5% direct and 4.62% indirect contributions. It also shows that ICTs contributed an average of 13.9% to the country's overall productivity and 22.1% to its labor productivity. In addition, it explains the role of ICTs in promoting gender equality, providing women with better working opportunities, and allowing Jordanian economy to benefit from the female workforce (Ministry of Information and Communications Technology, 2009).

Significant interest in assessing the benefits that ICTs can bring to education is also observed in (UNESCO Institute for Statistics, 2009). While concrete benefits of ICT adoption include the provision of tools for the teaching and learning process, an OECD study revealed that ICT in the classroom only improves performance if certain pedagogical conditions are met (UNCTAD, 2011). ICTs also play an important role in health; they inform women how to experience healthy pregnancy and safe delivery; and how to register births to provide "passport to protection" for children (Global Observatory for eHealth, 2014). Finally, it is also accepted that ICT can have an impact on the environment, both positive, e.g. through improved energy efficiency or negative, e.g. through increased greenhouse emissions. However, even the negative impacts can be mitigated through the use of ICTs (UNCTAD, 2011).

Supporting international global efforts, academia also engaged in investigating and advancing the ICT4D domain, with annual publication growth at 39% from 1999 to 2008 (Heeks, 2010). ICT4D research not only improved in terms of the number of publications, but also in the type of research topics addressed and the methods applied to obtain results. For example, a 2007 study investigating the links between ICT and socio-economic development concluded that most of the ICT4D research was descriptive – based on models or schemas of categorization, and not analytical. It also concluded that investigations lack rigor to make findings credible (Heeks, 2007). Existing theory-based ICT4D research mainly describe the case application of a theory, instead of the theory itself. A later 2009 study (Heeks, 2009) identified two main stages in ICT4D research. The first stage (ICT4D 1.0), from mid/late 1990s to mid/late 2000s, was mostly dedicated to finding off-the-shelf solutions that could be easily replicated in developing countries, a recurrent topic being tele-centers. The main outcomes of this stage are related to sustainability, scalability and evaluation of ICT4D projects. The second stage (ICT4D 2.0), currently in progress, emphasizes on what tools are being used, on application and business model innovation, and on assessing and scaling up existing applications (Heeks, 2009). Complementing the previous findings, a study investigating ICTD research published between 2000 and 2010 concluded that research questions are descriptive or measuring social change. The findings show that there is a dominance of technological approaches over social approaches, and that most frequent types

of recommendations refer to ICT infrastructure. Most of the work refers to the studies of individual countries or organizations and the most frequent contributions are related to best practices, with a growing contribution to theoretical foundations and policy recommendations (Gomez, 2013).

3. THE SIRCA II PROGRAM

SIRCA II was a capacity-building program focused on information society research in the Global South – i.e. in developing countries in Africa, Asia and Latin America. Conducted during 2012-2013, SIRCA II was a joint effort of the International Development Research Centre (IDRC) in Canada and the Singapore Internet Research Centre (SiRC) at Nanyang Technical University in Singapore. The aim of the program was to promote excellence in ICTD and information society research, contributing to the field through building human-capacity among researchers of various disciplines interested on the field, and through dissemination of research findings in peer-reviewed publications and international conferences.

SIRCA II pursued three main objectives (The Singapore Internet Research Centre, 2013):

1) *to promote high-quality multidisciplinary social science research in Internet development, e-services, new media use and its social impact, and policy for the benefit and advancement of individuals, organizations, nations and society;*
2) *to support networks and linkages among researchers through a mentorship programme as well as workshops and conferences to share knowledge and conduct training activities; and*
3) *to disseminate the research findings through such venues as academic journals, conferences and other relevant online and print media outlets.*

The main direct beneficiaries of the SIRCA II program were junior researchers in developing countries – called "Principal Investigators", who were responsible for conducting research projects on the field of information society/ICTD addressing a relevant problem in their local context. Each Principal Investigator was peered with a senior researcher called "Collaborator", who was responsible for providing guidance to the Principal Investigator during all activities of their research project. In such way, the program promoted bi-directional collaborative learning and experience sharing for both emerging and established researchers (The Singapore Internet Research Centre, 2013). In addition to academic collaboration and mentorship to principal investigators, the program provided financial support, and opportunities for publication and participation in international events facilitating international exposure and network-building to all researchers involved in the Program.

A continuation of the SIRCA I Program focusing on strengthening ICTD research capacity in Asia (Chib & Harris, 2012), the SIRCA II Program started in October 2011, when the call for expressions of interest was disseminated. In response, 266 registrations of interest were received, which later resulted in 128 research proposals submitted. After a competitive evaluation process conducted by well-known international experts, 15 proposals were selected to be funded by the Program. The winning proposals provided a fair distribution of research projects across the three targeted regions – 5 proposals from Africa; 5 from Asia; and 5 from South America. The 15 funded projects are listed in Table 2.

ID	PROJECT DESCRIPTION	COUNTRY
1	ICT for the Development of Labor Productivity in Cameroon	Cameroon

2	ICT and Food Security in Côte d'Ivoire: Case of Mobile Phone on Food Products Distribution from Village to City	Ivory Coast
3	StoreRooms: Science and Technology Opportunities and Resources Portal for Kenyan Female University Students	Kenya
4	Impact of Mobile Banking on Micro Savings, Payments and Household Welfare: Randomized Controlled Trials	Senegal
5	Course Redevelopment for Online Delivery Using Learning Technologies	Tanzania
6	ICTs and Empowerment of New Generation Migrant Workers in China	China
7	The Dynamics of Interplay of Technology with 'Health Seeking Behavior' and 'Doctor-Patient Interaction' in Telemedicine: Case Studies from Rural India	India
8	The Internet and Women Empowerment - A Study of How Women in Indonesian Urban Areas Use Social Media to Become Entrepreneurs	Indonesia
9	ICT Usage among Burmese Ethnic Women Organizations in Thailand: Enabling Change For Women and Communities	Thailand
10	Cybersex in the Anti-development State: Labor Politics and Life Histories	Philippines
11	Youth, Inequalities and ICT. A Qualitative Study of Youth Paths to the Incorporation of Computer and Internet in the Context of the "Conectar Igualdad in La Plata and Gran La Plata" Program	Argentina
12	Supporting Collaborative Deliberation: Designing Consultation Portals for Deliberative Practices in Brazil	Brazil
13	ICT's and the Natural Knowledge Economy: Diverging or Converging Paths?	Ecuador
14	Are Digital Textbooks A Sustainable Alternative in Peruvian Schools? Adapting the Pedagogical Approach of the "Leer Es Estar Adelante" Program to a Digital Format.	Peru
15	ICT and Welfare Policies: Digital Skills' Impact on Formal Education and Labour Market Trajectories of Young Uruguayans	Uruguay

Table 2. SIRCA II Funded Projects

After introducing background information about SIRCA II, the following three sections assess the results produced by the Program in terms of its three goals – 1) promotion of high-quality multidisciplinary social science research, 2) support to networks and linkages among researchers and 3) dissemination of research results.

3.1 Promotion of High-Quality Multidisciplinary Social Science Research

SIRCA II promoted a multidisciplinary approach to ICTD and information society research by involving principal investigators and collaborators from nine disciplines, including: Communication Sciences – 6 researchers; Computer Science – 2; Economics – 5; Education – 3; Information Technology and Information and Communication Technology – 5; Management – 2; Psychology – 1; Sociology – 5; and Sustainable Development – 1. The list of researchers, including their countries, type of involvement in SIRCA II – Principal Investigator (PI) or Collaborator (CO); and their disciplines is presented Table 3. Disciplines involved in the SIRCA II Program are illustrated in Figure 1.

ID	RESEARCHER	COUNTRY	TYPE OF INVOLVEMENT	RESEARCHERS' DISCIPLINES								
				COMMUNICATION SCIENCES	COMPUTER SCIENCE	ECONOMICS	EDUCATION	IT AND ICT	MANAGEMENT	PSYCHOLOGY	SOCIOLOGY	SUSTAINABLE DEVELOPMENT
1	Kabran Aristide Djane	Ivory Coast	PI								x	
2	Kassimu Nihuka	Tanzania	PI				x					
3	Stephen Kimani	Kenya	PI		x							
4	Tefong Achille	Cameroon	PI						x			
5	Mamadou Alhadji Ly	Senegal	PI			x						
6	Nikos Dacanay	Thailand	PI									x
7	Rajesh Kumar Chamdwani	India	PI						x			
8	Ezmieralda Melissa	Indonesia	PI	x								
9	Baohua Zhou	China	PI	x								
10	Elinor May Cruz	Philippines	PI	x								
11	Matías Dodel Schubert	Uruguay	PI								x	
12	Héctor Sebastián Benítez Larghi	Argentina	PI								x	
13	María Paz Olivera Rodríguez	Peru	PI	x								
14	Andrea Lucia Ordoñez Llanos	Ecuador	PI			x						
15	Fabro Steibel	Brazil	PI	x								
16	Gloria Bonder	Argentina	CO							x		
17	John Traxler	UK	CO				x					
18	Julian May	South Africa	CO			x						
19	Richard Ling	Denmark	CO								x	
20	Jude Lubega	Uganda	CO					x				
21	Alexander Flor	Philippines	CO					x				
22	Ang Peng Hwa	Singapore	CO					x				
23	Jack Linchuan Qiu	China	CO	x								
24	Roger Harris	Hong Kong	CO					x				
25	Rahul De	India	CO			x						
26	Arul Chib	Singapore	CO					x				
27	Roxana Barrantes	Peru	CO			x						
28	Elsa Estevez	Argentina	CO		x							
29	Hernan Galperín	Argentina	CO								x	
30	M. Soledad Ramírez-Montoya	Mexico	CO				x					
TOTAL NUMBER OF RESEARCHERS PER DISCIPLINE				6	2	5	3	5	2	1	5	1

Table 3. SIRCA II Researchers

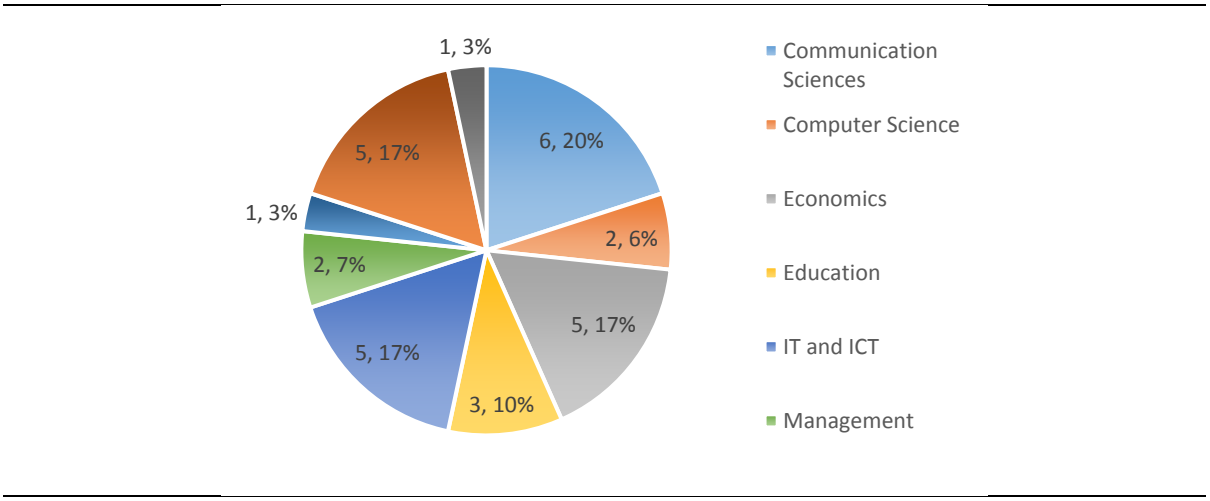

Figure 1. Disciplines of SIRCA II Researchers

In addition to the different researchers' disciplines, the research work of the SIRCA II Program benefited from the cultural diversity of its researchers as well as for having a good representation of female and male researchers. Regarding cultural diversity, SIRCA researchers come from 22 countries and economies: 1) Argentina, 2) Brazil, 3) Cameroon, 4) China, 5) Denmark, 6) Ecuador, 7) Hong Kong SAR, 8) India, 9) Indonesia, 10) Ivory Coast, 11) Kenya, 12) Mexico, 13) Peru, 14) Philippines, 15) Senegal, 16), Singapore, 17) South Africa, 18) Tanzania, 19) Thailand, 20) Uganda, 21) United Kingdom, and 22) Uruguay. Regarding gender, SIRCA II involved 22 male researchers (73%) and 8 female researchers (27%). The diversity of SIRCA II researchers is illustrated in Figure 2.

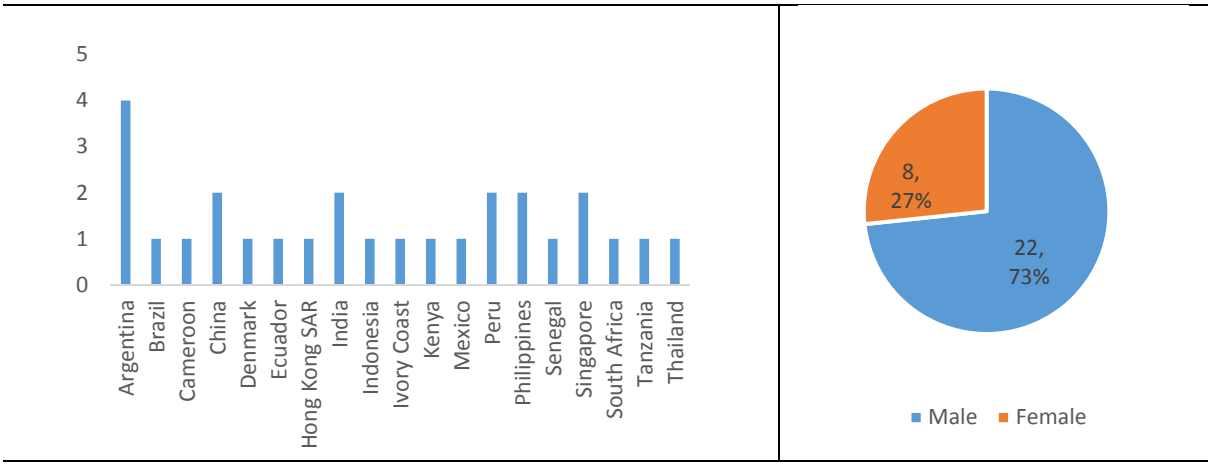

Figure 2. Diversity of SIRCA II Researchers

To ensure high-quality research, Principal Investigators regularly received feedback and comments from Collaborators and well-known international experts. Comments and feedback addressed research methodologies applied for their projects, including research questions, methods for data collection and data analysis, and theoretical foundations underpinning their research work. In addition, as explained in the next sections, Principal Investigators received training and feedback for their publications.

One of the SIRCA II Principal Investigators provided a quote to explain his impressions about the closed mentorship he received:

> *"I have really learned a lot from the SIRCA project in the past three years. Well-designed workshops, one-to-one mentoring, and step-by-step book chapter writing training… all of these not only help me to complete the project smoothly, but also award me a lifelong wealth of skills for academic research"* (Baohua Zhou).

3.2 Support to Networks and Linkages among Researchers

Several activities were organized and funded by the SIRCA II Program as part of the networking and capacity-building efforts, as explained below.

On March 2012, the first face-to-face meeting of principal investigators and collaborators took in Atlanta, collocated with the International Conference on Information and Communication Technologies and Development (ICTD 2012). One-day training sessions were organized to build capacity on topics relevant to ICTD research, such as gender analysis, ethics and multidisciplinary approach on ICTD research. During such sessions, principal investigators presented their projects and received open feedback from other researchers. The training was followed by an open session organized at ICTD 2012 Conference, where the SIRCA II Program was broadly announced to the community. Later, during 2012, the collaborators visited the principal investigators in their home countries to provide mentorship and support during field work, as well as guidance for their research work.

In May 2013, the SIRCA II Book Writing Workshop was organized on the side-lines of the IFIP 9.4 12th International Conference on Social Implications of Computers in Developing Countries, in Jamaica. The aim of the workshop was to facilitate feedback and discussion on the chapters submitted by principal investigators and collaborators to the SIRCA Volume II book (Singapore Internet Research Centre, 2013). In addition, the workshop included lectures on topics relevant to principal investigators, such as publications in journals and research impact, as well as provided an opportunity for open discussions on impact of ICTD research on policy and practice. A poster session organized at the IFIP 9.4 Conference enabled the presentation of results of the 15 SIRCA II projects. Additionally, one principal investigator presented her research work at the conference PhD track session. In August 2013, SIRCA II organized an Academic Writing Workshop in Mauritius. The workshop provided an opportunity for Principal Investigators to learn about academic writing and to receive feedback on the chapters submitted for SIRCA's second book volume. Finally, in December 2013, SIRCA participated in an Academic Writing Workshop at the University of Western Cape, in Cape Town, South Africa. The Program also organized an open session at the ICTD 2013 Conference that took place in Cape Town. Finally, back-to-back with the ICTD 2013 Conference, a three-day SIRCA Bootcamp was organized for all SIRCA II researchers.

Some impacts of SIRCA II's efforts on networking and linkages were explained by the Principal Investigators:

> *"SIRCA has contributed immensely to my research by enabling me to establish links with resourceful experts and outstanding organizations"* (Tefong Vaumi Achille).

> *"The SIRCA Programme has helped in building a strong community of senior and emerging Latin American researchers, which would have been difficult to build otherwise SIRCA activities, gave us the opportunity of meeting in-person, knowing each other and collaborating in academic activities, which has strengthened our bonds. This is the beginning of long-term collaboration relationships, where more research initiatives are being, and will be, constructed regionally"* (Laura León).

3.3 Dissemination of Research Findings

SIRCA II invested significant efforts to ensure a broad dissemination of the research findings. In addition to individual efforts conducted by Principal Investigators who published and participated in various international conferences and events, the Program, as a whole produced two major publications:

1) A book titled "*Impact of Information Society Research in the Global South*" (Chib, Mayand Barrantes, 2015) comprising 15 book chapters written by SIRCA II Principal Investigators and Collaborators, grouped into two major areas: Impact of Research, and Research on Impact.

2) "*The Electronic Journal of Information System for Developing Countries Special Issue on the SIRCA II Program*", which comprises five papers written by SIRCA II Principal Investigators, in addition to this introductory paper.

One of the Principal Investigators provided an example of the impact of the SIRCA II efforts for disseminating research results:

> *"As a result of the networking, training and research outputs involved in my SIRCA project, I have so far: worked as a consultant for UNESCO in a media policy portal, lectured in two universities on ICT4D (both at the under-graduate and graduate level), started a new consultant position as Information and Technology Architect in a new portal on Human Rights policy in the MERCOSUR region, collaborated with start-up IT companies in Brazil to design and implement technologies researched during the SIRCA project"* (Fabro Boaz Steibel)

After introducing some background about the SIRCA II Program, the following sections describes some of the research findings produced by the Program, as presented by the papers included in this special issue.

4. SIRCA SPECIAL ISSUE OF EJISDC

The special issue of The Electronic Journal of Information Systems for Developing Countries (EJISDC) on the SIRCA II Program includes five selected papers submitted by principal investigators of the program. All of them study an important aspect of the impact of ICT4D initiatives, covering different areas – from building e-skills, through leveraging on e-skills for occupational attainment, to achieving socio-economic development based on ICT capital investments and ICT-related jobs. In addition, one of the papers investigates how ICT can enrich ICT4D research methods. The following sections present a summary of the papers.

4.1 Building E-skills

The paper titled "Digital and Social Inequalities: A Qualitative Assessment of the Impact of the Connecting Equality Program on Argentinean Youth" (Benitez Larghi et al., 2015) studies the impact of the Connecting Equality Program (Programa Conectar Igualdad or PCI) in bridging the digital divide and fostering social inclusion among students of two schools in Argentina. An initiative implemented by the Argentinean Government, PCI distributed netbooks to students in high schools. Based on primary data collected through semi-structured interviews, the authors conduct a qualitative research based on a constructivist view of technology (Pinch & Bijker, 1984) and a socio-anthropological approach to the ICT appropriation process (Wincor, 2009). The main contribution of the paper is to show that the implementation of PCI had a positive impact among lower class youth in terms of access, skills, and types of ICT use they do. It also discusses how the program guaranteed access to the first computer and promoted the sharing of knowledge and digital skills with family members for this social group.

4.2 Leveraging on E-skills for Occupational Attainment

The paper titled "e-Skill's Effect on Occupational Attainment: A PISA-based Panel Study" (Dodel, 2015b) analyzes how the development of e-skills during the age of 15/16 contributes to white collar occupational achievements at the age of 19/20, in addition to other factors traditionally associated to pathways, in Uruguay. Based on secondary data collected through a survey conducted as part of the Programme for International Student Assessment (PISA) tests, the author adopts quantitative methods applying longitudinal studies to assess the effect of digital skills (independent variable), in addition to nested models to assess the role of non-ICT variables (dependent variables). The main contribution of the paper is to provide statistical evidences of the links between ICT and transitions to adulthood and welfare, and the relevance of e-skills for occupational achievements among a population of young adults in Uruguay. In addition to the research results presented on this paper, more findings from the "ICT and Welfare Policies: Digital Skills' Impact on Formal Education and Labour Market Trajectories of Young Uruguayans Evaluated by PISA (Panel Study) 2003" project are published in (Dodel, 2015a).

4.3 Achieving Socio-Economic Development

The paper titled "ICT for the Development of Labour Productivity in Cameroon" (Péguy Choub Faha & Vaumi, 2015) studies the impact of ICT capital on improving productivity of Small and Medium Enterprises (SMEs) in Cameroon. Based on primary data collected through a field survey among companies located in two cities, the authors follow quantitative and qualitative approaches, based on the method of Instrumental Variables and cross-sectional analyses for investigating the research problem. The main contribution of the paper is demonstrating the positive impact of ICT for improving the productivity of SMEs – i.e. that an increase in the ICT-capital by 1 per cent is associated with 24 per cent higher labor productivity; and providing some policy recommendations for governments to enable SMEs to develop ICT capabilities, such as encouraging local and foreign investors to work collaboratively to get the most from their ICT investments, reducing the administrative burden for investors to easily create business partnerships, and creating institutional mechanisms to assist local and young companies to invest on ICT to improve productivity.

The paper titled "Exploring the Cybersex Phenomenon in the Philippines" (Cruz & Sajo, 2015b) explores complex and unique characteristics of cybersex activities; from illustrating how cybersex is organized, experienced and mediated, through analyzing negative effects - such as how workers face exploitation and resistance and are affected by mechanisms of surveillance and control; to investigating positive effects – such as how they

are able to create value for themselves, not just in monetary terms, but also in pursuing autonomy, personal development, and kinship-oriented care. Based on primary data collected through interviews with cybersex workers in two cities in the Philippines, the authors adopt a qualitative approach based on case study analysis to study the problem. The main contribution of the paper is highlighting weaknesses of government ICT discourse when promoting Filipino-based ICT skills. On the one hand, cybersex workers adopt the impositions made by service-based labor in a global digital economy – rudimentary e-skills, ability to speak English and to empathize and foster customer relations; but on the other hand, they face exclusion and are subjected to the standards and prerequisites of the legitimate digital economy. In addition, it illustrates social problems raised by an ICT service that is more focused on ICT for capital than on ICT for development. In addition to the research results presented on this paper, more findings from the "Cybersex in the Anti-development State: Labor Politics and Life Histories" project are published in (Cruz & Sajo, 2015a).

4.4 Building Research Capacity

The paper titled "Analyzing Multimedia Data: Exploring the Dimensions of Context in ICT for Development Research" (Chandwani & De, 2015) investigates how multimedia data can provide a significant amount of contextual information of a phenomenon, facilitating qualitative analysis performed by researchers when investigating it. Based on video recording materials of interactions between patients and doctors when delivering telemedicine services in India, the authors analyze how information about contextual aspects – e.g. physical settings where online interactions take place such as the lightening of the room and the seating arrangements, the presence or absence of paramedical or other technical staff, and the body language of doctor and patients, among many others; can enrich qualitative research analysis. The main contribution of the paper is to highlight the various advantages of the usage of multimedia data for conducting qualitative analysis on ICT4D research, including deepening the field of vision of the researchers to be able to consider contextual factors of the environment so to better understand the socio-cultural context, as well as the temporal preservation of contextual details. In addition, it also discusses some of the limitations related to subtle contextual aspects that may not be considered during the theoretical conceptualization of the research or beyond the focus of the data collection process. In addition to the research results presented on this paper, more findings from the "The Dynamics of Interplay of Technology with 'Health Seeking Behavior' and 'Doctor-Patient Interaction' in Telemedicine: Case Studies from Rural India" project are published in (Chandwani & De, 215).

5. DISCUSSION

The SIRCA II Program explored in depth the connection between policy and practice on ICTD, as well as analyzed both: a) impact of research and b) research on impact (Chib et al., 2015).

In particular, the collection of papers presented in this special issue mainly focuses on research on impact of ICTD policies and practice. They cover a wide spectrum of different aspects and stages of the virtuous cycle (World Economic Forum, 2014) mentioned in the Introduction section that enriches a country's IT-ecosystem – from building e-skills, through the use of e-skills for labor attainment, to how ICTs are used by citizens and businesses to achieve socio-economic development. In addition, to investigate the performance of such stages in the eco-systems, countries also need to build capacity for ICT4D research. The five papers included on the SIRCA special issue of EJISDC study impacts of policy and practice in all such stages, as depicted in Figure 3.

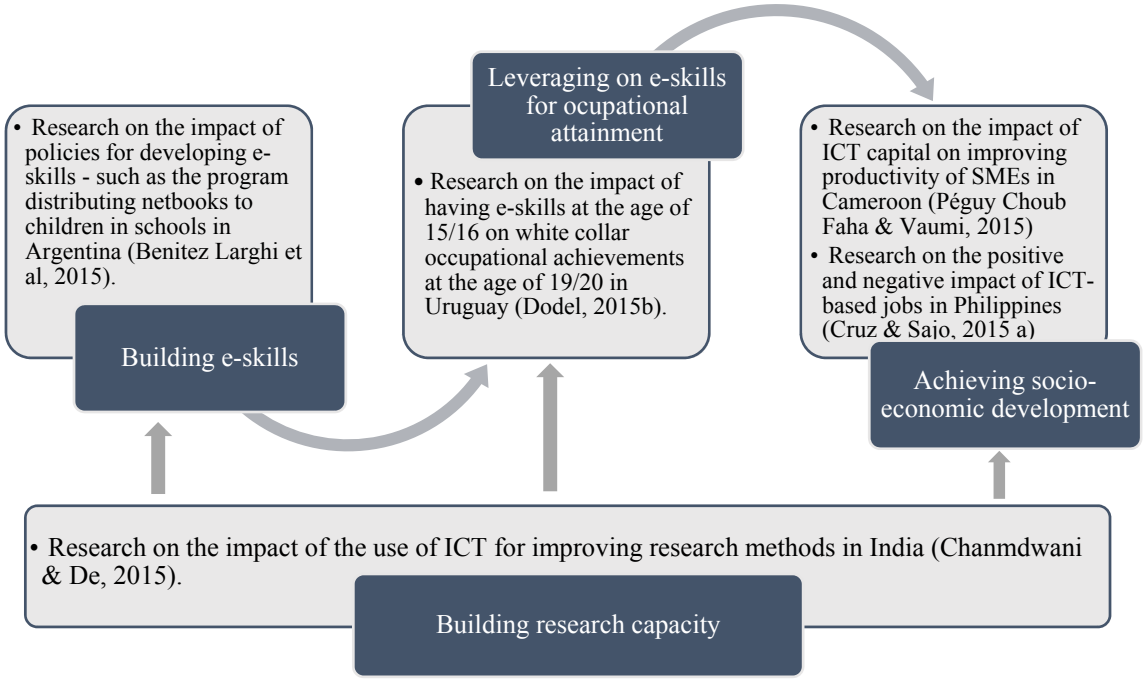

Figure 3. Research on Impact of ICTD Policy and Practice – Lessons Learnt from the SIRCA II Program

6. CONCLUSIONS

This introduction presented a brief evolution of the ICT4D policy and research domain and presented the experience of SIRCA II – a program aiming at promoting excellence in ICT4D and information society research in the Global South. According to these authors, three main lessons learnt from the SIRCA II Program include: 1) the need for enhancing the capacity of human resources in developing countries for conducting ICT4D research, 2) the relevance of mentoring, peer-learning, networking and international exposure in building such capacity, and 3) the need for building researchers' capacity on how to translate research results into policy recommendations. In addition, five major lessons learnt from research results presented on this special issue include: 1) the importance of public policies facilitating access to ICTs to children in schools, 2) the relevance of possessing e-skills for obtaining a job in the information society, 3) the benefits of capital investments on ICTs for SMEs development, 4) the need for governments to proactively monitor and regulate the negative social effects of ICT-based jobs, and 5) the potential of leveraging on the use of new ICTs for improving research methods.

The future work of the SIRCA Program has being already announced. The SIRCA III Program will award research grants for two-year projects focused on cross-cutting theoretical frameworks in the area of Open Development (Smith & Reilly, 2013). Research projects will be led by teams of two senior researchers and /or practitioners investigating open development topics in developing countries in Africa, Asia and Latin America. As members of the academic community and citizens of the Global South, we wish SIRCA III, its researchers and the supporting institutions – The Singapore Research Centre (SiRC) and IDRC, the best success, as achieved by its predecessors, the SIRCA I and SIRCA II Programs.

ACKNOWLEDGEMENTS

The authors thank Prof. Arul Chib, Director of the SIRCA Program and Senior Editor of EJISDC, and Dr. Roger Harris, Collaborator of the SIRCA II Program and Co-Editor of EJISDC for their support and feedback on the preparation of the special issue.

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