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Proceedings Annual Workshop of the AIS Special Interest Group for ICT in Global Development

12-14-2014

A Cluster Analysis of Research in Information Technology for Global Development: Where to from here ?

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Research-in-progress Paper

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ABSTRACT

While research in Information Systems recognizes the importance of Information Technology in a global context, it continues to focus on a narrow view of IT adoption. In recognizing that the majority of innovations in IT are taking place in developing countries, it is important to find out what research is being undertaken to understand the effects of the different technologies on development outcomes. This paper conducts a cluster analysis of 214 papers from the SigGlobDev Workshop, the Information Technology for Development Journal and other Information Systems Journals and conferences which have published papers in Information Systems and Global Development. This analysis throws light on the ways in which research is being undertaken in this area. The contribution of this paper lies in identifying the key areas in which Information Systems research is addressing the ways that development outcomes are or are not being addressed, and it highlights areas that still need to be investigated.

Keywords: IT for Development, Economic Development, Social Development, Human Development, Cluster Analysis

INTRODUCTION

It appears that current research in Information Systems (IS) focusses on how Information Technology (IT) can be adopted by users. Yet the majority of people in organizations adopt technology on a regular basis, and gains from the adoption of IT have only been assessed in a rudimentary fashion such as return on investment, net present value or transaction cost analysis. The bottom line of a business, community or society relating to its survival and growth has not been connected to its use of IT. Limited research has been conducted in IS into studying the outcomes of IT Adoption beyond variables affecting the user perceptions of technology. One way of assessing the ways in which technology can improve the lives of people is by assessing the ways in which the majority of businesses in the world that are micro-enterprises adopt the technology. There is evidence to suggest that when these businesses use IT in innovative ways, they grow by a factor of 3.8 (Qiang *et al*. 2003).

Although innovations in Information Systems have had an impact on multiple aspects of the way organizations do business, and how communities and regions grow, little is known about how this impact takes place. Questions arise, such as, Why do we need to know about how IT brings about Development? Why does it matter? While the majority of innovations in Information Systems appear to be taking place in the developing world, little research in Information Systems has attempted to understand why this is the case? And, how are these innovations affecting the lives of people?

Cell phones are being used to make payments at street markets and to drive agriculture supply chains in African and Asian countries. Mobile technologies also support the transfer of funds between people in Asia, Africa and the Middle East. The world's largest numbers of users of mobile payments reside in Kenya. Fishermen and farmers are able to find new markets by using simple text messaging; new businesses are developing which support the increased demand fueled by the liquidity and income generated by new markets. The Economist reported that for every 100 cell phones in a typical developing country, gross domestic income rises by almost a percentage point. This suggests that there is growth in incomes through the use of mobile technologies (Economist, 2009).

Recent events in the world have shown that Information and Communication Technologies (ICTs) can bring about significant changes in the lives of people. For example, the use of social

media and mobile communications have brought about changes in the way people interact with their governments - as can be seen in the Arab Spring – and the way they do business and interact in their communities. However, what research is being undertaken to understand the effects of technology on development outcomes? And how is this research contributing to what we already know? Are there any connections between levels of analysis, research methods and contributions development outcomes?

Because there are many different ways of adopting IT, this paper provides a theoretical and empirical basis of understanding the outcomes of using IT. It appears that the innovative ways in which Information Systems are used in different regions enable these regions to develop. The purpose of this paper is to find out what is known about the effects of Information Technologies on how development takes place. We review key papers in leading journals and workshops that report on these innovations. Our analysis samples 214 papers from the SigGlobDev Workshop, the Information Technology for Development Journal and other Information Systems Journals and conferences that have published papers in Information Systems and Global Development. We hypothesize that the different development outcomes, including social development, economic development, and human development, are associated with the research methods scholars choose, as well as different levels of analysis. We follow a cluster analysis method to see how these papers are grouped with each other. This analysis throws light on the ways in which research is being undertaken in this area. The contribution of this paper is in identifying the key areas in which Information Systems research is addressing the ways in which development outcomes may or may not be addressed and highlights areas that still need to be investigated.

THEORETICAL BACKGROUND

The concept of *development* has its roots in innovation of the firm. Development is defined as "changes in the system that arise from within the system" (Schumpeter, 1934, p.63). Development is often used to describe growth in organizations and in the regions in which they reside. ICTs and development can be viewed as socioeconomic improvements through transfer and diffusion (Avgerou, 2010). Economic development can entail political, opportunity, and economic freedom (Sen, 1999). As ICT development entails increasing diversity of research topics, research methods, and research implications, we surveyed the literature in the Information

System Research areas to understand the role of ICT as an artifact in development (Sein and Harindranath, 2004, Taylor et al., 2010; Orlikowski and Iacono, 2001). We hope to derive a common body of knowledge that can be shared in the IS area (Hirschheim and Klein, 2012).

Traditionally, IS research has been driven by areas such as adoption and diffusion of IT (Davis 1989, Harrison et al. 1997, Venkatesh, et al. 2003, Gefen, et al. 2003) for developing methods and approaches for implementing IS globally and for managing dispersed collaborative environments in a variety of contexts including off-shore outsourcing (Carmel and Nicholson, 1993; Tractinsky and Jarvenpaa 1995, Willcocks et al. 2004, Sahay et al. 2003, La Rovere & Pereira, 2000, Watson et al 1997). Since IS research is both a science and a profession, generalizability is a major concern in IS research (Lee and Baskerville, 2003).

Similarly, research in the field of Information Technology for Development (ITD) has grown to provide specific insight and approaches through which Information Systems can be implemented and adopted in a variety of cultural contexts. It is the study of how innovative applications of IT bring about improvements in the lives of people. These improvements are assessed in terms of economic, social and human outcomes. ITD research has made contributions in providing equitable access to information and knowledge in areas such as education (Rodrigues and Govinda 2003; Rodrigo 2003, Scheepers and de Villiers 2000), healthcare (Braa et al 2004; Mosse and Sahay 2005; Kimaro and Nhampossa, 2005), software development (Chudnovsky and Lopez 2005; Tan and Leewongcharoen, 2005; Han, 2000), reduction in poverty (Cecchini and Scott 2003; Kenny, 2000; Qureshi et al 2009), better government (Tan and Leewongcharoen, 2005; Walsham and Sahay, 1999; Qureshi, 1998), and off-shore outsourcing (Sahay et al., 2003; Preis-Heje et al., 2005; Hawk and McHenry, 2005). Now that the effects of globalization permeate many parts of life, organization, and society, the relevance of ITD research for the MIS community is evident.

Although ICT has been conceptualized as a tool to achieve social, economic, and human development, little is known about how this tool may actually enable development. Brown and Grant (2010) argue that the existing research in ICT for Development can be categorized into "For Development" and "In Developing" countries by reviewing 184 journal and conference articles from 1982-2007. ICT for Development research focuses on the link between ICTs and development, and empowering marginalized populations, while the research of ICT in

Development focuses on cultural implications and local adaptation (Brown and Grant, 2010). It is argued that increased research attention should be placed on research in developing contexts, that is, "For Development." Avgerou (2008) suggested that IS research in development should engage with the study of IS innovation with particular social-economic rationales, especially in development countries. Sein and Harindranath (2004) also proposed ICT use, ICT views, and ICT impact as key ICT artifacts, to understand the role of ICT in national development.

Some suggest that in a set of emerging economies, IT investments achieved consistently higher growth rates of GDP and productivity (Kraemer and Dedrick, 1994; Samoilenko and Osei-Bryson, 2011). However, Bollou and Ngwenyama (2008) investigated the total factor productivity of ICT sectors in six West African countries from 1995 to 2002. They determined that total factor productivity of those countries did not benefit from the investment, because "Using ICT as an engine of economic growth is complex" (Bollou and Ngwenyama, 2008, p303). Heeks (2002) pointed out that the accessibility of IS failure in developing countries is not as easily identified, compared to the industrialized countries. Pick and Azari (2008) conducted research on the influence factors on ICT from 71 developing and developed countries. They identified technology attributes that are strongly associated with foreign direct investment (FDI), government prioritization of IT, and education. These authors suggested that there was a lack of case study research from developing countries about how ICT could leverage economic, social, and human development. The definition of development remains controversial; the majority of definitions of 'development' carry implicit value assumptions (Summer and Tribe, 2008). Willis (2011) placed development theories within a historical context. Escobar (1995) conducted a discussion of alternative visions for a post-development era, suggesting that current views on development prevent people in developing countries from coming out of poverty. The various applications of ICT have been seen to fuel globalization. A number of theories have been developed on the nature and impact of the process of globalization (Castells 2001, Held et al 1999, Hirst and Thompson 1996, Robertson 1992, Scholte 1993, Wallerstein 1974, Giddens 2003). Castells (2000) was notable in his description of globalization fueled by IT; he suggested that what characterizes the current technological revolution is the application of knowledge and information within knowledge generating and information processing devices. The following sections describe what is known about the three aspects of development: economic, social and human.

Economic Development

The most discusses aspect of development, Economic Development, can be viewed as quantitative and qualitative improvement in the economy. Economic development as a concept entails a broad view of economic growth. Malecki (1997) distinguished between economic growth and economic development. Economic growth "increases in the quantity or the value of the goods and services" (Malecki, 1997, p1) and economic development "leads to qualitative improvements in life" (Malecki, 1997, p1). As Sen (1973, p748) pointed out, "economic growth is one aspect of the process of economic development." Economic development involves the growth and improvement of factors such as literacy rates, poverty rates, employment rates, GDP per capita, access to healthcare, and government investment.

On the other hand, care must be taken to understand ICT investment and strategies towards development countries. Ewusi-Mensah (2012) provided analysis associated with IT diffusion in sub-Saharan Africa. He identified inadequate IT resources, hindered levels of IT assimilation, and the inadequate human resources as the main reasons the impact of IT on the economy is problematic.

Essentially, as a country level indicator, economic development is highly related to human development in education, health, and income. Economic growth and development are often observed simultaneously. For example, Kamal et al. (2008) investigated ICT capacity and skills, and their effect on economic development in 183 countries of the United Nations. The authors showed that increase in skill development and ICT capacity development would ultimately lead to economic development. Jiménez et al. (2013) investigated the Cobb-Douglas relationship, between GDP per capita, info-density, tertiary and secondary education, and labor from 72 countries. They pointed out that there is an imbalance between developed and developing countries in the ICTs' effect on GDP per capita.

As a key determinant of a nation's development of production, technology can be explained as an exogenous factor which could interact with other determinants, such as capital and labor, and lead to economic growth (Mankiw, 2012). Mankiw et al. (1992) provide an augmented Solow Growth Model and analyze the data of 121 countries from 1960-1985. It has been observed that there are not substantial externalities to the accumulation of physical capital, which provides the foundation for emerging economies in the world, such as Brazil, Russia, India, and China

(BRIC) to catch up and to achieve "leapfrogging"(Brezis et al., 1993). That is, new technology enables developing countries to use lower wages to achieve new leadership (Brezis, 1993; Lee and Lim, 2001; Steinmueller, 2001).

Samoilenko and Osei-Bryson (2011) used the Solow Growth Model to show that IT can have an effect on productivity in certain types of countries under certain conditions. Disparities occur in all societies, including those considered to be developed. Chakraborty and Bosman (2005) measured the inequalities in home PC ownership in the United States by applying the Lorenz Curve and the Gini coefficient. Based on the data gathered in 2011, the authors found that inequalities in PC ownership are substantially smaller among white households than among African American households in the United States. It is important to bridge those gaps because the use of IT appears in both developed and developing areas. There are several international organizations, for example, International Telecommunication Union (ITU), United Nations Conference on Trade and Development (UNCTAD), UNESCO Institute for Statistics (UIS), Organization for Economic Co-operation and Development (OECD), UN Department of Economic and Social Affairs (UNDESA), and World Bank, have been focused on the measurement of and access to ICT infrastructure. The core indicators for measuring access to ICT are radio, telephone, television, and computer (ITU, 2014).

Social Development

Social development is governed by many factors such as capital, technology, and government support. Social development tends to focus on 'putting the people first' in the development process (World Bank, 2014). Warschauer (2004) introduced the idea of interaction between ICT and social inclusion. Social relations shape access to ICT, as well as human and social development (Coleman, 1988). The concept of social capital is also introduced; social capital is defined as "aspect of social structures, and the facilitation certain actions of actors within the structure" (Coleman, 1988, p.98). The benefit of ICT can be shared through social development, which will increase social capital (Warchauer, 2004).

Midgley et al. (1986) pointed out the importance of community participation in social development. Although those changes, especially from the Internet (Castells, 2001) will provide challenges, opportunities, and risks for emerging areas (Mansell and Wehn, 1998; Morales-Gomez and Melesse, 1998), it is important to understand how those changes could lead to

sustainable development (Credé and Mansell, 1998). Byrne and Sahay (2007) conducted a participatory design for social development in South Africa. They showed that community plays a crucial role in social development. On the other hand, it is important to understand the issue of cost and wealth distribution, access, ownership and control, and culture when ICT contributes to social development (Morales-Gomez & Melesse, 1998).

Government has an effect on social development. E-government, defined as "The employment of the Internet and the world-wide-web for delivering government information and services to the citizens," e-learning - the application in education - and e-Health, healthcare practice using the Internet (United Nations, 2006), play a critical role which could lead to social development, especially for marginalized people in developing countries (Unwin, 2009).

Human Development

The idea of human development began a revolution of its own in the 1950s and early 1960s with the research of Schultz (1961), Mincer (1958), and Becker and Chiswick (1966). Economists current place much greater emphasis than in the past on the importance of knowledge and information to development of countries and of individuals (Becker and Woessmann, 2011). Human Capital has a role in lowering economic costs or in elevating customers' willingness to pay (Porter, 1985, p. 394). Human capital is defined and created by changes in individuals which increase skills and capabilities, enabling people to behave in new ways (Coleman, 1988). Human capital also can be described as all the competencies and commitments of the people within an organization (Ceridian, 2007).

Human capital may be assessed in terms of education and *social embeddedness*. Social embeddedness is defined as the degree to which individuals or firms are enmeshed in a social network (Granovetter, 1985). Boyer-Wright and Kottemann (2008) compared e-government issues in emerging parts of the world, including Eastern European and Asian countries, and in advanced countries. They also noted that education and on-the-job training of individuals plays an important role in ICT use in the three domains. Ngwenyama and Morawczynski (2009) determined that economic factors, human capital, geography, and civil infrastructure factors should be considered during analysis. Baliamoune-Lutz (2003) argued that ICT diffusion is not associated with education, a conclusion based on cross-sectional data from the World Economic Forum's (WEF) Government Information Technology Report (GITR).

Education and training expenditures are the key variables used to assess human capital. Education in its broadest sense is the means through which aims and habits of a group of people are sustained from one generation to the next. Training is the acquisition of knowledge, skills, and competencies as a result of learning vocational or practical skills, and increasing knowledge that relate to specific useful competencies. Training has the specific goals of improving an individual's capability, capacity, and performance. Training forms the core of apprenticeships and provides the backbone of content at institutes of technology (also known as technical colleges or polytechnics). As a socioeconomic improvement, it is critical to understand how ICT could lead to social, economic, and ultimately human development (Avgerou, 2010).

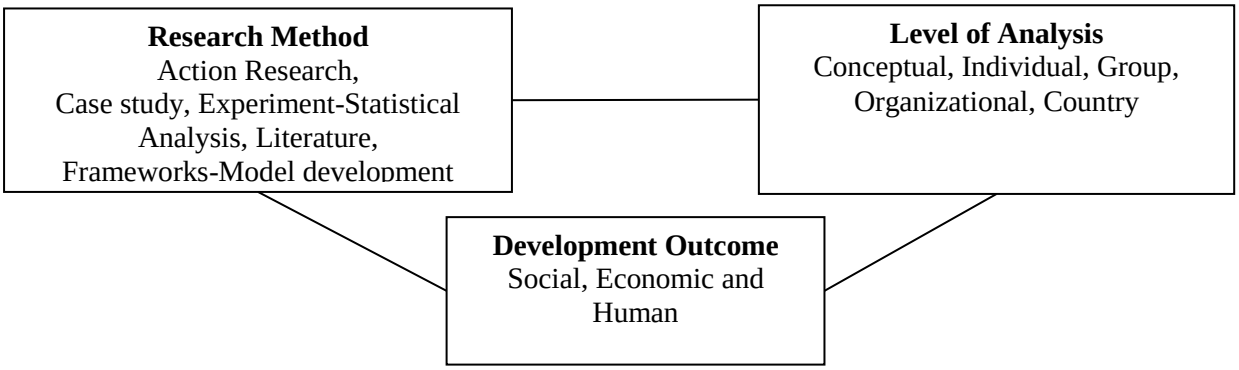
In sum, economic development, social development, and human development are not independent systems. Although human development is closely associated with social development and economic development, economic development outcomes are also associated with them. This relationship can be cyclical in some cases, bringing negative growth cycles as well as positive growth cycles (Qureshi 2005, Qureshi et al 2009).

CONCEPTUAL RESEARCH MODEL

Although development outcomes can be assessed in multiple ways through economic, social and human development lenses, research methods and levels of analysis also vary. Based on the discussion of the literature above, we hypothesized that the different development outcomes - social development, economic development, and human development - are associated with the research methods scholars choose as well as different levels of analysis. Figure 1 describes the conceptual research model we propose.

Research methods that can be identified in the IS field range from qualitative action research and case studies to quantitative methods, which range from experiments to statistical analysis methods. There are also a range of theoretical papers that report literature reviews and develop models or frameworks. IT for Development research tends to go beyond the conceptual, individual, group and organizational levels of analysis to the country level of analysis. In this analysis these three aspects of research, research method, level of analysis and development outcomes, are used as the basis of coding the articles collected.

Figure 1. Conceptual Research Model



RESEARCH METHODOLOGY

Cluster Analysis was conducted in this research to identify the key themes. Cluster Analysis has been widely applied in the IS research field to help researchers classify and unravel entities in a given context (Balijepally, Mangalaraj, & Iyengar 2011). Particularly, two-step cluster was adopted, because the relocation and hierarchical clustering methods did not directly address the issue of determining the number of clusters (Bacher, Wenzig, & Vogler, 2004). The two-step cluster could sufficiently contain both continuous and categorical variables, which provided opportunities to extend this research in the future. Two-step cluster analysis in SPSS involves two steps: the pre-cluster data stage, which adopts a sequential clustering approach (Theodoridis and Koutroumbas, 1999), and grouping data into sub-clusters, using agglomerative hierarchical clustering methods (Bacher, Wenzig, & Vogler, 2004).

Cluster analysis is considered to be a powerful tool in IS research, because it permits researchers to examine the socio-technical phenomenon through interaction with organization, technology, and people (Balijepally et al., 2011). Lowry et al. (2013) conducted cluster analysis on top IS journals; they identified MISQ, ISR, and JMIS as Tier 1 clusters, and EJIS, ISJ, JAIS, and JSIS as Tier 2 clusters. Because of the exploratory setting of the proposed research hypothesis, two-step cluster analysis in SPSS was selected. Data was collected from recent journals, conferences, and workshop publications.

In order to triangulate the cluster analysis, we conducted a test of independence. This was conducted to find out if there was any correlation between the variables to triangulate the findings from the exploratory cluster analysis. Pearson's chi-squared ($\chi 2$) test for independence

was conducted to further explore if the three dimensions/categories: research methods, level of analysis, and development outcomes.

DATA COLLECTION

This study carried out content analyses of publications in IS research as they related to how ICT related to Development outcomes. Since the majority of ITD has been reported since 2008, this research was focused on publications from 2008-2014. However, other important and representative IS journals and conferences from 2002-2014 were also included in the research. The major journals in MIS that are highly cited were scanned for the terms "Information Technology for Development." The journals that produced the most papers in this area are: the Information Technology for Development Journal, Senior Scholars' Basket of Journals [1]: European Journal of Information Systems, Information Systems Journal, Information Systems Research, Journal of AIS, Journal of Information Technology, Journal of MIS, Journal of Strategic Information Systems, MIS Quarterly, and Annual SIG GlobDev Pre-ICIS Workshop. We selected these journals and workshops because they represent the frontier of research in IS, especially from IT for development. The combination of journals and conferences provided up-to-date research trends and insightful research analysis. Particularly, our sample contained comprehensive collections of all SIG GlobDev Pre-ICIS Workshop publications from 2008-2013.

Table 1. Description of Data

Paper Resources	Time Frames	Number of Paper
Annual SIG GlobDev Pre-ICIS Workshop	2008-2013	118
The Journal of Information Technology for Development (ITD)	2008-2014	74
Other Important and Representative IS journal and conference publications	2002−2014	22
Total		**214**

[1] http://aisnet.org/general/custom.asp?page=SeniorScholarBasket

Through the above selection and searches by using keywords "development" and "Information Technology," 217 publications were gathered for this study. Following Zhang et al.'s (2011) approach, each paper was examined and coded using the concepts discussed in the conceptual development section. Step one in the research involved examining, coding and validating the results. Step two involved the revalidation of a random sample of the results. Table 1 provides the description and distribution of the data.

MODE OF ANALYSIS

Each paper gathered was further coded using the concepts discussed in the conceptual development section. There are nine variables that needed to be coded into the spreadsheet: publication year, publication type, key words, research methods, demographics, findings, development outcomes, theory base, and level of analysis. At the first stage of exploratory research, research methods, development outcomes, and level of analysis were selected and identified as important variables. Table 2 provides an overview of the coded variables from the paper.

Table 2. Variables from the Paper	
Publication Year	The Year of Publication
Publication Type	Paper can be either journal, workshop, or conference publications.
Key Words	Keys words from the publication
Research Methods	**Action Research, Case Study, Literature Review, Model Development, and Statistical Analysis**
Demographics	The location where the study was studied
Findings	Findings of the paper
Development Outcomes	**Economic Development, Human Development, Social Development**
Theory base	Different theories that authors adopt, e.g., UTAUT, Sen's Capability Framework.
Level of analysis	**Conceptual, Country, Group, Individual, and Organizational**

Research methods in the sample of papers we identified are classical research methods that can be observed from IS research, including Action Research, Case Study, Literature Review, Model Development, and Statistical Analysis. Development outcomes contained the three types of development which were discussed in the theoretical background, including economic development, social development, and human development. The third variable we identified was the level of analysis, which contained Conceptual, Country, Group, Individual, and

Organizational levels of analysis. The other variables we gathered and coded will provide the opportunity to further explore the data in future research.

RESULTS AND ANALYSIS

Cluster analysis enables us to discover structures in data without explaining why they exist. There are certain determining factors affecting development outcomes: research method, theory base, level of analysis, and location of the study. The cluster analysis (Hair et al., 2006) using SPSS version 21 was conducted on the coded 214 papers. Seven papers were excluded due to incomplete data. Two-way cluster analysis was conducted, and three clusters were generated. Table 3 provides information about the cluster distributions.

Table 3. Cluster Distributions

		N	% of Combined	% of Total
Cluster	1	85	41.06%	39.7%
	2	48	23.19%	22.4%
	3	74	35.75%	34.6%
	Combined	207	100.0%	96.7%
Excluded Cases		7		3.3%
Total		214		100.0%

The three clusters that were identified contain 85 (41.06%), 48 (23.19%), and 74 (35.75%) publications, respectively. Table 4 below provides the summary of the sample data findings.

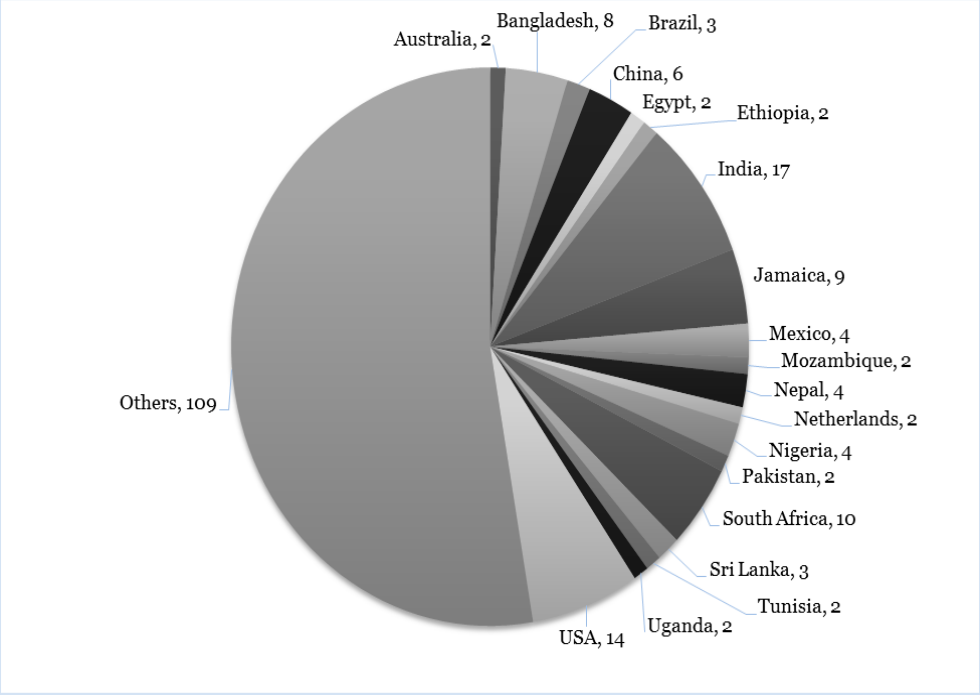
Table 4. Summary of the Sample Data Findings

Dimension	Type	Number	Percentage
Research Methods	Action Research	7	3.38%
	Case Study	86	41.55%
	Literature Review	17	8.21%
	Model Development	50	24.15%
	Statistical Analysis	47	22.71%
	Total	**207**	**100%**
Level of Analysis	Conceptual	21	10.14%
	Country	77	37.20%
	Group	4	1.93%
	Individual	35	16.9%
	Organizational	70	33.8%
	Total	**207**	**100%**
Development Outcomes	Economic Development	86	41.55%
	Human Development	40	19.32%
	Social Development	81	39.13%
	Total	**207**	**100%**

There are 86 papers that used case study as the main research method, which represented 41.55% of all research method chosen from the sample. The second and third most frequently used methods are model development and statistical analysis. Only seven papers from the sample selected action research as the research method. In terms of level of analysis, the majority of the papers focused on country, organizational, or individual level analysis. Very few research papers focus on group level analysis. The most-studied level of analysis in the sample of papers studied was the country level of analysis.

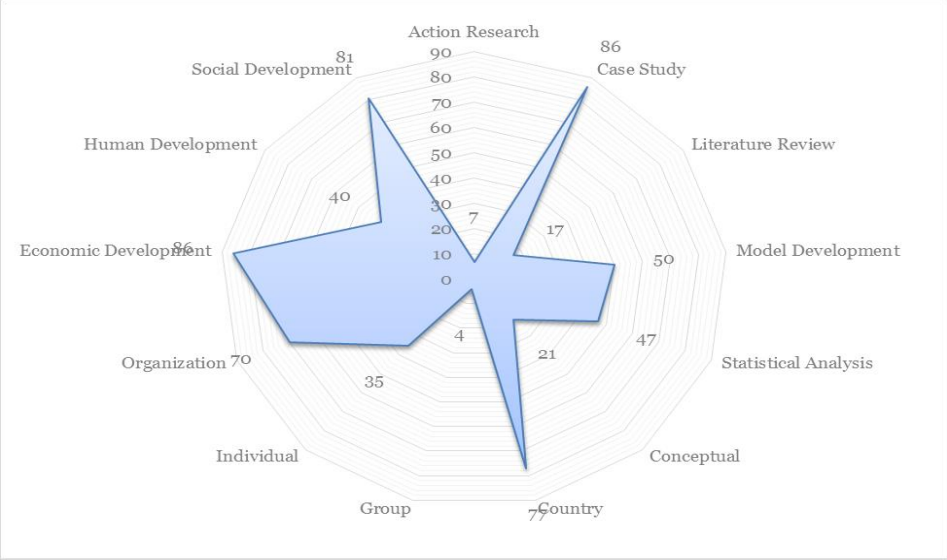
As is illustrated in Figure 2, studies in global development were not limited to developing countries but also included developed countries such as the United States, Australia and the Netherlands. It is interesting to note that the majority of country-level studies in the development outcomes of IS are in India and the USA. The countries studied in the 207 papers analyzed in this sample are distributed as follows:

Figure 2. Main Countries



Of the total number of papers analyzed, the papers appeared to cluster around social and economic development, human development with case study, model development and statistical analysis methods being the most used. The following figure 3 illustrates the distribution of papers:

Figure 3. Distribution of total Papers

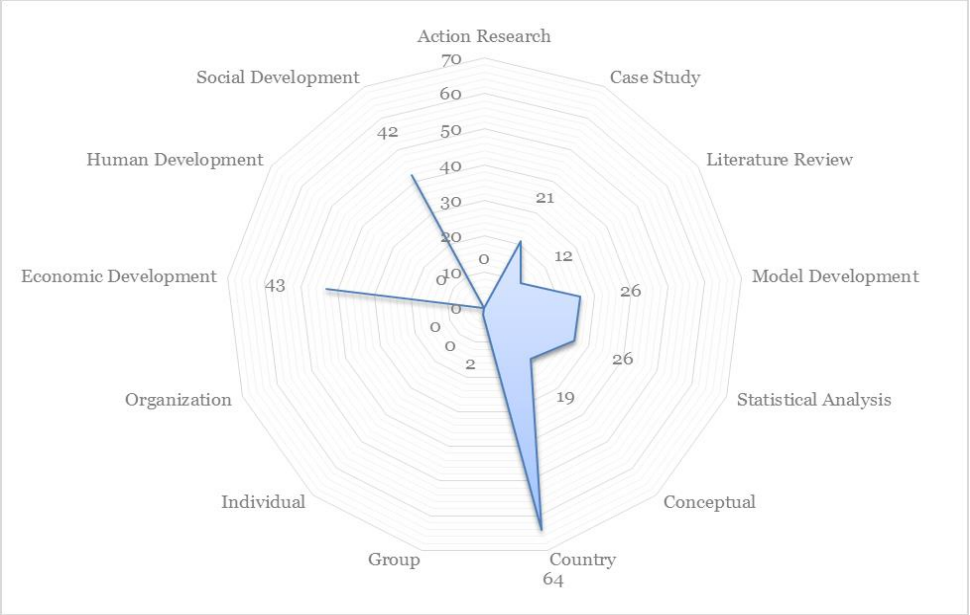


In terms of development outcomes, a combination of economic and social development were found and social and human development papers appeared to stand in their own cluster. As stated above, three clusters were identified from the 207 publications. The following sections provide a specific description of each cluster.

Cluster 1- Economic and Social Development at the Country level

The first cluster contains the largest number of papers, 85 across 207 publications, which covers 41.06% of the data. As data presented in Table 5 indicates, 75.29% of the papers in this cluster comprise country-level analysis. Among the groups, development outcomes arrive at either economic development (50.59%) or social development (49.91%). In terms of research methods, a mixture of case study (24.71%), literature review (14.12%), model development (30.59%), and statistical analysis (30.59%) were observed. This distribution is illustrated in figure 4.

Figure 4. Economic and Social Development Country Level

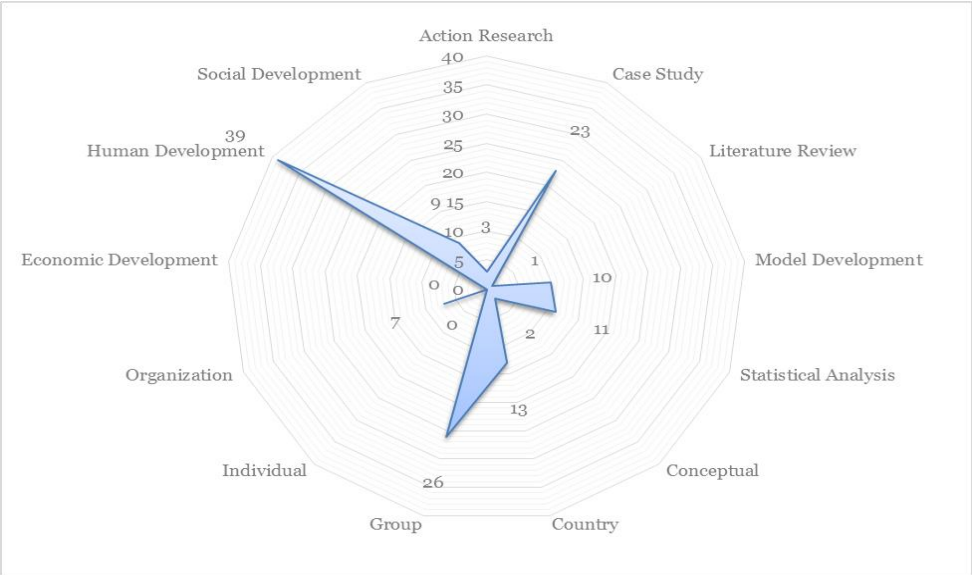


The clustering of papers at the level of analysis indicates that economic and social development outcomes are most studied. Although there is a significant correlation between level of analysis and development outcomes (see appendix 1), it appears from a review of the papers in this cluster that the main contributions in this cluster relate to the digital divide, mobile penetration and payments, tele-centers, telecommunications, and on cyber-crime and corruption. Models and frameworks used were primarily Sen's capability approach and statistical analysis at the macro level.

Cluster 2-Human Development at the Group Level

Members from cluster 2 represented 48 (23.19%) of the sample. This was the smallest of the three clusters. More than half (54.17%) of the papers in this cluster comprised research at the group level. We also observed that there was a mixture of research methods. 81.25% of the papers in this group studied human development, and the rest of the papers (18.75%) studied social development. Economic development was not observed in this cluster. This cluster is illustrated in Figure 5.

Figure 5. Human Development at the Group Level

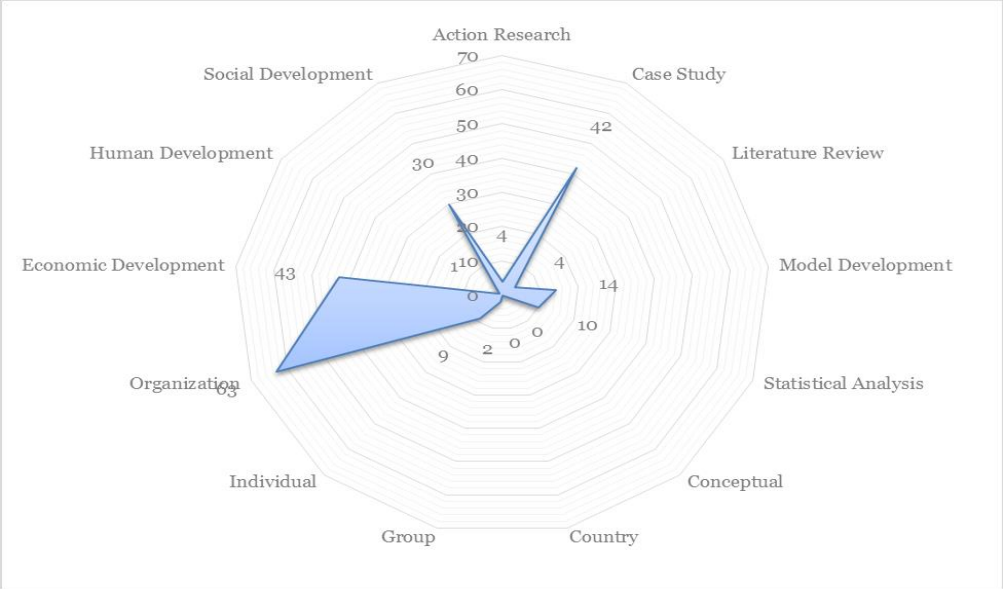


In addition to the types of papers observed in cluster 1 on the digital divide, mobile phones and the digital divide mostly using the Sen Capability model, this cluster was also comprised of papers on crowdsourcing, Massive Open Source On-Line Communities, eLearning and education. The key characteristic of this cluster is that human development outcomes are studied at the group level. The group level is also seen to encompass communities that use ICTs to achieve better livelihoods.

Cluster 3- Economic and Social development of Organizational Case Studies

The third cluster was comprised of 74 papers, or 35.75% of the papers from this sample. In this group, more than half of the research methods used in these papers were case studies (56.76%). In terms of level of analysis, 85.14% of the papers focused on organizational level analysis. In development outcomes, 98.65% of the papers in this cluster focused either on economic development (58.11%) or social development (40.54%). This cluster is depicted as follows:

Figure 6. Economic and Social development of Organizational Case Studies



Papers in this cluster were comprised of ethnographic studies, ICT intermediaries, participation, mobile and telecenter usage, health information systems and small business entrepreneurship through ICTs. It appeared from the papers in this cluster that case studies in organizations relate primarily to how people may achieve better economic livelihoods for themselves, and how social capital and social embeddedness may enable social development outcomes. These papers showed that it is possible to arrive at conclusions based on case studies of economic and social development outcomes.

We know from the above literature review that social and economic development outcomes are interconnected. The results of our analysis confirm these connections and show that contributions are being made through both qualitative and quantitative methods. The following Table 5 provides a summary of the key content of each cluster described above.

Triangulating this analysis with a test of independence between the three sets of variables (see appendix 2), we found that there is a significant correlation between: 1) levels of analysis and development outcomes and 2) levels of analysis and research methods. However there was no significant connection between development outcomes and research methods. These findings suggest that it is the level of analysis that is most important in helping researchers in our field arrive at contributions to development.

Table 5. The Cluster Content			
	Research Methods	**Level of Analysis**	**Development Outcomes**
Cluster 1: Country level economic development (n=85)	Model Development and Statistical Analysis	Country	Economic and Social
Cluster 2: Group level analysis on human development (n=48)	Case Study, Model Development, and Statistical Analysis	Group	Human and Social
Cluster 3-Organizational level case studies on economic and social development (n=74)	Case Study	Organizational	Economic and Social

The lack of clustering of conceptual and individual levels of analysis, and action research and literature review research methods suggest that these may be ways in which contributions to development need to be made. An area that still needs to be investigated in more depth are human development outcomes at the individual level. Given that the majority of IS research is at the individual and organizational level, it is surprising to see that limited research on development outcomes particularly at the individual and conceptual level is being undertaken. While conceptual papers abound in both IS literature and in ITD literature, it is interesting to note that conceptual papers and literature reviews that are currently published in our field rarely offer insights into development outcomes.

CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

The authors of this paper conducted a cluster analysis of a sample of papers from the SigGlobDev Workshop, the Information Technology for Development Journal and other Information Systems Journals and conferences which have published papers in Information Systems and Global Development. This analysis throws light into the ways in which research has been undertaken in this area. Three clusters, Economic and Social Development at the Country level, Human Development at the Group Level, and Economic and Social development of Organizational Case Studies have been are identified. Our research indicates that there is limited research on development outcomes particularly at the individual and conceptual level. The contribution of this paper is in identifying the key areas in which Information Systems research has addressed how development outcomes may or may not be addressed, and the authors highlight areas that still need to be investigated.

The study has several limitations that need to be addressed. First, as Ketchen and Shook (1996) point out, due to the limitations of cluster analysis, cluster analysis should be used in combination with other research methods, such as determination the number of clusters, validating clusters, and multicollinearity among variables, in order to maximize the development of knowledge. Second, due to the sample size limitation, we a larger sample size is needed to further investigate the research.

Finally, as illustrated in Appendix 3, we provided a test of independence. This was conducted to determine whether there was any correlation between the variables to triangulate the findings from the exploratory cluster analysis. Pearson's chi-squared ($\chi 2$) test for independence was conducted to further explore if the three dimensions/categories, i.e. research methods, level of analysis, and development outcomes. In future research, we will conduct cluster analysis and test of independence for the extended sample gathered from those major journals, conferences, and workshops in IT for Development research.

REFERENCES

Avgerou, C. 2010. "Discourses on ICT and Development," *Information Technologies & International Development*, 6(3), pp-1.

Avgerou, C. 2008. "Information systems in developing countries: a critical research review," *Journal of information Technology*, 23(3), 133-146.

Baliamoune-Lutz, M. (2003). An analysis of the determinants and effects of ICT diffusion in developing countries. Information Technology for development, 10(3), 151-169.

Balijepally, V., Mangalaraj, G., & Iyengar, K. 2011. "Are we wielding this hammer correctly? A reflective review of the application of cluster analysis in information systems research," *Journal of the Association for Information Systems*, 12(5), 375-413.

Bacher, J., Wenzig, K., & Vogler, M. 2004. *SPSS two step cluster: A first evaluation* (pp. 578-588). Lehrstuhl für Soziologie.

Baskerville, R. L., & Myers, M. D. 2002. "Information systems as a reference discipline," *MIS Quarterly*, 1-14.

Becker, G. S., & Chiswick, B. R. (1966). Education and the Distribution of Earnings. The American Economic Review, 358-369.

Becker and Woessmann (2011) The Effects of the Protestant Reformation on Human Capital in: Rachel McCleary (ed.) The Oxford Handbook of the Economics of Religion , 2011.

Bollou, F., & Ngwenyama, O. 2008. "Are ICT investments paying off in Africa? An analysis of total factor productivity in six West African countries from 1995 to 2002," *Information Technology for Development*, 14(4), 294-307.

Boyer-Wright, K. M., & Kottemann, J. E. (2008). High-level factors affecting availability of online government services worldwide. Electronic Government, an International Journal, 5(4), 375-389.

Braa, J. Monteiro, E. and S. Sahay. (2004) "Networks of Action: Sustainable Health Information Systems across Developing Countries."MIS Quarterly. 28, 3, 337-363.

Brezis, E. S., Krugman, P. R., & Tsiddon, D. 1993. "Leapfrogging in international competition: A theory of cycles in national technological leadership," *The American Economic Review*, 1211-1219.

Brown, A. E., & Grant, G. G. 2010. "Highlighting the duality of the ICT and development research agenda," *Information Technology for Development*, 16(2), 96-111.

Byrne, E., & Sahay, S. 2007. "Participatory design for social development: A South African case study on community-based health information systems," *Information Technology for Development*, 13(1), 71-94.

Carmel, E., & Nicholson, B. (2005). Small firms and offshore software outsourcing: high transaction costs and their mitigation. Journal of Global Information Management (JGIM), 13(3), 33-54.

Castells, M. (1996, second edition, 2000). The Rise of the Network Society, The Information Age: Economy, Society and Culture Vol. I. Malden, MA; Oxford, UK: Blackwell

Castells, M. 2001. *The Internet galaxy: Reflections on the Internet, business, and society*. Oxford University Press, Inc..

Cecchini, S. and C. Scott, (2003) "Can information and communications technology applications contribute to poverty reduction? Lessons from rural India.". Information Technology for Development, 10, 2, 73-85

Ceridian UK Ltd. (2007) Human Capital White Paper Retrieved on September 17, 2012 via http://www.ceridian.co.uk/hr/downloads/HumanCapitalWhitePaper_2007_01_26.pdf

Chakraborty, J., & Bosman, M. M. 2005. "Measuring the digital divide in the United States: Race, income, and personal computer ownership," *The Professional Geographer*, 57(3), 395-410.

Chudnovsky, D., & López, A. (2005). The software and information services sector in Argentina: the pros and cons of an inward-oriented development strategy. Information Technology for Development, 11(1), 59-75.

Coleman, J. S. 1988. "Social capital in the creation of human capital," *American journal of sociology*, S95-S120.

Credé, A., & Mansell, R. E. 1998. *Knowledge Societies--in a Nutshell: Information Technology for Sustainable Development*. IDRC.

Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.

Digital Divide 2014 The Digital Divide, ICT and the 50x15 Initiative Retrieved Sep 25, 2014, from http://www.internetworldstats.com/links10.htm

Escobar, A. 1995. *Encountering Development: The Making and Unmaking of the Third World*. Princeton: Princeton University Press

Ewusi-Mensah, K. 2012. "Problems of information technology diffusion in sub-Saharan Africa: the case of Ghana," *Information Technology for Development*,18(3), 247-269.

Gefen, D, E Karahanna and D Straub "Trust and TAM in Online Shopping: An Integrated Model' MIS Quarterly. Vol 27 No 1 (March 2003) pp 51-90.

Giddens, A. 2000. Runaway World: How Globalization is Reshaping Our Lives. New York.

Granovetter, M. (1985). Economic action and social structure: the problem of embeddedness. American journal of sociology, 481-510.

Han, R. (2000) "Software engineering services for export and small developing economies."Information Technology for Development, 9, 2, 77-91.

Harrison, D. A., Mykytyn Jr, P. P., & Riemenschneider, C. K. 1997. Executive decisions about adoption of information technology in small business: theory and empirical tests. Information Systems Research, 8(2), 171-195.

Hawk, S. and W. McHenry (2005) "The Maturation of the Russian Offshore Software Industry" Information Technology for Development, 11, 1.

Heeks, R. 2002. "Information systems and developing countries: Failure, success, and local improvisations," *The information society*, 18(2), 101-112.

Held, D. and McGrew, A., Goldblatt, D. and Perraton, J. 1999, *Global Transformations: Politics,Economics and Culture*, Polity Press, Cambridge.

Hirst, P., & Thompson, G. 1996. *Globalization in Question: The International Economy and the Possibilities of Governance.* Cambridge: Polity.

Kamal, M., Qureshi, S., Najjar, L.2008. "A Global Analysis of the Effect of IT Capacity on Development – Understanding Sourcing of Skills". *CONF-IRM 2008 Proceedings*. Paper 4. http://aisel.aisnet.org/confirm2008/4

Kenny, C.J. (2000) "Expanding Internet access to the rural poor in Africa'. Information Technology for Development, 9,1, 25-32.

Ketchen, D. J., & Shook, C. L. 1996. "The application of cluster analysis in strategic management research: an analysis and critique," *Strategic management journal*, 17(6), 441-458.

Hirschheim, R., & Klein, H. K. 2012. "A Glorious and not-so-short history of the information systems field," *Journal of the Association for Information Systems*,13(4), 188-235.

ITU 2014. "Manual for Measuring ICT Access and Use by Households and Individuals 2014" Retrieved Sep 25, 2014, from http://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2014-PDF-E.pdf

Jimenez, N., Najjar, L., Qureshi, S., & Haworth, D. 2013. "Information and Communication Technologies Effects on Economic Growth," *AMCIS 2013*

Kimaro, H. C., & Nhampossa, J. L. (2005). Analyzing the problem of unsustainable health information systems in less-developed economies: case studies from Tanzania and Mozambique. Information Technology for Development, 11(3), 273-298.

Kraemer, K. L., & Dedrick, J. 1994. "Payoffs from investment in information technology: Lessons from the Asia-Pacific region," *World Development*, 22(12), 1921-1931.

La Rovere, R. L., & Pereira, M. V. R. (2000, May). Adoption of ICT and competitiveness in the tourism sector: the case of Brazilian travel agencies. In Proceedings of the 6th International Working Conference of IFIP WG 9.4: Information Flows, Local Improvisations and Work Practices. SBS Conferences, Cape Town.

Lee, A. S., & Baskerville, R. L. 2003. "Generalizing generalizability in information systems research," *Information systems research*, 14(3), 221-243.

Lee, K., & Lim, C. 2001. "Technological regimes, catching-up and leapfrogging: findings from the Korean industries," *Research policy*, 30(3), 459-483.

Lowry, P. B., Moody, G. D., Gaskin, J., Galletta, D. F., Humpherys, S. L., Barlow, J. B., & Wilson, D. W. 2013. "Evaluating Journal Quality and the Association for Information Systems (AIS) Senior Scholars' Journal Basket Via Bibliometric Measures: Do Expert Journal Assessments Add Value?" *MIS Quarterly*, 37(4), 993-1012.

Malecki, E. J. 1997. "Technology and economic development: the dynamics of local, regional, and national change" University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.

Mankiw, N. G. 2012. *Macroeconomics* Worth Publishers; Eighth Edition edition

Mankiw, N. G., Romer, D., & Weil, D. N. 1992. "A contribution to the empirics of economic growth (No. w3541)". *National Bureau of Economic Research*.

Mansell, R., & Wehn, U. (Eds.). 1998. Knowledge societies: information technology for sustainable development. *United Nations Publications*.

Midgley, J., Hall, A., Hardiman, M., & Narine, D. 1986. Community participation, social development and the state. Methuen.

Mincer, J. (1958). Investment in human capital and personal income distribution. The Journal of Political Economy, 66, 281-302.

Morales-Gomez, D., & Melesse, M. 1998. "Utilising information and communication technologies for development: the social dimensions," *Information technology for Development*, 8(1), 3-13.

Mosse, E. L., & Sahay, S. (2005). The role of communication practices in the strengthening of counter networks: Case experiences from the health care sector of Mozambique. Information Technology for Development, 11(3), 207-225.

Ngwenyama, O., & Morawczynski, O. (2009). Factors affecting ICT expansion in emerging economies: An analysis of ICT infrastructure expansion in five Latin American countries. Information technology for development, 15(4), 237-258.

Orlikowski, W. J., & Iacono, C. S. 2001. "Research commentary: Desperately seeking the "IT" in IT research—A call to theorizing the IT artifact," *Information systems research*, 12(2), 121-134.

Pick, J. B., & Azari, R. 2008. "Global digital divide: Influence of socioeconomic, governmental, and accessibility factors on information technology," *Information Technology for Development*, 14(2), 91-115.

Porter, M.E. (1985) Competitive Advantage, Free Press, New York, 1985.

Preis-Heje, J., Baskerville, R. and G.Hansen (2005) "Strategy Models for Enabling Offshore Outsourcing: Russian Short-Cycle-Time Software Development"Information Technology for Development, 11, 1

Qiang, C., Pitt, A., & S. Ayers. 2003. "Contribution of Information and Communication Technologies to Growth,"*World Bank Working Paper No. 24*. World Bank. http://lnweb18.worldbank.org/ict/projects.nsf/WSISPublication

Qureshi, S. (1998) "Fostering Associations in Africa through Networking."Information Technology for Development, 8, 1, 121-136.

Qureshi, S., (2005) How does Information technology effect Development? Integrating Theory and Practice into a process model. *Proceedings of the eleventh Americas Conference on Information Systems*, Omaha, NE

Qureshi, S., Keen, P. and M. Kamal, (2009). "Business Models for Development: The Global Capability Sourcing Model." In S. Kamel eds "*E-Strategies for Technological Diffusion and Adoption: National ICT Approaches for Socioeconomic Development*", IGI.

Robertson, R. 1992. *Globalization: Social Theory and Global Culture*. London: Sage.

Rodrigo, M. M. T. (2003) "Tradition or transformation? An evaluation of ICTs in Metro Manila schools." Information Technology for Development, 10, 2, 95-123.

Rodrigues, A.J. and S. Govinda (2003) "Towards an integrated management information system: A case of the University of Mauritius."Information Technology for Development, 10, 1, 41-57.

Sahay, S., B. Nicholson, and S. Krishna (2003) Global IT Outsourcing: Software Development Across Boarders, Cambridge University Press, Cambridge, UK.

Samoilenko, S., & Osei-Bryson, K. M. 2011. "The spillover effects of investments in telecoms: insights from transition economies," *Information Technology for Development*, 17(3), 213-231.

Scheepers, H. and C. de Villiers (2000) "Teaching of a computer literacy course in South Africa: A case study using traditional and co-operative learning."Information Technology for Development, 9, 3/4, 175-188.

Scholte, J.A. 1993. *International Relations of Social Change*. Buckingham: Open University Press.

Schultz, T. W. (1961). Investment in human capital [Presidential address delivered at the annual meeting of the American Economic Association, Saint Louis, MO, December, 1960]. The American Economic Review, 51, 1-17.

Schumpeter, J.A. 1934. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* NJ:Transaction Publishers

Sein, M. K., & Harindranath, G. 2004. "Conceptualizing the ICT artifact: Toward understanding the role of ICT in national development," *The Information Society*,20(1), 15-24.

Sen, A. 1983. "Development: Which way now?" The Economic Journal, 745-762.

Sen, A.K. 1999 *Development as Freedom Anchor*; Reprint edition Oxford University Press.

Steinmueller, W. E. 2001. "ICTs and the possibilities for leapfrogging by developing countries," *International Labour Review*, 140(2), 193-210.

Summer, A. & Tribe, M.A 2008 I*nternational development studies : theories and methods in research and practice* London ; Thousand Oaks, Calif. : Sage, 2008.

Tan, F. B., & Leewongcharoen, K. (2005). Factors contributing to IT industry success in developing countries: The case of Thailand. Information Technology for Development, 11(2), 161-194.

Taylor, H., Dillon, S., & Van Wingen, M. 2010. "Focus and Diversity in Information Systems Research: Meeting the Dual Demands of a Healthy Applied Discipline," *MIS Quarterly*, 34(4), 647-667.

The Economist, 2009. "Mobile marvels," from http://www.economist.com/node/14483896

Theodoridis, S. and K. Koutroumbas. 1999. *Pattern recognition*. Academic Press, New York.
Tractinsky, N., & Jarvenpaa, S. L. (1995). Information systems design decisions in a global versus domestic context. Mis Quarterly, 507-534.
United Nations, 2010. The Millennium Development Goals Report;New York.Retrieved on 2011.11.06 via http://www.un.org/millenniumgoals/pdf/MDG%20Report%202010%20En%20r15%20-low%20res%2020100615%20-.pdf
United Nations. 2006 . "United Nations E-Government Survey 2014" Retrieved Sep 25, 2014, from http://unpan3.un.org/egovkb/Portals/egovkb/Documents/un/2014-Survey/E-Gov_Complete_Survey-2014.pdf
Unwin, P. T. H. (Ed.). 2009. *ICT4D: Information and communication technology for development*. Cambridge University Press.Norris
Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.
Wallerstein, I. 1974. The Modern World System, Vol. I. New York: Academic Press
Walsham, G. and S. Sahay (1999) "GIS for district-level administration in India: Problems and opportunities"MIS Quarterly, 23, 1, 39-65.
Warschauer, M. 2004. *Technology and social inclusion: Rethinking the digital divide*. MIT press.
Watson, H. J., & Gray, P. (1997). Decision support in the data warehouse. Prentice Hall Professional Technical Reference.
Willis, K. 2011. *Theories and practices of development*. Taylor & Francis.
Willcocks, L.P., Hindle, J., Feeny, D.F., and Lacity, M.C. "IT and business process outsourcing:
The knowledge potential," Information Systems Management (21:3), 2004, pp. 7-15.
World Bank. 2014. *Social Development Overview*. Retrieved Sep 25, 2014, from http://www.worldbank.org/en/topic/socialdevelopment/overview#1
Zhang, P., Michael Scialdone, and Min-Chun Ku. 2011. "IT Artifacts and The State of IS Research" (December 6, 2011). *ICIS 2011 Proceedings.* Paper 14. http://aisel.aisnet.org/icis2011/proceedings/generaltopics/14

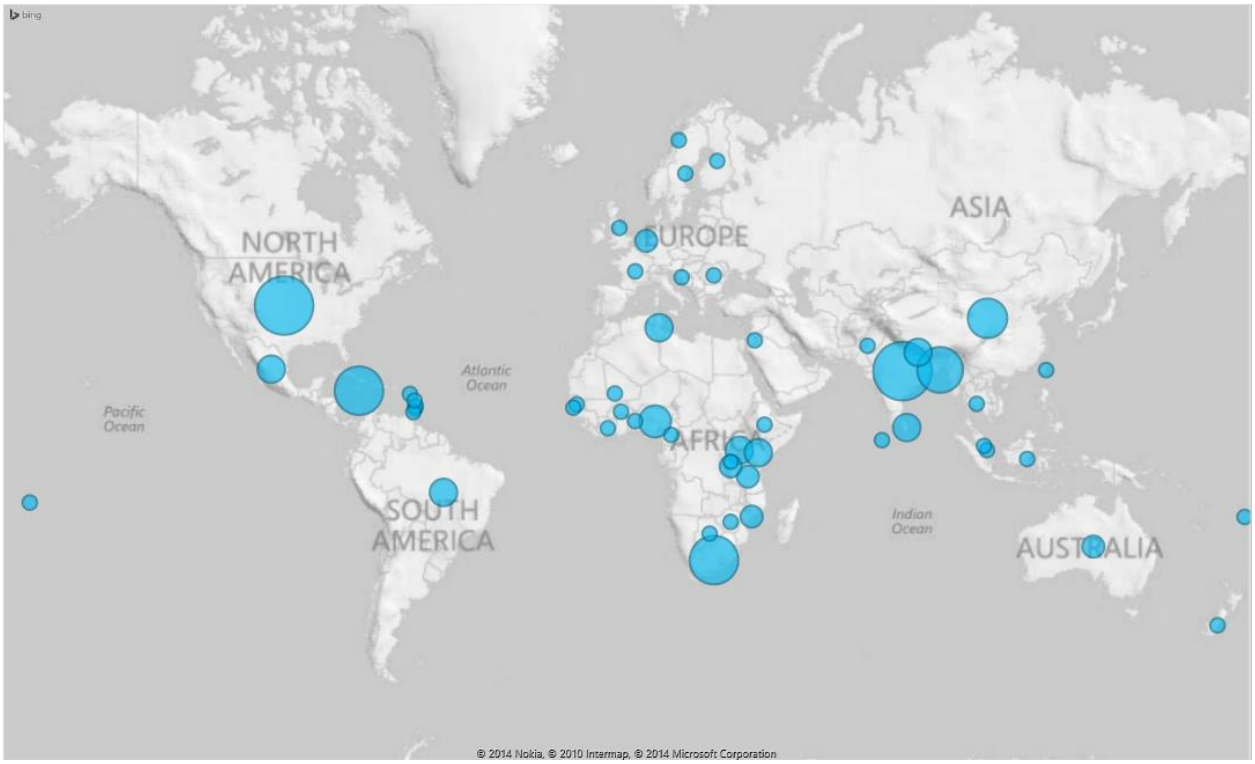
APPENDIX 1: CLUSTER ANALYSIS

Table 6. Cluster 1-Country level, economic and social development			
Cluster 1 (n=85)			
Dimension	**Type**	**Number**	**Percentage**
Research Methods	Action Research	0	0.00%
	Case Study	21	24.71%
	Literature Review	12	14.12%
	Model Development	26	30.59%
	Statistical Analysis	26	30.59%
	Total	**85**	**100%**
Level of Analysis	Conceptual	19	22.35%
	Country	64	75.29%
	Group	2	2.35%
	Individual	0	0.00%
	Organizational	0	0.00%
	Total	**85**	**100%**
Development Outcomes	Economic Development	43	50.59%
	Human Development	0	0.00%
	Social Development	42	49.41%
	Total	**85**	**100%**

Table 7. Cluster 2-Group level, human development			
Cluster 2 (n=48)			
Dimension	**Type**	**Number**	**Percentage**
Research Methods	Action Research	3	6.25%
	Case Study	23	47.92%
	Literature Review	1	2.08%
	Model Development	10	20.83%
	Statistical Analysis	11	22.92%
	Total	**48**	**100%**
Level of Analysis	Conceptual	2	4.17%
	Country	13	27.08%
	Group	26	54.17%
	Individual	0	0.00%
	Organizational	7	14.58%
	Total	**48**	**100%**
Development Outcomes	Economic Development	0	0.00%
	Human Development	39	81.25%
	Social Development	9	18.75%
	Total	**48**	**100%**

Table 8. Cluster 3-Organizational level case study on economic and social development			
Cluster 3 (n=74)			
Dimension	**Type**	**Number**	**Percentage**
Research Methods	Action Research	4	5.41%
	Case Study	42	56.76%
	Literature Review	4	5.41%
	Model Development	14	18.92%
	Statistical Analysis	10	13.51%
	Total	**74**	**100%**
Level of Analysis	Conceptual	0	0.00%
	Country	0	0.00%
	Group	2	2.70%
	Individual	9	12.16%
	Organizational	63	85.14%
	Total	**74**	**100%**
Development Outcomes	Economic Development	43	58.11%
	Human Development	1	1.35%
	Social Development	30	40.54%
	Total	**74**	**100%**

APPENDIX 2: MAIN COUNTRIES STUDIED



APPENDIX 3: TEST OF INDEPENDENCE

This was conducted to find out if there is any correlation between the variables to triangulate the findings from the exploratory cluster analysis. Pearson's chi-squared ($\chi 2$) test for independence was conducted to further explore if the three dimensions/categories, i.e. research methods, level of analysis, and development outcomes.

Chi-square Test of Independence for Level of Analysis and Development Outcomes

H_0=Level of Analysis and Development Outcomes are independent with each other.

H_a= Level of Analysis and Development Outcomes are dependent with each other.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.146[a]	8	.001
Likelihood Ratio	23.396	8	.003
Linear-by-Linear Association	.776	1	.378
N of Valid Cases	208		

a. 4 cells (26.7%) have expected count less than 5. The minimum expected count is .75.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.334	.001
N of Valid Cases		208	

Since p value is .001, so the null hypothesis is rejected. Level of Analysis is dependent with Development Outcomes.

Chi-square Test of Independence for Level of Analysis and Research Methods

H_0=Level of Analysis and Research Methods are independent with each other.

H_a= Level of Analysis and Research Methods are dependent with each other.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	54.404[a]	16	.000
Likelihood Ratio	56.324	16	.000
Linear-by-Linear Association	17.459	1	.000
N of Valid Cases	209		

a. 12 cells (48.0%) have expected count less than 5. The minimum expected count is .13.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.454	.000
N of Valid Cases		209	

Since p value is 0, so the null hypothesis is rejected. Level of Analysis is dependent with Research Methods.

Chi-square Test of Independence for Development Outcomes and Research Methods

H_0=Development Outcomes and Research Methods are independent with each other.

H_a= Development Outcomes and Research Methods are dependent with each other.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.548[a]	8	.298
Likelihood Ratio	10.236	8	.249
Linear-by-Linear Association	4.165	1	.041
N of Valid Cases	208		

a. 4 cells (26.7%) have expected count less than 5. The minimum expected count is 1.31.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.209	.298
N of Valid Cases		208	

Since p value is .298, null hypothesis cannot be rejected.

Based on the initial test of independence, it appears that level of analysis and development outcomes, level of analysis and research methods are dependent with each other, while development outcomes and research methods are independent with each other. As the research is continuing, the test of independence will be conducted once data collection is completed.