

**IS IT ICT “FOR DEVELOPMENT” OR “IN DEVELOPING COUNTRIES”? EXPOSING THE DUALITY OF THE ICT AND DEVELOPMENT RESEARCH AGENDA**

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# IS IT ICT “FOR DEVELOPMENT” OR “IN DEVELOPING COUNTRIES”? EXPOSING THE DUALITY OF THE ICT AND DEVELOPMENT RESEARCH AGENDA

## ABSTRACT

Central to this paper is the argument that existing classifications of the ICT and development literature fail to explicitly acknowledge a fundamental duality between two distinct problem domains found within the research body. Through an extensive review of 185 journal articles and conference proceedings, a framework is proposed that suggests a partitioning of the existing literature into two distinct streams of research: (1) those studies that focus on understanding technology “for development”, and (2) those studies that focus on understanding technology “in developing” countries.

More than an exercise in semantics, the authors argue that the two streams represent separate sets of research objectives, which are currently being conflated and addressed interchangeably within the same research environment. At present, there appears to be little recognition or explicit acknowledgement of this branching of research domains, as well as little reflective discussion on the epistemological, methodological and theoretical implications of this delineation.

A discussion related to the efficacy and relevance of the two separate research agendas is provided, along with recommendations for future research directions.

**Keywords:** *ICT and Development, Technology and Development, Reflective Classification, Technology Appropriation, Use of Technology in Developing Countries, Literature Classification, Literature Review*

## I. INTRODUCTION

### THE ICT AND DEVELOPMENT AGENDA

The advancement of information and communication technologies<sup>1</sup> (ICT) has had an undeniably profound affect on redefining the production processes by which human work is performed. Beyond this commercial impact however, ICTs have also proven to be a catalyst for a more holistic, and wide-ranging social and economic transformation. Contemporary social theorists, including Anthony Giddens, Ulrich Beck and Manuel Castells all privilege, whether explicitly or implicitly, the deterministic role that information-based technology has played in defining modern society. The ability to facilitate time-space distancing (Giddens 1990, pp. 63-78), provide voice to the marginalized and enable an interconnected, information-rich global community has positioned ICTs as a prominent disruptive force able to influence the creation and evolution of social, political, cultural and economic norms.

While the extent to which these benefits can be realized remains to be seen, it is this perceived capacity to provide broad, far-reaching, and even revolutionary, socio-economic change that has brought ICT to the center of the development discourse. Driven by the panacea-like allure of poverty reduction, socio-economic development and sustainability, and the vision of a networked global society, both governments and donor agencies including the World Bank have aggressively pushed the notion of ICT to the forefront of their development agendas (Hanna and Schwabe 1990). The effect of this focus, based on the belief in a direct causal relationship between ICTs and development, has been a marked shift in public and private funding away from traditional development programs (agriculture, shelter, education, etc.) and towards those programs that encompass a central ICT-based proposition (Wade 2004).

Although most stakeholders would agree that ICTs are unable to alone alleviate all the challenges facing developing countries, there is a growing recognition that increasing a nation's ICT capability through improvements in infrastructure, education, and institutional support, provides the largest and widest-reaching return on a development-oriented investment. The

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<sup>1</sup> For the purposes of this study, we adopt Von Braun and Torero's (2006) definition of ICT as any technology that facilitates the production, gathering, distribution, consumption and storage of information.

underlying logic of this position rests in the belief that by rectifying the disproportionate diffusion of ICT within the developed and developing world (Von Braun and Torero 2006), broader social and economic inequalities will become less complex to address. As such, the opportunity cost associated with channeling scarce development funding and resources towards ICT-based programs is generally viewed as tolerable and acceptable when weighed against the potential direct and indirect benefits of such an investment (Steinmueller 2001).

## **THE RISE OF THE ICT AND DEVELOPMENT RESEARCH DOMAIN**

In support of the need for a critical and scholarly examination of the broad ICT and development agenda, and given the practical importance of the development ideal, academics from a variety of disciplines, including sociology, economics, political science, anthropology, and organizational science, each bringing the unique perspectives and methodologies of their primary disciplines, have joined the core base of researchers from both information systems and development studies (Sahay and Walsham 1995; Heeks 2007) to investigate the central issues surrounding the ICT and development phenomenon.

Paralleling the practitioner environment, academic interest and awareness of the ICT and development agenda has grown dramatically over the last three decades (Heeks 2002). During this time, the primary objective of the research has evolved from understanding “if” there is a causal relationship between technology and development, to the more prescriptive exercise of understanding “how” to maximize the developmental benefits derived by ICT use and adoption (Walsham and Sahay 2006; Walsham, Robey et al. 2007). Applying a very loose interpretation of the Kuhnian perspective, over the last 30 years, the ICT and development field has been moving from a pre-paradigmatic stage, where the fundamental proposition underlying the entire research effort was questioned, towards a normal science stage where the basic theory behind that core proposition has reached consensus. Based on the multitude of critiques on the current state of the literature base, however, it appears that the field may be better classified at present as a fragmented adhocracy.

## **INTERNAL CRITIQUE OF THE LITERATURE BASE**

Despite the growing literature base, and the increasing recognition and acceptance of ICT and development scholarship as an independent academic field, a number of researchers from within the community have raised concerns related to the progress and trajectory of the ICT and development research agenda. The context of this critical analysis can be divided along two dimensions: extrospective critique, addressing issues related to the outward relevance and efficacy of the research body, and introspective critique, addressing issues related to the ontological, epistemological and methodological positions adopted by the research community.

From an extrospective perspective, critique has included the apparent disjoint between academic scholarship and the requirements of practitioners (Odedra-Straub 2002), a shifting focus on the end consumer of research (Qureshi 2003), the prominence and dominance of western bias in prescriptive analysis (Raiti 2006), an overly optimistic and enthusiastic belief in the role that ICTs play in development (Wade 2004; Raiti 2006), an over generalization of the ICT construct (Steinmueller 2001), and a lack of connection and integration with the overall poverty reduction discourse (Heeks 2002). As possibly the most substantial critique (Sahay and Avgerou 2002; Walsham, Robey et al. 2007) both point to the continued high failure rates of practitioner ICT and development initiatives as a direct reflection on the lack of efficacy of the entire research field.

Introspective, or reflective critique of the research field includes a general lack of cumulative tradition (Raiti 2006), a fragmentation of research topics and problem domains (Sahay and Walsham 1995), the investigation of the ICT construct in isolation of the development construct (Walsham and Sahay 2006; Heeks 2007), an emphasis towards the interpretive approach (Walsham, Robey et al. 2007), an underutilization of the action research methodology (Walsham and Sahay 2006), and the tendency for some research to lack sufficient academic rigor (Walsham, Robey et al. 2007).

## **RESEARCH MOTIVATION AND RESEARCH QUESTION**

The obvious question that arises when reviewing this collection of critiques, is how does a body of research, which on the surface can be considered to have a relatively narrow focus, namely the intersection of technology and development, be considered by so many as disjointed and lacking

of any centralized research trajectory? Motivated by the proliferation of reflective commentary around this topic, the central thesis of this paper posits that the current ICT and development literature base, used as the reference works for the majority of critique, represents a conflation of two distinct problem domains, namely, ICT for development and ICT in developing countries. Failure to explicitly acknowledge the fundamental duality between the two problem domains has substantially contributed the fragmentation of the research body as a whole. This proposition suggests, therefore, that researchers must strive to recognize and understand the implications of working within each of the two disparate research streams, if they are to increase the efficacy and relevance of the ICT and development agenda, as well as provide a less ambiguous foundation on which to foster a more prevalent cumulative tradition.

The flow of the paper will be as follows. After this introduction, the second section will provide a definition and classification of the ICT and development literature base, culminating in the proposal of a modification of Walsham and Sahay's (2006) classification framework to specifically draw attention to the notion of dual problem domains. The third section provides a discussion on the methodological approach of the study and outlines the dimension of the literature review against which the classification framework was applied. The fourth section provides a discussion on the results and implications of the empirical analysis. The paper concludes with a summary of findings, including implications for academics and practitioners, as well as direction for future research.

## **II. FRAMING THE ICT AND DEVELOPMENT LITERATURE**

As with any multi-paradigmatic research community an attempt to provide a concise and singular articulation of research scope for the ICT and development field proves problematic. Although encompassing an intersection of two foundational themes: technology and development, the true boundaries of that intersection are complicated by the multiple interpretations and complexities associated with each of the central tenets. Fundamental ontological differences in the basic understanding of technology (for example, the contrasting views of technology determinism and social construction of technology (Tettey 2000)) are further complicated by several competing opinions on how to define development, and how best to properly and fairly measure the resulting construct (Heeks 2007). The result of this amalgam is a research field that on its surface should have a well-defined and trenchant scope, but in

practice encompasses a wide variety of research questions spanning a nebulous collection of problem domains (Ramani and Bhatnagar 2000).

Recognizing the diversity of the research body, Walsham and Sahay (2006), through the survey of a number of topical journals and conference proceedings, attempt to frame the ICT development literature by identifying four primary areas of research: (1) understanding the link between ICTs and development, (2) understanding the cross-cultural and multi-cultural implications of ICTs, (3) understanding the notion of local adaptation and how developing countries appropriate ICTs, and (4) understanding how ICTs lead to the development and prominence of marginalized groups.

In the first of these areas, the objective of the research is to explore the relationship (generally assumed to be causal) between technology and one of the many measures of socio-economic development. With consensus around the belief that ICTs can have a prescriptive effect on development, the focus of most research within this area is concerned with how technology can be leveraged best to achieve developmental objectives (Walsham and Sahay 2006; Walsham, Robey et al. 2007). The second and third areas of research are linked by a common view that technology, as a socially constructed artifact, is necessarily ingrained with the cultural, political and social predispositions of its creator. The resulting research addresses both the macro implications of this phenomenon, such as technology colonization, imperialism and cultural erosion, as well as the micro implications surrounding the means by which individuals, organizations and nations tailor their appropriation of western-inscribed technologies to fit with their cultural, political and social environments. The final area of ICT and development research, as defined by Walsham and Sahay (2006) investigates the ability of technology to enable the development and support of marginalized populations by providing a conduit by which these sub-cultures may connect with the larger global society.

## **FOR DEVELOPMENT VS IN DEVELOPING – A RECOGNITION OF MULTIPLE PROBLEM DOMAINS**

Although Walsham and Sahay (2006) provide an inclusive taxonomy by which to capture and identify the breadth of the ICT and development literature, their framework fails to acknowledge a fundamental divide within the field. In the first and last research areas as defined by their

classification, socio-economic development is clearly treated as a dependent variable influenced both positively and negatively by a set of independent variables related to the adoption or appropriation of ICT. Common to studies of this variety is the presence of a direct, or causal relationship between the two primary constructs<sup>2</sup>, and a clear research objective related to understanding how and why technology facilitates development.

Examples of this type of research include Lishan's (1996) study of the connection between ICT adoption and the solving of priority issues related to sustainable development, Checchini and Scott's (2003) prescriptive analysis on the supporting soft infrastructure necessary to maximize the potential of ICTs to reduce poverty, the investigation by Macevska (2005) of the proposed causal link between ICTs and increased public health, used by the author as a specific measure of development, and Akpan's (2003) critical review of the underlying assumptions related to the discourse connecting ICTs and economic development.

In contrast, studies in the second and third research areas as suggested by Walsham and Sahay (2006) possess a much less explicit connection between the technology construct and the development construct, and in many cases the notion of development is completely absent from the analysis. The focus of these types of studies is generally related to issues of technology within developing countries as opposed to understanding the issues as they relate directly to development. From this perspective, the dependent variable is often a measure of technology adoption, appropriation, or use. This is not to suggest that the implicit objective of the researchers practicing within this area is completely detached from the technology-development relationship, but rather that this type of direct correlation is at the most secondary, or peripheral to the relationship of interest.

Examples of research that would fall under this perspective would include Lubbe's (2000) use of six case studies in Namibia to study how organizations define and manage their IT investments, Montealegre's (1996) study of the challenges and opportunities facing business and e-commerce managers operating in less-developed countries, Ehikhamenor's (2003) examination of the

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<sup>2</sup> It should be noted that the terms "causal relationship" and "constructs" are used here in their most general and colloquial sense to identify a research agenda that attempts to link technology to development, and are not intended to bias any particular ontological or epistemological approach.

success rates of IT implementations within Nigerian banks, and the study of trust and human intermediaries on e-government initiatives in India by Rajalekshmi (2007). Common to all these studies is an emphasis in understanding core IS issues (IT investment, management of IT, IT implementation and trust factors of e-government) within a developing country context.

The implication of recognizing these distinct problem domains is far from subtle, as it highlights the fact that the ICT and development literature, as defined by Walsham and Sahay (2006) is a culmination of two distinct streams of research: (1) those studies that focus on understanding technology “for development”, and (2) those studies that focus on understanding technology “in developing” countries. Figure 1 provides a graphical representation of the proposed extension of Walsham and Sahay’s (2006) framework to highlight the duality of problem domains within the ICT and development literature.

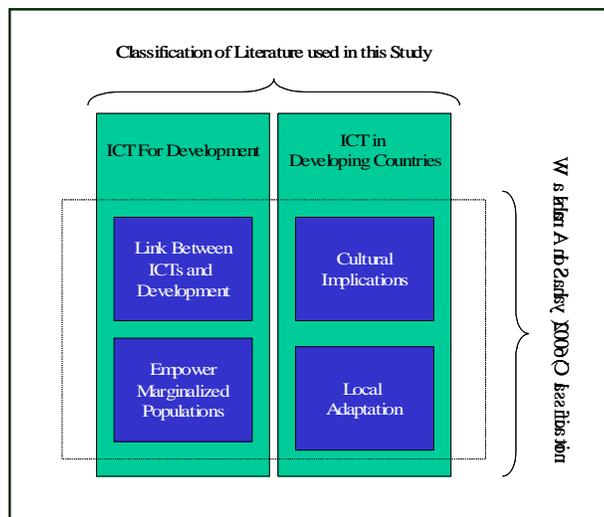


Figure 1 – Classification of ICT and Development Literature

### III. RESEARCH METHODOLOGY

Following Webster and Watson's (2002) concept-centric methodology of IS literature reviews, a survey of the ICT and development literature was undertaken in order to classify the research body against the proposed problem domain specific framework. In the interest of ensuring an inclusive examination of the field, articles were drawn from four primary sources to ensure that the broadest perspective of ICT and development research is represented. Following the approach by Sahay and Walsham (1995), government publications and development stakeholder reports were considered out of scope for the purposes of this review. The review pool was drawn from:

1. All articles from two dedicated ICT and development journals (*Information Technology for Development, Information Technology and International Development*)
2. Relevant<sup>3</sup> articles from eight general IS journals (*MIS Quarterly, Information Systems Research, European Journal of Information Systems, Information Technology and People, Information and Management, Information and Organization, Communications of the ACM and Communications of the AIS*)
3. A Sampling<sup>4</sup> of relevant articles from three general Development Journals (*World Development, Journal of International Development and Journal of Development Studies*)
4. A Sampling of articles from AIS Conferences, and the *Electronic Journal for Information Systems in Developing Countries*.

Business Source Complete, an online periodical database was used as the primary source for journal articles, except for the *Electronic Journal of Information Systems in Developing Countries*, which was accessed directly online (<http://www.ejisdc.org/ojs2/index.php/ejisdc>).

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<sup>3</sup> Relevance was determined by keyword searches. Keywords included "development", "ICT and development", "ICT", "technology and development".

<sup>4</sup> An online random number generator facilitated sampling – One number was generated to represent the journal volume or conference date, and a second number was generated to identify the particular article within that source that would be included in the review pool.

Conference articles were sourced from the AIS reference elibrary.<sup>5</sup> As a means for capturing historical trends, articles were drawn across three decades of publishing dates, ranging from 1982 to 2007.

From the initial source listing, two IS journals did not produce any results for articles related to the ICT and development agenda, resulting in an initial literature pool of 195 articles. On first review, ten articles were removed as they were determined to be internally or administratively focused (i.e. commentary, introductions to special issues, book reviews, etc), leaving 185 articles as the review base for this analysis. Table 1 provides the distribution of selected articles by source.

Source Journal or Conference	Number of Articles	Date Range
Dedicated ICT and development Journals		
IT for Development <sup>6</sup>	106	1996-2007
Information Technologies and International Development	52	2003-2007
Relevant Articles from General IS Journals		
MIS Quarterly	7	1996-2007
Information Systems Research	2	1998
Information and Management	3	1998-2006
Information and Organization	2	2004-2007
Information Technology And People	1	1998

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<sup>5</sup> <http://aisel.aisnet.org/>

<sup>6</sup> Volumes of IT for Development prior to 1996 were not available online or in print, and as such were not included in the analysis.

Communications of the ACM	2	1991-1993
Relevant Articles from General Development Journals		
World Development	1	1997
Journal of International Development	2	2002-2006
Journal of Development Studies	2	1982-2004
Sampled Articles from Other Journals and Conferences		
The Electronic Journal of Information Systems in Developing Countries and Conference papers	5	2002-2007
<b>Total</b>	<b>N = 185</b>	<b>1982-2007</b>

*Table 1 - Resource Pool by Source Type and Date*

### **Classification Methodology**

Articles from the review pool were read and categorized according to the nature of the research activity undertaken by each author. Where applicable, the stated objective of the article was cross-referenced with the theoretical model employed, however given the general atheoretical nature of the literature base as a whole (Montealegre 1999; Ramani and Bhatnagar 2000; Heeks 2001; Roman 2004; Raiti 2006), this approach was not always possible. In the cases where theoretical constructs and the stated research objectives were either ambiguous or missing, a subjective interpretation of the original author's intent was ascribed.

Through an initial scan of a subset of random articles, a simple taxonomy was developed to guide the classification of articles. The pretest step revealed four primary categories based on the dual problem domain framework: (1) articles that attempted to directly understand the causal link between ICTs and some measure of development (coded as "For Development"), (2) articles

that investigated the appropriation, use or diffusion of ICTs within a developing country context (coded as “In Developing”), (3) articles that contained elements of both problem domains (coded as “Both”), and (4) articles that addressed neither the for development or in developing research agendas (coded as “Neither”).

In addition to the problem domain, additional descriptive elements were also collected to allow for a richer analysis. These additional data points included: the type of theoretical contribution (no theory, appropriate theory, extend or test theory, build theory), the actual theory employed by the author if appropriate, the geographic focus of the study, an interpretation of the epistemological approach, and an outline of the methodology employed by the study.

As the majority of the literature review was performed by one author, two activities were undertaken to limit the impact of potential single reviewer bias: (1) classifications of articles were re-verified during a secondary verification review, and (2) the establishment of a systematic framework lessened the subjective nature of the classifications, limiting the amount of interpretation required by the reviewer.

#### IV. SURVEY RESULTS AND DISCUSSION

At a summary level, Table 2 provides the counts for the reviewed articles across each of the four problem domain classifications. From this table it is clear that the ICT and development literature is dominated by studies with problem domains and research objectives that are primarily focused on the investigation of technology within a developing country context. In fact, as is shown, greater than two-thirds (71%) of all articles surveyed fall directly under this classification, and when combined with the category of “both” it is observed that over four of every five articles published within the literature base addresses the “in developing” research agenda.

Problem Domain	Count
In Developing	132
For Development	33
Both	19
Neither	1
<b>Total</b>	<b>185</b>

*Table 2 - Theoretical Type by Research Stream*

As the simple inverse of this initial observation, the true skewness of the research domains is highlighted in the finding that only 18% of the review base contains articles that attempt to directly and explicitly link some element of technology to a development construct. Conflating the “for development” and “both” classification shifts the distribution slightly, however the aggregated set of articles still represent a drastically underrepresented research agenda. (See Appendix A for a listing of articles classified as “for development”)

Possibly the most telling summary statistic is revealed when the review lens is limited to only the *Information Technology for Development Journal*, which by semantic definition should privilege the “for development” agenda<sup>7</sup>. Focusing solely on this journal, it is found to be dominated (75 out of 106 articles) by the “in developing” agenda. As a leading journal within the ICT and development domain, this observation provides a marked illustration of the integration of the two separate research domains, that when untangled, reveals a rather uneven distribution of research effort across the two agendas. Table 3 provides a summary of problem domain classification by review source.

Source	N	In Developing	For Development	Both	Neither
IT for Development	106	75	20	10	1
Information Technologies and International Development	52	37	8	7	0
General IS Journals	17	13	4	0	0
General Development Journals	5	2	1	2	0
The Electronic Journal of Information Systems in Developing Countries and Conference papers	5	5	0	0	0
<b>Total</b>	<b>185</b>	<b>132</b>	<b>33</b>	<b>19</b>	<b>1</b>

*Table 3 – Summary of Problem Domain Classification by Source*

As a secondary outcome from the classification exercise, it appears that the current literature base validates the central thesis of this paper that a dual research agenda exists within the ICT

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<sup>7</sup> Although the solicited research subjects of the IT for Development Journal spans both domains, the second sentence of the Journal’s aims and scopes definition states that the journal “*publishes social and technical research on the effects of Information Technology (IT) on economic, social and human development*”, which would appear to suggest a leaning toward the “for development” agenda. Source: <http://www3.interscience.wiley.com/journal/109863476/home/ProductInformation.html>

and development domain. With an acknowledgement that the circular validation of the framework could be argued to suffer from the notion of *Petitio Principii*, from a purely anecdotal perspective, the framework is considered validated by the observation that all but one of the articles in the review pool were able to be classified into one of the two (or both) research domains. The sole outlier, an article by Peled (2000) was excluded, as it appeared not to contain a link to development and was based loosely on a case study within Israel, which by all accounts is not considered a developing country.<sup>8</sup> Beyond this single paper, however, all other articles could be slotted within one of the two research agendas.

## **DISCUSSION**

Through an examination of the empirical evidence provided by the literature review, two overarching conclusions can be drawn: (1) The ICT and development literature does appear to combine the “in developing” and “for development” research agendas with little explicit recognition of the disparate problem domains, and (2) This combination has masked the relative dearth of research focused on understanding the impact or effect of ICTs on development-based constructs. Based on these observations, the discussion now moves away from empirically substantiating these findings, to discussing the implications of exposing this duality of the ICT and development research agenda.

### *Increased emphasis on the “for development” agenda is required*

As a fairly direct implication of the findings of the literature review, it is evident that a requirement exists for an increased focus on research addressing the “for development” agenda. Authors pursuing research within the overall ICT and development domain must be cognizant of the differences between the two sub-streams, and must consciously direct their research to ensure it addresses the appropriate problem definition. To this end, researchers specifically within the “for development” domain must explicitly connect the focus of their study to a development-centered construct. Overall, the results of the review point to need for further concentration on

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<sup>8</sup> Israel is classified as one of 65 High-Income countries by the World Bank and as a Developed Country according to the CIA World Fact Book.

the first and fourth subject areas of Walsham and Sahay's (2006) taxonomy in order to advance a scholarly understanding on the impact of technology on socio-economic development.

### *A Relevance and Efficacy Disjoint*

Guided by a practitioner agenda to employ ICTs to improve or accelerate socio-economic development, a majority of extrospective commentary has measured the relevance or efficacy of the efforts of the academic community against the donor agencies' and other development bodies' ability to realize tangible development results. In fact, as mentioned in the introduction, Sahay and Avgerou (2002) and Walsham, Robey et al. (2007) both point to the continued failure rates of practitioner initiatives as evidence that academicians may not be providing sufficient value, by means of relevant and prescriptive research, to the practitioner community. As with similar disciplines struggling with understanding the relevance of their research (for example, Bennis and O'Toole (2005)), this externally focused criteria of successful research often leads to an entrenched philosophical debate on the merits of various ontological, epistemological and methodological positions and their inherent abilities to drive "useful" social research. By delineating the contemporary research body along the "for development" and "in developing" streams, a more parsimonious and pragmatic answer can be found: that the majority of the work within the body is associated with an "in developing" agenda, while commentary on the efficacy and relevance of the research body is often judged against "for development" constructs. In other words, little evidence is available to substantiate the impact of academic work on the "for development" agenda, because little existing work is actually dedicated to understanding the dimensions central to this agenda. Based on this observation, to accurately assess the relevance and efficacy of the current ICT and development research domain, one should be assessing the impact of academic research on organizations and individuals to use, appropriate and diffuse technology within a developing country context, as this would be more reflective of the actual research being undertaken within the domain.

### *Implications on the Use and Appropriation of Theory*

Another impact of the current conflation of problem domains within the ICT and development research body manifests itself in the choice and appropriateness of reference theories adopted by researchers across the two disparate problem domains. If we view the "in developing" problem

domain as simply a contextual variant for traditional IS research, perhaps it follows that the theories that are appropriate for the IS domain are also appropriate for the ICT and development domain. Where this logic falters however, is with the use of these same theories to address the problem domain of the “for development” agenda, which is entirely unique to that of both the “in developing” stream and the IS discipline. Although the majority of researchers within the ICT and development field may not need to look outside the traditional reference domains, those that focus on the “for development” stream must step beyond this bound and seek theories that are more aligned to the development focus of their research. Equally interesting is the notion that articles classified within the “for development” stream did not tend to draw on development or economic theories any more than those addressing problem domains from the “in developing” stream. In fact of the three articles within the review pool that were identified as appropriating theory from either the development or economic literature, only one was classified as “for development”.<sup>9</sup>

The issue that arises is one of the appropriateness and suitability of a particular theory to address a particular problem domain. Are social and technology-based theories appropriate for addressing development-oriented research that ultimately aims to understand the relationship between technology and some measure of socio-economic development? Although a scientifically rigorous answer to the question of theory suitability is beyond the scope of this survey, and may well be in fact unanswerable (as discussed by Freese (1980)), at a pragmatic level, it would seem reasonable to assume that for a theory to provide a useful lens into a “for development” phenomenon, it must contain some connection to the larger development discourse. It would appear however, based on the lack of recognition of the two streams of ICT for development research that the “for development” agenda will continue to be overshadowed by works within the “in developing” stream, and as such may continue to look towards the use and extension of the same set of theories, despite a dramatic difference in problem domains and research objectives.

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<sup>9</sup> Duncombe (2007) uses the livelihoods framework as a lens by which to investigate the role that ICTs play in the overall poverty reduction agenda.

### *Level of Analysis Implications*

Similar implications to the above can be drawn with respect to the level of analysis chosen by a respective researcher when studying a particular problem domain. By definition, the “for development” research stream requires researchers to adopt a national, societal or population-based macro perspective that provides for an adequate assessment of larger development constructs. Although most aspects of “development” might be able to be measured at an individual level, by adopting such a restrictive lens, it would be difficult to assess the pareto optimization of a particular technology initiative under investigation, making any generalizable development conclusions within the larger population of the individual essentially unsupportable. In contrast, the “in developing” research stream which revolves around the understanding of ICT adoption, diffusion and use, allows for a more granular level of analysis performed at the organizational, work-team, and even individual level. Although a macro national or societal lens may also be appropriate for this stream of research, it is likely that any conclusions that are drawn at this level will most likely be derived by extrapolating the results of a more granular level of analysis.

### *Mixed Constructs Inhibit Cumulative Tradition*

The delineation of the two research ideals presented in this paper are based on the recognition that two distinct sets of *dependent* variables are being combined into one singular research agenda. An interesting result of this collapsing is a lack of progress in defining clear and valid *independent* variables that can be reused, re-examined and built upon to establish a cumulative research tradition within the ICT and development community. As different interpretive schemes would be necessary for dealing with the two sets of dependent variables, various independent variables have been introduced into the literature in support of the dominant “in developing” ideal that only serve to the further convolute the “for development” agenda. By explicitly separating the two research streams, each stream can focus on advancing the understanding of relationships specific to their individual agendas.

## **V. CONCLUSIONS**

The substantial impact of failed ICT and development initiatives has motivated a number of reflective researchers to question the efficacy and appropriateness of the ICT and development

body of scholarship. As a means for understanding the disjoint between academic research and practitioner acceptance and success, a framework is proposed that suggests the partitioning of the existing literature into two distinct streams of research: those studies that focus on understanding technology “for development”, and those studies that focus on understanding technology “in developing” countries.

Through the application of this two-stream framework within an extensive review of 185 journal articles and conference proceedings, two primary conclusions are identified: (1) The ICT and development literature does appear to combine the “in developing” and “for development” research agenda with little explicit recognition of the disparate problem domains, and (2) this conflation has masked the surprising dearth of research focused on understanding the impact or effect of ICTs on development-based constructs.

Without the explicit recognition of this conflation, future research within the ICT and development domain will continue to face the same scathing reflective commentary. By acknowledging and accepting the differences between each problem domain, it is hoped that researchers will be able to move the agenda of both streams of research forward, unencumbered by the ambiguity caused by the aggregation of competing research objectives.

## **IMPLICATIONS FOR ACADEMICS AND FUTURE RESEARCH**

A number of implications are drawn from the conclusions of this study. Firstly, the research community must recognize that the body of scholarship falling under the label of ICT and development contains two distinct streams of research, each with unique problem domains and theoretical requirements. As such academics should be very clear in which stream that their research effort falls. Secondly, academics must strive to ensure that the theories they employ are appropriate for addressing their particular research objective, and are not chosen simply because of convenience or familiarity. As suggested by Truex, Homstrom et al. (2006), authors should ask themselves why the chosen appropriated theory is better than other options. The problem domain should drive the choice of theory and methodology, not the other way around. Lastly, increased attention should be placed on the “for development” stream, which is critically underrepresented within the literature, but imperatively important within the practitioner and donor agency domain.

## IMPLICATIONS FOR PRACTITIONERS

Practitioners must continue to leverage the academic community for insight into the ICT and development phenomenon, as well as open their efforts to the scrutiny of academic inquiry. ICT for development research can provide practitioners with insight into the complex processes and outcomes that can be obtained when ICTs are introduced into the development milieu. However, they must carefully assess the appropriateness of research results they are adopting to ensure that they do apply to the development agenda and are not simply replications of research conducted in other settings. To grow the stock of ICT for development research there must be an active and sustainable partnership between academia and the practitioner community. It is only in this way that the potential for ICTs to impact social-economic well-being can be fully realized.

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## VII. APPENDIX A – ARTICLES CLASSIFIED AS “FOR DEVELOPMENT”

Author	Title	Source	Date	Volume	Issue
Hall, P.	Distance Education and Electronic tworking	IT for Development	1996	7	2
Cyamukungu, M.	Development Strategies for an African Computer Network	IT for Development	1996	7	2
Valantin, R.	Global program initiative: Information Policy Research	IT for Development	1996	7	2
Lishan, A.	Electronic Communications Technology and the Development of Internet in Africa	IT for Development	1996	7	3
Morales-Gomex, D. Melesse, M.	Utilizing Information and Communication Technologies for Development: The Social Dimensions	IT for Development	1998	8	1
Avgerou, C.	How can IT enable economic growth in developing countries?	IT for Development	1998	8	1
Toluyemi, T.	The Role of Accounting Information Systems in the Sustainability of Agricultural Development Projects in Nigeria	IT for Development	1999	8	4
Reichgelt, H.	Software Engineering Services for Export and Small Developing Economies	IT for Development	2000	9	2
Gregson, J. Gaurab, R.	"Breathing the Thin Air of Cyberspace": Global knowledge and the Nepal Context	IT for Development	2000	9	3/4
Cecchini, S. Scott, C.	Can Information and Communication Technology Applications Contribute to Poverty Reduction? Lessons from Rural India	IT for Development	2003	10	2
Cecchini, S. Raina, M.	Electronic Government and the Rural Poor	Information Technologies and International Development	2004	2	2
Micevska, M.	Telecommunications, Public Health, and Demand for Health-Related Information and Infrastructure	Information Technologies and International Development	2005	2	3
Proenza, F.	The Road to Broadband Development in Developing Countries Is Through Competition Driven by Wireless and Internet Telephony	Information Technologies and International Development	2006	3	2
Smarajiva, R.	Preconditions for Effective Deployment of Wireless Technologies for Development in the Asia-Pacific	Information Technologies and International Development	2006	3	2
Heeks, R.	Using Competitive Advantage Theory to Analyze IT Sectors in Developing Countries: A Software Industry Case Analysis	Information Technologies and International Development	2007	3	3
Mansell, R. Nordenstreng, K.	Great Media and Communication Debates: WSIS and the MacBride Report	Information Technologies and International Development	2006	3	4
Abraham, R.	Mobile Phones and Economic Development: Evidence from The Fishing Industry in India	Information Technologies and International Development	2007	4	1

Medhi, I. Sagar, A. Toyama, K.	Text-Free user Interfaces for Illiterate and Semiliterate Users	Information Technologies and International Development	2007	4	1
Akpan, P. I.	Basic-needs to globalization: Are ICTs the missing link?	IT for Development	2003	10	4
Slavador, T. Sherry, J. Urritia A.	Less cyber, more café: Enhancing existing small business across the digital divide with ICTs	IT for Development	2005	11	1
Li, S.	The impact on information and technology on relation-based governance systems	IT for Development	2005	11	2
Kimaro, H.C. Hjampossa, J. L.	Analyzing the problem of unsustainable health information systems in less-developed economies: Case studies from Tanzania and Mozambique	IT for Development	2005	11	3
Kannabiran, G. Narayan, P.C.	Deploying Internet banking and e-commerce - case study of a private-sector bank in India	IT for Development	2005	11	4
Musa, P.F.	Making a case for modifying the technology acceptance model to account for limited accessibility in developing countries	IT for Development	2006	12	3
Jacucci, E. Shaw, V. Braa, J.	Standardization of health information systems in South Africa; The challenge of local sustainability	IT for Development	2006	12	3
Corea, S.	Promoting development through information technology innovation: The IT artifact, artfulness, and articulation	IT for Development	2007	13	1
Puri, S.K. Sahay, S.	Role of ICTs in participatory development: An Indian experience	IT for Development	2007	13	2
Gerhan, D.R. Mutula, S.M.	Testing a recent model of ICT in development: Botswana and its university	IT for Development	2007	13	2
Wong, P-K.	Leveraging the Global Information Revolution for Economic Development: Singapore's Evolving Information Industry Strategy	Information Systems Research	1998	9	4
Cuervo, M.R. Lopez Menendez, A.J.	A multivariate framework for the analysis of the digital divide: Evidence for the European Union-15	Information and Management	2006	43	6
Goodman, S.E.	Computing in a less-developed Country	Communications of the ACM	1991	34	12
Sadowsky, G.	Network Connectivity for developing countries	Communications of the ACM	1993	36	8
Wade, R.	The World Bank and India's Irrigation Reform	Journal of Development Studies	1982	18	2