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# Government's Implementation of Information and Communication Technology in Developing Countries: An Analysis of Human Development Outcomes

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# GOVERNMENT'S IMPLEMENTATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN DEVELOPING COUNTRIES: AN ANALYSIS OF HUMAN DEVELOPMENT OUTCOMES

*Research in Progress*

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## Abstract

*In the context of Information and Communication Technology (ICT) for development (ICT4D), the capabilities approach raises questions about the best way to generate human development outcomes through the government's implementation of ICT, responding to specific demands of the people. The capability approach relates development to the improvement of life that people lead and the freedoms they enjoy. This research proposes a conceptual model and four main propositions to explain how government's implementation of ICT contributes to improved human development. This study takes the perspective that ICT use in government can somehow impact human development, especially if it reflects users' needs and if it gives to everyone the opportunity and the ability to use technologies to provide a better life for themselves. The contribution of this study is the extending of the ICT4D research and its impact in human development. By including the social context in the model, we emphasize the differences between countries in different levels of development and, especially, the differences between users' demands in these countries. Also, we will be able to analyse the differences in human development outcomes when government goals reflect citizens' needs.*

*Keywords: ICT4D, Developing Countries, Capability Approach, Human Development.*

## 1 Introduction

The social scenery of human life has been reshaped by the technology revolution on Information and Communication Technologies (ICT), which is currently recognized as an enabler for national progress and social transformation (Majchrzak, Markus and Wareham, 2013). Considered as a driver of social, economic and political changes, the technological change has elicited public and academic attention through the way it relates to development aspects, such as: social transformation, organizational change, economic growth and public reform (Faik and Walsham, 2013).

Reflecting on Information Systems (IS) field, Walsham (2012) says that researchers should be concerned with how ICT can contribute to a better world, where everyone has the opportunity and the ability to use technologies to provide a better life for themselves, their communities and the world in general. Considering that ICT have a key role in changing how people live, the relationship between ICT and development has been investigated in a new area of study called information and communication for development (ICT4D) (Kleine, 2013; Nijhia and Merali, 2013). Avgerou (2010) suggests that one of the main motivations for ICT4D researchers should be the enhancement of the innovation potential of ICT to contribute towards improving the human condition. Whereas ICT have not met the expectations broadcast on its impact on development, the task of researchers is to understand what it takes to occur (Avgerou, 2010).

Development is essentially the process of expanding the real freedoms that people enjoy (Sen, 1999). Such freedoms are incorporated by aspects of individual choices and opportunities to get results that they value and have reason to. Since the first global Human Development Report (HDR) in 1990, most countries have registered significant human development. The Report in 2014 also shows that progress is continuing and overall global trends are positive. But natural or human-induced disasters and crises still leads to loss of lives and livelihoods and development are undermined (UNDP, 2014).

The human development approach, developed by the economist Mahbub Ul Haq, is anchored in Amartya Sen's work on human capabilities. The main idea of human development consists of the image of people fulfilled and happy in their lives and with skills and opportunities to be whatever they want (RDH, 2009). In opposing the assumptions of economic growth, the human development approach suggests that by looking at specific characteristics of people we can see the whole. Human development involves choices and considers what is valued by the people to have better lives and be happier (RDH, 2009).

Nussbaum (2011) believes that the human development paradigm, also called the capability approach, is a theoretical approach in the context of world development. The issue of this paradigm is related to what people are actually able to be and do, i.e., their capabilities (Nussbaum, 2011; Robeyns, 2005). The capability approach is a framework to assess measures of individual and social well-being and to develop policies and proposals for social change (Robeyns, 2005). According to Robeyns (2005), in the context of developing countries, this approach can be used both in the analysis of social cost-benefit and in the design of policies for the societies welfare or development by governments. In the context of ICT4D, Dorothea Kleine (2010, 2011, 2013) translates Sen's approach into policy analysis and ethnographic work on technology adaptation.

The capability approach has made great contributions in research on human development, encompassing such aspects as poverty reduction, gender equality, and democracy (Zheng; Stahl, 2011). Recently, this approach has been used to investigate the adoption of ICT in society, since it offers a way for thinking about the development of ICT as individual freedom, and not only about its impact on economic development (Kleine, 2010). This approach has been adopted in various ICT4D research to discuss empowerment (Alsop, Heinsohn, 2005), livelihoods (DFID, 1999), evaluation of ICT projects (Madon, 2005; Heeks; Molla, 2009; Heeks, 2010), digital inclusion (Madon et al, 2009), and the theoretical exploration on ICT and human development (Kleine, 2010, 2011, 2013; Zheng, 2009).

The diffusion of ICT in developing countries has been recent and fast, and led to a range of contributions for development (Walsham, Robey and Sahay, 2007; Avgerou, 2008; Heeks, 2010). However, in recent years, the research has moved far beyond the analysis of the potential of ICT, including the ICT4D value chain (infrastructure, accessibility and use), for the ICT's impact on development. According to Heeks (2010), there is a constant need for new impact assessment of ICTs, since its contribution to development changes constantly. In that way, the overall goal of this research is analyse how government's implementation of ICT improve human development outcomes in a context of developing countries.

Considering that many projects in ICT4D are implemented without prior consultation about the kind of life people want, the capability approach could help to understand this phenomenon, question the validity of those projects and improve the outcomes of ICT use in government (Kleine, 2010). Based on this context, this study addresses current gaps in research by furthering our understanding of the improvements and benefits to society through ICT. ICT in government should realize that people want to improve their lives based on their values and, in essence, to have better and happier lives. Therefore, the following research questions are proposed:

1. *How does government's implementation of ICT contribute to improved human development?*
2. *To what extent government goals and implementations of ICT reflect what people want?*
3. *To what extent human development outcomes serve users' needs?*

This study takes the perspective that ICT use in government can impact human development and improve citizens' lives, especially if the deployments address the users' needs, provide all users equal access to technology, and ensure users have the ability to use technologies.

The rest of this paper is organized as follows. We first describe the current state of research for both ICT4D and the capability approach. We used disciplined process when conducting our literature review this as suggested by Webster and Watson (2002)—using keyword searches in ProQuest and Google Scholar for ICT, ICT4D, and capability approach as well as following forward and backward citations. Finally, we describe our conceptual model and explain how it furthers our understanding of the relationship between ICT use in government and the consequential impact in human development.

## 2 ICT4D evaluation

ICT4D has emerged as a diversified field in IS research, emphasizing the use of ICT for governance and improving performance of public and private organizations (Nijhia and Merali, 2013). ICT in the context of ICT4D “refers to any technology serving the purpose of gathering, processing, and disseminating information, or supporting the process of communication”, especially for the use of internet and mobile phones (Kleine, 2013, p.5).

The change with regard to the evaluation of ICT4D brought new challenges to the process of assessing ICT impact on social and economic development (Kivunike et al., 2013). This concern is higher in developing countries, where such aspects as appropriation, use, and impact of ICT depends of contextual factors. It can be evaluated using the ICT4D value chain model, focusing on interconnecting resources and processes to systematically analyze the steps that an ICT initiative crosses over time (Kivunike et al., 2013). Heeks and Molla (2009) suggested that the valuation basis for ICT4D projects revolves around the value chain, consisting of four main targets of assessment, following a standard input, process and output.

The concepts that the ICT4D value chain comprises are (Heeks; Molla, 2009; Heeks, 2010): *Readiness*: evaluation that analyzes the systemic prerequisites of an ICT4D initiative (it may also include the evaluation of the strategy that turns precursors into inputs); *Availability*: implementation of ICT4D project transforming inputs into a set of tangible results in the field of ICT, which can be assessed based on the presence and availability of the deliverables; *Uptake*: assessment that measures the extent to which the supply of ICT projects are being used by their targeted population. *Impact*: evaluation of the project's impact, which can be divided into three sub-elements: *Outputs*: the micro level behavioral changes associated with the ICT4D project (such as new communication patterns, new information and decisions and new actions and operations). *Results*: the costs and benefits associated with specific ICT4D projects (financial and other quantitative benefits, qualitative benefits and disbenefits). *Development Impacts*: ICT4D project's contribution to broader development goals (public goals as the Millennium Development Goals (MDGs)).

The value chain is represented by a ICT4D intervention (input) that results in deliverables, which, once operated by the beneficiaries target, produce outputs that lead to results, and impacts (Kivunike et al., 2013). The achievement of results from outputs as well as the impact is affected by various contextual factors, particularly in developing countries (Kivunike et al., 2013; Nijhia and Merali, 2013).

Research in ICT4D involves assumptions about the nature of ICT innovation, and how it contributes to development (Avgerou, 2010). Challenges in this field include the ability to address the inter-relationship of the ICT innovation with their cognitive and socio-political context, that is of identifying the relevant context and importance for each case of ICT innovation. Also, understanding how the socio-economic context of a country allows ICT actions to contribute for the improvement of life in developing countries, including the role of ICT for transforming the living conditions of poor populations (Avgerou, 2010).

## 3 Capability Approach

The capability approach, developed by the economist Amartya Sen (1999) and the philosopher Martha Nussbaum (2000), provides the theoretical underpinning for human development discussion (Stewart,

2013). The approach of development as freedom, proposed by Sen (1999) describes development as a process of expanding real freedoms. A key issue in this conceptualization of development includes a gap between the perspective of economic wealth and the broader focus on the life that we lead. For the author, development has to be related mainly to the improvement of the lives people lead and the freedoms that they enjoy.

The main concepts of the approach proposed by Sen (1987, 1999) are functioning and capabilities. A functioning is something earned by the individual and is related to living conditions, while capacity is the ability to achieve this. Capabilities are the notions of freedom: what real opportunities you have regarding the life you may lead (Sen, 1987).

This analysis of development considers the freedoms of individuals as the basic constituent elements, and attempts to expand the capabilities of people to lead lives they value (having the freedom to do the things one values becomes relevant to your overall freedom and the opportunity to expand the same to have valuable outcomes (Sen, 1999)). The overall ability of a person can be magnified by five different types of instrumental freedoms: economic opportunities, political freedoms, social facilities, transparency guarantees and protective security. These freedoms have a role in society and have complementarities that can vary depending on the country concerned.

“What are people really able to do and to be?” The capability approach can answer that question by looking the set of capabilities, or real opportunities, someone has (Nussbaum, 2011, p.6). On one hand, capabilities can be used to give an account of comparison between regions or nations. On the other hand, the idea of capabilities can be used to develop a partial account of basic social justice (Nussbaum, 2011).

According to Nussbaum (2011), there are ten capabilities that are central requirements of a life with dignity. These capabilities require affirmative government support for their creation and preservation. The Central Human Capabilities proposed by Nussbaum (2011, p.7) are: 1. Life; 2. Bodily Health; 3. Bodily Integrity; 4. Senses, Imagination, and Thought; 5. Emotions; 6. Practical Reason; 7. Affiliation; 8. Other Species (being able to live with concern for and in relation to animals, plants, and the world of nature); 9. Play (being able to laugh, to play, to enjoy recreational activities); and 10. Control over one's Environment (political and material).

Robeyns (2005) proposed a framework that represents the difference in the capabilities approach between means (goods and services) and functioning or capabilities. In this sense, the approach is interested in certain characteristics of a good (such as a bicycle) which allows for a functioning (such as mobility). The relationship between a good and functioning is influenced by three sets of conversion factors. The first group consists of personal conversion factors that influence how a person can change the characteristics of a product, like metabolism, physical condition, sex, reading skills and intelligence. The second group includes social conversion factors, such as public policies, social norms, discriminatory practices, gender roles, social hierarchies and power relations. And finally, the third group includes the conversion factors of the environment such as climate and geographical location (Robeyns, 2005).

According to Robeyns (2005), we need to know about a person and the conditions in which she lives to identify the functioning she can reach by a good that she has. In this way, the capability approach takes into account the plurality of functions and capabilities, as well as personal conversion and social-environmental factors, including the social and institutional context that affects the conversion factors of a good in an effective way (Robeyns, 2005). In addition to goods and services, there are other means that act as inputs for the creation or expansion of capabilities, such as social institutions. Thus, the circumstances that form the set of people's opportunities and circumstances that influence their choices should be central for assessing capacity (Robeyns, 2005).

## **4 Research Propositions and the Conceptual Model**

The purpose of this exploratory study is to capture, describe, document and conceptualize government's implementation of ICT as well as explain how it contributes to improved human development when government's goals reflect citizens' needs. Considering the emergent nature of the field, we start

our study with the identification of definitions and relevant concepts. To achieve the paper's objective, we have created a conceptual model that illustrates the relationship between ICT use in government and its impact to human development. Future steps include a field study in cases of open government data platforms in a developing country (Portal Brasileiro de Dados Abertos – Brazil). The multiple cases approach is appropriate considering that the research aims to investigate the issues, technologies, and policies within an empirical context (Yin, 2013), and specifically in an explanatory study that seeks to answer “how” and “why” research questions (Yin, 2013).

#### **4.1 ICT use in government and Social Context**

The advent of the internet has brought greater visibility to public organizations through the diffusion of their implementations of ICT worldwide (Heeks, 2005). Government's implementation of ICT is intrinsically related to social context and also has an impact on it, which is complex in developing countries, as it is characterized by the interweaving of actors, agencies, civil society, and foreign and global players (Nijhja and Merali, 2013).

One of the conclusions of Walsham, Robey and Sahay (2007) on the use of ICT in developing countries is that it requires a better understanding of the institutional context, in addition to the comprehension of socio-technical changes that occur over time. Such understanding is suggested currently in the analysis of the role of ICT in enabling or inhibiting complex social problems, including "aspects of the social and institutional ecosystem that sustains the social problem and how competing ecosystems of ICT may be harmful or helpful" (Majchrzak, Markus and Wareham, 2013).

Based on the experiences of several countries that presented growth and effective conversion of projects in human development, the UNDP (2013) identified that development strategies will succeed only by adopting a commitment to equality of opportunity, giving everyone the chance to enjoy the benefits of growth. Also, the way in which strategies and projects are translated into development policies will depend on the specific context, according to the characteristics of the country, the government capacities and their relations with the rest of the world (UNDP, 2013).

People's well-being is influenced by the freedoms within which they live and by their ability to respond to and recover from adverse events, including natural or human-made (UNDP, 2014). The HDI in 2014 focused on the resilience that underpins any approach to securing and sustaining human development. In essence, resilience is about ensuring that state, community and global institutions work to empower and protect people. In this way, human development involves removing the barriers that hold people back in their freedom to act and live a life that one values (UNDP, 2014).

The impact of ICT investments in human development varies with the context (countries in different economic development levels), being, in many, cases complex and conditional (Bankole et al. 2011). The directions of the impacts of ICT investments in the standard of living may be different from the corresponding directions of health impacts, for example (Bankole et al. 2011). Thus, the application of ICT should be appropriate to different contexts and countries goals in human development.

Given the dichotomy between developed and developing countries and the influence of Western values on modern society, Western Europe and North America end up serving as a reference for many developing countries in the pursuit of modernization, especially in regard the use of ICT (Zheng, 2009). As a result of this influence, we can see the increased importing of values and advice from those countries with insufficient reflection, as well as technology transfer and ICT by developing countries without considering their compatibility with local conditions (Zheng, 2009).

Considering the development in terms of capabilities, it is possible to assess the impact of ICT beyond superficial levels of access and use, or economic benefits (Zheng, 2009; Madon, 2005). The impact assessment of government's implementations of ICT depends on several factors, mainly related to the degree to which the needs and priorities of individuals were affected and social outcomes achieved (Madon, 2005). Thereby,

**Proposition 1:** *The ability of the government goals for ICT a) to reflect the users' needs b) will impact positively in governments' implementations of ICT.*

**Proposition 2:** *Governments' implementations of ICT will produce impact of ICT use in government as outputs lead to results and to impacts on development.*

**Context variable 1a:** *Governments' implementation of ICT is intrinsically related to the social context, as well as Government goals for ICT and users' needs.*

**Context variable 1b:** *The achievement of results from outputs as well as the impact on development is affected by social context factors, particularly in developing countries.*

## 4.2 Human Development Outcomes and Conversion Factors

The vision of ICT4D from the perspective of the capability approach emphasizes the incorporation of ICT in pursuit of human development. This perspective assesses the contributions of ICT in the capabilities of people (set of capabilities) to achieve a valuable life and in actual opportunities that people use ICT for what they consider valuable (functioning) (Zheng, 2009). The circumstances (conversion factors) that form the set of opportunities for the individual (set of capabilities) that influence their choices should receive a central place in the evaluation of human development, considering the conversion of a good to a functioning (Robeyns, 2005).

Thus, it is suggested that human development is conditioned by the functioning of individuals through ICT, as a result of their choices as a representation of their capabilities.

Kleine (2013), based on the capabilities approach, states that from the use of ICT the individual gains a capability or, more often, a tool used to enhance other capabilities. Considering development as the expansion of the capacities of human beings to lead lives they value, ICT should be seen as a means to achieve this objective in the development process, provided a set of conversion factors be present (Zheng, 2009). Such factors affect the well-being and the freedom agency of individuals (Robeyns, 2005), and can be the conditions for ICT to be effectively disseminated and exploited (Zheng, 2009).

Conversion factors are the conditions that allow people to do whatever they want with their lives (Zheng, 2009). Thus, government's implementations of ICT for development should take into account three factors (Zheng, 2009): the free flow of information that is useful to improve the well-being and freedom of individual agency; the conversion factors present in the environment to generate potential functioning and to allow people to have the freedom of choice to perform this functioning; and a consideration of the diversity and differences in human conditions.

The recognition of individual agency, the mobilization for the potential advantage of ICT and the contextualization of agency should be an integral part of development (Zheng, 2009). The prospect of agency should present a concern that goes beyond having or not having, but includes the power of do something. Also, it should emphasize the agency of ICT users, considering their aspirations and needs to evaluate the design of social arrangements and cultural values in relation to individual capabilities that form the set of capabilities of the individual (Zheng, 2009).

The freedom of choice to perform a functioning is part of the set of capabilities of the individual, which includes the basic capabilities as a subset of all the resources that refer to the freedom to do some basic things that are necessary for survival, and capabilities necessary to achieve what is valued (Nussbaum, 2011; Robeyns, 2005).

Human development will result from the choice of the individual (based on your set of capabilities, including the freedom to achieve a functioning) and secondary outcomes (functioning) that will depend on how individuals live and what is valued by them, and ICT can contribute in achieving these results (Kleine, 2010). For that, the government's implementations of ICT should ensure that the ICT standards and ideas reflect the choices of individuals (Kleine, 2011). Thus, the result of human development seeks to map the functioning resulting from choices of the individual as a representation of their capabilities (Kleine, 2010). Therefore,

**Proposition 3:** The *impact of ICT use in government* acts as outputs that lead to results and to impacts on development, allowing *users' use and appropriation* of ICT.

**Proposition 4:** The level of *users' use and appropriation* of Government's implementations of ICT will impact **Human Development Outcomes**

**Context variable 2:** The *conversion factors* present in the environment are conditions that generate potential functioning and that allow people to have the freedom of choice to perform this functioning (**Human Development outcomes**).

The Figure 1 shows the logic of our proposal, based on concepts explained in this section.

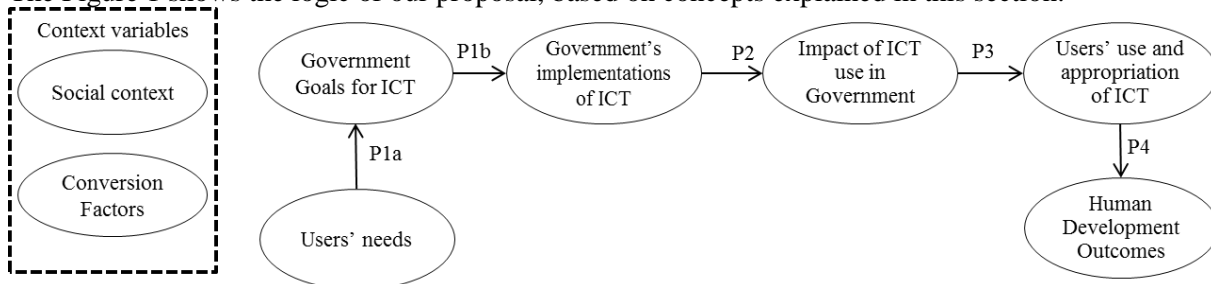


Figure 1. Conceptual Model

Variable	Definition	Indicators	References
<b>ICT4D</b>			
Government Goals for ICT	Based on the ICT4D value chain, Readiness is the evaluation that analyzes the systemic prerequisites of an ICT4D initiative, including the evaluation of the strategy that turns precursors into inputs	Inputs Strategy Goals	Heeks e Molla (2009)
Governments' implementations of ICT	Based on the ICT4D value chain, availability is the implementation of ICT4D project transforming inputs into a set of tangible results in the field of ICT	Presence and availability of deliverables	Heeks e Molla (2009)
Impact of ICT use in Government	Evaluation of the project's impact, which can be divided into three sub-elements:	<i>Outputs:</i> New communication patterns New information and decisions, New actions and operations <i>Results:</i> Financial and other quantitative benefits, Qualitative benefits, Disbenefits <i>Development Impacts:</i> Public goals	Heeks e Molla (2009)
<b>Human Development</b>			
Users' needs	Includes the individual agency and the agency of ICT users, considering their aspirations and needs to evaluate the design of social arrangements and cultural values in relation to individual capabilities	Agency of ICT users Aspirations Needs	Kleine (2010) Robeyns (2005) Zheng, (2009)
Users' use and appropriation of ICT	Consists of the capability set that is defined as what a person can be ('beings') or do ('doings'). From this capability set, an individual makes choices and thus translates the potential to be or do a variety of things into functionings	Capability set Freedom of choice • existence of choice • sense of choice • use of choice • achievement of choice	Kleine (2010) Robeyns (2005) Nussbaum (2011)



<i>Variable</i>	<i>Definition</i>	<i>Indicators</i>	<i>References</i>
Human Development Outcomes	Consists of secondary outcomes (functionings)	<i>Beings</i> Well fed, sheltered, healthy <i>Doings</i> Work, education, voting, participating in community life.	Kleine (2010) Robeyns (2005)
<b>Context Variables</b>			
Social context	Consist of social context factors	Social institutions Social and legal norms Other people's behaviour and characteristics Environmental factors	Robeyns (2005)
Conversion factors	The factors that's influence the relationship between a good and functioning	<i>Personal Factors:</i> Metabolism, physical condition, gender, reading skills, intelligence <i>Social factors:</i> Public policies, social norms, discriminatory practice, gender roles, social hierarchies, power relations <i>Environmental factors:</i> Climate , geographical location	Robeyns (2005)

## 5 Concluding Remarks

To ensure benefits to society through ICT, governments should understand the kind of life that people want, and what they value to have better lives and be happier. This is the basic idea of the capabilities approach, which links development to the improvement of the life that people lead and the freedoms they enjoy, allowing a better understanding about the best way to improve human development outcomes through ICT by meeting the specific demands of the people. We propose a conceptual model based on the ICT4D perspective to understand governments' implementations of ICT, and uses the capability approach to analyse its impact in human development. We argue that users' needs and government goals for ICT, its use in government different social contexts can present different results, particularly in developing countries. Also, results in terms of human development are dependent from the use and appropriation of ICT use in government outputs and conversion factors, such as personal, social, and environmental factors.

The contribution of this study is the extending of ICT4D research and its impact in human development. By including social context in the model, we emphasize the differences between countries at different levels of development and, especially, the differences between users' demands in these countries. Also, we will be able to analyse the differences in human development outcomes if government goals reflect citizens' needs.

Future steps include two main phases. As an exploratory qualitative research, the first phase consists of a literature review and interviews with experts, resulting in the validation of the conceptual model presented in this paper. The second consists of multiple case studies in cities' government in cases of open government data platforms in a developing country (Portal Brasileiro de Dados Abertos – Brazil), considering the delivery of government information and services to society as the unit of analysis. This choice is justified, considering that the use of data provided by open government data platforms has a great potential to enable new services, improve the lives of citizens and make government and society work better. Also, further research may include cases in developed countries that usually present higher levels of human development, even though developed and developing countries has been experienced a deceleration in the HDI growth (UNDP, 2014).

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