# Enabling development through governance and mobile technology

Adegboyega Ojo [a,*], Tomasz Janowski [a], Johanna Awotwi [b]

[a] Center for Electronic Governance, United Nations University International Institute for Software Technology, P.O. Box 3058, Macao
[b] Centre for e-Governance, MP 270 Mamprobi, Accra, Ghana

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## ABSTRACT

The impact of mobile technology on governance and development has attracted significant interest in Information and Communication Technology (ICT) for Development and Electronic Governance communities. There is growing consensus that governance mechanisms must complement access to technology to achieve greater impact on development. However, few or no rigorous research exists to show how such mechanisms can support the delivery of mobile services to vulnerable groups. This study fills this important gap by first providing a conceptual framework, based on the Choice Framework and the Structuration Theory, to elaborate on the relationship between ICT, governance and citizen capabilities. Second, the framework is applied to analyze livelihood needs of 45 women head porters interviewed in Accra. Third, as all women under study have access to mobile phones, we determine which governance mechanisms are needed to support the delivery of mobile services to them. Results show that three governance mechanisms enable the contribution of mobile technology to meeting the livelihood needs of this group: 1) updating financial and telecommunication regulations to enable the provision of mobile-based services e.g. mobile microfinance, to vulnerable groups; 2) mobilizing local communities in the production of local contents; and 3) engaging non-governmental organizations in building capacity of government agencies in mobile service delivery and in training vulnerable communities in effective use of mobile technology to access information and services critical to their needs. We conclude by discussing the use of the Structuration Theory along with the Choice Framework to shape development processes based on citizen needs and by discussing the applicability of our framework to similar vulnerable groups.

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## 1. Introduction

Adopted by the UN General Assembly in 2000, the Millennium Development Goals (MDG) commit both developed and developing countries to do "all they can to eradicate poverty, promote human dignity and equality and achieve peace, democracy and environmental sustainability". With a few years away from the 2015 MDG target, there is some consensus that achieving MDG rests upon good governance (Ghaus-Pasha, 2007). While no general standards for good governance exist (Nanda, 2010), the concept is usually described in a normative sense to include political stability, rule of law, control of power and accountability. Governance, according to the international development organizations such as the OECD or the World Bank, connotes a neo-liberal agenda of reducing the role of government in favor of the market and corporate interests (Kemp & Parto, 2005).

In the case of Africa, many studies have shown that achieving long-term social and economic development requires an enabling environment to promote good governance and constrain opportunistic activities by civil servants and politicians (Mbaku, 2000).

Increasingly, such environment relies on Information and Communication Technology (ICT) (Ghaus-Pasha, 2007).

Due to their relative accessibility, mobile phones can directly support development needs and provide a service delivery channel to even the most disadvantaged groups in the society (Aker & Mbiti, 2010; Karan, Cheng, & Khoo, 2008). While the general optimism about the potential of mobile devices for development and governance is still strong (Alrazooqi & De Silva, 2010), the use of such devices in the delivery of development-related services (mobile ICT for development or MICT4D) and the provision of public services (mobile governance for development or MGOV4D) are increasingly required to produce concrete evidence of impact (Aker & Mbiti, 2010). For example, Carroll (2006) and Rossel, Finger, and Misuraca (2006) identify critical factors for achieving successful mobile governance (MGOV) initiatives and propose fundamental rethinking of the MGOV concept while calling for more sophisticated approaches to designing and implementing MICT4D and MGOV initiatives.

Building on our earlier work (Awotwi, Ojo, & Janowski, 2011), this article examines the critical role of governance in ensuring access to and effective use of mobile phones and other mobile devices in the delivery of public services to vulnerable groups in the society. It relies on the case of migrant women micro-entrepreneurs in Ghana who rely on mobile phones to address their basic livelihood needs. Specifically,

we consider the case of women involved in head porterage — carrying of goods or luggage on the head for a fee (Opare, 2004). Head porterage is a major form of transportation of goods in Ghana and other parts of West Africa, considered vital in facilitating trade (Yeboah, 2009). In the Ghanaian context, head porters are of strategic policy importance to the government since the trade is dominated by young women with no or little formal education.

Methodologically, we address the problem in three steps. First, we develop a conceptual framework to show how governance and technology can enable effective delivery of mobile services to citizens to fulfill their livelihood needs. Second, we apply the framework to analyze data collected from the field interviews of 45 migrant women micro-entrepreneurs involved in head porterage in the Accra area of Ghana. The analysis identifies: 1) concrete livelihood needs of the members of the head porter community, 2) how the use of mobile phones can support such members and the community as a whole in fulfilling such needs, and 3) what kind of governance mechanisms could be applied to increase and sustain the impact of the use of mobile phones on fulfilling such needs. Third, guided by the outcome of this analysis, we propose a set of development strategies on how mobile technology could support the implementation of important governance mechanisms to enable effective development efforts. The theoretical framework underpinning this work is primarily based on the Choice Framework (Kleine, 2010). Ideas from the Structuration Theory (Giddens, 1984) were employed in elaborating some key constructs in the Choice Framework such as Agency.

Our work makes two contributions to practice and policy: 1) it provides better understanding of the critical information and service needs of a vulnerable community, amenable to the delivery of mobile services; and 2) it identifies specific governance mechanisms to ensure not only that mobile services are delivered to those who need them, but also that the use of such services is effective in meeting such needs; and one contribution to theory: 3) our conceptual framework refines the Choice Framework based on the constructs from the Structuration Theory, for instance to elaborate on the nature and the categories of knowledge that the head porters, as an agency, possess.

The rest of this article is organized as follows. Section 2 presents the background to understanding governance, development and mobile governance for development. Research questions and methodology are provided in Section 3, followed by the conceptual framework in Section 4. Section 5 presents the case study of the head porters in Ghana including data collected from the field interviews with 45 women head porters and the analysis of such data by applying the framework introduced in Section 4. Section 5 provides examples of mobile technology initiatives that could address the governance requirements, identified in Section 5, to enable the use of mobile services to meet the livelihood needs of the members of the head porter community. Section 6 discusses the findings of the study and the extent to which the findings could be generalized to other vulnerable groups, and justifies the validity of the proposed conceptual framework. Finally, Section 7 presents some conclusions and plans for future work.

## 2. Background

This section reviews the literature to introduce and relate three central concepts in this work — development, governance and mobile ICT. The section introduces development in Section 2.1. The enabling role of ICT and mobile ICT for development are introduced in Sections 2.2 and 2.3 respectively. The challenges to successful mobile ICT-enabled development are presented in Section 2.4 followed by the governance mechanisms to address such challenges in Section 2.5.

### 2.1. Development

There are three predominant schools of thoughts on what constitutes development (Kleine, 2009; Sein, 2004): 1) development as modernization or economic growth; 2) development as exploitation of the poorer countries by richer or more developed countries through colonization or dependency; and 3) development as expansion of the freedoms that people enjoy to lead their lives. In addition, focusing not only on the outcome but the process leading to development, participatory development insists that effective development must include participation of people (Chtinis, 2005).

The "development as expansion of freedoms" model treats development as "expansion of assets and capabilities of the poor to participate in, negotiate with, influence, control and hold accountable the institutions that affect their lives" (Sen, 1984). The assets include material, financial, natural, geographical, human, psychological, informational, cultural and social resources (Kleine, 2009). To various extents, such assets could satisfy three categories of human needs — existence, relatedness and growth (Yang, Hwang, & Chen, 2011). This model is most relevant in understanding development from the perspective of the poor and other vulnerable segments of the society.

The exposition of the "development as freedom" idea recognizes the intrinsic value of participation in development processes. As people attach value not just to the final outcomes but also to the process through which such outcomes are achieved (Chtinis, 2005), it highlights the importance of participation in reaching freedom from hunger, disease, illiteracy and other desirable outcomes (Sen, 1984). Freedom to participate is therefore a constituent and not just a means for achieving development.

The most influential measure of global development is the Millennium Development Goals — MDG framework (United Nations, 2002). MDG consist of eight development and poverty eradication goals: 1) eradicating extreme poverty and hunger; 2) achieving universal primary education; 3) promoting gender equality and women empowerment; 4) reducing child mortality; 5) improving maternal health; 6) combating HIV/AIDS, malaria and other diseases; 7) ensuring environmental sustainability; and 8) developing global partnerships for development. Each goal is associated with a number of targets.

### 2.2. ICT-enabled development

ICT can be viewed as a tool, proxy or an element of a larger computational entity (Orlikowski & Iacono, 2001). As a tool, ICT can serve as labor substitution and enhancer of productivity and social relations. As a proxy, ICT can serve as a symbol of dynamism, transformation, modernity or of other desirable qualities by its stakeholders. As an element, ICT can be part of a larger social, economic, political or technical system, and serve as technology, algorithm, code, model or system.

Efforts to better understand the actual or potential impact of ICT in general and on development in particular have produced various views and usage scenarios (Orlikowski & Iacono, 2001; Sein, 2004). However, it is accepted that ICT holds a great potential for human development, industrialization and economic growth (Sein, 2004; Tongia, Subrahmanian, & Arunachalam, 2004).

Development-oriented ICT usage includes four scenarios (Sein, 2004): 1) ICT as an export product to earn foreign income; 2) ICT as a support tool for governments and other organizations involved in development activities; 3) ICT as an economic driver with macro-level influence on e.g. infrastructure development, education or private sector modernization; and 4) ICT as a support tool for farmers, women micro-entrepreneurs, rural health providers and other development actors.

Concerning poverty reduction and support for small and micro-enterprises, ICT can play three main roles (Heeks, 1999): 1) as production technology or output — ICT is used in production processes or produced as a tangible or intangible product; 2) as information processing technology — ICT is used for processing information created within and outside an enterprise; and 3) as communication technology — ICT is mainly used to send and receive information.

Overall, it is suggested that the proxy view of ICT in development and the application of ICT in specific development sectors hold the greatest potential for concrete impact (Sein, 2004).

### 2.3. Mobile ICT-enabled development

Among ICT tools, mobile devices and specifically mobile phones are accessible today to most segments of the society; by the end of 2010, the mobile subscription in the developing world was over 70% (ITU, 2011). In addition, about 5% of the subscribers in the developing world have access to mobile broadband services. Given such accessibility levels, mobile public services are increasingly deployed by governments in different parts of the world. Examples of mobile services available in the countries of the Sub-Saharan Africa include (Aker & Mbiti, 2010): farmers using text services to learn about crop prices, job seekers calling friends in neighboring countries to learn about job opportunities, and HIV/AIDS patients receiving daily reminders about timely use of medicines. Mobile public services to deliver critical information on disasters and hazards, to file complaints or to report criminal activities are available in many countries in Asia (Ghyasi, Uonuma-gun, & Kushchu, 2004).

However, considering the poor and other vulnerable members of the society, for instance women micro-entrepreneurs, due to resource inequalities ICT largely plays the role of the basic communication technology (Heeks, 1999). There is also a need to rigorously investigate if mobile phone usage and mobile services are indeed having a significant impact on development (Aker & Mbiti, 2010). To this end, attention must be paid to the users of mobile public services in order to determine the factors that could affect their uptake (Carroll, 2006).

Given the increasing availability of data on pilot mobile public services, attention is gradually shifting in both ICT for development and mobile governance communities to how challenges and barriers that may limit the effectiveness of mobile ICT for development can be addressed.

### 2.4. Challenges to mobile ICT-enabled development

Mobile ICT for development (MICT4D) faces a number of challenges including the provision of the required infrastructure, regulatory and political environments, awareness and acceptance by citizens, as well as security, privacy and equitable acceptance (Karan et al., 2008). Following a study of over 30 MICT4D initiatives in East Africa, a similar set of technical and organizational issues were identified in Hellström (2010): resource-sharing among stakeholders, content production, usability of devices, operator lock in, mobile penetration and accessibility.

Four application-specific challenges that must be addressed when implementing MICT4D initiatives for the poor, particularly for women micro-entrepreneurs are (Heeks, 1999): 1) inequalities related to overt resources — availability of skills to keep technology working, money to purchase access and literacy to read content; 2) inequalities in access to social resources particularly for poor entrepreneurs to be able to assess trustworthiness of information sources, determine local relevance of content and apply information and services received through mobile devices; 3) inequalities that affect decision-making and action by poor entrepreneurs including availability of financial resources; and 4) lack of locally-relevant data available through mobile devices from the formal information sources, forcing poor entrepreneur to rely on informal sources in their communities.

The MICT4D challenges identified by Heeks (1999), Hellström (2010), and Karan et al. (2008) above could be consolidated into the following eight challenges: infrastructure investment, regulatory and political environment, citizen awareness and acceptance, security and privacy, equitable access, resource mobilization through partnerships, contents availability, and basic literacy and e-literacy. These challenges are associated, on the one hand with limited capacity of the poor to be able to benefit from access to mobile services, and on the other with limited capacity of government organizations as providers or enabler of mobile services. Addressing such challenges requires a range of governance mechanisms, as described in the following section.

### 2.5. Addressing challenges to mobile ICT-enabled development through governance

Characterized by accountability, transparency and promotion of growth, pro-poor growth in particular, good governance is instrumental to achieving progress in human development (Nanda, 2010; Ngwainmbi, 2005). In addition to economic growth, it aims at minimizing the vulnerability of the poor through access to information and participation in government decision-making processes. In addition, there is an increasing empirical evidence that connects public sector performance, including the pursuit of good governance principles, with development success (Turner & Hulme, 1997).

At the same time, low impact of the international development initiatives on development outcomes such as MDG has been attributed to the lack of supporting good governance mechanisms. In particular, seven governance mechanisms required for achieving MDG has been identified in Ghaus-Pasha (2007): 1) development of pro-poor policy frameworks to enable growth and development of specific sectors; 2) building public administration institutions and training civil servants to formulate specific strategies and coordinate with development partners and civil society; 3) decentralization and effective delivery of services at the lower levels of government, while mobilizing local communities to participate in decision making and to contribute to the implementation of pro-development government programs; 4) ensuring accountability and transparency by opening up and increasing access to public information, and building awareness of the rights and obligations by citizens; 5) ensuring the rule of law by establishing institutional structures and clear accountability rules of the three branches of government, while increasing the effectiveness of the police force and of the anti-corruption bodies to enforce laws; 6) adopting a rights-based approach to development with emphasis on education, shelter, physical security and other rights of every citizen; and 7) involving the civil society in the articulation of policies and strategies, and in the monitoring and evaluation of government programs.

The degree to which these mechanisms impact specific MDG is also provided in Ghaus-Pasha (2007). Table 1 below explains how these governance mechanisms may respond to the challenges facing MICT4D initiatives. However, while evidence exists that good governance leads to development, development and growth may not automatically lead to improved governance.

## 3. Methodology

This section describes our approach to determining which governance mechanisms should be applied to address MICT4D-related challenges facing migrant women head porters.

To this end, our research objectives include:

1. Developing a conceptual framework to better understand the link between development and the enabling technology and governance structures.
2. Applying the conceptual model to answer three research questions:

R1. What are the critical livelihood needs of the women head porters and similar vulnerable groups?

R2. How could mobile ICT support this group in meeting such needs?

R3. Which governance mechanisms could be adopted to support the implementation of mobile ICT initiatives to meet such needs?

**Table 1**
Addressing MICT4D challenges with governance mechanisms.

| No | MICT4D challenges | Governance mechanisms |
|---|---|---|
| 1 | Infrastructure investment (Karan et al., 2008) | Public administration and civil service — involving the private and voluntary sectors in pro-development programs |
| 2 | Regulatory and political environment (Karan et al., 2008) | Public administration and civil service — developing the required regulatory frameworks and training civil servants in specialized skills |
| 3 | Citizen awareness and acceptance (Karan et al., 2008) | Accountability and transparency — raising awareness and acceptance among citizens on the use of mobile devices to receive information and provide feedback to government and other development actors |
| 4 | Security and privacy (Karan et al., 2008) | Public administration and civil service — developing appropriate regulatory frameworks in the area of mobile information security |
| | | Rule of law — protecting citizens from arbitrary government action e.g. through unauthorized use of information provided over mobile devices |
| 5 | Equitable access (Heeks, 1999; Hellström, 2010; Karan et al., 2008) | Decentralization and delivery of services — ensuring that mobile services are accessible to all segments of the society |
| 6 | Resource mobilization through partnerships (Hellström, 2010) | Civil society participation — involving non-governmental and civil society organizations, and the private sector in MICT4D initiatives |
| 7 | Contents availability (Heeks, 1999; Hellström, 2010) | Decentralization and delivery of services — ensuring that relevant contents and services are available at the local level |
| | | Civil society participation — soliciting partnerships of civil society organizations in developing local contents |
| 8 | Basic literacy and e-literacy (Heeks, 1999) | Human rights — adopting a rights-based approach to literacy and invoking the Universal Declaration of Human Rights, Article 26 related to education (Ghaus-Pasha, 2007) |

The approach consists of two major steps: developing conceptual model; and applying the model to build instruments and analyze data from the case study to answer the three research questions.

The conceptual model is based on the integration of the Choice Framework (Kleine, 2009) and the Structuration Theory (Giddens, 1984). For our case study, the migrant women head porter community was selected because: 1) it provides a critical micro-logistics service for the local population — affordable transportation of goods; 2) members of this community — young migrant women with no or little formal education pose a significant development challenge for the governments and the civil society; and 3) there are few research studies focusing on the needs of this community (Kwankye, Anarfi, Tagoe, & Castaldo, 2009; Opare, 2004; Yeboah, 2009) but none of them addresses how the community can benefit from the use of mobile devices. The development of the conceptual model is documented in Section 4.

We adopt the following steps to answer the research questions and validate our model:

○ *Step 1 – Determine livelihood needs for migrant head porters* – To obtain the required information, an interview protocol was developed based on our conceptual framework, specifically Table 2 and administered to 45 women head porters including in-depth discussions with one of them. The interviews provided sufficient information to enable developing the livelihood need profile of the head porter community. In addition, the collected data was checked for consistency with previous studies (Kwankye et al., 2009; Opare, 2004; Yeboah, 2009) and specific studies on migration and development (de Haas, 2008). This step is described in Section 5.2.

○ *Step 2 – Identify MICT-enabled initiatives to help migrant head porters pursue their livelihood needs* – Based on the livelihood needs identified in Step 1, we develop mobile information and service requirements for the head porter community, and map these requirements to existing initiatives reported in the literature such as Aker and Mbiti (2010), Hellström (2010), Kushchu and Kuscu (2004), Rossel et al. (2006), and Trimi and Sheng (2008). This step is described in Section 5.3.

○ *Step 3 – Define critical governance requirements to support the implementation and sustainability of MICT-enabled initiatives* – Based on the MICT initiatives identified in Step 2, guided by the Government and Citizen Agency views on the required Governance and Technological Structures described in Tables 3 and 4 respectively, we determined the governance requirements for MICT initiatives targeted at the head porter community. As our attempts at interviewing municipal- and state-level officials to obtain current conditions of the Governance and Technological Structures failed, we relied on one of the author's knowledge of the local governance environment. This step is described in Section 5.4.

○ *Step 4 – Validation* – We pursued two validation goals: 1) to validate our conceptual framework and 2) to determine the accuracy of our interview findings. Concerning the first goal, the framework was validated incrementally by checking the adequacy of the information elements in developing data-gathering instruments in Step 1 in order to carry out the analysis in the Steps 2 and 3. Concerning the second goal, the findings based on our interviews were compared through triangulation with findings in related literature (de Haas, 2008; Kwankye et al., 2009; Opare, 2004; Yeboah, 2009) considering different periods of research. This step is further described in Section 6.

## 4. Conceptual framework

This section presents the conceptual framework underpinning our study. The framework is based on the Choice Framework (Kleine, 2009); one of few available frameworks operationalizing the Capability Approach (Sen, 1984); and the Structuration Theory (Giddens, 1984). Section 4.1 presents an overview of the Choice Framework. Section 4.2 elaborates the core constructs of the framework based on the Structuration Theory. Section 4.3 applies the framework to describe a model of "Mobile ICT-enabled development". The model links mobile ICT structures to the choices made by citizens and government, both treated as "agencies" in the framework, and to development outcomes. Section 4.4 further refines the model in Section 4.3 to include the governance construct. The resulting model describes "Mobile ICT-enabled Governance and Development".

### 4.1. Overview

The conceptual framework is an extension of the Choice Framework (Kleine, 2009) which itself is an operationalization of the Capability Approach (Sen, 1984). In this context, the notion of "choice" represents the degree of empowerment of an agency such a citizen or government. The Choice Framework was adopted as it is one of few operationalizations of the Capability Approach which can describe the impact of ICT on development. The Choice Framework also builds on the earlier attempts to operationalize the Capability Approach, specifically the Empowerment Model and the Sustainable Livelihood Framework (Kleine, 2009). Fig. 1 below presents an abstract view on the Choice Framework.

The framework consists of four main constructs (Kleine, 2009):

○ *Agency* — It is an entity which possesses some abilities and relies on different kinds of resources as inputs to achieve its goals. The resources comprise: material resources like machinery, equipment and other inputs to production processes; financial resources such as cash and shares; natural resources such as local climate and available minerals; geographic resources related to the physical location

**Table 2**
Properties of citizen and government agencies in the MICT4D context.

| Properties | Agencies | |
|---|---|---|
| | Citizen | Government |
| Discursive knowledge | What kinds of information and services do citizens receive from governments through mobile devices? | What kinds of information and services are requested by citizens through mobile devices? |
| Practical knowledge | How capable are citizens in receiving information and services from governments through mobile devices? | How do governments request and deliver information and services from and to citizens through mobile devices? |
| Reflexivity | o According to citizens, what is the relevance and effectiveness of government information and services received through mobile devices? <br> o According to citizens, how useful are government information and services received by them through mobile devices for fulfilling their needs? | o According to government, what is the willingness of citizens to use mobile devices for requesting from or providing information and services to government? <br> o According to government, what is the effectiveness of mobile devices as an information and service delivery channel? <br> o According to government, what challenges exist in using mobile devices as an information and service delivery channel? |
| Existential needs | o Material resources to live and work in communities <br> o Financial resources in terms of cash and other assets to support self and family <br> o Natural resources in terms of climate, access to water and other | o Material resources that enable government officials to carry out their functions <br> o Financial resources allocated to specific government initiatives |
| Relatedness needs | o Cultural resources such as family, heritage or membership in social groups <br> o Psychological resources such as self-confidence and level of resilience <br> o Geographical resources including proximity to work location <br> o Social resources including relationships and networks within the community | o Psychological resources including trust <br> o Social resources including network of citizens and other non-state actors <br> o Geographical resources including physical proximity to citizens served |
| Growth needs | o Human resources like the state of health, level of education and skills possessed <br> o Information resources including access to and ability to benefit from information | o Human resources consisting of the availability of skilled personnel <br> o Information resources consisting of available information on citizens <br> o Information and services for citizens |

of the agency; as well as human, psychological, informational, cultural and social resources. According to this model, an Agency is the subject of development.

o *Choice* — It represents a degree of empowerment of an Agency determined by the combination of its resources and structural conditions. The model defines four levels of Choice: 1) existence of Choice — Agency has access to resources, 2) sense of Choice — Agency is able to assess and decide on the relevance of existing resources, 3) use of Choice — Agency is able to determine how to use resources to achieve its goals, and 4) achievement of Choice — Agency is able to act and achieve its goals. These four levels are somewhat equivalent to the four-stage Information Value Chain (Heeks, 2006).

o *Structure* — It includes formal and informal laws, rules, regulations, norms, customs, culture, policies, institutions and processes. The framework also includes discourses as Structures as rules, laws, norms, policies, etc. often emanate from them and are embedded in them. In general, a Structure enables or constrains an Agency in the attainment of its goals.

o *Outcome* — According to the Capability Approach, the primary development Outcome is the choice itself. The secondary Outcome depends on the Agency's choice informed by its underlying values, for example whether the Agency values more communication, knowledge, income, voice, time, etc. Achieved at the Agency level, such Outcomes could be aggregated at the national or international level where MDG are formulated and measured. For instance, increased income at the Agency level directly contributes to poverty reduction at the community, national and international levels.

In order to serve our purposes, we extended the basic Choice Framework in two ways. The first concerns the elaboration of the nature of Agency and Structure and the interactions between them based on Structuration Theory (Giddens, 1984). Specifically, the

**Table 3**
Government and citizen views on Governance Structures for MICT.

| Structures | Agencies | |
|---|---|---|
| | Citizen | Government |
| Rules and regulations | o Awareness and understanding of regulations on MICT-based information and services <br> o Perception on the adequacy of regulations on MICT-based information and services | o Availability of regulations on MICT-based information and services <br> o Impact of regulations on MICT-based information and services to citizens <br> o Adequacy of regulations on MICT-based information and services with respect to citizen needs and concerns |
| Organization and resources | o Effectiveness of institutional frameworks for MICT-based information and services, for instance regulations on the cost of mobile services | o Roles and responsibilities of the government units involved in MICT-based information and service delivery <br> o Allocation of budgetary and other resources for MICT-based services |
| Norms and principles | o Confidence in existing laws to protect the interests of citizens in the provision of MICT-based information and services | o Availability of laws to guard against misconduct such as illicit use of citizen information, in the provisioning of MICT-based services, and enforcement of such laws |

**Table 4**
Government and citizen views on Technological Structures for MICT.

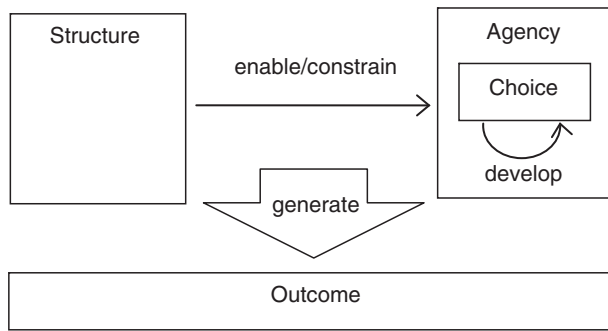| Structures | Agencies | |
|---|---|---|
| | Citizen | Government |
| Policies and programs | o Awareness of government policies and programs on MICT-based information and service delivery <br> o Awareness about existing MICT-based information and services | o Availability of policies and programs promoting the use of MICT-enabled information and services <br> o Portfolio of MICT4D initiatives <br> o Status of MICT4D policy and program implementations |
| Skills and capacity | o Knowledge about the use of MICT for receiving information and services from government <br> o Availability of programs to support citizens in the use of MICT information and services | o Availability of competent staff to deliver information and services using MICT <br> o Availability of financial and technical resources to deliver MICT information and services |

**Fig. 1.** Abstraction of Choice Framework.

Structuration Theory enables better understanding of an Agency and reasoning about how it can produce or change Structure, e.g. how citizens shape government policies through participation, not only how Structure enables or constrains Agency. The second extension, following the applications of the Structuration Theory to Information Systems and Electronic Governance research (Meneklis & Douligeris, 2007; Orlikowski, 1992; Veenstra, Janssen, & Tan, 2010) reinforces the reciprocal relationship between the enabling and constraining effects of Structure on Agency and production or change effect of Agency on Structure. In addition, the second extension elaborates on the elements of Structure, for example rules and resources, as relevant in the context of the Choice Framework.

### 4.2. Core constructs

The four constructs of the Choice Framework are described in the following sections: Section 4.2.1 — Agency, Section 4.2.2 — Structure, Section 4.2.3 — Choice and Section 4.2.4 — Outcome.

#### 4.2.1. Agency

The conceptual framework identifies Citizen as one type of the Agency construct. As the prime subject of ICT-based intervention in the development context, Citizen possesses a degree of Choice and pursues desired Outcomes. In particular, we treat migrant head porters and similar vulnerable groups in the society considered in the study as instances of the Citizen type. The notion of Agency is also applied to cover Government, representing various kinds of public sector organizations particularly at the lower levels of government that interact directly with head porters and other Citizens.

The Agency construct is associated with three basic properties in our conceptualization (Giddens, 1984; Kleine, 2009) — Knowledge, Reflexivity and Needs, as depicted in Table 2 for the Citizen and Government Agencies. According to the Knowledge property, an Agency possesses information about its social encounters with other Agencies, for instance interactions among porters and those between porters and government entities. According to the Reflexivity property, an Agency understands the social interactions it is part of. According to the Needs property, an Agency has certain livelihood needs and requires resources to meet these needs. Altogether, the properties determine what specific development needs an Agency has, and the extent to which it is able to participate in the development processes to meet such needs.

Following Giddens (1984) and Orlikowski (1992), we can distinguish two categories of Agency-related Knowledge: Discursive and Practical. Unlike Discursive Knowledge which can be articulated, Practical Knowledge can be only drawn from the behavior and actions of an Agency. According to(Yang et al. (2011), an Agency has three categories of needs: Existential needs including safety, physiological needs and material needs; Relatedness needs including senses of security, belonging and respect; and Growth needs including self-esteem and self-actualization. While these categories are particularly

related to human Agencies, we also apply them to describe the needs of Government Agencies. Following Kleine (2009), seven types of resources can be identified to fulfill such Needs including material, cultural, psychological, geographical, social, human and informational resources.

Based on these categorizations, Table 2 describes the Knowledge, Reflexivity and Needs properties of the Citizen and Government Agencies when they attempt to satisfy their needs through the use of mobile technology (MICT4D context). The table provides a basis for profiling head porters and government organizations in terms of what they need and what and how they know to fulfill such needs, thus for collecting and analyzing information for our study. This will be elaborated in Section 5.

#### 4.2.2. Structure

Structuration Theory identifies three basic kinds of structures (Giddens, 1984): Signification Structures relate to the rules, regulations and other stocks of knowledge drawn by actors (Orlikowski, 1992); Domination Structures consist of the resources related to power, organizational capability and transformative capacity to achieve outcomes; and Legitimation Structures are concerned with the norms or rules governing legitimate or appropriate conduct.

This section elaborates on the structure construct as it relates to MICT — the use of mobile phones in the delivery of services to citizens. Two kinds of structures are considered in our framework: 1) Technological Structures — policies and programs that affect the availability, affordability and development of the required skills and capacities of citizens, government officials and institutions involved in the provision of information and services; and 2) Governance Structures — institutions, organizations, discourses, policies, programs and laws that enable or constrain effective development and delivery of services, particularly at lower levels of government (Kleine, 2009).

Signification, Domination and Legitimation structures are all relevant to defining the enabling Governance Structures for MICT. Signification Structures are operationalized in our framework as rules and regulations, Domination Structures as organizations and resources, and Legitimation Structures as norms and principles. In order to evaluate the adequacy of existing Governance Structures for MICT for our study, Table 3 describes how Government and Citizen Agencies view all three kinds of structures.

Technological Structures are only represented through Domination Structures from the Structuration Theory. This includes policies and programs, and skills and capacity required to provide and receive MICT information and services. In order to evaluate the adequacy of existing Technological Structures for MICT for our study, Table 4 describes how Government and Citizen Agencies view policies and programs and skill and capacity structures for MICT.

#### 4.2.3. Choice

The Choice construct describes the level of empowerment of Citizen and Government Agencies and their capacity to address their needs. Four levels of empowerment identified in Kleine (2009) are: 1) Existence of choice — whether different possibilities exist and are in principle attainable to an Agency, if enabled by existing resources and structural conditions; 2) Sense of choice — awareness by an Agency, based on available information and educational resources, about existence of opportunities; 3) Use of choice — ability of an Agency to make choices based on the availability of requisite skills and other resources; and 4) Achievement of choice — whether an Agency is able to achieve its goals following the actions taken. These four stages from (Kleine, 2009) logically map to the four information value chain stages from Heeks (2006): access, assess, adapt or apply, and act. The goal of the Government and Citizen Agencies is to increase their levels of choice by expanding resources and putting in place the necessary enabling structures. Table 5 describes the four levels of choice and provides examples for each level.

### 4.2.4. Outcome

The Outcome captures the impact of increasing the level of Choice for an Agency, primary for Citizen Agency. The existence of Choice is the primary development Outcome. The secondary development Outcome resulting from this Choice is based on individual citizen objectives, for instance the satisfaction of specific existence, relatedness or growth needs. Millennium Development Goals (MDG) is the most common framework of development outcomes. The framework comprises eight goals: 1) eradication of extreme poverty, 2) achievement of universal free primary education, 3) promotion of gender equality and empowerment of women, 4) reduction in child mortality, 5) improvements in maternal health, 6) combating HIV/AIDS and other diseases, 7) pursing environmental sustainability, and 8) setting up the global partnership for development. Concerning the study in this article, we aim at determining the structural conditions under which MICT-based information and services can have a positive impact on poverty and hunger eradication (MDG1), women empowerment (MDG3), and child and maternal mortality (MDG4 and MDG5), particularly for the head-porter community.

### 4.3. Choice Framework for MICT and MGOV-enabled development

This section describes our conceptual framework for analyzing MICT and MGOV-enabled development. The framework aims at identifying what Technological and Governance Structures are required to effectively deploy MICT-enabled information and services, and how citizens can influence the required changes to existing Governance Structures in order to achieve their goals. The framework refines the original Choice Framework based on the elaborations of the Agency, Structure, Choice and Outcome constructs in Sections 4.2.1 to 4.2.4 respectively.

The first step in defining the framework is to review the concept of Mobile Governance (MGOV). The literature on MGOV offers at least two broad perspectives on this concept. According to the first perspective, MGOV is an extension of EGOV (Trimi & Sheng, 2008) — ICT-enabled transformation of the internal workings of government and its relationships with other government entities and with citizens, businesses and other non-state actors. One such definition considers MGOV as a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services,

applications and devices to benefit the parties involved in e-government including citizens, businesses and all government units (Kushchu & Kuscu, 2004). The second perspective suggests a fundamental rethinking of the MGOV concept beyond a simple extension of EGOV with respect to the use of mobile devices. For example, "m-Government should not be too specific an area of e-government (i.e. limited to the notion of mobile access), but on the contrary take upon the current dominant movement in favor of mobile technology usages, and steer experiments and initiatives in a way that ultimately offers more benefits, and even empowers citizens in their various flexibility needs" (Rossel et al., 2006).

Our conceptual framework supports the second perspective. On the one hand, citizens are in a position to influence changes in existing Technological and Governance Structures informed by the evolution of their mobile service culture and needs over time. On the other, by interacting with citizens, government entities and their intermediaries can observe evolving patterns of usage and needs, and respond by updating the necessary Technological and Governance Structures. The influence of citizens and government entities on Technological and Governance Structures is supported by the agency-structure duality principle of the Structuration Theory.

The conceptual framework is depicted in Fig. 2. According to the framework, Citizen and Government Agencies can be involved in four kinds of interactions: 1) between Citizen and Government Agencies – G2C and C2G – for example when a citizen requests mobile services from its government; 2) between two or more Government Agencies – G2G – for example when jointly delivering requested mobile services to citizens; 3) between two or more Citizen Agencies – C2C – for example to discuss the usage of mobile services provided by government; and 4) between Citizen or Government Agencies and Technological or Governance Structures, for example to change the Governance Structures to fulfill citizen needs.

The latter is represented by the four arrows linking Citizen and Government Agencies introduced in Section 4.2.1 with Technological and Governance Structures introduced in Section 4.2.2. Arrows labeled 2 and 3 represent the enabling effect of Technological and Governance Structures on Citizen and Government Agencies. Arrows labeled 1 and 4 represent the influence of Citizen and Government Agencies on creating new or updating existing Technological and Governance Structures. The figure also includes arrows between Technological and Governance Structures to represent their alignment, for instance supporting a policy aimed at developing new mobile public services with the provision of financial and human resources at various government agencies involved with implementing this policy.

The Choice construct in Fig. 2 corresponds to the four levels of empowerment of Citizen Agencies to successfully receive mobile information and services to achieve their goals, and for Government Agencies to successfully provide such information and services, as described in Table 5. The knowledge, reflexivity and need profiles of Citizen and Government Agencies in Table 2 provide the basis for determining the level of choice for such agencies.

While the Outcome construct captures any development goal for Citizen or Government Agencies discussed in Section 4.2.4, this article focuses on the outcomes that are directly relevant to the particular category of Citizen Agency — female head porters from Ghana.

## 5. Case study — Ghanaian migrant women head porters

This section presents the case study on the use of mobile phones by migrant women head porters from Ghana to fulfill their livelihood needs. The section is structured into five parts. Section 5.1 describes the MICT4D policy environment in Ghana. Section 5.2 presents some background about Ghanaian head porters, the socio-demographic profile of our interviewees, and the summary of the livelihood needs of this group based on the field interviews and some secondary sources. Section 5.3 presents the information and service requirements for this

**Table 5**
Levels of choice.

| Degree of empowerment (Kleine, 2009) | Information value chain (Heeks, 2006) | Description | Example MICT-based information and services |
| --- | --- | --- | --- |
| Existence of choice | Access | Agency has access to resources | Citizen Agency has access to MICT-based information and services |
| Sense of choice | Assess | Agency is able to assess and decide on the relevance of resources | Citizen Agency has adequate knowledge to decide on the relevance of available MICT-based information and services |
| Use of choice | Adapt or apply | Agency is able to determine how to use resources to achieve its goals | Citizen Agency has adequate skills and other resources to receive MICT-based information and services |
| Achievement | Act | Agency is able to act and achieve its goals | Citizen Agency is able to realize its goals e.g. to add voice to the call or to build a hostel for head-porters, through MICT services |
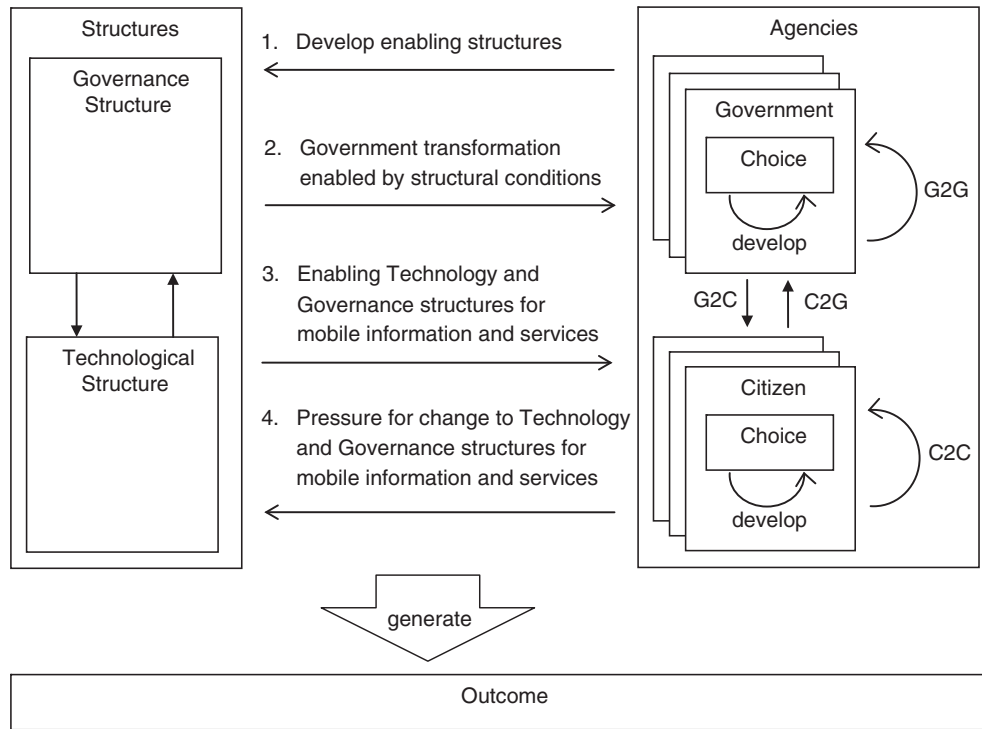
**Fig. 2.** Choice Framework for MICT and MGOV-enabled development.

group to fulfill its livelihood needs. Section 5.4 presents example MICT4D initiatives relevant to implementing such information and service requirements, while Section 5.5 proposes a set of governance mechanisms to support the realization of such initiatives. The final Section 5.6 provides the answers to our research questions.

### 5.1. Policy context

Ghana is a stable democracy in Sub-Saharan Africa making a good progress toward its goal of becoming a middle-income country by 2020. Over the recent years, the economic growth of Ghana reached 6% (AEO, 2012). According to the Canadian International Development Agency (CIDA), since 1990 the Ghanaian government has been working closely with the donor community and has nearly halved the number of citizens living in extreme poverty. Ghana is currently classified as a Medium Human Development country based on the 2011 Human Development Index by the UN Development Programme (UNDP, 2011) with the adult literacy rate of 66%.

Following the completion of the Growth and Poverty Reduction Strategy Phase II from 2006 to 2009 (IMF, 2009), the next phase was directed primarily towards the attainment of the anti-poverty objectives of the UN MDG. Under the Highly Indebted Poor Countries pact, MDG were transformed into the domestic economic policy framework in return for the debt relief grant (IMF, 2009). The policy is to use ICT in government as a pivotal tool to improve accountability and transparency, develop human resources and strengthen national unity.

Ghana's ICT vision is expressed in the Ghana ICT for Accelerated Development policy (GOG, 2003). The policy aims at addressing various developmental challenges facing the country as a basis for achieving major policy goals and objectives including those of the World Summit on the Information Society (WSIS, 2003) — "building a people-centered, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life".

### 5.2. Livelihood needs

Head porterage refers to the carriage of goods or luggage on the head for a fee (Opare, 2004). It is a major form of transportation of goods in Ghana, considered vital in facilitating trade in the country (Yeboah, 2009). Although both men and women are engaged in head porterage, men increasingly use bicycles, carts and other technological aids, making head porterage an occupation almost entirely practiced by young women and teenagers migrating from the northern to the southern parts of Ghana, with usually no plans or resources to acquire such technological aids. A picture of a typical head porter or "*Kayayoo*" (singular form of *Kayayei*) is shown in Fig. 3.

According to Opare (2004), women engage in head porterage in order to: save for future investment, save for marriage needs, support family or undergo apprenticeship. Unfortunately, the occupation is also linked to independent child migration which continues to draw public concern. It has important implications for the development prospects of the migrants' origin and destination areas, and for socio-economic advancement of the child migrants themselves. In particular, 87.3% of the child migrants have little or no education (Kwankye et al., 2009) and only about 5% of the female porters obtained the education beyond the primary school level (Opare, 2004; Yeboah, 2009).

To obtain a better understanding of the socio-economic status of this group, this study investigated what opportunities, in terms of receiving public information and services and fulfilling livelihood needs, are gained by the female migrant head porters who obtain access to mobile phones i.e. MICT4D. The study also examined what kind of governance mechanisms are required to effectively implement the identified MICT4D initiatives.

The major source of data for our study was semi-formal interviews with 45 head porters with access to mobile phones, including 15 mobile phone owners. The interviews were carried out in Agbobloshie and Kinbu Garden Center in Accra from 10 to 23 October 2011. The socio-demographic profile of the interviewed group is described in Table 6.

The interviews were conducted in the semi-formal setting in the porters' neighborhood, guided by the interview protocol designed to

**Fig. 3.** Ghanaian head porter.
Source: Ce-G (2010).

elicit their livelihood needs and to establish the adequacy of existing technology and governance structures to help fulfill such needs. Developed based on Tables 4, 5 and 6, the interviews contained the questions on: family background, reasons for migration, usage of mobile phones, average income, monthly spending on mobile phones, expectations for mobile phone access and services, and future plans. Table 7 provides the highlights of questions.

The responses concerning the porters' knowledge, reflexive abilities, resources and needs, including confirmations from the literature, are summarized in Table 8. From the table, the major existential needs of the head porters include: affordable sources of water, access to affordable shelters, cheaper mobile phones, reduced call tariffs, micro-banking and saving services, and safe money transfer services; relatedness needs include: access to police and ambulatory services through mobile phone, protection from harassment by men and abuse by women customers, and support for integration into the social network on arrival; and growth needs include: access to healthcare services beyond child delivery, availability of vocational training and counseling, basic reproductive health and HIV/AIDs awareness, and information on weather conditions.

Addressing such needs requires providing information and services required by porters, and putting in place governance mechanisms such as regulations on mobile phone pricing, partnering with non-governmental or private sector organizations to build shelters, development of awareness programs and others. Information and service needs amenable to MICT support are discussed in the next section.

### 5.3. Information and service requirements to fulfill livelihood needs

This section describes the information and services requirements of the head porters to fulfill their livelihood needs, based on the analysis carried out in Section 5.2.

We discuss such requirements under six categories:

1. *Micro-banking and money transfer services* — A major goal for women migrant porters is saving money for their future plans which include educating children, setting up own business, enrolling in apprenticeships, etc. In the absence of micro-banking and money transfer services for saving and transferring money from the southern parts of Ghana to the relatives in the villages in the north, and having

to entrust local cooperatives or "Susu" and family members, women migrant porters are exposed to the high risk of losing their savings. In order to make possible micro-banking and money transfer services, government could make such development part of its pro-poor policy efforts, while telecom operators and banks could support the development of mobile phone-based micro-finance products.

2. *Health awareness* — Given the low literacy level and general vulnerability of the head porter community, the provision of health-related information to member of this community is critical. At least three categories of health information are essential: 1) prevention of HIV and sexually transmitted diseases; 2) locations of vaccination centers, reminders of vaccination schedules, etc. for their infants; and 3) basic hygiene and sanitary practices particularly during diseases outbreaks, epidemics and disasters. The possibility of delivering such information over mobile phones could reduce the instances of child mortality among this group.

3. *Information on weather conditions and forecast* — Given that a good number of women migrant head porters have no real shelter, the possibility of receiving advance warning to avoid being trapped under the rain could reduce the incidence of abuse and harassment against such women, which usually happen during rainy nights. Providing weather-related information by relevant government agencies would require cooperation with telecoms operators.

4. *Information on shelters and settlements* — Porters do not generally have proper shelters. In addition to the government-facilitated action for providing shelters for porters and similar vulnerable groups, information on the locations of available shelters and settlements for new migrant porters is essential, and having such information available through mobile phones would be very useful.

5. *Hotlines for emergency and incident reporting* — Related to abuse and harassment suffered by head porters, the possibility of a simple mobile-phone based, location-based incident reporting service would be highly desirable to assist law enforcement in apprehending offending parties. Given the illiteracy levels of these women, voice-based mobile phone-enabled "911" hotline service is required. As a custodian of law and order, government should facilitate such development. Otherwise, given the vulnerable status of this group, civil society organizations could assist in provisioning such services.

   While the head porters did not directly express interest to participate in government decision-making, their requests for health services, accessible mobile phones, cheaper call tariffs, etc. all require communication with government. Given that participation is both part of the development process and the outcome of development, we add the sixth category related to voting and participation:

6. *Voting and participation* — With low literacy levels among head porters and basic economic and social problems they face in their lives, voting and participation are not priority issues for them. Therefore, through civil society participation and human rights instruments, basic awareness of the rights and benefits, and of the importance of contributing voices to government decisions that directly or indirectly affect their lives, is critical. Even when government does not provide the means or show the willingness to empower such women, civil society organizations could provide various channels for them to contribute and have a say in their future.

**Table 6**
Socio-demographic profile of the interviewed head porters.

| Age | 18–30 years |
|---|---|
| Marital status | 10 single, 35 married |
| Distance between shelter and market | 1 km |
| Education | 2 with primary school level, 43 with no formal education |
| Parents' occupation | 42 — farming, 2 — trading and 1 — housewife |

**Table 7**
Highlights of interview questions.

| No | Questions |
|---|---|
| 1 | Head porters introduction |
| 2 | Education level — highest level of educational attainment, vocational training |
| 3 | Languages spoken — first, second, etc. |
| 4 | Parents' background |
| 5 | Living conditions in terms of access to electricity, fixed phone lines, refrigeration, radio |
| 6 | Livelihood priorities |
| 7 | Basic health knowledge |
| 8 | Motivations for migration to Accra |
| 9 | Means of communication on arrival in Accra — events |
| 10 | Expenses on different communication services, including air time |
| 11 | Amount of time spent on mobile phone |
| 12 | Level of access to mobile phones — ownership of SIM or phone, shared ownership of either, no form of ownership |
| 13 | Type of calls made on mobile phone — friends and family, work, etc. |
| 14 | Use of SMS, and reasons if not used |
| 15 | Expectations in terms of phone ownership |
| 16 | Language preference for mobile phone interface |
| 17 | Desired level of cost reduction in mobile |
| 18 | Average monthly income |
| 19 | Distribution of income across needs |
| 20 | Status of head porter in family e.g. main income earner |
| 21 | Impact of ownership or access to mobile phone on needs |

*5.4. MICT4D initiatives to implement information and service requirements*

Table 10 provides example MICT4D initiatives from different parts of the world that fulfill the six information and service needs described above. For each initiative, the table provides the originating country, partners involved in the implementation and development outcomes produced. At least two observations can be made from the initiatives in Table 9. First, the development and implementation of MICT4D initiatives involved partnerships among government organizations at different levels, telephone operators, software organizations, research centers, universities, non-governmental and international organizations, and microfinance institutions. Second, most services produced by the initiatives involve sending and receiving text messages. However, given low levels of literacy among porters, MICT4D initiatives for this group would have to rely on voice communication, on "short codes" and "interactive voice response" systems as interfaces to MICT4D applications.

*5.5. MICT4D implementation challenges and governance mechanisms to address them*

This section discusses the challenges associated with implementing MICT4D initiatives to serve the information and service needs of Ghanaian women migrant head porters, and identifies possible governance mechanisms to address such challenges. Table 10 indicates the set of challenges that could face the implementation of each category of initiatives in Table 9.

Two general challenges concerning MICT4D initiatives for our group are illiteracy and resource mobilization. Therefore, in addition to addressing specific challenges indicated in Table 10, government must tackle the problems of illiteracy and development of required partnerships with mobile operators and civil society organizations. Given their wish to use savings to educate children, porters clearly value education and therefore government should support this group in acquiring primary education to address their literacy and digital literacy needs. In addition, given the contents required by porters, e.g. on settlements, shelters or health, mobilization of community efforts including the porters themselves in providing information is essential. For the services that require submission of sensitive information such as incident notification and voting, the challenge is how to protect the privacy of porters and the security of the provided information. Poor awareness of the rights and obligations of porters

as citizens also presents a challenge in requesting them to vote and provide inputs into government consultation processes. In addition, engaging porters in the community efforts required to develop and maintain local contents, with little direct benefits for them is a challenge.

In Table 10, the column "Governance Mechanism" provides possible governance responses to the challenges, following general mapping of MICT4D challenges to governance mechanisms in Table 1. The first type of governance mechanism includes updating regulatory frameworks to enable the development of new services in the finance and telecommunication sectors, and protection of information provided by citizens. The second type includes mobilizing civil society organizations and the local community to co-produce the content required for MICT4D applications. The third type includes working with civil society organizations and other non-state actors to access resources and technical expertise in the areas of joint interest, such as in providing shelters for homeless head porters. The fourth type includes developing the skills and capacity of government organizations and officials to offer the required information and services, for instance about using mobile phones for emergency and incident reporting.

The responses above can be associated with governance actions in the areas of pro-poor policy, decentralization, service delivery, public administration reform, civil society engagement, transparency, accountability and protection of human rights.

*5.6. Summary of results*

To summarize the results obtained from the case study of the women migrant head porters from Ghana, Table 11 provides the answers to the research questions associated with our second objectives in Section 3.

## 6. Discussion

This work builds on the Kleine's operationalization of the Choice Framework (Kleine, 2009) to describe how mobile technology, enabled by appropriate governance mechanisms, could help expand the choice and assets of vulnerable groups in the society. By applying the Structuration Theory to capture the nature of Citizen and Government Agencies, and the nature of interactions between such agencies and various structures provided by the development context, a number of latent issues in the Kleine's framework were revealed. For example, the potential for citizens to shape the form and nature of the technological and governance context they find themselves. Enabling such "citizen participation" is expected to shape the governance and technology structures depicted in Fig. 2, part of governance support to development in general, and consistent with participatory development perspective presented in Section 2.1.

The mapping of Kleine's resource categories in Table 2 against three basic categories of needs provided in (Yang et al., 2011) enabled prioritizing needs with respect to available resources. For instance, the case study revealed that women head porters consider relatedness needs, specifically contacting families at home, as most important for mobile phone usage.

Considering research results, our work confirms that providing access to mobile phones to head porters and other vulnerable groups is insufficient to fulfill their livelihood, information and service needs and to maximally exploit opportunities provided by mobile technology. A key barrier is low literacy. This supports the assertion that ICT plays a limited role in poverty alleviation but is of great value in providing information from and about the poor (Heeks, 1999). For instance, while almost all interviewed head porters confirmed that access to mobile phones has great impact on their lives, they also spend significant part of their earnings on the use of mobile phones. Given that the head porters on average lack basic education, they are likely to spend more on phone calls, up to USD 40 per month

**Table 8**
Need and resource profiles of the interviewed porters.

| Attributes | | Field interviews | Earlier research findings |
|---|---|---|---|
| Discursive knowledge | | o Despite low literacy, the porters were able to articulate their needs, how mobile phones have or could have helped in addressing such needs, and expectations from government. | o Information provided by porters in other documented studies like (Yeboah, 2009) demonstrate their discursive knowledge. |
| Practical knowledge | | o Examples of the porters' tacit knowledge related to the secondary use of mobile phone were discovered during the interviews. For instance, porters use mobile phones as contact databases and consult them when searching for other domestic jobs besides head porterage. | No information |
| Reflexivity | | o An example of this ability is the porters' reflection on the attainment of goals with respect to savings and consequent education of their children. | o In our earlier interview with a young female porter (Awotwi et al., 2011) she reflected on missing opportunities not being able to use text messages due to her illiteracy. |
| Existential needs | Material | o 15 porters owned a mobile phone, another 15 expected to acquire one within a year<br>o No proper shelter | o Does not own any technology for trade since occupation is planned for short period (Opare, 2004)<br>o Lives in booths, market stalls or shop fronts (Opare, 2004; Yeboah, 2009)<br>o Requires affordable accommodation (Yeboah, 2009) |
| | Financial | o Saving money and sending back to family are most important<br>o Spending on a private phone is USD 50 per month, USD 40 per month without private phone, USD 30 per month on food, and USD 19 per month on water<br>o Saving is through the local cooperative (Susu)<br>o Economic independence as the first livelihood priority | o Saving money for future investment (Kwankye et al., 2009; Opare, 2004)<br>o Supporting family needs (Opare, 2004)<br>o Earning above the minimum wage and better than average un-skilled worker (Opare, 2004)<br>o No social security (Opare, 2004)<br>o Susu, a non-banking service is the primary means for saving management (Opare, 2004; Yeboah, 2009)<br>o Risks by Susu or family entrusted to safeguard money (Yeboah, 2009) |
| | Natural | o Access to cheaper source of water | |
| Relatedness needs | Cultural | No information | No information |
| | Psychological | o Police and ambulatory services to be available through phone | o High exposure to road accidents (Yeboah, 2009) |
| | Geographical | o Lives about 1 km from the market<br>o No financial cost on transportation — walking to market | No information |
| | Social | o Family and friends are the most important<br>o Need to communicate with other porters on arrival | o Abject poverty is predominant in the originating community (Opare, 2004)<br>o Susceptible to abuse, even by women, and harassment by men (Opare, 2004)<br>o Very vulnerable group (Opare, 2004)<br>o Part of a social network of current or former migrant porters, customers and family (de Haas, 2008) |
| Growth needs | Human | o No education<br>o Desire vocational training<br>o Have access to hospital for child delivery<br>o Health is second while education is third on the livelihood priority<br>o Desire ability to educate children | o None or limited schooling (Opare, 2004)<br>o Exposure to reproductive health risks and vulnerable to HIV/AIDS (Yeboah, 2009)<br>o Requires vocational training and counseling by NGO (Opare, 2004)<br>o Susceptible to gastro-intestinal diseases due to poor sanitary conditions (Yeboah, 2009) |
| | Information | o Exploit mobile phone database to provide domestic services to customers<br>o Receive information on elections through phone<br>o Have basic HIV/AIDs awareness<br>o Use of mobile phone to keep in touch with family is first priority, followed by work-related calls<br>o Desire cheaper mobile phone<br>o Desire weather reports through mobile phone | |

according to Table 8, compared to those who are able to use text messages. Specifically, our study confirmed by two other studies on head porters (Opare, 2004; Yeboah, 2009) shows that the percentage of head porters with no formal education in a given sample can range between 57% and 96% compared to the 67% adult literacy rate in the country (UNICEF, 2010).

To reduce this barrier, we proposed technological initiatives such as the use of interactive voice response systems, in addition SMS, as well as content production in local languages and dialects. However, while this may address the literacy barrier, it also presents a resource burden on government which may be hard to justify economically considering the relative size of the head porter population. Without an explicit pro-poor policy, the public investment required to implement this strategy may be difficult to realize.

In addition to the literacy and other citizen-related factors, lack of capacity to reach this segment of the society by many municipal and local governments is well known (Turner & Hulme, 1997). Thus,

specific governance mechanisms such as the involvement of civil society, private sector and international organizations as government intermediaries in dealing with specific segments of the population are critical in gaining access to financial and technical resources. This is supported by the fact that almost all MICT4D initiatives in Table 9 were implemented through partnerships involving government organizations, mobile operators, civil society organizations, international organizations and research institutions.

Another observation from our research is that many mobile ICT applications described in the literature were not relevant to the migrant women head porters. A key reason is the difference in information needs. Porters clearly have different information needs than farmers. While MICT4D initiatives share many technical elements, the availability of relevant contents in the form and language understandable by the target users is a major challenge. For instance, for new migrant head porters, information on settlements and shelters is critical to be able to integrate into existing support networks.

**Table 9**
Example MICT4D initiatives relevant to head porters' information and service needs.

| Application | Country | Description | Partners | Outcomes |
|---|---|---|---|---|
| Micro-banking and money transfer (Plyler, Haas, & Nagarajan, 2010) | Kenya | M-PESA — Enables transfer of money from one mobile phone user to another without the need for bank accounts | DFID, Vodafone, Faulu Kenya (Microfinance), Safaricomm, etc. | As at 2009, over 7.7 million M-PESA accounts exist. Impact has been in job creation, expanded local economy, and capital accumulation. |
| Health awareness (UN Foundation & Vodafone Foundation, 2009) | India | Communicating information in engaging ways through games tailored for different demographic and social groups | ZMQ Software Systems and Delhi State AIDS Control | Awareness of HIV/AIDS enhanced and improved public awareness outcomes |
| | Uganda | SMS-based HIV/AIDS awareness quiz | Celtel, AIDs Information Centre, Merck, Dutch Ministry of Foreign Affairs | About 40% increase in the number of people coming in for free HIV/AIDS testing and strengthened partnership |
| Weather information (Hellström, 2010) | Uganda | Allows people to send and receive text messages to find out weather forecast for their region | Applab, MTN, Ugandan Department of Meteorology | Information not available |
| Shelter and settlement Info. (Aker & Mbiti, 2010) | Niger | Reducing search cost by receiving information through mobile phones, e.g. price information in Niger over phones | Government and mobile operators | Traders prefer weekly grain prices over phone mobile to traditional broadcast over radio |
| Incidence notification and reporting (Hellström, 2010) | Kenya Zimbabwe | Ministry of Internal Security forwards messages warning against public unrest | Government initiative | Public awareness in the time of crisis, access to valuable information |
| | Tanzania | Provision of free mobile phones to Tanzanians with Albinism to notify police when suspected of being in danger | Tanzanian Police, Vodacom | Potentially reduces the killings of albinos for ritual purposes |
| Voting and consultation (EWX, 2011; GAC, 2009; Hellström, 2010) | Argentina | Allows citizens of La Plata to vote for public investment projects through SMS | Local government initiative | Voting and participatory decision-making |
| | Estonia | M-Voting takes place during 2011 elections. | Estonian Government through its parliament | |
| | Ghana, Sierra Leone | SMS to transmit, collect and interpret timely information from volunteer observers at polling stations | Centre for Democratic Development, National Democratic Institute, USA | Contributing to acceptance of results and citizens' recognition of right to information about the electoral process |
| | Uganda | Sending SMS to remind potential voters about upcoming referenda | Electoral Commission Uganda, SMS Media | Electoral Commission sent 500,000 SMS to remind about 2005 referendum |

From a policy perspective, governments are required to: 1) invest in education and training of this segment of the society, 2) promote technology innovation around voice-based interfaces and 3) engage civil society and private sector organizations in multi-stakeholder partnerships to support and empower this group. In addition, micro-financial institutions similar to M-PESA are essential to provide savings and money transfer services (Duncombe, 2010). Such governance mechanisms are critical to the effective adoption of MICT4D.

Finally, we discuss the validity of our conceptual framework. A rigorous approach to validate the framework would be to: 1) develop variables for different instances of the agency, structure, choice and outcome constructs; 2) identify possible causal relationships between these variables; and 3) apply data collected from the interviews to quantitatively confirm the relationships. In addition, concrete evidence to show that better governance structures can indeed contribute to improving development outcomes would be necessary to fully validate the framework. However, such full validation is beyond the scope of this study.

Instead, a limited validation was carried out by: 1) checking the adequacy of the framework for analyzing porter need and for determining the governance and technology structures required to address them, and 2) comparing the results obtained from this and from other studies. Concerning the first, the framework enabled detailed profiling of the porters' livelihood needs (Table 8) although we also experienced

**Table 10**
Governance measures to overcome MICT4D implementation challenges.

| No | Initiative | Challenge | Governance mechanism |
|---|---|---|---|
| 1 | Micro-banking and money transfer | Regulatory and political environment, resource mobilization | Requires updating the regulatory framework for the financial sector to allow and enable the development of micro-banking institutions, product and services. Such structural changes may be easier to implement if they are part of a larger pro-poor policy framework, government decentralization and service delivery strategy. |
| 2 | Health awareness | Content availability, resource mobilization, citizen awareness and acceptance | Requires the mobilization of local government officials in partnership with local communities and civil society organizations to produce and maintain the required contents. This also requires raising awareness on both direct and indirect benefits for the porters and their communities. Such actions could be part of the overall government decentralization and service delivery programs. |
| 3 | Weather information | Content availability, resource mobilization and partnership | Since weather information is usually available as vital information for government operation and mobility, access to this information in the local dialects and in voice-enabled form is needed. The response involves providing funding and building partnerships with civil society organizations and other third-parties with financial and technical resources. |
| 4 | Shelter and settlement information | Content availability, resource mobilization, citizen awareness and acceptance | This type of specialized initiative could be addressed by working with relevant civil society organizations whose missions cover provision of shelters. When not feasible, government could provide this information through its service decentralization program in cooperation with owners and managers of shelters. |
| 5 | Incidence notification and reporting | Security and privacy, citizen awareness, resource mobilization | Given that receiving emergency notifications and broadcasting information to citizens through traditional channels like television or radio is problematic in the developing world, government could utilize mobile phones through training and skill development among civil servants. Concerns related to the identity and privacy protection of citizens could be addressed through regulations protecting citizen-provided information. |
| 6 | Voting and consultation | Security and privacy, citizen awareness and acceptance | Transparency and accountability demands of good governance provide a framework for supporting and resourcing this service. Concerns related to security and privacy could be addressed by enacting regulations that protect citizen-provided information. |

**Table 11**
Findings based on the head porter case study.

| Research questions | Findings |
|---|---|
| What are the critical livelihood needs of the women head porters and similar vulnerable groups (Table 8)? | o Existence — affordable sources of portable water, affordable shelters, cheaper mobile phones, reduced call tariffs, micro-banking and saving services, and safe money transfer services<br>o Relatedness — access to police and ambulatory services through mobile phone requests, protection from harassment by men and abuse by women customers, and support for integration with the porter's social network on arrival<br>o Growth — access to healthcare services beyond child delivery, availability of vocational training and counseling programs particularly on basic reproductive health and HIV/AIDS awareness, information on weather conditions |
| What types of mobile ICT could support this group in meeting its livelihood needs (Table 9)? | o Micro-banking, savings and money transfer services<br>o Voice-based health-awareness information on reproductive health, HIV/AIDs and child immunization<br>o Interactive voice-based weather information<br>o Interactive voice-based shelters and settlement information<br>o Interactive voice-based incident reporting and emergency notification system<br>o Interactive voice-based voting system |
| What kind of governance mechanisms could be adopted to support implementation of MICT initiatives to meet such needs (Table 10)? | o Changes to regulations to financial and telecoms sectors<br>o Mobilizing local communities and civil society organizations<br>o Engaging civil society organizations<br>o Capacity building for government<br>o Digital literacy campaigns |

some difficulty in assigning, for example, the concept of "porter's shelter or accommodation" into any of the resource categories. Unfortunately, given our inability to interview government officials, we could not establish the adequacy of the conceptual framework to describe the technology and governance structures. Concerning the second, we found that the information obtained from secondary sources is consistent with our primary data (see Table 8).

On generalizability of our findings, we observe that all six information and service requirements identified for head porters in Section 5.3 are relevant to any non-literate migrant women community without proper shelter. Consequently, the governance mechanisms discussed in Table 10 are also applicable to such communities. However, for other groups, the livelihood needs and the enabling governance requirements must be analyzed again, perhaps using the conceptual framework presented here.

## 7. Conclusions

The main contribution of this research is providing the first step in operationalizing the Choice Framework to relate development and enabling technological (mobile ICT) and governance (good governance) structures by integrating the Choice Framework and Structuration Theory. The integration has at least two benefits. The first is the elaboration of the citizen and governments agencies based on the constructs from the Structuration Theory. The second is the explication of duality between the citizen and government agencies on the one hand and the governance and technological structure on the other, and consequently the identification of citizen participation as an integral element of development.

Applying our framework to the problem of determining MICT needs and related governance mechanisms for the migrant women head porter community produced useful information for profiling vulnerable migrant women engaged in local community markets. From the practical and policy perspectives, the research produced a detailed account of the livelihood, information and service needs of the Ghanaian women migrant head porters, and identified mobile ICT initiatives and enabling governance mechanisms to address such needs. These governance mechanisms include: 1) updating financial and telecommunication regulations to enable the provision of mobile-based services e.g. mobile microfinance, to vulnerable groups; 2) mobilizing local communities in the production of local contents; and 3) engaging non-governmental organizations in building capacity of government agencies in mobile service delivery and in training vulnerable communities in effective use of mobile technology to access information and services critical to their

needs. Overall, the findings of this study are consistent with the findings of previous studies identified in Section 3.

The research has three main limitations. The first is the lack of civil society organizations and other non-state actors as elements in the conceptual framework, in addition to citizens and government (Fig. 2). The second, given our inability to interview government officials, we had to derive the required technology (Table 9) and governance mechanisms (Table 10) indirectly from citizen needs and past studies. The third, lacking empirical validation of the conceptual framework, testing the hypotheses inherent in the model was difficult, albeit the study established a good basis for carrying out such empirical validation in the future.

Despite such limitations, we believe that this research provides a foundation for further empirical and scientific studies of head porters and similar migrant women communities based on our conceptual framework.

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**Adegboyega Ojo** is Academic Program Officer at the United Nations University International Institute for Software Technology in Macao (UNU-IIST). Before joining the Electronic Governance Program at UNU-IIST in 2004 as a Postdoctoral Fellow, he was senior lecturer at the University of Lagos in Nigeria where he earlier obtained his bachelor and doctorate degrees. His expertise covers methodological and tool support for strategic planning and alignment of electronic government, e-government measurement, whole-of-government models and software infrastructure for e-government. He has published several journal articles, book chapters, and papers in conference proceedings in the e-government domain and successfully led the development of national e-governance strategy in Africa. Adegboyega is a member of the Computer Professionals of Nigeria.

**Tomasz Janowski** is a Senior Research Fellow at the United Nations University International Institute for Software Technology in Macao, where he founded and headed the Center for Electronic Governance. Previously, he was Research Fellow at the University of Warwick, UK, where he obtained PhD in Computer Science and Assistant Professor at the University of Gdansk, Poland, where he obtained MSc in Applied Mathematics. He also worked for software firms in Poland and the U.S. Tomasz's research focuses on introducing engineering methods to Electronic Governance (EGOV) policy and practice including foundations, development frameworks, models and design, measurement, etc. He directs EGOV research, transfers research results into practical instruments, and applies such instruments in government policy and practice. Under his leadership, the EGOV center developed a capacity-based EGOV development framework EGOV.*; built instruments to support the use of this framework; and applied the framework in Afghanistan (EGOV.AF), Cameroon (EGOV.CM) and Macao SAR (e-Macao). Tomasz is one of the earliest proponents of connecting EGOV research and practice — he founded and coordinated International Conference series on Theory and Practice of Electronic Governance (ICEGOV), and connecting social and design sciences in EGOV research — and he co-founded the mini-track on EGOV Development Methods at Hawaii International Conference on System Sciences. He is an Associate Editor of Government Information Quarterly (Elsevier), serves on the editorial board of the Journal of E-Governance (IOS Press), is a member of the IFIP Working Groups 5.5 and 8.5, and has been a program chair at six international conferences.

**Johanna Ekua Awotwi** is the Director of Research and ICT Operations of the Centre for e-Governance, a Ghanaian NGO that creates awareness in the use of ICT at the local level for socio-economic development and job creation. Johanna has over 30 years of experience in managing educational, marketing and ICT products and operations. She is a 'veteran' of the International Conference on Theory and Practice of Electronic Governance series, having presented papers for all conferences since 2007. She has written book chapters, been a Rapporteur for ICT conferences for the Commonwealth Telecommunications Organisation (UK) on the African continent and a trainer for ICT Change Management for some African countries.