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# ICTs AND SUSTAINABLE DEVELOPMENT: A CAPABILITY PERSPECTIVE

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# **ICTs AND SUSTAINABLE DEVELOPMENT: A CAPABILITY PERSPECTIVE**

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## **ABSTRACT**

Much research on developing countries highlights the developmental potential associated with ICTs as a rationale for implementing particular information systems. However, such initiatives are often problematic to realize and difficult to sustain. In this paper we examine the promise of development associated with the introduction of an Electronic Voters' Registration (EVR) system in Nigeria. We employ key concepts from Sen's capability approach to assess the arrangements made by the Nigerian government and its Independent National Electoral Commission (INEC) to enable participation in registration and polling exercises, focusing on the scope these opportunities provided for expanding people's freedoms to engage in developmental activities. Our analysis shows that the arrangements were sufficient to encourage significant voter turnout but inadequate to sustain developmental potential. We conclude with some implications for policy makers advancing an agenda of 'ICTs for development'.

**Keywords: Capability Approach, Sustainable Development, Developing Countries, Freedom and Development, Nigeria.**

## **INTRODUCTION**

This paper explores the issues affecting the sustainability of ICT-based development initiatives, that is, information systems intended or perceived to contribute to socio-economic development. In an information systems context, sustainability implies the preservation of systems, and the sustenance of the benefits of such system, with consideration given to the arrangements which ensure the long term usage of the systems. A classification of these arrangements is suggested by Ashley and Carney (1999) according to the economic, institutional and social elements required for systems to remain in line with their objectives. However, other issues need to be considered when sustainability is viewed from the perspective of developing countries (DCs). Here, the link between ICTs and development is crucial. Questions arise about how information systems can benefit development (Walsham et al, 2007); the notion of development being pursued (Prakash and De, 2007); and the validity of linking ICTs and economic development (Avgerou, 2003). Furthermore, there are concerns about how the development reaches people who operate from positions of vulnerability. Specifically, we refer to the concept of sustainable development (WCED, 1987) and its demand to meet the needs of all people, particularly the poor and less privileged.

Notwithstanding these challenges, DCs continue to introduce information systems without explicit consideration of the concept of development being advanced or the processes through which it may be achieved. This study examines the scope and limitations of the developmental opportunities surrounding the introduction of an electronic voters' registration (EVR) system in Nigeria and their

implications for the sustainability of the initiative. Our aim is to provide some insight into the reasons why the sustainability of ICT-based development projects is so difficult to achieve.

The next section contains a review of relevant literature on the relationship among ICTs, development and sustainability, focusing on the concept of sustainable development as the key concern of our study. The following section provides details of our research approach. First, we describe the theoretical perspective through which we examine the sustainability of a development initiative to enable participation in registration and polling exercises in Nigeria. We introduce some key concepts from Sen's capability approach (CA) which inform our assessment of the scope and limitations of the focal intervention. Then we outline our research methods together with a supporting rationale. The next section provides details of the research setting, followed by our analysis of the case. The final section contains conclusions from the study with implications for research and practice.

### **ICTs, DEVELOPMENT AND SUSTAINABILITY**

The potential of ICTs to contribute to healthcare improvements, education and increasing citizen participation is recognized by governments and institutions in DCs. Indeed, ICTs are being used to further the development agenda in all sectors of society (Walsham et al, 2007). However, the relationship between ICTs and development is a much contested notion. Some authors suggest that ICTs can lead to a rapid process of development through the facilitation of market mechanisms as the means to achieving economic growth in developing countries (UNDP, 2001). Others argue for a change from an economic-centric perspective on development to a context sensitive one which reflects the social conditions in which IT is embedded (Avgerou, 2003). This perspective challenges the "leapfrogging" notion and suggests prerequisites to development agendas. Suggestions include the improvement of basic facilities such as healthcare and education (Bollou and Ngwenyama, 2008) and reforms of government and bureaucratic structures (Ciborra and Navarra, 2005).

However, the superiority of western and scientific knowledge over traditional and indigenous forms of knowledge continues to be implied in practice (Puri and Sahay, 2007). Furthermore, we see development initiatives become problematic due to ill-conceived strategies which guide the initiatives (Soeftstad and Sein, 2003) or little consideration for the local factors which affect systems' implementation and usage when shaped in the context of more advanced nations (Maumbe et al., 2008). These issues are particularly relevant when we consider that DCs invest already scarce resources into IS projects. Such initiatives, even if successful in the early stages of implementation, often become problematic or fail over time, leading to abandonment in some cases. Several authors identify the way that IS projects in DCs lose commitment in the form of resources, technical and functional maintenance (Avgerou, 2008; Heeks, 2002) and call for research to examine the issues relating to the sustainability of ICT-based development initiatives (Walsham and Sahay, 2006). In this paper we adopt the view that ICTs, if conceived and accommodated in locally meaningful ways (Avgerou, 2003; Prakash and De, 2007), can provide a platform for advancing development agendas in ways that are sustainable in the longer term. Our work is informed by the concept of sustainable development (WCED, 1987) and a capability approach to the introduction of ICTs (Sen, 1999; Zheng, 2009), which we go on to discuss.

## **Introducing Sustainable Development**

The dominant ideologies in the development literature (i.e. economic and social) inform the broad measures used to evaluate growth. The measures are Income Per Person and the Human Development Index (Mann, 2003) respectively. The former accounts for market based indicators of economic activity while the latter indicates levels of growth based on health and education metrics. Some arguments suggest a relationship between income levels and human development (Mann, 2003), particularly in low income areas such as developing countries. However, such views give little consideration to the inequalities amplified by the uneven levels of infrastructural development in DCs (Halewood and Kenny, 2008; Elnagar, 2008).

From a human development perspective, authors advocate improvements in the health and educational sectors (Qureshi, 2009; Midgley, 2003) in the belief that increases in living standards are prerequisites to national growth. This approach views income growth as insufficient, and attempts a more equitable distribution of the benefits of development initiatives (Soefestad and Sein, 2003). It also sees people as participants rather than beneficiaries in the development process (Srinivasan, 2001). Thus, it reflects the principles of democratic governance by promoting the involvement and participation of citizens in activities which lead to growth. Critics of this approach show concern about the differences in individuals' needs based on their cultures and values. However, as Qizilbash (2002) argues, these differences do not negate the possibility of shared needs or interests. We refer to the concept of basic needs which describes the minimum requirements for survival and wellbeing, and the prospect of providing equitable opportunities for people to participate in programmes vital to their growth. Furthermore, there are concerns about how development reaches all people, particularly those of less privileged and future generations. Here, the concept of sustainable development applies, described as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). This conception shows concern for the objectives of socio-economic development and recommends a long term view which takes account of the impacts of productivity on resources.

Conceptually, the demands of sustainable development are also its challenges. First, "meeting the needs of all" implies that people should be treated with a certain level of equity. The challenge is that satisfaction of needs may be perceived as draining resources, rather than an investment in the less privileged (Anand and Sen, 2000). Second, extending the privilege of equity to future generations may compromise the ability of present-day people to meet their own needs. In this case, deprived people are more likely to be concerned with access rather than the preservation of resources for future generations. Thus there are significant challenges for societies striving to meet the needs of all people. Nevertheless, the "meeting of needs" may be seen as a moral obligation or, as Gasper and Truong (2005) argue, an entitlement when viewed from a human rights perspective.

In sum, sustainable development aims to distribute the benefits of development in an efficient and equitable manner, while ensuring that such opportunities are extended to future generations. In this paper we examine one of the fundamental rights in a democratic society – the benefit of being registered to vote and thus able to participate in the choice of leadership. We focus on the implementation of an electronic voters' registration system in Nigeria and the extent to which the activities of the government and its collaborators provided means for the equitable participation of citizens in the registration process and the extension of such privileges to future exercises.

## RESEARCH APPROACH

### Theoretical perspective

Our theoretical approach is informed by a variant of the human development perspective concerned with expanding people's freedoms to engage in activities that they value. Sen's (1999) capability approach proposes such an expansion of freedom as both the primary end and the principal means of development. Thus, development requires making improvements in people's general capabilities as well as in the processes through which they engage in activities that they have reason to value. Rather than focusing on economic growth as the goal of development, Sen sees it as a means only which needs to be viewed in light of the differences in people's needs arising from conditions beyond their control, such as physical disability.

Sen describes the role of freedom in development in two parts. The first is the *constitutive role* which refers to the *capability* to develop one's potential, uninhibited by circumstances outside one's control. Development in this sense involves expanding people's basic freedoms so that they are empowered against deprivations, such as literacy or health deficits, through the removal of unfreedoms that limit their choice and opportunities for exercising their reasoned agency. This aspect of the approach recognizes the role of individual agency, in which people exercise their capacities to act in order to participate in initiatives that are vital to their growth. The second part addresses the *instrumental role*, which refers to the *means* of achieving development and the freedom to pursue it if one so desires. Development in this sense concerns the way that people's rights, opportunities and entitlements contribute to expanding their freedoms in general so that they are able to achieve economic progress. This aspect of the approach recognizes the influence of social arrangements on individual agency, as forces that can restrict people's freedom to participate, and thus inhibit their capacity to act.

In this paper, we draw upon the instrumental role of freedom to examine the social arrangements for registration and voting in Nigerian elections and their influence on citizens' freedoms to participate in the valued activity of electing their leaders. We complement our analysis by drawing upon the constitutive role of freedom to highlight the crucial nature of people's capabilities, that is, their basic freedoms to participate in activities that contribute to development. Capabilities occupy a central role in Sen's approach, as a mediator between commodities (i.e. the goods and services to which a person has access) and functionings (i.e. a person's actual achievements in life). Capabilities are constitutive of a person's development because they determine the extent to which the individual can benefit from goods and services and convert potential into actual achievements (Robeyns, 2000). In our case, the arrangements made by the institutions to enable registration and voting in elections are assessed in terms of citizens' capabilities to benefit from them in a way that expanded their freedoms.

Sen describes the instrumental role of freedom in terms of five distinct types of arrangements that can contribute, directly or indirectly, to the general capability of a person to participate in developmental activities:

- i. Political freedoms: these refer to the opportunities that people have to choose leadership and other kinds of representation based on principles they value, and the possibility to challenge and scrutinize the authorities.
- ii. Economic facilities: these refer to the arrangements which enable people to have and use economic resources for consumption, production or exchange.

- iii. Social opportunities: these refer to the arrangements made for public education, healthcare and other forms of intervention which improve the living standards of people.
- iv. Transparency guarantees: these refer to arrangements which allow interaction with others based on some basic presumption of trust.
- v. Protective security: this refers to institutional measures which provide vulnerable people with some form of relief to mitigate situations which may lead to further deprivation.

In Sen's (1999) view, these instrumental freedoms can contribute, individually and jointly, to enhancing people's capabilities. For example, the creation of social opportunities, such as education and health, can increase public participation in political activities. Similarly, transparency guarantees which prevent corruption, financial irresponsibility and other under-hand dealings can encourage people to participate in economic activities that contribute to economic growth. In our case, we use these ideas to examine the influence of institutional arrangements – such as media, market, legal system, political parties, trade unions, public interest groups and so on (Sen, 1999; Evans, 2002) – on people's freedom to participate in the electoral process.

We recognize that how people exercise their freedoms is dependent upon the dynamics of power and its reproduction within the context of study. In this sense, institutional arrangements reflect the mode of governance (i.e. democracy or authoritarian) of the nation state that gives it meaning. While Sen's approach may be seen to favour the practice of democracy in an idealist sense (Navarro, 2000), our stance is that citizens' interests should be taken into account in decision making – an approach that we believe reflects the principles of democracy in its truest sense. We extend this approach to examining the constraints to effective and equitable participation of citizens in the registration and voting exercises addressed by our case. In this way, the framework helps us to elicit information on how people live, as well as to reflect upon the wider context of our study i.e. Nigeria.

### **Research methods**

Qualitative research methods were employed based on the social context of this study (Myers, 2009). Interviews were conducted with some key participants in the electoral process to gain valuable insights (Walsham, 2006) into the institutional arrangements made to support registration and polling exercises in the 2007 Nigerian elections. The data collection and analysis was influenced at the time by King et al.'s (1994) framework for institutional interventions (for a detailed account of the research methodology and theoretical framework, see Maiye and McGrath, 2008). However, the theoretical basis of our research has since evolved, in line with changes in our ideas resulting from the continuous study of related literature (Walsham and Sahay, 1999). In this paper, we draw upon Sen's (1999) ideas concerning the instrumental and constitutive roles of freedom to inform a reinterpretation of the events in the case study.

While King et al.'s (1994) framework enabled us to examine the scope of institutional interventions promoting ICT innovation in Nigeria, it was less useful for explaining the issues with sustainability of the innovations in the longer term. King et al. (1994) argue that institutions are able to exert control over the supply and demand of innovations through the creation of incentives and the provision of knowledge and expertise which impact on the production, availability and adoption of such innovations. However, within the context of our study, additional efforts were required, for

example, to incorporate indigenous knowledge, and to build trust in the innovations and the mechanisms and processes needed to support them.

In this paper, our theoretical perspective is informed by concepts from Sen's capability approach which addresses the freedom of people to engage in developmental activities that they value. Seeing human freedom, rather than economic growth, as the main objective of development, Sen's approach places responsibility for fostering the conditions for such growth on governments and its institutions. Furthermore, it acknowledges a two-way interaction between people and institutions such that the social, political and economic arrangements put in place by institutions can affect people, but people can in turn influence the activities of the institutions by exercising their reasoned agencies. The latter aspect is particularly relevant to our study. If development initiatives are designed to benefit people, one may expect the promise of growth to lead to their continued participation, and this in turn can contribute to the sustainability of the projects. With these ideas in mind, we explore how people's freedoms contribute to their participation in ICT innovation such that valuable lessons can be learned by policy and decision makers.

## **CASE STUDY**

### **The Nigerian Context**

Nigeria is a developing country in West Africa with an approximate population of 160 million people (NPC, 2006). The country gained its independence from the British in 1960 and has been through a series of democratically elected and authoritarian government regimes since then. As a result, the country has been troubled with political and economic instability (Uhuegbu, 2004) with each regime articulating policies which are short lived. This political uncertainty contributed to the irregular development of infrastructure and poor economic performance. The effects on national development can be seen in the high levels of corruption, inefficient public utilities (Mursu et al., 2000) and a low GNI per capita of US\$930 (World Bank, 2007).

Nigeria recognizes the potential of ICTs in development and this belief is reflected in the National Policy for Information Technology (2001). The vision statement reads: "to make Nigeria an IT capable country in Africa and a key player in the Information Society by the year 2005, using IT as the engine for sustainable development and global competitiveness". One strategy is to use cutting edge technologies to "improve accessibility to public administration for all citizens, bringing transparency to government processes" within the country (NPIT, 2001). This paper examines one such effort where the electoral commission of the country introduced an electronic voters' register.

### **Elections in Nigeria and the Independent National Electoral Commission**

The first elections in Nigeria were conducted in 1959, but the political history shows irregularity and instability owing to the interruptions from military regimes (BBC, 2007). This cycle continued up until 1999 when the country returned to a democratic dispensation and went on to subsequent ones following the elections in 2003 and 2007 (INEC, 2007). However, the elections have been a cause for concern. International observers have adjudged the elections neither free nor fair (BBC, 2007) with reports of electoral malpractices which led to tribunal hearings and, at times, cancellation.

The Independent National Electoral Commission (INEC) was established in 1998 with a mandate to organize all the elections in the country, including the registration of voters and political parties; collation and publishing of election results; and the administration and prosecution of all election related matters (COFRN, 1999; INEC, 2007). Elections are organized such that a period is set aside prior to the exercise, during which people report at temporary polling/registration units to register. These units are usually set up in residential areas, with their numbers dependent on the areas' population and geographical size. The units are supervised by INEC staff deployed from either the head or state offices.

Before the introduction of an electronic voters' register, the system involved capturing citizens' details on paper forms and compiling the lists from each unit at the headquarters. Voters' cards would then be issued to the registrants at the end of the exercise. On election days, the registered voters would be accredited using the list for that unit, confirming they could vote at the unit. The registrant would then be issued a ballot paper to cast their vote. At the end of the day, all ballot boxes would be sent to secure locations for counting, after which the results would be sent to headquarters for approval and publishing.

The major problem with the system was its failure to produce a reusable register. The inability to update information (owing to relocation, age increments and deaths) meant that new registers had to be created for every election. Also, the system was deficient in dealing with cases involving multiple registrations, where people presented themselves several times to register at the same or different units. The more cards possessed by such people, the more money they would receive from selling votes. Previous attempts at tackling such malpractices included the staining of registrants' thumbs' with semi-permanent ink which was expected to outlast the registration period.

### **The Electronic Voters' Register**

INEC introduced the electronic voters' register (EVR) to reduce electoral fraud and ensure that all votes count. This system was used in the 2003 and 2007 elections. The major objective of the system was to build a database that could be updated with ease and reused for subsequent elections. The system introduced in 2003 involved the use of Optical Mark Reader (OMR) forms. Registrants were required to shade-in their personal details and put their thumbprints on the forms. These forms were later scanned onto the systems within each ward and transcribed by the OMR software for storage in the database. Biometric verification was run on the fingerprints within each ward to disqualify multiple registrants. The error rate associated with this system led to the replacement of the OMR forms with Direct Data Capture (DDC) machines for the 2007 elections. In this case, registrants' personal details were entered directly on to digital forms including their thumbprints and photos. The digital forms allowed for confirmation of accuracy before the voters' cards were printed out for immediate collection.

### **ANALYSIS**

Throughout the analysis we draw upon Sen's instrumental freedoms to focus on the institutional arrangements supporting the introduction of an EVR for the 2007 Nigerian elections. We invoke the constitutive role of freedom to support our explanation of the issues surrounding the sustainability of the ICT innovation.



### **Political Freedoms**

Political freedoms refer to the opportunities that people have to choose their representatives, to hold them to account and to enjoy freedom of political expression. In Sen's (1999) view, the prospects derived from all forms of political expression are necessary for people's interests to be effectively and equitably represented. In our study, the DDC machines were an important means of ensuring accuracy in the registration process and thereby reducing electoral fraud. Demonstrations of the machines were made to the members of the Nigerian National Assembly (i.e. legislators) and representatives of the political parties, while pilot registration schemes were carried out for citizens in the capital city.

These efforts to gain stakeholder acceptance for the system were successful in generating a lot of interest and support from the people. There were reported cases in which people gave up their car batteries, and some state governors donated generators to power the systems during the registration exercise. However, these interests were not effectively represented during the authorization process at the National Assembly. The legislators gave approval for the DDC machines to be used in the registration of voters, but denied approval for their use as an authentication device in the voting exercise:

*"Voting is carried out in two days while registration lasts for two months. They [legislators] felt the devices would cause more problems in the field as a result of power failures which may halt operations. They also mentioned areas with no power at all even though the commission gave the option of batteries"* (ICT Director).

Notwithstanding the logistical issues, the legislators' decision did not reflect the desires or interests of the people they were engaged to represent. Indeed, questions were raised about the legislators' intentions and there was a consequent loss of confidence in the voting exercise and the published results. In such circumstances, one might expect the citizens to attempt to hold the legislators to account. However, in a constitutive sense, Nigerian citizens do not have the freedoms required to exercise their agency in this manner. For example, easy access to the legislators is not always possible since many of them spend significantly more time lobbying on behalf of businesses (in which they often have vested interests) rather than dealing with their constituents' problems. Furthermore, legislators may not feel a sense of obligation to their constituents, particularly if they were not freely and fairly elected. As we noted earlier, previous elections were rife with malpractices which allowed some legislators to take office even though they were unresponsive to the people. Thus, in our case, citizens lacked a number of the basic capabilities enabling freedom of political expression, with consequences for the sustainability of the EVR initiative. These findings suggest a need for reforms of government and bureaucratic structures (Ciborra and Navarra, 2005) to enhance interactions between government and citizens.

### **Economic Facilities**

Economic facilities enable people to own and use economic resources for consumption, production or exchange. Thus the freedom to benefit from such arrangements is a crucial requirement of the economic development process. In our study, Nigerian citizens could benefit from such activities in the form of temporary employment contracts and wages in return for supporting INEC operations during the registration exercise. Ad hoc staffs, comprising local citizens, were engaged to support

operations in the 36 states of the federation. However, this arrangement caused some concerns for INEC staff:

*“you train a set of people [ad hoc staff] to carry out the work, but on the field you see a different set. The original persons trained would have subcontracted the jobs to relatives and friends who do not have adequate skills for the roles. And there were no measures to ensure compliance from the parties concerned”* (Assistant Director, Voter Registry Dept).

The situation described above reveals two major capability deficits affecting the conduct of economic activities in the country. First, there is an absence of effective identity infrastructure which is a vital condition for transacting business in most countries. The lack of proper means of identification constrained the capabilities of INEC staff to monitor who was actually fulfilling the temporary contracts. Second, the high levels of poverty in the country breed corruption and other underhand practices. As a result, some people saw an opportunity to earn money, albeit fraudulently, and took advantage of INEC’s ineffective monitoring mechanisms by subcontracting their jobs. Although the temporary contracts were intended to benefit citizens, there were adverse effects on the registration exercise. The untrained operators could not work the machines properly which resulted in longer wait times for citizens in some wards. The long queues meant that some citizens were reluctant to wait, and on the whole were discouraged by the experience. Economic development depends not just on the resources that people own or have available, but also on the prevailing conditions for exchange of goods. In our case, the capability deficits outlined above had implications for economic transactions which in turn affected the sustainability of the EVR initiative.

### **Social Opportunities**

Social opportunities refer to a society’s arrangements for education, healthcare and other interventions which influence people’s living standards. Such arrangements not only help people to live better but are also important because they promote social interaction and effective participation in economic and political activities (Sen, 1999). In our study, efforts were made to educate citizens in the usage of the EVR system and the benefits of registering to vote. A variety of campaigns were used to create awareness of the registration and voting exercises, such as media publications, rallies by political parties, and arrangements to supplement literacy deficits e.g. radio and television.

The campaigns were successful in prompting citizens to exercise their right to vote. They promoted the systems with slogans alleging “computerization will reduce electoral fraud” and “this is your vote, this is your world”. These messages gave rise to a misconception among citizens that the systems were introduced to eradicate all forms of electoral fraud rather than just registration fraud. Some people made no distinction between the registration and voting exercises. Consequently, there was a high level of expectation amongst people at the time of registration which led to disappointment after the elections amidst reports of high rates of electoral malpractice. Focusing on people’s freedoms in a constitutive sense, there is a low literacy level within the country, which means that campaigns designed to encourage people to participate in registration and voting exercises need to take special care that their messages are not misleading. What many people expected was the elimination of electoral fraud, but since the campaign messages did not engage these concerns they may be seen, at best, as propaganda and, at worst, as a deliberate attempt to mislead citizens. Thus efforts designed to mobilize support for registration and voting had negative consequences for the sustainability of the EVR system.

### **Transparency Guarantees**

Transparency guarantees refer to arrangements which allow interactions with others based on some basic presumption of trust so that people understand what they are being offered and remain willing to participate in beneficial transactions. A level of openness is required in a society to prevent corruption, misappropriation of funds, and other underhand dealings (Sen, 1999). The EVR system in our study was designed such that registration lists would be printed out on a daily basis. The printed lists were to be displayed within each ward at the end of every day to allow for verification before being used for accreditation during the voting exercise.

However, there were complaints from people who did not find their names on the lists after registration, or whose wards did not display the lists until the election days. In these circumstances, some people were unable to verify their names or get accredited to vote. There was much speculation as to the cause of this problem, but no explanations were offered by INEC or the government. During our interviews, a high ranking official of INEC made the following comment:

*“time was spent obtaining the due process [open competitive bidding] certificates before the awards of the contracts to supply the DDC machines and this affected the delivery times of the machines. Perhaps the government could have given a due process waiver”.*

Prior to the introduction of the EVR system, INEC had autonomy to procure equipment and supplies for their activities, and were able to do so in a timely manner. However, the Government’s public procurement act was invoked, which requires that all procurement contracts are awarded through an “open competitive bidding” process (BPP, 2007). While this requirement may have resulted in late delivery of the DDC machines, the official’s comment does not address the delays that occurred once the machines were delivered. We have already discussed the freedom deprivations experienced by Nigerian citizens in relation to making their representatives accountable. The situation outlined here reinforces our argument, revealing the widespread nature of the problem within the prevalent institutions in Nigeria. The fact that neither INEC nor its supporting institutions are accountable to the citizens means that the latter received no satisfactory response to their complaints about the lists. Indeed, some people remained of the opinion that the lists were deliberately tampered with for political reasons. Such speculation led to increased mistrust in the EVR system, negatively affecting people’s willingness to participate.

### **Protective Security**

Protective security refers to institutional measures that provide relief to vulnerable people to mitigate poverty, famine or other situations leading to further deprivation or death. Sen (1999) argues that a ‘social safety net’ – including unemployment benefit, income supplements, and ad hoc arrangements in disaster situations – should be extended to vulnerable people whose deprivation inhibits their participation in developmental activities.

In our study, the registration exercise benefited from collaborations with the police and other security agencies to dispel violence. Some state governors also employed ad hoc measures. For example, public holidays were declared to allow those who would otherwise have no time off work to register. Other incentives took the form of preferential treatment for registered voters, such as the free enrolment of their school children and the prompt payment of salaries to public servants.

However, there was still some reluctance to register in parts of the country owing to the violence that citizens had experienced in the past. Although the collaborations with the security agencies were intended to guard against such hazards, there were fears regardless in certain areas. In previous voting exercises, these areas had been prone to violence owing to an insufficient police presence. While Nigeria meets the United Nations' recommended police to citizen ratio, reports show that the police are often engaged in activities other than the protection of the general public (UN, 2009). Reports indicate that a sizeable number of police officers are deployed to guard private organizations and multinational companies leaving some areas short of police presence. From a constitutive freedom perspective, the deployment of police officers favours business corporations and the small number of people who work for them while the majority of citizens in the local area are poorly protected. This constraint on free movement means that people in volatile areas are less inclined to go to the polling/registration units for fear of being assaulted by political thugs. Thus, proximity to certain services (the police, in this case) influenced people's willingness to participate in valued activities.

## **CONCLUSION**

In this paper we examine the sustainability of ICT-based development projects by focusing on the introduction of an electronic voters' registration (EVR) system in Nigeria and the supporting arrangements to enable citizens to participate in the registration and polling exercises. Our study was informed by the concept of sustainable development, and hence was based on the view that ICTs can be used to advance a development agenda but a key concern is how the initiative meets the development needs of future as well as present generations. We focused on the scope and limitations of the development opportunities surrounding the EVR system and their implications for the sustainability of the initiative.

Our study was informed by Sen's (1999) capability approach. Thus we used some ideas from development economics to address the extent to which the EVR system contributed to expanding Nigerian citizens' freedoms to participate in developmental activities and then derived some implications about the prospects for the initiative in the longer term. Although widely acknowledged in other disciplines, Sen's ideas are still relatively unfamiliar in the IS field, particularly in their application to case study material (for examples, see Madon, 2005; Zheng and Walsham, 2007). One possible reason is that, as Sen (1999) himself acknowledges, the framework is incomplete. This presents a challenge, but also an opportunity, since it provides space to consider a wide range of capabilities and means of (and constraints on) achieving them appropriate to the diverse development contexts in which such initiatives are attempted. It also provides scope to use the ideas in conjunction with other theories rather striving to complete the framework by adding to or refining its dimensions.

In our study, some key capability deprivations related to local constraints on holding legislators and other representatives politically accountable, lack of an effective identity infrastructure, high poverty and low literacy levels, and inadequate police protection for vulnerable people. These issues adversely affected the sustainability of the ICT innovation and its prospects for maintaining a reusable electoral register. They also highlight the crucial impact of a fragile infrastructure and limited experience in the practice of democracy on ICT-based development projects. By adopting a wider lens than we had done in previous work (cf. Maiye and McGrath, 2008), we were able to foreground some significant challenges to countrywide development initiatives in Nigeria, the extent

of which had not been revealed by our earlier research. Further work might explore the issues we raise here in the next round of elections in Nigeria as well as in other DC contexts.

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