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► To cite this version:

More Manda, Judy Backhouse. Towards a “Smart Society” Through a Connected and Smart Citizenry in South Africa: A Review of the National Broadband Strategy and Policy. 5th International Conference on Electronic Government and the Information Systems Perspective (EGOV), Sep 2016, Porto, Portugal. pp.228-240, 10.1007/978-3-319-44421-5_18 . hal-01636446

HAL Id: hal-01636446

<https://hal.inria.fr/hal-01636446>

Submitted on 16 Nov 2017

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Towards a “smart society” through a connected and smart citizenry in South Africa: a review of the national broadband strategy and policy

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Abstract. Broadband has been recognised as an enabling technology in connecting government and citizens in transitioning towards a smart society. However, governments, especially in developing countries, continue to face challenges in their bid to connect citizens. This study provides an understanding of how institutional pressures have influenced policy implementation to advance the “smart agenda” in a developing country context, using South Africa as an exemplary case study. The study is an interpretive qualitative case study, using documentary evidence as data. Institutional theory is used as a lens for interrogating the issues confronting government in implementing “smart” initiatives. We conclude that policy alone is not sufficient if not supported by a strong implementation plan and other supporting institutional mechanisms such as leadership to coordinate, and direct resources and activities in the institution.

Keywords: smart citizen, smart society, e-government, institutional theory

1 Introduction

Governments around the world have realised the great potential of using Information and Communication Technologies (ICTs) to create so called “smart societies” for social and economic development [37]. Broadband internet access has been recognised as an enabling technology for connecting people, businesses and governments in the smart society [23]. The adoption of inclusive and effective broadband policies has thus been identified as a critical step in enhancing digital connectivity [23].

In this study we explore the implementation of broadband and other relevant policies aimed at assisting South Africa to realise its vision of a smart and connected society by 2030. Lofgren [29] argues that “mainstream e-government literature rarely goes beyond basic descriptions of the policy ideas and the actors behind them. The bargaining and negotiations between policy actors (both inside and outside the government), which initiate the policy, set the agenda, as well as actually implement the policy, has been notably overlooked in the literature of e-government.” This is the gap this study is hoping to close by contributing new knowledge through the use of institutional theory as a lens for understanding institutional forces that have impacted policy implementation in a developing country context.

In the last decade, South Africa has made progress towards building a “smart society”, realising the value of ICT in the social and economic development of the country. It is one of the few countries in Africa that has adopted the “smart” agenda through initiatives such as “smart cities” which include efforts to enhance connectivity through broadband, digital access and e- literacy of residents [3]. The National Development Plan (NDP) is South Africa’s national strategic framework which sets a vision for the development of the country, including developing an ICT infrastructure for stimulating social and economic development. A concern that the NDP seeks to address is that “*South Africa’s ICT sector has not brought affordable, universal access to the full range of communications services and has lost its status as continental leader in internet and broadband connectivity*” [45]. Only 49% of South Africa’s population is using the internet, ranking 40th among 144 developing countries. Access to fixed broadband per 100 capita still remains low at 3.3 with an overall ranking of 110 out of the 189 International Telecommunications Union member states [23].

Smart societies are being brought about as “society is moving towards a socio-technical ecosystem in which physical and virtual dimensions of life are intertwined and where people interactions ever more take place with or are mediated by machines” [40]. The concept of smart society is based on the idea of how the techno-social trends can be leveraged towards addressing some of the challenges facing modern society [21]. A smart society is thus an advanced stage of the information and knowledge society characterised by communities with diverse values, needs and skills yet linked by a common identity [26, 40]. It is also defined as “one that successfully harnesses the potential of digital technology and connected devices and the use of digital networks to improve people’s lives” [27]. From these definitions, it is clear that smart societies are driven by technology, digital connectivity, knowledge, skills, common goals and innovation to institute political, social and economic development.

Policy implementation remains one of the significant challenges in governing the “smart” environment [41]. The purpose of this study is therefore to provide an understanding of how institutional pressures in government have influenced policy implementation in the “smart” era. We conducted this study in a developing country context, where few such studies have been conducted and findings will strengthen policy implementation through a better understanding of forces impacting e-government.

The **main question** shaping this study is:

- What institutional barriers is the South African government facing in its bid to create a connected and smart citizenry that is responsive to the smart society?

The **main objectives** of the study are to:

- *Understand barriers confronting the South African government in its bid to create a smart citizenry that is responsive to the demands of a smart society.*
- *Examine how policy implementation impacts broadband penetration to increase citizen connectivity in realising the vision of a smart society in South Africa.*

This paper is divided into two sections; the first section reviews literature on increasing citizen participation in a smart society. The second section discusses challenges in smart society development in South Africa using institutional theory as a lens to explain and understand issues confronting government in policy implementation.

2 Methodology

The study is a qualitative interpretive case study as its purpose is to understand the complex social, cultural, economic and political issues surrounding policy implementation in South Africa. A review of literature and documentary evidence were used as the main methods of gathering data. Literature on smart societies and government to citizen e-government was reviewed so as to help understand some of the issues confronting governments in their bid to develop smart societies. We reviewed literature published between 2000 and 2015 because the “smart agenda” is still a fairly new concept in e-government research. Literature searches using key words such as “smart society”, “smart citizen”, “smart government”, “broadband penetration” and “e-participation” were conducted across four databases namely Google scholar, Science direct, IEEE explore and Wiley online. For documentary evidence, we reviewed the national broadband policy and other strategic national policies addressing the “smart agenda” published in the last 10 years (2005-2015) so as to understand institutional pressures impacting smart initiatives in South Africa (see table 1). Relevant government and media reports were also used as sources of data. International reports such as the United Nations e-government report, Alliance for Affordable Internet and International Telecommunications Union (ITU) broadband reports were also consulted. Documents often contain rich information about institutions and their actions which may be difficult to gather through other methods such as interviews.

Table 1. E-government and ICT Policy Framework South Africa

Policy / Strategy	Key elements
Digital migration policy (2008)	The Policy seeks to enable South Africa to emerge as a global leader in harnessing ICTs for socio-economic development.
National Development Plan (2012)	A long term strategic plan for South Africa which provides a broad strategic framework to guide key choices and actions including the development of e-government.
National Infrastructure Plan (2012)	The plan seeks to transform the economic landscape through provision of key national infrastructure such as ICT, transport etc to strengthen service delivery.
Integrated ICT policy (2013)	The policy integrates the telecommunications, broadcasting and ICT framework into one policy framework due to convergence of Technology
National Broadband Policy (2013)	Provision of broadband services to ensure social and economic inclusion.

Thematic analysis was used for analysing qualitative data and it involved identifying general themes in the data. Closed (deductive) coding was used to identify and classify themes of interest coming through from literature and theory.

3 Theoretical framework

The study is underpinned by institutional theory which helps in understanding the interlinked and complex relationships inherent in institutional mechanisms, technology, social, and economic context, and institutional factors in which they are embedded [30]. We examine how internal and external institutional pressures have influenced policy implementation in support of smart society development in South Africa. Institutional theory is used as a lens for understanding how institutional ele-

ments, including regulative, normative and cultural-cognitive elements, together with their associated resources and activities identified by Scott [42] have influenced progress towards the smart agenda in South Africa. We also explore the three mechanisms identified by DiMaggio and Powell [14], through which isomorphic change occurs to understand institutional pressures influencing the smart agenda. These include coercive isomorphism that stems from formal and informal political influence to institutionalise certain rules and practices, mimetic isomorphism which results from pressure to imitate other organisations as standard responses from uncertainty and the need to minimise risk, and normative isomorphism associated with professionalisation of organisational actors. Institutional theory was used for identifying themes in the data for analysis. The adoption of institutional theory is particularly appropriate given the multidisciplinary nature of this study. This study crosses disciplines such as information systems, public administration and information science in the investigation of societal, technological and political issues central in the study of e-government.

4 Increasing citizen participation in a smart society

The country's citizens have been recognised as the most important beneficiaries of a connected and smart society [45]. E-government services worldwide have tended to shift towards being citizen centric as the successful transition towards a smart society relies on the ability of citizens to participate fully in government's smart initiatives [9, 39, 55]. There are few definitions of "smart citizen" appearing in academic and practitioner literature. Smart citizen has been defined as "the citizen with wisdom and virtue based on collective opinion" [33]. It has also been defined as "the one who is healthy, having morals and create smart plan for all activities in best manner" [28]. From these two definitions it is clear that the concept of "smart citizen" has not been approached from the socio-technical perspective. It is against this background that we propose the following definition in the e-government context: A smart citizen is "*a technologically savvy citizen who has access to information and knowledge which they use to make informed choices in participating in social, economic, political and other activities in a smart society*". Citizen engagement and participation in government activities is one of the key features of smart societies. Electronic participation (e-participation) is defined as the use of ICTs to enhance citizen engagement and participation in government [18, 35]. The use of sophisticated ICTs in government has "little social value if citizens are not able to use services or interact in political processes in meaningful ways" [22]. Citizen participation has however been compromised by a complexity of factors such as mistrust of government, mistrust of technology, low e-literacy and low access to technology [4, 12]. In the next sub-section we discuss several factors that have been identified in literature as important in developing a smart and connected citizenry that is responsive to the demands of smart society.

4.1 Technology: Information and communication infrastructure

At the heart of the convergence of ICT, telecommunications and broadcasting is the need for modern high-tech telecommunication infrastructure [20], such as broadband [10]. Broadband technologies have the potential to enhance the quality of life of

citizens and improve connectedness between governments, businesses and their societies [19]. Broadband technologies promote the transition to smart societies by “modernizing economies and societies by stimulating the use of the internet and enabling the use of feature-rich applications and services” [52]. It is therefore clear that for smart societies to work, smart citizens need to be connected and broadband is needed for the levels of connectivity envisaged.

Broadband penetration is affected by supply side factors such as legislation, regulation, infrastructure and competition. It is also affected by demand factors such as affordability, its perceived value to citizens and business and socio-cultural factors such as e-readiness and acceptance of new technologies in society [5,17, 19,38, 52].

Despite the recognition of broadband as a key enabler in creating a smart citizenry, the reality is that broadband penetration has been slow in developing countries as compared to developed economies. Lack of economic development, low Gross Domestic Product, low personal income levels and other socio-economic factors contribute to this [52]. Developing countries are still grappling with challenges such as poverty and poor health and hence connectivity is not an immediate priority [23]. More than two billion people in developing countries are being “priced out” of accessing the internet [1]. Population and demographic characteristics such as population density and urban versus rural populations were also found to have an impact [23,52]. Expanding infrastructure to areas outside of urban areas, into remote and rural areas is one of the significant supply side challenge[23].This is especially true in developing countries where a significant population still lives in rural areas. In South Africa for example an estimated 40% of the population live in rural areas [46].

4.2 E-skills for a connected and smart citizenry

The e-skills of citizens is one of the important factors that influence citizens’ ability to leverage the benefits of a smart society. Leading countries in broadband penetration such as Singapore, were found to have higher e-skills levels [8]. Citizen participation in smart societies is generally higher in countries with high levels of e-skills, compared to countries that are still struggling with low levels of e-skills [8]. Many governments have developed e-skilling initiatives for citizens to address this concern. Citing successes in developed countries, studies on the accessibility of e-services in South Africa found that the level of ICT skills and literacy among citizens has a major role in the successful participation in e-services, by influencing the ability of citizens to access and use information [31, 34].This is clear evidence of mimetic pressure at play, which in some cases including in South Africa, has influenced policy decisions.

4.3 Role of government in broadband diffusion: broadband policies, strategies, regulation and infrastructure

Governments play a major role in establishing regulative mechanisms such as policy and legislation for promoting the development of broadband for socio-economic prosperity by improving the framework conditions, stimulating demand and indirectly supporting the supply side [17]. Developed countries such as Singapore, USA and Sweden have increased broadband penetration through supportive policies that promote infrastructure development, competition and regulate the sector [5, 7]. Here we

see the use of coercive mechanisms to promote the growth of socio-economic infrastructure. Developing countries have liberalised the telecommunications sector and established independent telecommunications regulators to promote a telecommunications regulatory environment that is in line with global best practices [6,25]. This is evidence of the mimetic mechanism at work where developing countries have copied developed countries in their efforts to increase broadband penetration.

4.4 Security, privacy and trust concerns in a smart society

Citizens' security and privacy concerns in the connected and smart environment are a major threat to the success of smart initiatives due to increased mistrust of smart initiatives by citizens [4]. Legal and social concepts of a citizen's "right to privacy" which are intertwined with the challenge of security and the benefits of smart initiatives, have posed a significant challenge for governments [15]. Governments have responded by developing policies, legislation and other mechanisms for addressing security, privacy and trust concerns [2]. Addressing citizens' concerns is critical in promoting citizen participation and trust in a smart society. The development of such regulative mechanisms can be viewed as governments' response to external pressures from citizens, who are one of governments' most important stakeholders.

5 Results

We discuss five key national projects implemented by the South African government aimed at increasing citizen connectivity to support the vision of a smart society.

5.1 Broadband implementation in South Africa: "SA Connect" project

To progress towards the goal of universal access, in 2013, South Africa launched a national broadband project "SA Connect", the country's broadband strategy and policy. The broadband strategy and policy's objective is to ensure affordable broadband access for all by addressing both supply-side issues such as e-readiness, skills and availability and demand side issues such as infrastructure, regulation and competition. The strategy aims to bridge the gap between the currently poor status of broadband in South Africa, and the country's vision of a seamless network that will make broadband universally accessible at an affordable cost to all. This is an example of the use of policy as a normative mechanism in achieving desired goals by proposing amendments to the institutional framework necessary for effective regulation of an environment of open and fair competition. The four-pronged strategy includes:

- (i) Digital readiness: This pillar addresses institutional, regulatory and environmental reforms necessary to create a fair and competitive environment.
- (ii) Digital development: The focus is the smart procurement of quality infrastructure and services in order to address public sector broadband demand.
- (iii) Digital future: The focus is on the introduction of an open access wireless broadband network and wholesale fibre through public-private partnerships.
- (iv) Digital opportunity: The focus is on e-readiness programmes, development of local content and ICT entrepreneurship as strategies to stimulate demand.

South Africa is multi-cultural and multi-lingual with eleven official languages which government needs to cater for. The production of content in local languages is important in ensuring that citizens can fully participate in and benefit from smart initiatives. This is important in offering equivalent services to all citizens as well as reducing long-standing hostilities perpetrated by socio-historic injustices [31]. Cultural and linguistic inclusivity in this case is used as a basis for achieving institutional legitimacy. We observe government's attempt to influence desired social behaviour through e-participation as well as strategies to stimulate demand as attempts to establish social norms with the long-term goal of embedding new cultural-cognitive assumptions in South African society.

The inclusion of the informal sector and ICT entrepreneurship in the national broadband policy is of importance because the informal sector plays an important role in the South African economy. The South African economy is currently struggling to absorb college and university graduates with unemployment currently at 25% with a low absorption rate of 43.5% [50]. ICT entrepreneurship and innovation are key features of a smart and connected society [36]. We argue that normative pressure on government to meet their social obligations has influenced government to find innovative responses in addressing some of these socio-economic challenges.

5.2 Strategic Infrastructure Projects

The Strategic Infrastructure Projects (SIPs) support government's goals of using ICT to "underpin the development of a dynamic and connected information society that is more inclusive and prosperous" [46]. SIP 15: *Expanding access to communication technology* aims to enhance connectivity and access to information by providing for broadband coverage to all households by 2020[44]. Despite the establishment of SIP 15, internet access is still low in South Africa with only 10.8% of the population accessing internet at home due to high costs [49]. We argue that infrastructure development alone is not sufficient in increasing citizen connectedness if it remains unaffordable. The adoption of smart technologies does not guarantee success of smart initiatives [32]. A holistic approach is needed to yield a positive result.

5.3 Smart cities initiative

The "smart cities" initiatives are part of government's project of developing South Africa's major cities into world class cities. The government is embarking on several national initiatives such as "e-schools" and free wireless broadband in public areas so as to support the national goal of creating a smart society. As part of their "smart cities" agendas, several cities in South Africa such as Johannesburg, Cape Town and Pretoria have embarked on projects to roll out free wireless broadband in public areas to provide connectivity and access to all residents. The Gauteng provincial government's R2-billion "paperless classrooms" project, for example, aims to provide learners in public schools with digital connectivity [11]. Resources and associated activities are thus critical in realising the goal of a connected and smart citizenry.

5.4 Digital migration programme

To promote digital access to all South Africans, the government is migrating the broadcasting infrastructure from analogue to digital, a move which is key in enabling faster broadband services. To ensure inclusion of all citizens, the government will provide free set-top boxes to 5 million poor households [13,43]. Social obligation thus plays a major role in influencing policy decisions aimed at addressing social and economic inequalities. The need for digital migration derives from the International Telecommunications Union (ITU) resolution where countries were given a June 17 2015 deadline to migrate. Here we observe the role of coercive isomorphic pressure in influencing policy direction. Delays in implementation resulted in South Africa missing the deadline. Inefficiencies and a leadership crisis since the split of the former Communications Department into the Department of Telecommunications and Postal Service and Department of Communications have been cited by government leadership as some of the challenges [48]. It appears that coercive isomorphic pressure is unlikely to lead to desired behaviour if not accompanied by sufficient supportive normative and cultural cognitive mechanisms such as leadership, resources and trust.

5.5 E-readiness programme (e-skills and e-literacy)

E-readiness (e-skills and e-literacy) are among the key success factors in moving towards a smart and connected society. The success of e-government in Singapore for example has been attributed to the e-readiness of its citizens among other factors [8]. E-readiness enables citizens to fully leverage the benefits of a smart society as well as participate fully in smart initiatives. In recognition of the importance of e-readiness, South Africa established the Ikamva National e-Skills Institute (iNeSI) to co-ordinate the development of an e-skilled and e-empowered society and delivers on the goals of the NDP. This is a significant example of the positive role of mimetic pressure in influencing desired behaviour. Social obligation is the basis for attaining legitimacy in this instance. The implementation of e-readiness programmes for citizens, despite several strategies and initiatives put in place, have been hampered due to a fragmented approach, poor resourcing and inefficiencies in coordination. This reiterates the importance of supportive institutional mechanisms and their associated resources and activities in driving institutional priorities to achieve success and legitimacy [42].

6 Discussion

6.1 Poor implementation: integrated e-strategy challenge

South Africa still lacks an integrated e-strategy to guide and coordinate the development of ICT in government, business and society [13,47]. This is a stumbling block in the implementation of policies geared towards developing a smart society, which require a much more coordinated approach. This has often resulted in inefficiencies due to poor coordination of institutional resources and activities and delays in implementing critical projects such as the Strategic Infrastructure and “SA Connect” projects. Poor capacity due to leadership and resource constraints in institutions tasked with the implementation of policies has compromised planning and associated activi-

ties in implementation. This is a threat to government's NDP vision of ensuring that by 2030, "A seamless information infrastructure will be universally available and accessible and will meet the needs of citizens" [45] and prevents the NDP from being fully implemented. South Africa is failing to meet some of its short and medium term targets set out in the NDP due to poor implementation. The presence of normative and regulative institutional mechanisms such as policies and legislation are therefore not a panacea if these are not supported by effective implementation mechanisms.

The slow implementation of legislation aimed at addressing privacy and security in the "smart" era is also concerning. The Protection of Personal Information Act aimed at protecting personal information privacy came into law in 2013 but is still yet to be fully implemented. The Cybercrimes and Cybersecurity Act aimed at protecting critical information infrastructure is still in draft and is yet to be finalised and implemented, leaving South Africa vulnerable to cyber-attacks that have been on the increase globally. This compromises citizens' trust of the "smart" environment because of the perception that it is intrusive to their privacy and increases security risks.

6.2 Institutional leadership challenges

Despite the existence of coercive isomorphic mechanisms such as policy and legislation, and normative mechanisms such as appeals to social justice, South Africa continues to face challenges in achieving its goal of universal access in transitioning to a smart society. The Broadband Council, composed of high level experts set up to stir broadband development, is dysfunctional and has been rocked by resignations of experts citing lack of guidance from government [51]. A leadership challenge in the department of Telecommunications and Postal services, the department responsible for coordinating the broadband project and ICT in government, has also been a major blow. To indicate the gravity of the matter, on the 3rd of August 2015, the Minister of Telecommunications and Postal services initiated an independent public service inquiry into the management affairs of the Department of Telecommunications and Postal Services [13]. Institutional mechanisms fail in the face of incompetence and self-interest, creating significant setbacks to the success of government's vision of a smart and connected society. Such failures are likely going to lead to citizens' mistrust of government as an institution driving the smart agenda.

6.3 Socio-economic challenges

South Africa is still battling with socio-economic challenges such as poverty, inequality and high unemployment [50]. Broadband, telecommunications and connectivity tariffs remain unaffordable to most South African citizens, some of whom still lack decent housing, healthcare and clean water. Broadband connectivity is therefore the lowest priority for the majority of citizens. South Africa is described as a "dual economy" where an advanced capitalist economy co-exists with an informal traditional economy [31]. Despite the government making some progress in addressing poverty, social injustices and inequality, these remain significant challenges and are threatening South Africa's successful transition towards a smart society.

Economic challenges have resulted in broadband roll-out having a lower priority as evidenced by insufficient funding. In the Medium Term Expenditure Framework

(MTEF) for 2015/2018, despite requesting R1.4 billion (US\$95 million) for broadband rollout, the SA connect project was only allocated R739 million (US\$47 million) by National Treasury. This figure falls short of requested funds and casts a shadow of doubt on South Africa's ability to reach its target of 100% broadband connectivity by 2020. Resourcing thus remains important in supporting other institutional mechanisms and activities in implementation of policy, without which implementation is bound to be compromised.

6.4 Infrastructure roll-out challenges

Infrastructure roll-out has largely been biased towards urban areas where citizens are already economically advantaged compared to their rural counterparts. Even within cities, the focus has been on wealthier suburbs. This is despite the fact that policy clearly prioritises rural areas in infrastructure roll out. Social obligation in this instance is seen as having a profound influence in policy decision making but there is less evidence of such in implementation. This has the potential to increase inequalities by widening the digital divide and is a threat to achieving the national vision of smart society as access and connectivity remain low in marginalised areas. Several metropolitan cities in South Africa (including Pretoria, Johannesburg and Cape Town) are already enjoying free wifi rollout in public places and in some public schools. Rural areas are not developing at the same pace as South Africa's major cities. This is concerning considering an estimated 40% of the population lives in rural areas [46].

7 Conclusions

South Africa has made some progress in transitioning towards a smart society through a connected and smart citizenry. Government has played a significant role by developing an enabling policy framework, implementing regulative and normative measures such as the broadband project and e-readiness programmes. Poor leadership, socio-economic barriers such as affordability and the slow and poor implementation of policy and programmes are some of the barriers discussed. Government efforts are at times uncoordinated and fragmented, hence threatening the success of smart initiatives. The slow pace of development in rural and poor areas will further increase the connectivity divide. This has compromised government's efforts in realising its vision of a smart society through the provision of a smart and seamless information infrastructure. What is clear is that policy alone is not sufficient if not supported by a strong implementation plan and other appropriate institutional mechanisms such as leadership to direct resources and activities in the institution. We also observed the influence of mimetic and coercive pressure in policy direction in South Africa, where the international community has directed best practice and policy decisions. The socio-cultural, socio-economic and socio-historic contexts in developing countries like South Africa however make it impractical to follow these so called "best practices". Governments often find themselves doing a balancing act between domestic priorities and international best practices in policy and governance. This may lead to poor conceptualisation and implementation of policy.

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