Missed opportunities for introducing transformational government: Assessing the contentious e-toll project in South Africa

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Abstract

Purpose – The purpose of this paper is to trace the trajectory of the Gauteng Freeway Improvement Project, an electronic tolling (e-tolling) programme based in South Africa, to argue for the importance of taking advantage of similar public project opportunities to introduce the concept of Transformational Government (t-government).

Design/methodology/approach – The research uses an interpretive perspective and utilizes actor–network theory (ANT) to identify the roles and interests of the various stakeholders within the project and assess how each stakeholder could have better influenced the project's sustainability using a t-government approach.

Findings – The findings suggest that in the midst of waning global actor interest, and strong local displeasure about specific public projects, public participation offers an ideal opportunity to introduce the notion of t-government, the use of information and communication technologies (ICT) to transform government for citizen benefits. The research allowed the authors to posit that public participation projects are solid and indispensable avenues for introducing t-government. Part of this claim is hinged on the view that the specific e-toll project carries a visible ICT artefact, which has embodied its own patterns of use characterized by various viewpoints, values, opinions and rhetoric.

Practical implications – The paper elevates the importance of t-government as a means to bring about practical transformation in government using public projects. The paper suggests how governments can use public participatory approaches to assimilate a new way of working in government.

Originality/value – This paper contributes to research on the emerging discourse on t-government. The paper also highlights the utility of ANT as a tool for understanding the dynamic public sector ICT programmes, their associated complexities and unintended consequences.

Keywords E-government, Actor network theory (ANT), E-Participation, Electronic tolling, Transformational government (t-government)

1. Introduction and background

The introduction of the terminology of transformational government (t-government), related to value addition of e-government initiatives to citizens and businesses, is a welcome conceptual addition to the metaphors used for understanding the impact of

information and communication technology (ICT) in the public sector. Particularly, Irani *et al.* (2007a, 2007b) see t-government as a process in the public sector that ensures exploitation of e-government for benefit realization. T-government encourages thinking towards "beneficiation", how e-government initiatives should provide value to stakeholders, not only from a policy design perspective but also from a public participation view. In evaluating the impact of e-government projects, the issue of "beneficiation" not only brings to the fore the maturity stage of an e-government project but also forces project designers to think about how the roles and interests of various stakeholders influence the success of an e-government project.

Extant research on the implementation of information systems and, in particular, e-government highlights various challenges. Such projects are inherently risky, multi-faceted, non-linear and very technical in nature (Brown, 2005, Ebbers and Van Dijk, 2007). Citizen trust is also often cited as a barrier (Warkentin *et al.*, 2002; Alsaghier *et al.*, 2009). A lack of alignment of the social, technical and organizational aspects of implementation (Elbanna, 2007) is seen as a limitation. Another aspect that is highlighted is the lack of partnerships and collaboration across public, private and non-profit sectors within e-government projects (Ndou, 2004). Additionally, the socio-technical nature of e-government projects requires an appreciation of the social context of these complex implementations. The above noted challenges call for a close consideration of how stakeholder participation (such as citizens) can be used to introduce the notion of using ICT for transformation in government.

Public participation has seen much research and has had increasing interest from academics, governments, non-governmental organization's and practitioners alike (Rowe and Frewer, 2004). Public participation may be defined as:

> […] the practice of consulting and involving members of the public in the agenda-setting, decision-making, and policy-forming activities of organizations or institutions responsible for policy development (Rowe and Frewer, 2004, p. 512).

The idea of citizen participation is not novel and has been considered for different domains such as public administration (Yang, 2005, Coursey *et al.*, 2012), health services reform (Tritter and McCallum, 2006), planning for development (Cornwall, 2003, Saxena, 1998), environmental projects (Luyet *et al.*, 2012) and city planning (Kotus, 2013). Additionally, it is becoming more accepted that "a non-consulted public is often an angry one" (Rowe and Frewer, 2004, p. 514); thus, steps need to be taken to involve citizens to enhance the success of transformational government projects. Thus, we seek to answer the question: how can citizen public participation be taken advantage of to introduce the notion of t-government as a means to ensure the sustainability of e-government projects in the context of a developing country? This paper investigates how the roles and interests of various stakeholders can be used to influence the trajectory of an e-government project, and can impact the sustainability of other government projects.

We address the research question by focusing on a specific transformational government project: the South African Gauteng Freeway Improvement Project (GFIP), typically linked to an electronic road tolling initiative conceived in 2006 by the South African Government. The initiation of the GFIP was partly based on the need to evolve a funding mechanism that would ensure that road maintenance and improvement is sustainable. Ferrari (2005) argues that the construction and maintenance costs of a road

network can be financed, in part, through public funding and, in part, by imposing tolls on some of its roads. Gauteng Province, the hub of economic activity in South Africa, provided the context to explore how the government of South Africa, through the GFIP, attempted to initiate an electronic tolling (e-toll) system as a basis for evolving a road maintenance and improvement policy for the rest of the country. Global road e-tolling reported from various countries have relied on several motivations as a basis for the initiation of these projects. Several of these projects are in North and Central America, Europe, South East Asia and Middle East. The GFIP e-tolling project was the first of its kind in Africa, and we explore its motivations as a basis for focusing on t-government, as a new metaphor for explaining how the roles and interests of various stakeholders can be used to impact the sustainability of e-government projects. We link the South African e-toll implementation to the concept of e-government because the systems are dependent on ICT and seek to transform the efficiency of road revenue collection without the necessity of manned tolling booths. It is reported that the e-tolling system was initially proposed by economist William Vickery in 1959 (Beaulier *et al.*, 2012) and revolves around the use of transponders (e-tag) as a form of electronic automated vehicle identification system. Gantries are built in selected parts of a road and are fitted with cameras for automatic number plate identification as well as charging through the e-tag system.

The remainder of the paper is structured as follows: first, we review the literature on the emergent t-government. In the next section, we describe the theoretical rationale for road tolling levies as a foundation for unearthing motivations for the e-tolling or "open road tolling" project of South Africa. The next section presents the research methodology and the description of the stakeholders, the roles and interests in the project. The subsequent section presents the findings of how the interests of the stakeholders can be used to affect the sustainability of the project through recourse to the notion of irreversibility from actor–network theory (ANT). We make conclusions in the last section of the paper and link the conclusions to implications for undertaking transformational government projects, relevant to developing countries in Africa.

2. Informing literature on transformational government

ICT's are said to have transformative power in countries that use them in public administration processes (UNPAN, 2012). The challenge is in how they are deployed and the involvement of citizens therein. There is a theme in the literature that suggests that ICT's have not yet changed how governments interact with citizens. A study of 19 Organisation for Economic Co-operation and Development countries found that technologies allow for the attainment of restricted modernization goals; however, they do not significantly alter citizen relations (Pina *et al.*, 2007). E-government may not necessarily result in reforms, but rather bolster the interests of those in power (Coursey and Norris, 2008). Indeed, it reinforces pre-existing social and political structures (Pina *et al.*, 2007). This has resulted in a call for an alternative conceptualization of public sector ICT projects for citizen benefits, which may be found in the emergent transformational government (t-government) domain.

Scholars have addressed the area of t-government from various viewpoints. Weerakkody *et al.* (2011) and Weerakkody and Dhillon (2008) studied t-government from a business process reengineering perspective. In another study, Reinwald and Kraemmergaard (2012) reviewed t-government from a stakeholder angle and indicated

that managing different groups of stakeholders is the key to t-government success. Information technology (IT) governance was found to be important for t-government (Montazemi *et al.*, 2010). Also, a framework of trust and t-government has been considered (Bannister and Connolly, 2011). King and Cotterill (2007) offer readers a customer relationship management approach for t-government based on citizen co-production and conclude with a four-stage maturity model (King and Cotterill, 2007). Joseph and Johnson (2013) push for attaining t-government through the exploitation of big data to improve government services. Jones (2012) compiled a framework of t-government based on the prior work of Hackney and Jones (2006), which identifies barriers, objectives and priorities for t-government implementation.

T-government is about meeting citizen's needs (Sipior *et al.*, 2012). As Sharif (2008) laments: "[…] the current t-Government approach simply may not be sustainable in its present form as it only concentrates on the IT/information security (IS) component" (Sharif, 2008, p. 74). T-government is concerned with transforming government services through ICTs supported by increased citizen participation (Fernando *et al.*, 2010). In essence, t-government "has a soft focus and is people orientated" (Jones, 2012, p. 608) and more research is needed that focuses our thinking towards a citizen-centric approach for public services (Irani *et al.*, 2007b). This paper is aligned to this notion.

3. Theoretical foundations to electronic tolling system

The theoretical motivation for starting an e-tolling initiative is typically linked to two main reasons: the first is the problem of congestion on roads and the second is the necessity to "force" a proportion of road users to shift to uncongested roads (Ferrari, 2005). The imposition of congestion tolls is linked to the works of Beckmann *et al.* (1956), who argue that capacity constraints on some road network links are inevitable as a basis for defining road tolls in such a way that they give rise to an equilibrium traffic flow pattern in the road network. However, part of the motivation for the imposition of the road toll to ensure road decongestion is either the development of alternative routes or the existence of other options for the road users.

The second motivation for road tolling is related to the necessity to recoup maintenance and improvement costs incurred in some road networks because it may not be possible to rely solely on public financing (Ferrari, 2005). The imposition of the road toll is rationalized on the basis that if construction of the road is by public funds, then the funds have to be obtained by levying taxes, which typically results in the loss of social welfare (Rosen, 1985). The increasing use of road tolls to finance transportation infrastructures has become increasingly popular as governments realize that public financing is untenable, despite the negative effects on social welfare (European Commission, 1998).

E-tolling is a form of financial instrument for road construction and maintenance (Waersted, 2005, Leromonachou *et al.*, 2006) as well as the use of road tolling as an efficient tool for transportation management (Albert and Mahalel, 2006). While many citizens and other stakeholders believe that governments should provide more road capacity to ease traffic congestion, financing the additional capacity is normally inadequate, and thus governments resort to road tolling as one form of financing (Li and Hensher, 2012). The use of e-tolling is based on using technology to ensure the efficient collection of toll charges for both congestion management as well as maintenance and improvement of roads. In assessing e-tolling as a tool for realizing automatic road user

charging, the e-toll systems need to be designed to meet the technical objectives, the objectives of the designated geographical area and the optimization of the public and political acceptability to ensure the success of the project (Saleh and Farrell, 2005).

In this paper, we mainly focus on the latter perspective, that is, how the optimization (or lack thereof) of the public and political acceptance can be used to introduce the notion of t-government in the public sector. Our proposition is that public and political acceptability for e-government-related projects such as the GFIP in South Africa is intricately linked to the interests and roles that various stakeholders play, which impact on project milestones. ICT implementations in the public sector require an appreciation of the social and political aspects influencing the outcomes of the projects. Prior research on IS implementation shows that these projects require "delicate management" (Elbanna, 2007) to better understand their outcomes and the gap between the original objectives versus the resultant project form (Dery *et al.*, 2013). In the ensuing sections, after presenting the adopted research methodology, we explore how stakeholder roles and interests have impacted on the future sustainability of the GFIP e-tolling project, as a transformational government initiative.

4. Research methodology

We adopted an interpretive research paradigm to underpin the research. We used actor–network theory (ANT) as the theoretical lens through which the research was viewed. ANT enabled the study to trace the interests and roles of stakeholders in the GFIP project, "follow" the actors and the consequences of their actions on the trajectory of the e-toll system in South Africa.

We use four ANT discursive practices: the first is the concept of problematization, which refers to the process through which the actual problem is highlighted (during the translation phase) and a solution or vision for the network is created (Alcouffe *et al.*, 2008). The solution is then viewed through a focal actor as the "obligatory point of passage". Secondly, interessment is also part of the translation process and it is essentially about raising the interest of other actors in the vision or project. Actors find mechanisms of locking allies into the problematization (Rhodes, 2009). The concept of interessment is used to show how stakeholders entice other stakeholders to fit their programme of activities. Thirdly, enrolment is when the various actors within the network begin showing their acceptance of the new vision or project. Also, technical artefacts are produced and consolidated such that they secure the dominant interests of the main actors (Teles and Joia, 2011, Heeks and Seo-Zindy, 2013). Enrolment results in "black boxes", which are essentially things within the networks such as method, concept or even an institution that are entrenched and are not questioned (Teles and Joia, 2011). Enrolment is used by focal actors to define and coordinate the roles of other actors. Lastly, mobilization involves the on-going analysis of the various interests to ensure that they remain generally constant and have stability (Alcouffe *et al.*, 2008, Haque and Mantode, 2013). The network is mobilized when there is a solid representation of the masses within the network and actors in the network become spokespeople for the vision (Dery *et al.*, 2013). The paper uses the concept of mobilization as a way to attain visibility for representing stakeholder groups. The four discursive practices (problematization, interessment, enrolment and mobilization) are used as part of a qualitative theoretical thematic analysis procedure to analyse policy documents, speeches, project documents and other sources of information on the e-toll system in

South Africa. In theoretical thematic analysis, the analysis is deductive in nature and the analysis is driven by the researchers' theoretical (in our case, ANT) or analytic interest (Braun and Clarke, 2006).

Callon and Law (1992, p. 46) argue that the success or failure of the sustainability of any project is linked to three interrelated factors:

(1) "the capacity of the project to build and maintain a global network that will for a time provide resources of various kinds in the expectation of an ultimate return";

(2) "the ability of the project to build a local network using the resources provided by the global network to ultimately offer a material, economic, cultural or symbolic return to actors lodged in the global network"; and

(3) "the capacity of the project to impose itself as an obligatory point of passage between the two networks".

Secondary data were collected between June 2012 and October 2014. The study used secondary data to emphasize the high degree of public participation from all the different sectors of society: government, citizens, media, political, civil society and the private sector. The secondary data consisted of the following publicly available sources:

(1) Government:
- Official public sector documents from the affected national government departments.

(2) Political:
- Proceedings of the Parliament of South Africa.

(3) Media:
- Documents.
- Media reports.

(4) Public:
- Websites.

(5) Civil society organizations:
- Position papers and reports.
- Non-governmental organizations.

(6) Private sector:
- Consulting companies.

The paper acknowledges the danger of using secondary data as a source of data mainly because such uncritical sources of information present a great degree of bias, may lack quality and, hence, lack academic rigor. However, we argue that for this paper, the benefit of secondary data are how the data provided an important means to show the extent to which ICT was a means of collaborating with government to produce a transformational outcome, and how the project presented a missed opportunity for introducing the notion of t-government as a new way of working. Additionally, secondary data facilitated the ability to "eavesdrop thus providing unobtrusive access to sensitive situations and the past" (Cowton, 1998, p. 432).

5. Analysis of findings

The following section presents the analysis of the findings related to the assessment of stakeholder roles and interests, the consequences of the role playing and how these are likely to influence the trajectory of e-toll development in South Africa.

5.1 Stakeholder roles in the GFIP e-toll project

The starting point in understanding the problematization and initiation of the GFIP e-toll project is linked to the establishment of the South African National Roads Agency Limited (SANRAL) as a government parastatal through an act of parliament in April 1998. Operating under the Ministry (Department) of Transport as the sole shareholder, SANRAL's purpose is to be the custodian of and is expected to maintain and expand South Africa's national road network (SANRAL, 2012). Part of SANRAL's strategy for realizing its mandate is to evolve a financing mechanism that is not fully dependent on government budgetary allocations. Thus, in July 2008, SANRAL launched a Domestic Medium Term Note (DMTN), a finance instrument that allows for flexibility in raising finance for toll road construction. The DMTN programme is supported by credit ratings issued by Moody's Investors Service in 2008, which allowed SANRAL to secure finance to begin construction on the GFIP. The GFIP was approved by the Cabinet of the South African Government in 2007. Therefore, when the notion of problematization is used, what is apparent is how the Government of South Africa, by creating SANRAL in 1998, transferred the management of transportation challenges related to the road network to SANRAL, as the "obligatory point of passage".

In assessing how focal stakeholders enticed (interessment) other actors to the common goal of "accepting" e-tolling, we focus our attention on the phases of GFIP, and how the initial phase (Phase I) was effectively used to prepare stakeholders to adopt electronic tolling as inevitable. Whether the approach was a success or not is another issue and we trace the "toll" that has been exacted on the GFIP based on the strategy that was adopted. The GFIP was conceptualized to comprise three phases, of which Phase I, which included substantial upgrading of approximately 185 km of freeway (N1, N3, N12 and R21 routes), after which an e-toll strategy was to be implemented to charge users of the roads. Therefore, the sequencing of project activities involved the physical improvements of the roads, which the consumers readily welcomed, and was then followed by the introduction of the e-tolling using an e-tag system. So, one of the oft-used claims made by the government and its agencies to "entice" other stakeholders is to make the claim that e-tolling needs to be accepted because (Department of Transport, 2012):

> The improvements have been made and the benefits of these improvements are being enjoyed by road users. […]. Therefore, the funding of this project through the "user-pay" principle is required. This is an equitable way of funding the project, since the benefits will be enjoyed by those who pay for it.

However, those who oppose the e-tolling system counter that commuters cannot be penalized for using the road network covered under the e-tag system, yet GFIP, far from adopting a "user-pays principle" will be another example of taxation of the Gauteng economic heartland to finance the rest of the country. Part of the argument being advanced is that Gauteng Province, where the e-toll system is being implemented, is currently responsible for 50 per cent of all personal taxes with only 20 per cent of the population. Furthermore, the widespread culture of non-compliance is likely to lead to

many motorists avoiding the e-toll routes, which is likely to increase the risk of damage to the few alternative routes that exist (Deloitte, 2011). If the rationale for road upgrades and improvements was partly hinged on traffic congestion, then SANRAL should have spent greater effort in developing alternative routes, which, in their current state, are likely to be depressed as motorists try to avoid e-toll charges, rather than having seemingly had a singular focus on penalizing users based on the "user-pays principle". So, while SANRAL and other actors who have supported the design of the e-toll system advance the argument that the road improvements and upgrades that have been undertaken make it inevitable for the enactment of e-tolling charges, discordant voices inside the government itself are voicing different opinions. For instead, while it is normally assumed that under collective responsibility, the government coalition of the African National Congress (ANC), Confederation of South African Trade Unions (COSATU) and the South African Communist Party (SACP) would adopt a common position on the e-toll saga, evidence suggests the contrary.

For instance, the SACP claims that the new e-tolling system will cause the prices of commodities and public transport to rise, especially due to the fact that working-class communities mostly make use of public transport (Graham, 2012). This state of affairs would further be exacerbated because SANRAL did not make any improvements to the alternative routes, for motorists who would want to avoid e-tolling charges. The SACP also claims that there was a poor consultation process, yet according to SANRAL and the Department of Transport, consultation has been on going since the inception of the GFIP in 2007 (GCIS, 2013). COSATU, one of the government coalition partners, and the Democratic Alliance, the official opposition party, also question the credibility of the Swedish and Austrian companies involved in the supply of e-toll, as well as the secrecy surrounding the award of contracts (Cohen and Wild, 2012). We also see the use of DMTN as a possible tool being used by SANRAL, in conjunction with the Treasury Department (Ministry of Finance), to "prove" that viability of road maintenance and financing is possible through public–private partnerships, yet SANRAL's and Treasury's actions of underwriting the DMTN instrument using 20 billion rand from the social welfare fund has been condemned as risky. Thus, while the DMTN is positioned by the government and SANRAL as a viable mode of financing for road e-tolling, its intended consequences of "enticing" user enrolment is actually negative with various civil society organizations and other discordant voices within the government itself articulating concerns over the underwriting of the DMTN using social welfare.

Therefore, the actions surrounding the implementation of the electronic tolling system must be seen from the perspective that SANRAL needed to "act" in various ways to meet the national road network challenges, while its actions influenced and were also influenced by a number of actors captured in Table I. In Table I, and based on the preceding analysis, we identify some of the stakeholders as designers; in other words, those actors who were dominant in the policy design process and its implementation as well as their interests, while the users are generally clustered as individuals and businesses.

Table I reveals that there is a group of actors largely considered as "global" and comprise the cluster of stakeholders responsible for designing the e-tolling financing mechanisms. In the global actor group are the international consortium of e-toll suppliers whose interest is to obtain a return on their investments; the Department of Transport, whose interest is to craft an effective transport policy for the country; the

Table I. E-toll stakeholders: roles and interests

Actor	Project role	Potential interests in the GFIP project
Government-related actors		
Department of Transport	Designer	Craft equitable transport policy
SANRAL	Designer	Ensure implementation of e-toll policy and system
Treasury	Designer	Provide government funding Ensure viability of the project
Presidency	Designer	Provide political support Ensure viability of the project
DMTN	Designer	Reduce financial impact on motorists Obtain additional funding Gain legitimacy from citizens
Gauteng provincial government	Designer	Economic growth of South Africa's economic powerhouse Maintain political support for ANC-led provincial government
International institutions/service providers/other external parties		
Service providers	Designer	Gain contracts Profit maximization
Moody's investor services	Designer	Elevate credibility of SANRAL actions
Investors	Designer	Return on investment
Legal system	Designer	Promote and protect social justice and human rights Responsible and accountable justice for stakeholders involved
Competition commission	Designer	Reduce restrictive business practices that may jeopardize the equity and efficiency of the South African economy
Media	Designer/user	Disseminate claims about the project
Review panel	Designer	To undertake a comprehensive assessment of the socio-economic impact of the introduction of the GFIP in general and the e-tolls, in particular on the economy and the people of Gauteng Provide recommendations to Gauteng Premier
Users/other stakeholders		
OUTA/civil groups	Users	Efficiency in deliveries Avoid additional transport costs
Citizens/motorists	Users	Avoid additional transport costs
Political parties	Designer/users	Align with popular sentiments Win credibility with citizens for political mileage
Labour unions	Designer/users	Avoid costs to workers Align with dominant and popular stakeholders
Other non-human actors		
E-toll system	Designer	Inscribes the vision of implementers of GFIP
Technical and road infrastructure	Designer	Enabler of the vision of implementers of GFIP
Project-related documents and research reports	Designer	Disseminate claims about the project Rationalize GFIP

South African presidency, whose goal is to deliver on campaign promises and acts by "shoring" support for those whose interests appear to support the campaign agenda; and credit rating agencies, whose interest is to rationalize SANRAL financing instruments. On the other hand, the "local" actor groups is represented by the various media organizations, who have positioned themselves as a conduit for "voicing" the validity claims from various stakeholder groups (both global and local); civil society organizations representing various interest groups and who have positioned themselves as champions of e-toll users; various political parties, who make the claim that they represent the wider population of clients of the e-toll system.

5.2 Consequences of actions on the e-toll project

The analysis above identified the major stakeholder groups and their goals in the e-toll project. The formation of SANRAL in 1998 formed the basis from which to analyse how subsequent stakeholder actions and their consequences are likely to affect how the GFIP E-Toll project is likely to "pan out". Research utilizing ANT should reflect the story of a particular project over a period of time (Heeks and Stanforth, 2014). A timeline of key episodes, the actors and the consequences of stakeholder actions on local and global actor enrolment and mobilization for e-toll support is captured in Tables II and III.

Linked to the understanding of the chain of events (Table II) on a project is an assessment of the impact of key decisions on the enrolment of actors. Table III offers a view on the main decisions that influenced the project trajectory. The strengths of the two networks (local and global) may be traced as a project progress. This is done through a network analysis process.

The changing strength of the global and local networks over time is plotted on a two-dimensional graph, where the x-axis indicates the degree of the local actors' mobilization, and the y-axis outlines the degree to which global actors are attached (Callon and Law, 1992; Heeks and Stanforth, 2014). The intention in undertaking a network analysis is to establish the stability of the emergent e-toll network, as stability assumes that the project effectively enrolled and mobilized various actors (stakeholders and other nonhuman actors). A high placement on an axis indicates that a large portion of the actors have been translated and, therefore, support the project (globally) or that local actors are participating freely in the project, with very few of them deviating from the project (Heeks and Stanforth, 2014).

Thus, the translation trajectory of the GFIP e-toll project is mapped in Figure 1.

The starting point is the centre of the diagram and the arrow climbed moderately up the vertical axis as SANRAL was established by Department of Transport in 1998 to be the focal actor for addressing road transport challenges in the country. Further, focused problematization specific to Gauteng Province enabled SANRAL to enrol the Provincial Government of Gauteng, with the Department of Transport of the Gauteng Province launching public consultations in 1999 as well as the adoption of a road toll strategy in August 2000. These actions enabled a moderate recruitment of global and local actors. The increase was moderate since as early as 2002, Democratic Alliance, an opposition party, was already threatening to oppose the toll plans. We use the consequences of the various milestones in Table III to plot Figure 1.

On its establishment, SANRAL, in consultation with various governments in the Gauteng Province (Gauteng Provincial Government, Johannesburg Municipality and Ekurhuleni Municipality) developed the GFIP proposal, which was approved by the

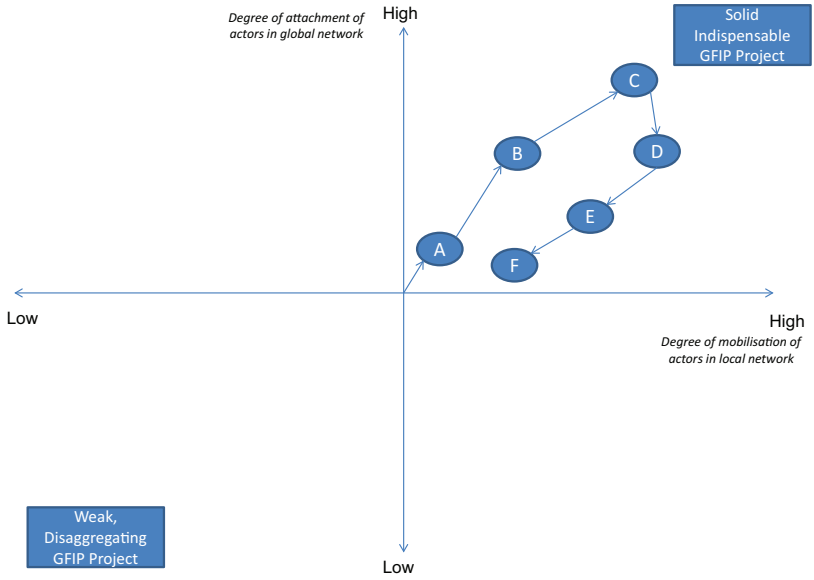
Table II. GFIP project milestones

Year	Milestone description
2004	SANRAL granted jurisdictional mandate to address Gauteng Province road upgrades
2008	Cabinet approval of the 187-km road upgrades to freeways
2008-2011	Construction of freeways
	Objections to e-tolling raised by various business, civil society groups, labour unions and political parties
2011	GFIP steering committee setup in April to engage with various stakeholders and assess objections to e-tolling
	Committee announces in June that e-tolling would continue with reduced tariffs despite objections
	Two launch dates for e-tolling are postponed and both missed
	Public consultations and a drive for e-tag registrations are undertaken
2012	OUTA: Opposition to Urban Tolling Alliance launched in February
	SANRAL announces a new launch date of April 2012
	OUTA makes an application in April to legally challenge the lawfulness of e-tolling–the interdict is obtained to halt e-tolls and conduct a judicial review
	Department of Transport agrees to postpone launch by a further two months
	May 2012 CEO of SANRAL tenders resignation, while a national government inter-ministerial committee led by the Deputy President is setup to conduct yet another consultation process
	CEO withdraws resignation after being convinced to stay
	Government/SANRAL applies to constitutional court to overturn interdict obtained by OUTA
	Constitutional court agrees with SANRAL and overturns the interdict but indicates that a judicial review may proceed
	SANRAL argued in court applications that it was ready to start the e-tolling within two weeks, but delayed the actual launch by over 12 months
	SANRAL obtains permission from high court in November to stop OUTA's request for a judicial review
2013	OUTA's appeal is heard in the high court. The punitive costs that were ordered against OUTA are overturned, but the court finds that it cannot rule on arguments on the alleged unlawfulness of e-tolling
	OUTA decides to not pursue the legal route further because it cannot match SANRAL's strategy of litigation due to limited funding
	Competition Commission investigates and exposes collusive practices of the construction companies, which impacted negatively on the price of GFIP
	E-tolls system is launched in December 2013
	SANRAL runs a multi-million rand marketing campaign
2014	It appears majority of Gauteng motorists have not registered for the e-toll system (39% have registered for e-toll tags), signalling a rejection of the system
	SANRAL continues to run a multi-million rand marketing campaign
	Citizens report bullying tactics from SANRAL through SMS, e-mail and postal messages coupled with roadblocks
	SANRAL mentions in June that it is looking at legal summons to be directed at motorists that are using the roads but refusing to pay
	New Gauteng Premier announces in state of the province address of June 2014 that the Provincial Government would set up a panel to assess the socio-economic impact of e-tolls in Gauteng
	GFIP e-toll review panel was setup in July and would run until November 2014 to find a "lasting solution"

Table III. Project decisions and impact on enrolment

Decision	Local consequences	Global consequences	Resultant impact on enrolment
A. Establishment of SANRAL; Adoption of road tolls strategy	Local point of focus for transport debate	Support from international partners	*Major (+) GA; Slight (+) LA*
B. Cabinet approval for GFIP; SANRAL adverts and intention to toll	Mobilization of local support; increasing visibility of SANRAL	Increased GFIP visibility; legitimization of international partners	*Moderate (+) LA; Major (+)GA*
C. Awarding of contracts and the beginning of the installation of Gantries	Increasing media and public focus on SANRAL; failure to consult remains a "sticky" issue; rationalization of GFIP using studies; increasing public awareness	Increased legitimization and mobilization by international partners; positive credit rating by Moody's	*Moderate (+) Las; Major (+)GA*
D. Dropping of SANRAL's credit rating; intervention by the Treasury	Questioning of SANRAL Funding model; Pressure for tariff reductions/E-Tag Registrations	Support from international partners wanes as credit rating drops	*Major (−) GAs; Major (+)LAs*
E. Court interdict and legal action	Challenges to e-toll	Show of power among different government entities	*Major (−) GAs; Major (−)LAs*
F. Establishment of gauteng province review panel	Increased defiance of e-toll by motorists Complexity of e-toll becomes increasingly evident	Future funding in question; increasing discordant voices within government and ruling party	*Major (−) GAs; Major (−)LAs*

Figure 1. ***Network diagram***



Cabinet of the South African Government in 2007 (Motlanthe, 2012). This is considered as one of the key milestones, given that, while it was critical for SANRAL to start gaining support of the local stakeholders by "selling" the idea of GFIP and mobilizing the provincial government of Gauteng, it remained key to gain "buy in" into the national government. Therefore, the cabinet approval that was granted for the GFIP was not only key for recruiting the national government as an important global actor but also related to future actions that would be critical for recruiting other global actors.

Thus, the GFIP problematization began with the establishment of SANRAL (Network Analysis–A), which was to become the Department of Transport's main driver for the maintenance of South Africa's ailing road network that was failing to keep up with the country's growth. SANRAL's strategy for road maintenance included the acquisition of additional funding from external parties other than their allocated Treasury budget. Their strategy was further approved by the Cabinet in 2008 (Network Analysis–B). Another part of the problematization phase was SANRAL's launch of the DMTN. The DMTN is a finance instrument that allows for flexibility in raising finance for toll road construction. The DMTN programme was supported by credit ratings issued by Moody's Investors Service in 2008, which allowed SANRAL to secure finance and begin construction. This bolstered SANRAL's vision for road upgrades in the eyes of various local and global stakeholders. The problematization phase also resulted in SANRAL (with the support of the Department of Transport) becoming the focal actor in the formation of the GFIP network. It is interesting to note that SANRAL is responsible for national roads however in 2004 it obtained a jurisdictional mandate to upgrade some provincial road network in Gauteng (Clarke and Duvenage, 2014). This reinforced SANRAL's role as an obligatory passage point for the GFIP project. However, the Government has also continued to realize that the approval that was granted in 2007 was possibly a mistake (PMG, 2012):

> […] I have said that if we could re-wind the clock back to 2007, we would not recommend embarking on this project at all. We have made that very clear (Pravin Gordhan, Finance Minister).

Also, possibly the only reason that the government remains intransigent in its support of the e-toll project is because (PMG, 2012):

> However, alas! there is a R20 billion debt. It has been incurred on phase A1, which is about 180 Kilometres of what was projected to be, let's not forget, more than 500 kilometres of e-tolling (Pravin Gordhan, Finance Minister).

Therefore, while the Cabinet's approval of 2007 was a "watershed" in setting the ground for local and global actors' enrolment, retrospectively, the government changed tune, evident in the emerging conflicting voices within the government itself. We see the Cabinet's action as having a moderate increase in support from local actors, while it resulted in a massive increase in support from global actors, as it set the stage for SANRAL's confidence in the issuance of the DMTN. The launch of DMTN in July 2008 can be attributed to increasing confidence by global stakeholders in SANRAL's ability to handle public–private partnership financing as well as a possible tactic by the national government to rationalize the "offloading" of infrastructure financing to other institutions outside government. The launch of the DMTN may have had a major increase in the enrolment of global actors (such as obtaining financing for e-tolls), but possibly just a minimal impact in the increase of local actors. Though, a subsequent media blitzkrieg since 2009 about SANRAL activities attracts the attention of media and parliament could have brought some visibility to SANRAL, resulting in local enrolment of local actors. The effect of media and parliament's visibility impacts positively on recruitment of local actors to be aware of e-toll.

We also see the installation of the 49 gantries in Gauteng's freeways as significant in entrenching the e-toll concept in the psyche of various stakeholders (Network Analysis–C); however, the municipal elections of 2011 dampened the positive image that may have been building up in the minds of the user actors over time. This state of affairs was exacerbated by the Moody's negative credit rating of SANRAL in 2011 and 2012 (Network Analysis–D) that gave rise to the predominant thinking that the funding model adopted by GFIP was risky. Yet, the launch of e-tags in April 2012 was successful, with a record number of motorists registering. While the "success" maybe viewed as an indication of a "lack of option" for motorists using the Gauteng' freeways, the registrations will provide fodder for entrenching e-tolls in South Africa. In other words, the GFIP e-toll programme can already be regarded as "successful", despite a court interdict suspending the e-tolls project.

Additionally, in efforts towards mobilization, the president of the country has also come out in support of the project in various public speeches. In one report, the President indicated that the e-tolls had been adopted legally, and thus citizens should comply (Ephraim, 2013).

SANRAL further tried to entice stakeholders by using research outputs from third parties to bolster their argument and vision for an intelligent transport system funded through e-tolling. The organization commissioned a report by Standish, Boting and Marsay in 2010. The report stressed that the current road network was compromising the economic growth potential of the province. Further to this, it positioned e-tolling and

the user-pays system as an equitable way of funding the upgrades (Hommes and Holmner, 2013).

The National Government has tried to garner public involvement by reducing the tariffs payable by motorists, extending the grace period for payments and increasing their investment in SANRAL (7am News Network, 2014, Clarke and Duvenage, 2014). Public transport taxis and buses were also exempted from paying e-tolls in the hope to appease the argument that the poor would be hardest hit with transport price increases due to e-tolls. COSATU, the largest labour movement federation, also strongly opposed the e-tolling strategy. On the launch of the system, the General Secretary of COSATU urged the public to stop the "economic apartheid" that would result from e-tolling. The legal battles between SANRAL and OUTA have also served to influence the enrolment of actors in a negative manner (Network Analysis–E). Although SANRAL eventually obtained a court order allowing them to continue with the implementation of e-tolling the process has highlighted SANRAL's failure to consult and increased challenges to the project in the minds of local actors. In further assessing the project, we believe it has not managed to fully mobilize the different stakeholders. This is also shown by the establishment of a review panel by the premier to assess the socio-economic impact of e-tolls in Gauteng (Network Analysis–F). Indeed, the assessment fails to show a solid representation of the masses within the network.

5.3 (Ir)Reversibility of e-tolls from the "tolls"

We use the network analysis model of Callon and Law (1992) as a relevant framework to trace the trajectory of the GFIP e-toll project from its inception to the current stage. The network analysis model uses a mapping process, in which the various milestones (Table III) are indicative of fluctuations of involvement from the global and local actors, which determine the degree of mobilization of local actors as well as the level of attachment of the global actors to the e-toll project. A project becomes reversible if both networks withdraw from engaging with the project, while a project becomes irreversible if there is continued active and mobilized involvement of both networks. We view involvement as stakeholders being aware of and engaging with the project in whichever form it exists. Involvement does not necessarily mean the actors are in support of the project or agree with its design indeed they may even be opposing the project. In the case of the GFIP, the project is irreversible in the sense that the physical infrastructure prevails, the various global and local actors are aware of the form taken by the e-toll project. As a socio-technical phenomenon, the e-toll project has from a technical stance gained stability. However, from an organizational, social and political vantage, it may be argued that various challenges remain.

The discussion now considers the involvement of citizens in public sector large-scale projects. Involving the public has several benefits such as better trust in decisions made by government, increased acceptance of the decisions, improved project design, a better understanding of project issues, the integration of various interests and opinions and finally the optimization of project plans (Luyet *et al.*, 2012). However, we also acknowledge that the involvement of the public may yield various problems for projects. Some disadvantages of public participation include increasing costs, time consuming processes, potential stakeholder frustration, new conflicts may arise, stakeholders may not be representative of the population and more dominant stakeholders may be

empowered whilst others are marginalized (Luyet *et al.*, 2012; Maier, 2001). However, we argue that public participation is an important contributor towards t-government.

Irani *et al.* (2007b) offer a comparison of e-government versus t-government, which highlights several variables including the nature of citizen involvement, service delivery and the evaluation of such projects. Their assessment indicates that citizen involvement should be beyond provision of access to ICT systems but rather focus on building citizens' social capital through the ICT project. Additionally, the service delivery model within t-government reflects a pull model rather than a push model where citizens manage the delivery process to fit their unique requirements. Also, citizens are at the core of evaluating the outcomes of t-government and provide feedback on the benefit realization thereof (Irani *et al.*, 2007b). Our view is that the GFIP reflects a push model and failed to "integrate citizenry in the work of Government" (Irani *et al.*, 2007b), which a t-government calls for. It is argued that the GFIP did not enhance the social capital of citizens and they were not at the centre of assessing the potential benefits prior to implementation.

Thus, we elevate the notion of the involvement of the public. The stakeholders may not be in agreement with the project but it is the participatory aspect that is essential to the trajectory of such projects. Thus, if participation results in unsupportive sentiment and public outcry this is not necessarily negative. This may be necessary for reducing the design–reality gap (Heeks, 2002) that often plagues e-government programmes. It is perhaps more important that stakeholders are involved than not, even if it may be perceived that the project is failing due to their involvement. We argue that participatory governance is essential, and thus a technically integrated system that is irreversible is not sufficient. Social integration is as important for sustainability of the projects (Elbanna, 2007).

6. Conclusions

The paper considered how ICT projects that enjoy public interest offer ideal and rare opportunities to introduce the notion of t-government; the principle that ICT is a platform that can be used to positively transform how government works supported by citizen participation. Specifically, the paper reviewed through an interpretive lens, the public discourse on the GFIP, an electronic tolling (e-tolling) programme based in South Africa. Overall, the paper shows how the e-tolling project was a missed opportunity to introduce t-government to enhance the sustainability of an ICT project through participatory principles.

The attachment of global actors appears to be waning, and events support the idea that there is moderate degree of mobilization of local actors, which is reducing. This allows us to make a claim: that the e-toll project remains solid and indispensable, even though there are "discordant" voices in the local actor groups as well as waning global actor network attachment. Part of this claim is hinged on the view that e-toll has become a visible technical artefact, which has managed to embody its own patterns of use (Callon, 1986) characterized by various viewpoints, values, opinions and rhetoric, which has already been converted to "visible" physical devices (toll stations, gantries, DMTN, e-tags, institutions, improved roads, reports, documents and scientific papers). In other words, it has already become a socio-technical information infrastructure, which can change its form, but has also gained some power, enough to influence its own future life – its extension and form.

In a preliminary sense, we may say that the e-toll project has become an "immutable mobile" (Latour, 1999) network that even though it is being moved around in time and space (delayed schedules, concerns, criticisms, court interdicts and political juxtaposing), it remains relatively stable and unchanged, thus displaying properties of irreversibility. We use the term "immutable mobile" as an entity that can travel from one point to the other without suffering from distortion, loss or corruption (Latour, 1999). When we trace the trajectory of the e-toll project since 2008, there is evidence of its persistent existence, despite "discordant" voices and resistance from various actors. As a socio-technical artefact, it has attained an "installed" base that allows it to remain relatively unchanged in technical form, although social form and acceptance remains conflictual. But, we also recognize that the e-toll project may change, as once a network is formed, it does not remain fixed because it is likely to be deserted by some of its key supporters or changes in alliances may allow a re-consideration of its goals.

In summary, e-toll has developed an installed base over time that has provided it with the momentum to be stable and irreversible. The momentum it has built is increasingly developing self-reinforcing processes (Arthur, 1998) linked to its R20 billion debt, improving learning effects (increasing public consultations), adopting better coordination by learning to concede ground and adapting to new expectations. In line with Hughes (1987), we are of the opinion that "Only a historic event of large proportions could deflect or break the momentum" (Hughes, 1987, p. 52). So, while the network model (Figure 1) described above is an oversimplification of the "real world", it affords us some inferences with regard to the unfolding scenario of how stakeholders are participating in transformational government projects such as e-toll. We especially pick on t-government projects becoming irreversible as they build momentum through various "service experiences" over time.

Thus, we deliberately elevate the notion of citizen participation and their service experience as an important component in realizing t-government projects. The discordant opinions being witnessed in the implementation of the GFIP e-toll may point to a critical lack of service experience. SANRAL, as the focal stakeholder for the GFIP projects, has seemingly delivered goods in the form of high-quality and maintained roads (technical integration and acceptance). However, there has been a lack of delivery on the crucial aspect of participatory governance and the service experience as seen with the outcry and resistance directed at the GFIP e-toll component (social integration and project acceptance). This study has highlighted that although the GFIP e-toll project is irreversible and the payment for the investment will most likely be sourced from citizens in some form of tax (e-toll or other taxes) there is still an opportunity to introduce t-government. This opportunity to engage with the fundamentals of t-government could positively impact the sustainability of future ICT-driven government programmes. Government implementers may find that this particular experience with GFIP e-toll has taken its toll on the citizenry so that future e-government initiatives may be met with distrust, and thus influence participation levels. It is acknowledged that such IS projects are influenced by a multitude of factors and challenges (Brown, 2005; Ebbers and Van Dijk, 2007; Warkentin *et al.*, 2002; Alsaghier *et al.*, 2009; Elbanna, 2007; Dery *et al.*, 2013). However, in this paper, we illuminated the area of user participation for a paradigm shift towards t-government.

The implication of this paper is a call for a conceptual shift towards designing e-government projects for sustainability. It is hoped that this paper highlighted the need

for t-government programmes that elevate the role of various actors within these complex initiatives such that stakeholders are engaged earlier in the process of delivery. This may result in empowered stakeholders that are encouraged to participate in e-government and thus potentially deliver benefits not only for the users but also value for the initiators of such programmes. This is rooted in the socio-technical nature of such initiatives requiring an understanding of technical, social and political factors influencing project delivery and outcomes. Another essential lesson and practical implication of this study for public sector practitioners and scholars is the critical need for attention to be given to the form of public participation pursued, given some of the disadvantages cited for increased participation on e-government projects. Furthermore, the contribution on a methodological level is that the paper also highlights that ANT may facilitate the study of public sector ICT projects and explicate how the projects do not consistently result in the expected outcomes as compared to the original design. It contributes to the existing examples of how ANT may be of value for case studies on IS implementations.

7. Limitations and future research

The paper used secondary data; however, an opportunity exists to extend the research through alternative data collection strategies such as interviews and focus groups with policymakers, civil society organizations and citizens. This will facilitate the capturing of additional perspectives from actors within the e-toll network.

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