




“Challenges associated with infrastructure delivery”

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Challenges associated with infrastructure delivery

Abstract

The main purpose of this paper is to document some challenges faced by Independent Development Trust (IDT) in infrastructure delivery of the provincial government of KwaZulu-Natal. Infrastructure delivery has a significant effect on the local budgets or budgets of projects in the province. The main focus of the study was the root causes of delays, budgetary overruns and the resultant effect on service delivery back-logs and socio-economic impact caused by such delays. The study setting comprised of professional stakeholders in the built environment and these include specialists and professionals in the engineering, construction management, civil and general building fields. The objectives of this study were achieved by means of a self-administered questionnaire that was distributed to a group of participants, composed of project managers, quantity surveyors, engineers, architects and project managers working with IDT. The nature of the research was quantitative and data analysis used descriptive and a bit of inferential statistics to arrive at some generalizations and conclusions. The study was able to affirm that there are major inefficiencies in the current infrastructure delivery model of the South African government. Major causes identified include factors such as delays in payments, poor planning, subsiding levels of professional ethics and standards exercised by professionals in the built environment, and so forth. The study also made some recommendations from the research findings. Clearly the infrastructure delivery model requires a new trajectory in tackling the under-development and triple challenges of poverty, unemployment and slow economic growth.

Keywords: Independent Development Trust, built environment, infrastructure delivery, budgetary overruns and payment delay.

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Introduction

The roots of government(s) failures or success lie(s) in the economic policies and decisions around appropriate economic mix, on how best is the government able to yield optimal output. It has been argued that the intervention of the government should be able to address market failures (Schiller, 1993). Like many economies, South African (SA) government has put infrastructure spending at the centre of its economic growth strategy. With limited resources and slow economic growth, it is critical that the government takes stock of how each rand and cent is accounted for, including prudent fiscal discipline (Zuma, 2013). Being in the global landscape, South Africa had to catch up with speed in dealing with issues of under-development, unemployment, poor economic growth, poverty and inequality.

The South African government has put infrastructure development at the centre of its developmental strategy. As a preamble to the National Development Plan (NDP), the plan cites amongst central challenges, the infrastructure that is poorly located

and under-maintained rendering it insufficient to nurture superior growth. Amongst the key clusters in the NDP is the construction / infrastructure cluster. This cluster has highlighted the importance of infrastructure investment in employment creation for low-skilled workforce. Another element emphasized in the plan is promoting employment in labor-absorbing sectors (National Planning Commission, 2013).

Independent Development Trust (IDT) is a Schedule 2, public entity in terms of the Public Finance Management Act (PFMA) classification established by the government of South Africa. The mandate of IDT is to support the government with program management and infrastructure delivery. In dealing with capacity challenges, a host of government entities would contract IDT and allocate respective budget with instructions on the nature and the scope for infrastructure assets to be constructed. Notable infrastructure assets built by the IDT are schools, hospitals, clinics, welfare centres, amongst many others (PFMA, 2007).

As a public entity, IDT is equally subjected to some of the arduous processes with which all government entities have to comply. The advantage, however, is that public entities have their own policies that offers a certain degree of flexibility. As much as the IDT has regional offices in all provinces in South Africa, this study is located in the KwaZulu-Natal (KZN) province and the study is focusing on factors affecting efficient delivery of infrastructure in the KZN (PFMA, 2007).

Despite the measures adopted and sustainable development goals, failure to finish most projects on time, budgetary overruns and poor quality of work-

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manship have created negative perception, as well as the reputation of IDT in managing projects in the provincial government of KwaZulu-Natal. This also negatively affects budgetary allocations given to IDT in each financial period. As a result, IDT has been confined to spending a lot of resources combating unnecessary operational issues and managing risks that ought to have been avoided by proper planning.

It is against this background that the paper seeks to investigate factors that affect the delivery of infrastructure in the province of KZN as part of strengthening the economic growth. The focus of this study is on infrastructure delivery of the government as part of strengthening the economic growth. Infrastructure delivery must be properly managed, as it affects the local budgets or budgets of projects in the province.

1. Literature review

1.1. Cost overruns and time delays. A cost overrun, also known as a cost increase, underrated or budget overrun, involves unexpected costs incurred in excess of budgeted amounts due to an underestimation of the actual cost during budgeting. Factors that have been identified as reasons for cost overrun in most projects are: design errors, scope change, inappropriate and inadequate procurement, complexity of project and post execution phase.

Aibinu and Jagboro (2002) assessed the causes, effects and methods of minimization of construction project delays in Nigeria. Results showed that cash flow problems, shortages of construction materials, client's financial difficulties, inadequate consultant experience and incompetent project team were causes of delay in construction projects. The research reveals the impact of delays and the consequential effect to project delivery, concluding by some recommendation, notably acceleration of project milestones and making contingency provisions (Aibinu & Jagboro, 2002).

Although acceleration in project delivery can inadvertently increase costs of the project in some cases, it is still a necessary intervention in ensuring that completion takes effect within scheduled timeframes. Notably, the Joint Building Contracts Committee (JBCC) provisions cites contractual period, defect liabilities, construction guarantees, penalties amongst some critical issues provided for. Invoking such punitive provisions can guarantee speedy delivery and enforce performance and adherence to contractual obligations (Maritz & Hattingh, 2015). Risks associated with construction largely lies with contractors. The JBCC deals with termination of contract by employer for contractors default, loss and damage, provided the employer is not in material breach of the agreement.

On the recommendation of Aibinu and Jagboro (2002), the question would be how much can be allowed as contingency provision and how can the client afford to provide for. The widely accepted norm for contingency allowance is 10% to cover the risk of shortfalls that may not have been anticipated by foresight.

1.2. Government planning processes. *1.2.1. Joint Building Construction Committees.* In South Africa, institutions such as Joint Building Construction Committees (JBCC) have formulated standardized agreements such as the JBCC contracts and Professional Service Agreements (PROCSA) with a view of ensuring that contractual issues are tightened in terms of compliance and regulatory practices, to guarantee that there is value creation in infrastructure delivery (Maritz & Hattingh, 2015). This takes us to the next section of the literature review, which deals with value creation through project management, discussed below.

1.2.2. Value creation through project management. Project Management Institute (2008) defines project management as the integrated application of the technical know-how together with skills and using the applicable tools and techniques in attaining specific project deliverables from all project phases.

Creedy et al. (2010) used a regression analysis to investigate any correlation of cost overruns with project risks. The study was able to indicate a positive correlation between budget and overruns. The research argued that highway organizations have lost credibility to the press, public and political fraternity largely because of spending patterns that are prompting researchers to suggest that organizations can rebuild their public images by embarking on prudent and realistic program estimates.

Another observation sighted in the study by Baloyi and Bekker (2011) on time delays was the client mandated scope changes, inadequate planning and materials shortages. On the ranking of these factors, a new element emerged, which is late awarding of contracts by the client. Of interest to the researcher is the client's attributed factors, which are scope changes and the late awarding of contracts. Whilst the study seeks to find means of providing value to most clients, some have also been found wanting as tributaries to the problem.

The study that sought to establish delays that were located in the Ugandan public sector ranked scope changes, payment delays by the client, lack of monitoring, cost of capital political and labor issues amongst the top five most prevalent causes (Alinaitwe et al., 2013).

Consideration of four constraints in construction is imperative. The constraints are scope, cost, time and quality. The research conducted in Klang Valley revealed serious factors credited to cost overruns that are inaccurate or poor cost estimation and design mistakes (Ali et al., 2010). Lack of skills in the government fraternity forces the government to make use of professionals to execute their projects.

The study by Endut et al. (2009) revealed that time overruns are higher when compared to cost overruns. The study by Kaming et al. (1997) presented opposite results to this assertion. The researcher has noted the time lag between these two sets of researchers, which could indicate possible changes that could have affected the outcome of the research between 1997 and 2009.

Statistical analysis using regression analysis demonstrated a strong and positive correlation between five success factors. This was in the study on World Bank projects. The factors in question were design, monitoring and co-ordination, institutional environment and training interventions. The institutional environment of organizations, as well as training interventions should be designed properly to ensure that correlation in these factors is possible. World Bank projects are characterized uniquely by their intangibility, which encapsulate poverty reduction as an important objective (Ika, 2009).

There is a significantly strong relationship between project success and the leadership competencies of the project managers. Leadership being amongst the most studies in human behavioral aspect identified competency of the project manager. The study suggested that competency of the project manager also need to be complimented by contingency skills, trait, behavior, vision in leadership and emotional intelligence as six major schools of thought (Geoghegan & Dulewicz, 2008).

The evolution of project management over the years has been influenced by the level of project failures, which have also prompted various institutes to develop certain sets of standards for managing projects. These standards have also reflected the level of awareness and attention paid to project management, signified by heightened level of growth in acceptance of formalized project management tools and techniques (Papke-Shields et al., 2010).

1.2.3. Socio-economic impact. Du Plessis (2007) has conceded that construction is a very large sector that is capable of yielding millions of work opportunities and also drives the GDP growth levels of significant proportions in most countries. There is further observation in the research that suggests broadening of the subject to other allied construction sub-sectors, such as building material production, transportation and prop-

erty market amongst many. Therefore, this suggests that the narrow view of construction is not beneficial, instead, if construction is unpacked and viewed in a broader context, there are even more socioeconomic benefits that will accrue in the entire value chain.

Du Plessis (2007) brought four categories of interpreting construction, i.e., the entire project cycle, every business of construction and related aspects, construction site activity and lastly the broader human settlement interventions. The researcher argues about the narrow view of confining construction to only project cycle activities relating to the contractor only while ignoring other broader issues that are imperative at feasibility, design, decommissioning and so forth.

There has been a problem in construction of trying to match world class standards and perhaps of trying to demonstrate global competitiveness and, in some cases, of trying to embrace market orientation in the approach, as a result, some construction work has been heavily mechanized with limited labor intensive approach that would have benefited the unskilled labor or the poor (Pillay & Bass, 2008). This neo-liberalism approach can somehow compromise developmental approach imperatives.

In the study by Alinaitwe et al. (2013), the research recommendations were on transforming from the conventional construction to design-built method. This means a turnkey approach where one practitioner is appointed for the entire suite of professional services and construction work. This method is quite stirring and can really bring much needed efficiencies. There is, however, question of spreading the economic benefit to many, especially in the South African context and some other developing nations, where labor intensive methods are still preferred in attempting to optimize the intake of laborers working in infrastructure project. Labor intensive approach is viewed by the government as another vehicle of increasing the employment opportunities to the poor.

Kaliba et al. (2009) brought other elements into the discussion, which were environmental protection, inclement weather and strikes due to their prominence in Zambia. Weather and political issues would obviously vary from one country to the other; these are not entirely different to the rest of the developing nations. The researcher contends that notable increase in a number of strikes is often the result of wage disputes especially to lower levels of skilled or unskilled.

2. Infrastructure

2.1. Service delivery. Service delivery in this paper is defined as the transfer of service from the

service provider to the service receiver or client. The client may or may not find value in the service provided.

2.2. Infrastructure. Infrastructure refers to the set of facilities and systems that are necessary for a community to function. These facilities include road network, sanitation, electricity grid, water supply, telecommunication system, health and education facilities, shopping facilities, sport and entertainment facilities, security and police service.

2.3. Effects of infrastructure delivery on provincial budgets.

- (a) Proper planning with effective monitoring and evaluation: Proper planning is very important for government departments to save money. For example, the routing of refuse collection vehicles must be handled with utmost care. Vehicle routes that save fuel must be determined before the refuse can be collected. Fuel and other vehicle expenses can significantly affect the budget allocation for the province.
- (b) Payment delays: Payments of projects or services done for the government departments require approval or authorization by higher offices in the province. This usually takes time and often results in payment delays. If the service provider happens to be a private company, then, the private company normally charges some interest on the delayed payments. These delays affect the government's provincial budget and are normally factored in during the budget allocation.
- (c) Collection of revenue: There is a lack of personnel in the government sector and caused by unattractive salary packages. This is an area of concern and is where most provincial governments waste resources. Since most government officials in charge of projects lack the necessary technical skills on what they do, they sometimes overpay subcontractors engaged to do projects in the province. This results in a cost, which is avoidable and is caused by ignorance and significantly affects the provincial budgets. In addition to overpayment, government equipment is not usually properly serviced because of the lack of skilled manpower. As a result, electricity or water is lost and is a cost to the government.
- (d) Lack of monitoring and checking systems. The government is a public entity, which means there is no strict ownership of whatever processes that take place there. This allows for corruption or diversion of resources to private use to easily take place. Corruption and diversion of resources are avoidable and

these are unnecessary costs to the government and affect the provincial budget.

- (e) External funding: A province with a pleasing infrastructure delivery system normally attracts external funding from nongovernmental organizations and foreign donors. Donors are not willing to fund projects in a province where corruption is rife. Government provinces that are well managed normally attract funding from nongovernmental bodies and other organizations, as there is obvious assurance that their funds will be put to good use. These external funds from donors reduce the government's burden or budget on water supply, health facilities or schools in the area.

3. Research methodology

Quantitative approach was used and the objectives were formulated as given in Section 3.1.

3.1. Objectives of the study.

- ◆ Research objective 1: sought to establish the causes of delays in completion of projects within the scheduled timeframes.
- ◆ Research objective 2: was aimed at ascertaining the impact of project management in terms of providing value for money to the government.
- ◆ Research objective 3: was assessing the extent of value that can be derived from optimal use of professionals in the entire life cycle of the project.
- ◆ Research objective 4: tested the socio-economic impact of the infrastructure delivery on the livelihoods of the infrastructure project host communities.
- ◆ Research objective 5: was intended to confirm if ethical standards of professionals are still exercised to the best advantage of the clients, in execution of projects.

The study focused on challenges faced by IDT in infrastructure delivery by seeking the views of professionals, i.e., architects, quantity surveyors, civil engineers, mechanical engineers, electrical engineers and project managers. These are practitioners from multidisciplines within engineering, design and building specialities who have been involved with IDT projects within the past 2 years.

3.2. Criteria for sample selection. In determining the best suitable system, the researcher had to observe carefully at the nature and characteristics of the population. In this instance, selection was from the entire population the names and contact details of the principals for companies contracted to IDT were utilized. The population size was 156 and is presented in Table 1 below.

Table 1. Breakdown of the research population size

Profession	Population	Representation (%)
Project managers	43	27.3
Civil / structural engineers	33	21.1
Quantity surveyors	31	19.7
Architects	23	14.8
Electrical engineers	9	5.9
Mechanical engineers	10	6.5
Other	7	4.7
Total	156	100.0

From the population size of 156, a sample of 108 was selected for study. Of the 108 targeted participants, 82 responded.

3.3. Data collection methods. Questionnaire was used as a research instrument. SurveyMonkey software and MS Excel were used to analyze the data.

4. Presentation of results / findings

The presentation of results streams from the 82 responses returned. The questionnaires were distributed to 108 respondents. The 82 responses represent a 76% return rate and the researchers considered them sufficient to draw inferences presented and discussed in this section.

4.1. Biographical information. Table 2 below reflects that 59 response count was for males and the remaining 23 was for females. This represents a 72%:28% ratio of males to females. This is a fair picture that mirrors the technical and engineering demographics of the province of KZN in the built environment where there are few female players in the industry.

Table 2. Biographical information indicating the gender of participants

Gender	Response percent (%)	Response count
Male	72.0	59
Female	28.0	23
Answered question	82	82
Skipped question	0	0

The researchers also noted that the respondents were from various professional backgrounds in engineering and built environment. The researcher also observed that only four out of twenty three represented by 17% female were directors in their respective engineering practices. This offered a glaring picture of the extent of male domination in the industry and the profession. The rest of the female respondents were either employed professionals or technologists.

The last set of analysis drawn by the researchers on biographical information collected was on the career backgrounds, professions or qualifications of the participants. Table 3 below indicates that the majority of participants were construction project manag-

ers (26.3%), and in the order of their rankings followed by the civil and structural engineers, quantity surveyors, architects, electrical engineers, mechanical engineers and others. The first four ranked professions accounts for 86% and are the most key professions in the construction projects in that they feature throughout the entire project life cycle, i.e., from project start up to finish. Table 3 illustrates the profile of professionals who responded to the study.

Table 3. Response count of the research participants by their professions

Profession	Response percent (%)	Response count	Ranking
Project management	26.3	21	1
Civil / structural engineering	23.8	19	2
Quantity surveyor	18.8	15	3
Architecture	17.5	14	4
Electrical	6.3	5	5
Mechanical	3.8	3	6
Other	3.8	3	7
Totals	100	82	N/A

Further presentation of results is on the research objectives, covering the largest component of the research questions, which are structured according to the sequence of research objectives.

4.2. Descriptive statistics. There were 40 questions in the questionnaire, with 5 being on biographical information, which has been presented and discussed above. The remaining 35 questions were aimed at addressing the research objectives in the main. The researcher deliberately mixed the sequence of questions in order to avoid any bias from respondents. The 5 research objectives and related questions of the research are listed in Table 4 below.

Table 4. Survey questions relating to each research objective

Objectives	Questions								
	6	12	15	23	24	28			
Objective 1	6	12	15	23	24	28			
Objective 2	9	13	14	20	22	27	36	38	39
Objective 3	10	11	25	32	33	34	35		
Objective 4	7	16	30	31	37				
Objective 5	17	18	19	21	26	29	40		

Question 8 was discarded. The researchers later discovered that the rest of the questions sufficiently covered the aims and objectives of the study. About 70% of research participants responded to the survey research, this represents 72% of males and 28% of females. The participants are from varying professional backgrounds, with the majority being project managers followed by civil / structural engineers, quantity surveyors and architects at 26.3%, 23.8%, 18.8% and 17.5%, respectively. The balance represents

other professional disciplines, which had insignificant impact in percentage count. The responses were grouped in terms of research objectives.

5. Discussion on research results / findings

5.1. Research findings. *5.1.1. Time delays and cost overruns.* The research had solicited views of participants on the reasonableness of the scope change approval period. About 51% of respondents agreed and another 39% are of strong approval, meaning that there is 90% endorsement by professionals. To back this, there is also 95% concurrence on the importance of reducing approval processes generally.

Only 50% of professionals are of the view that budget allocation should be on the basis of how quick the budget gets depleted. This could indicate the depth in understanding by professionals that it is not only spending that is a root cause of the problem.

Professionals are endorsing the increased number of infrastructure delivery teams as another possible solution. About 71% agrees and the researcher noted this view and also submits that increasing the number should not be confined to physical head count, however, there are other means of enhancing project resources.

5.1.2. Planning and value-add by professionals. Research results indicate a 93% approval by professionals who subscribe to the importance of proper planning by clients. On whether increasing professional fees can assist in reducing delays, the responses received were moderate, 61% of professionals agreed or strongly in favor of this. There was, however, a significant percentage that was not sure or feeling this was not extremely important.

There were concerns on the outcome of the research on two questions relating to government projects not completed on time, as well as on the question of private sector being more efficient and quicker regarding delivery periods. The consensus is supported by 75% and 84% of professionals who have, respectively, agreed.

The study quizzed the relevance of costing norms in terms of consistencies and major variances that are as a consequence of improper costing or relationship between norms and costing. The study did not provide absolute answers that approves or refutes the position of material cost inflations as a major cause. However, on the question of economic factors as biggest cost drivers, there was an 81% agreement on this assertion from the study.

5.1.3. Project management. The importance of proper design and documentation was supported by 96% of professionals who claimed the importance or extreme importance of this question. Pro-

fessional input to government is supported by 65% and the role of professionals at strategic level also favored by 83% of participants substantiating this important intervention. Nearly 52% of professionals have indicated their sentiments and concerns in not being roped in at planning stages of the project, where they could assist with certain tools and techniques to ensure efficient project management at planning and delivery.

5.1.4. Socio-economic impact. 87% of professionals felt that on-time payment of consultants or contractors is important or extremely imperative. 88% of respondents also agree with importance of imparting skills to beneficiaries, especially the host communities. There were moderate responses to the questions of whether there has been limited support given to contractors where 51% disagreed. This subject may require further interrogation in order to get an in-depth understanding of the extent of support and impact derived from empowerment of emerging contractors.

Although there were no extreme views on the question of infrastructure delivery or projects having insignificant impact economically, however, 57% disagreed. There are also balanced views in this research on whether projects are able to yield the required level of employability to job-seekers. 45% disagrees, 40% agrees with remainder not sure. There is no absolute stance on the matter. This also applies to the question on whether infrastructure is able to contribute towards business start-ups, only 45% agreed, 35% disagreed with the remaining balance that is not sure.

5.1.5. Ethical issues. There is overpowering 94% agreement in this research that the use of highly skilled is undoubtedly important. This is supported by 84% of respondents who suggested that the experience is the best attribute for project execution.

This research noted the 59% participations who did not refute the claim that there is a growing trend by professionals of deploying inexperienced staff to government projects. On a similar case which had a balanced view was the question of whether there is a tendency of inflating costs, 42% agreed and another 48% disagreed.

Lastly on ethical standards, this research remarked that professionals did not rebut or contest the claim that ethical standards have been deteriorating in the past. There was no outright view on the question of whether clients are being given the best value for money by professionals. There is 45% of those in agreement and the same percentage of those who disagree. This means professionals are also uncertain. Professionals may have to do the introspection on the level of ethical standards by retracing the steps that influenced the evolution of project management.

5.2. Research findings with reference to literature.

5.2.1. Time delays and cost overruns. Baloyi and Bekker (2011) observed a number of cases where time delays are a result of client mandated scope changes. This was also supported by Alinaitwe et al. (2013) on ranking scope changes amongst other issues causing delays in the public sector.

Albinu and Jagboro (2002) have even suggested making contingency allowances in the project to deal with the issues that may create delays at later stages of the project implementation. Another school of thought suggested that resources are one of the five key parameters that are integral in the integrated planning according to the study by Chitkara and Kohli (2007).

Adding more resources can also assist with acceleration, as also suggested by Albinu and Jagboro (2002). Although this may assist in speedy delivery, the cost factor will kick-in and this would require clients to make appropriate cost-benefit analysis. The researcher argues that increasing resources presents more risks. Risks can be in many ways and can also result in more delays, disputes and court cases. This is also endorsed by the study of Albinu and Jagboro (2002), as well as by Creedy et al. (2010) that validated a positive correlation between cost overruns with project risks. It is, therefore, imperative that risks areas are kept at minimal levels, largely by proper planning and implementation of proper monitoring, as envisaged by Albinu and Jagboro (2002).

5.2.2. Planning and value-add by professionals. Baloyi and Bekker (2011) had observed that time delays were also a result of inadequate planning. Khang and Moe (2008) had also identified the importance of the competency of planners and designers amongst and other project critical success factors. The importance of professional input to government planning is also validated by Mathenge (2012).

Albinu and Jagboro (2002) who also alluded on how delays have been prevalent in terms of frequent costs and time overruns, cautioned against the negative consequential effect on project delivery. Steinbrink et al. (2011) echoed strong sentiments on issues of material price explosion in major building and its negative impact on public purse.

5.2.3. Project management. The importance of proper design and documentation had an overwhelming view that is also sponsored by Baloyi and Bekker (2011) in emphasizing the negative impact caused by design errors. Subramani et al. (2014) also reinforced this view. Arguably, design errors often result in reworks associated with unnecessary cost and delays. The regression analysis by Ika and Thuillier (2012) also provided a strong

and positive relationship between success factors and design issues.

This supports Papke-Shields et al. (2010) that suggest that there is empirical evidence supporting positive relationship in project management practices and project success, implying that project management practices or standards inherently increase prospects of project success. This was also supported by Ika (2009) who cautioned that use of project management tools remain imperative in today's environment or suggesting that tools and techniques remain relevant.

5.2.4. Socio-economic impact. The importance of skills transfer is also supported by Du Plessis (2007) that studied how human needs ought to be balanced with environmental limits for sustainable development. Meredith and Mantel (2011) also suggested a host of global challenges in dealing with global projects recommending tools such as training, cultural exchange initiatives and hiring of local skills. Khang and Moe (2008) identified adequacy of local skills amongst project success factors. Alinaitwe et al. (2013) lifted lack of training amongst other inhibitors to project success, which also agrees with this research. Ika and Thuillier (2012) also identified training interventions amongst success factors. This was supported by 60% of professionals in this research who disagreed that infrastructure projects have not materially contributed to poor levels of skills.

Pillay and Bass (2008) argued though that construction fast-tracks the impetus of developing towns and major cities, sighting other economic spin-offs. The issues of strikes and political views raised by Kaliba et al. (2009) is also important, since the strikes are always on basic issues, including minimum acceptable wage rates.

5.2.5. Ethical issues. Ali et al. (2010) argued that lack of skills in government fraternity forces most governments to use professionals for their projects. Using inexperienced team is backed by the study of Mathenge (2012) where the study observed the weakened systems of enforcing strict codes by many professional bodies, societies or boards in instilling ethical codes and conducting work with absolute care and diligence. This research also made reference to a number of observed cases where there is a surge in a number of buildings that collapses, owing to design errors and the use of inexperienced team.

Papke-Shields et al. (2010) also endorsed this claim by suggesting that deployment of inexperienced professionals was a cause of project failures. The deteriorating professional or ethical standards were observed by Papke-Shields et al. (2010). This also emerged in the research by Mathenge (2012).

5.3. Comparisons. *5.3.1. Time delays and cost overruns.* This section of the research lifted the importance of reducing the turn-around times on issues such as approvals, scope changes and also recommended the need to consider increasing project teams. This research is in line with the literature by Baloyi and Bekker (2011), which observed cases of client attributed delays, Alinaitwe et al. (2013) on issues of scope changes by the clients and Chitkara and Kohli (2007) on the resources amongst five key parameters for project success. However, studies by Creedy et al. (2010) and Albinu and Jagboro (2002) raised sharp contrast on the issue of increasing resources or project team against the inherent risk factors.

5.3.2. Planning and value-add by professionals. This research underscored the importance of proper planning and increasing fees payable to professionals. It further confirmed that government projects are not completed on time, in most cases, sighting private sector as being more efficient in infrastructure delivery. There were no absolute views on the consistency of costing norms and their impact in major budget variances. The above observations correlate with Baloyi and Bekker (2011) on importance of adequate planning, Mathenge (2012) on the relevance of professional input, Khang and Moe (2008) on how critical is the competency of the planners, Albinu and Jagboro (2002) on the undesirable costs caused by delays and the effect thereof on project delivery and host communities. This research could not confirm the study by Steinbrink et al. (2011) study that it is material price explosion that has a material effect in project costing.

Based on the literature, the researcher noted the relationship between the study by Baloyi and Bekker (2011) and Steinbrink et al. (2011). It observed that Baloyi and Bekker's (2011) study was premised on construction of the 2010 FIFA World Cup stadia in South Africa. Delivery of stadia was time bound and it was necessary that commissioning of construction takes effect before the start of the games, under very tight timeframes. The research has noted that material costing would have been a major issue as also confirmed by Baloyi and Bekker (2011) given that the construction had to be fast-tracked and the demand was excessively high given the tight timelines. This was certainly unusual under typical and normal circumstances.

5.3.3. Project management. This research, however, could not provide unequivocal evidence that it is negligence in poor designs and documentation that affect projects adversely. The results, however, accentuated the importance of professional at feasibility and conceptual phases and application of appropriate tools and techniques. These results coincide

with Subramani et al. (2011) research on imperative impact of designs and negative impact of design errors, as well as Ika and Thuillier (2012) on the relationship between design issues and success factors. Papke-Shields et al.'s (2010) focal point was on project management practices that inherently increases prospects of project success. This study also certified the significance of appropriate project management tools as an enabler to the project success.

5.3.4. Socio-economic impact. Meredith and Mantel (2011), Du Plessis (2007), Khang and Moe (2008), Alinaitwe et al. (2013) and Ika and Thuillier (2012) all stressed the impact skills transfer or training, which were also confirmed in this research. About 57% of research participants that think infrastructure has economic impact reinforced the case made by Subramani et al. (2011) that suggested that construction is an integral part of the economic growth. Du Plessis (2007) validates research that suggested that construction is a very large sector that is able to yield millions of employment opportunities and propel economy to tightened levels. This is also supported by Broudehoux (2007) who found that infrastructure in urban economy can be another revenue stream.

This research concurs with the findings of Pillay and Bass (2008) and notes that reference is made to long term economic benefits. This also goes with manipulation of urban landscape for economic benefits that was adopted in France by Broudehoux (2007). As much as the researcher agrees with these views, the research by Pillay and Bass (2008) addresses economic impact in the urban setting, not necessarily the impact where there is extreme poverty and huge wealth gaps which were also identified by Steinbrink et al. (2011). This research is able to back Steinbrink et al. (2011) in that mega projects have insignificant employment impact, where there is extreme poverty. Construction models create temporary employment and not necessarily long term and sustainable employment.

This research is unable to argue with authority on whether the infrastructure projects are able to yield a fair amount of employability or whether projects are able to elevate construction employees to a level of creating their own businesses.

5.3.5. Ethical issues. On the question of deteriorating professional or ethical standards, this research corresponds with the study by Papke-Shields et al. (2010). Professional bodies should be getting concerned about this development which also emerged from the results of Mathenge (2012), which advocated that moral responsibility of professionals is supreme.

The researchers noted the narrow margin in the contrasting views on whether professionals tend to inflate cost in order to cover any potential

shortfall during the life of the project. The researcher is of the view that it is necessary that this topic becomes a subject for further research.

6. Recommendations

The research has been able to assist a host of role-players in the built environment in understanding the depth of the root causes of delays and the problems not necessarily unique to the South African public sector only, since there were many commonalities drawn from other countries that experience similar challenges.

In going forward, the role-players should take recommendations of this study and also take cognisance of this study in designing their delivery models. This is to ensure that pitfalls of the past are avoided for future cost and time savings, as well as deriving much needed value to the taxpayer and project beneficiaries.

6.1. Implications of this research. The implications of the study vary from changing the tradition on how delivery of projects has been done in the past to challenging the professional bodies and the regulatory environment. The regulatory environment of the government should not be cast in stone. These regulations also were not designed to be rigid forever, whilst they were for noble intentions in most cases, the delivery of infrastructure has to take another trajectory once again, noting the period since post-apartheid and the growing impatience amongst the poor who have been yearning for life changing development that they are yet to experience. Revision of legislations is a norm and from time to time they have taken effect as and when there is a compelling cause.

Studies on the causes and root causes have been extensively studied by the scholarship. New trajectory does not necessarily require answers to the problems, but solutions in re-modelling the delivery prototypes. New delivery prototypes can be modelled on efficiencies, drawing lessons from private sector, sensitivity towards unnecessary costs incurred by government and extreme impact to the poor or sustainable development, skills leverage and ultimate economic impact.

6.2. Addressing the research objectives. The five research objectives that this study sought to address, outlined below were addressed by the research, although there are some that were not adequately covered hence recommended for further future researches.

Research objective 1

To establish the causes of delays in completion of projects within the scheduled timeframes, there was an overwhelming consensus on the causes of

delays. Of interest is that most causes are common even in other studies conducted elsewhere, including other countries. It is left to the government to understand the root causes and implement appropriate measure to curtail delays.

Research objective 2

In order to ascertain the impact of project management in terms of providing value for money to the government, this research lifted two prominent things, which are planning and issues of price inflation to projects. Whilst the government has a three year planning cycle, there seem to be limitation in terms of value-add. This calls for the review of the planning resources and inputs in the government planning and delivery model to ensure that there is optimal value created.

Research objective 3

In assessing the impact that can be derived from optimal use of professionals in the entire life cycle of the project, this point can correlate well with the research findings of research objective 2 as one of many inhibitors to proper planning in terms of application of the project management science effectively and ensuring that there is engagement of professionals from conceptual stages of planning throughout the entire project life cycle.

Research objective 4

Arguably, one of the most important objectives in the South African context is this objective, which was to test the socio-economic impact of the infrastructure delivery on the livelihoods of the infrastructure project host communities, was able to create a platform for further studies and send the message that long-term employment opportunities are more sustainable than short term that are currently gained by host communities. This research also revealed that infrastructure assets built can also be a source of revenue and contribute to economic growth in a long run, if planned properly. The government and other role-players should, therefore, invest significantly in understanding how other countries have optimized this benefit.

Research objective 5

This research was also able to establish if ethical standards of professionals are still exercised to the best advantage of the clients in execution of projects. Some professionals were proponents of this assertion, while some others had strong opposing views. This would require further engagement from research and further dialogues. The question of ethics cuts across many fields and future studies can also try to establish if there is any relationship with moral decay in society, generally and perhaps the culture that has evolved over the years.

6.3. Recommendations to solve the problem.

Based on the discussion above and issues raised by the research, it is recommended that factors that are central to delays are presented to IDT team and also shared with clients, with a view of reviewing all the cumbersome processes and milestones in the value-chain. The review should address the following:

- ◆ How decision making processes are fast-tracked?
- ◆ How does the government model some efficiency in their systems and processes, by learning from the private sector?
- ◆ How the government engages the professionals and redefine their terms of references, including review of fees payable?
- ◆ How cashflow challenges that suppress speedy delivery of projects can be improved? and
- ◆ Review if there can be better methods to ensure that skills transfer, empowerment and real economic benefits can accrue to the host communities and the extreme poor.

6.4. Recommendations for future studies. Focus of future studies should be on areas that were quizzed by this research where there was no consensus, such as:

- ◆ improving or standardizing costing norms and gearing towards accuracy;

- ◆ the extent of negligence on designs, estimating and documentation by professionals and cost thereof to the government;
- ◆ the real impact of infrastructure project delivery model to the poor and the drive towards sustainable development; and
- ◆ driving towards reinvigoration of professional standards for the new trajectory.

The study deliberately looked at the engineering and built environment perspective. Changing the angle of the research to the most affected such as the poor could yield other solutions.

Conclusion

The research questions were relevant to the research problem. They were able to establish problems and causes thereof. They also highlighted the need to optimize the use of professionals and paying attention to project management science such as the use of appropriate tools and techniques as enablers. The five research objectives of the study were achieved and these objectives were mainly on exploring ways to efficiently manage projects in KZN province. What emerged from the study is that the way projects are managed affects the budgets of projects in the province. The study also highlighted the need for a serious relook at socio-economic and ethical issues.

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