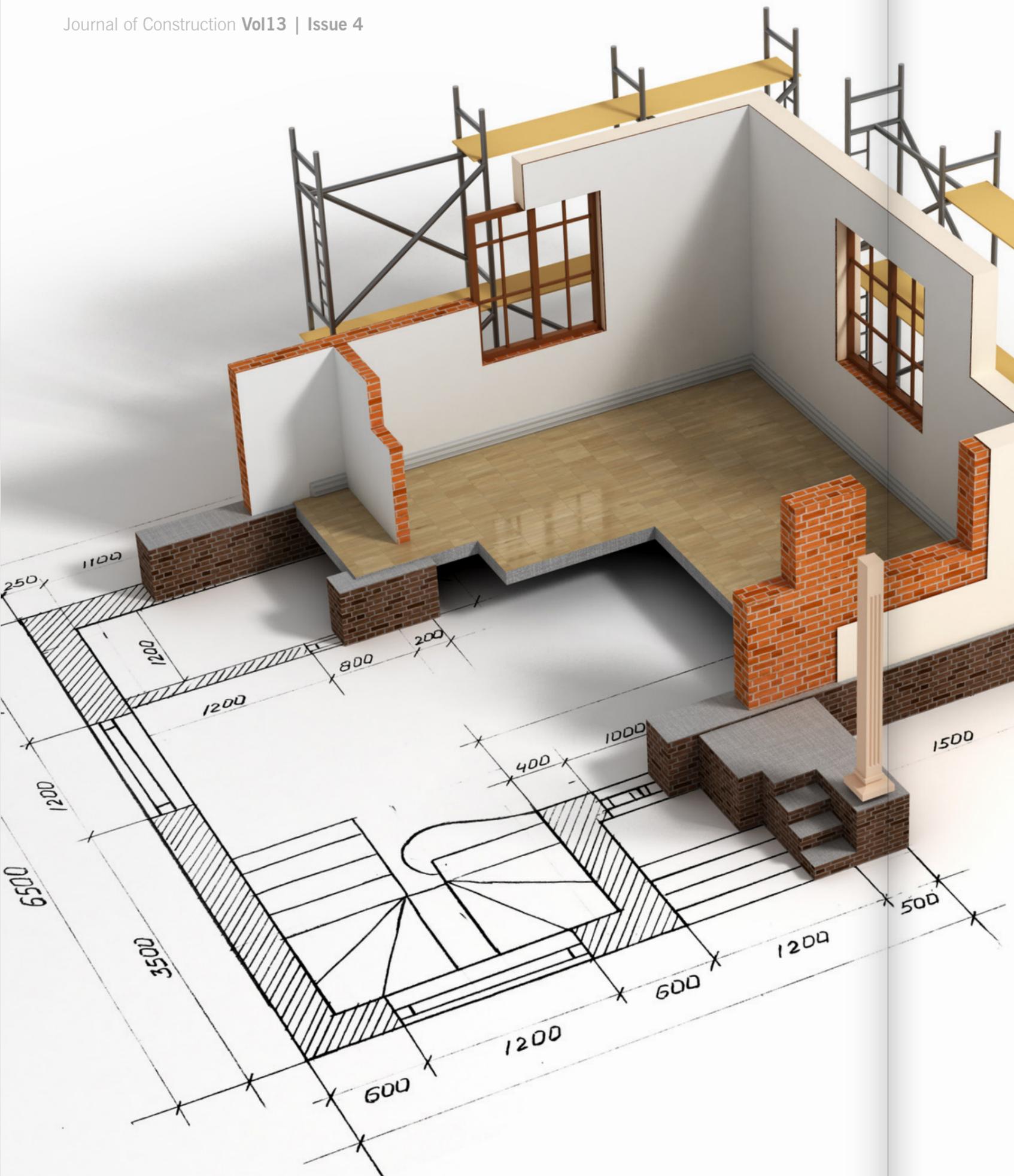




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AIM AND SCOPE

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THE EFFECT OF GOVERNMENT POLICIES ON THE CONSTRUCTION SECTOR'S ABILITY TO SUPPLY SUBSIDISED HOUSING IN SOUTH AFRICA

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Abstract

Purpose

The purpose of this study was to assess whether the government's housing procurement policy is sufficiently responsive to the requirements and constraints exhibited in the subsidised home building sector.

Design / methodology / approach

The methodological design for the study adopted a post-positivist philosophy, embracing a quantitative approach and using questionnaires, which incorporated mainly five-point Likert type scales, as an instrument for data collection. The primary outcome measures used for this study were the one-sample t-test, ANOVA, and the Scheffé test. This allowed an in-depth analysis of the differences in terms of government subsidised housing (GSH) stakeholders' perspectives relative to the effect GSH policy has on the ability of contractors to supply GSH.

Findings

The research findings indicated that respondents mostly disagree with the notion that the government's policy practices do not impact the construction of GSH. The implication is that the government's policy practices is regarded as inappropriate for application in the GSH sector.

Value

This study gives an indication as to why the housing delivery process in South African appears riddled with issues of quality, delays, private and public sector incompetence, and corruption. This led to the recommendation that the South African government critically reassess current GSH procurement policies to ensure that contractors supply maximum benefit in GSH.

Keywords: Housing construction / supply, Government policy / housing delivery, Subsidised housing / RDP, South Africa.

INTRODUCTION

Background

According to the South African constitution^[1] all citizens have the right to habitable housing that is healthy, safe, secure, accessible, and affordable, and which includes basic services. Legislation developed in response to the citizens' rights, therefore gives Government the responsibility to provide habitable housing to those who cannot afford it, which forms the backdrop for social housing in South Africa.

To fulfil its constitutional responsibility to provide habitable housing to the poor, as an act of liberation to relieve them from harsh living conditions, government delivers by making use of the private sector to supply GSH through taxpayer funding by means of a tendering (bidding) process, which involves the construction sector using construction practice-driven methods.

However, an analysis of housing delivery indicates that the closest Government came to its intended target of one million houses every five years was 758 342 during the second cycle (1999 – 2004). Although the number and pace of actual delivery cannot be played down as insignificant, the statistics do not show the quality, habitability, effectiveness, and cost-efficiency, relative to the best possible benefit afforded to both housing recipients and the taxpayers of South Africa.

This resulted in dissatisfied GSH recipients and citizens in general. Issues relative to dissatisfaction, include:

A huge housing backlog ^[2] ^[3] as well as quality and affordability issues ^[4], which puts government in a triangular predicament of huge backlogs (time) versus required quality (standards) versus affordability (budgets), fuelled by financial mismanagement ^[2]

- Policy and procedural guidelines issues, which resulted in a problematic and conflict-ridden process in practice ^[2];
- The divide between policy and practice, which relates to a lack of capacity and planning capabilities among those responsible for housing delivery ^[2];
- Established contractors leave ^[5] or do not engage in the GSH sector ^[6], leaving inexperienced and incompetent contractors to supply GSH ^[7];
- A flawed procurement process that permits loopholes, fraud, and corruption ^[8], which result in political priorities that marginalise construction ^[5], and
- GSH that does not meet the expectations of recipients in terms of dignity, integrity, demographics, family structure and size, culture and weather ^[9], as a result of general concerns regarding quality, design, size, thermal properties and exterior / interior finishes ^[10], which perpetuates shack erection ^[9] and led to recipients abandoning GSH due to health and safety concerns ^[11].

The related literature gives insight relative to housing delivery as a construction issue and a certain logic can be traced in the housing delivery process. Accordingly, it is argued that a shortage of housing for the poor does exist. Housing delivery is a process for relieving the poor from the housing shortage. The government needs to provide houses for free, and therefore draw up plans and put legislative structures in place. Taxpayer money and building contractors are needed to supply houses. Building contractors need to supply houses according to specifications to be paid.

To secure services from the construction sector, the government draws up procurement policies, according to which the procurement process should conform and thereby enter the realm of a long-established construction sector, which operates relative to long-established practices. Accordingly, the government's procurement policy should be compatible in terms of construction sector practices.

However, the government has certain ideological preferences and objectives to achieve, which forms the basis for the procurement policy. This causes the procurement policy to be flawed in terms of construction practices, which can be

considered as political priorities marginalising construction.

Research gap

Various research reports have been reviewed, and it was found that discussions, relative to the effect of GSH policies as a factor that influence construction supply, are incoherent and fragmented, which led to the realisation that a research gap exists. Most research reports have a social, administrative, or public service perspective and, in most cases, do not reflect the compatibility of GSH procurement policy relative to the complexities of construction supply practices.

Reports surveyed include Leigh Burgoyne ^[2], addressing subsidy allocation as a factor affecting housing delivery, in a community and development context; Mkuzo ^[12] focuses on the perceptions of the quality in GSH in a public administration context; Madzidzela ^[13], in a social context, addresses factors affecting housing delivery in a municipality and how to improve it, while Lebete ^[14] investigates how the implementation of a project accomplishes the aims of GSH policy. Those reports with a construction context are mostly fragmented. Oladapo ^[15], introducing a framework for cost management of low-cost housing, and Wentzel ^[16], analysing quality assurance in low-cost housing construction.

Research problem

A GSH procurement policy that is incompatible in terms of construction practices causes problems that result in:

- Established contractors leaving the GSH sector;
- The appointment of incompetent and poorly resourced contractors, who, in numerous cases, fail or abandon projects, which then requires the appointment of alternative contractors;
- Corruption during the bidding and construction phases, and substandard quality because of contractor incompetence and failing government systems.

Purpose and objectives

It appears that GSH delivery is a multi-stakeholder, multi-phase problem, exacerbated by political interference and corruption. GSH delivery appears ideologically and politically designed and executed, and certain practicalities relative to the construction process may not have been considered.

Policy and practice incompatibility, therefore, seems to be a major obstacle to GSH supply. It was, therefore, important for this study to assess whether the current policy is sufficiently responsive to contractors' requirements and

constraints to supply GSH.

The aim of this study was to assess whether the government's subsidised housing procurement policy is sufficiently responsive to the requirements and constraints exhibited in the construction sector.

The specific objectives were to determine whether:

- The government's housing procurement policies are appropriate for application in the GSH sector;
- The housing procurement process is appropriate for the GSH sector;
- Political priorities marginalise construction in the GSH sector;
- Contractors, typically appointed in the GSH sector, exhibit construction business competencies;
- Contractors, typically appointed in the GSH sector, exhibit construction resource capacity, and
- Government procurement policy practices impact corruption in the GSH sector.

LITERATURE REVIEW

Government procurement policy and governance

Governments need to deliver services, construct infrastructure, and maintain it for the people they serve, which often results in the purchasing of goods, services, and works from, and payment to the private sector ^[17]. This is achieved by means of a contractual arrangement between government and private organisations, in line with procurement policies and processes.

Ibiyemi ^[18] citing Jackson & Price (1995), reflect upon how market liberalisation has caused conflict between practice, policy, and ideology, and impacted upon developmental goals worldwide. Policy is described as a decision that serves as a guideline to address identified and selected goals or problems in the public interest and a mechanism to deal with problems. A procurement policy is the rules and regulations to govern the process of acquiring goods and services to ensure best value for money and instil external confidence of ethical conduct ^[19].

Governance is a process of acting upon policy by means of decision-making and implementation, while good governance reflects an attitude towards decision-making and the implementation of policy decisions ^[20].

Procurement as a system

The international council on systems engineering (ICOSE) ^[21] defines a system as an integrated set of elements, segments, and subsystems that perform flawlessly to accomplish a defined objective. Systems consist of various components that accept inputs, processing them and producing outputs in an organised manner ^[22], and need methodologies and techniques to help all the elements, segments and subsystems work closely together to maximise their chances of success in deploying products or service, which meet user and customer needs ^[21]. Procurement involves a succession of logically related actions, performed in a definite manner ^[23], to create and manage contracts, related to the purchasing of supplies, services, and engineering or construction works or disposals, or any combination thereof ^[24], with the intent of culminating in the completion and fulfilment thereof.

According to the cidb ^[23], the procurement process involves:

- Establishing and documenting what is required;
- Soliciting the private sector for offers to provide supplies or services; construct or maintain infrastructure, or undertake disposals;
- Awarding contracts to successful tenderers;
- Monitoring contractor performance, and
- Paying contractors according to performance.

The purpose of procurement systems is to carry out activities related to procurement in such a way that the goods and services procured are of the right quality, from the right source, at the right cost, and can be delivered in the right quantities, to the right place, at the right time, in order to maximise the system's chance of success in deploying products or services which meet system user and customer needs ^[25]. Procurement systems seek to ensure the best value for money for each of the six 'rights', and thereby describe the outcomes of procurement as performance indicators, to determine its level of success ^[26].

Public procurement mission objectives (fairness, equity, transparency, competitiveness, and cost-effectiveness, in terms of socio-economic and environmental objectives) ^[26] should not be confused with procurement system objectives ^[19]. As external policy objectives, procurement mission objectives have the purpose of meeting policy and organisational objectives in terms of delivering better services ^[27], and arise from government procurement legislation, policy and guidelines, which is termed a secondary procurement policy that promotes objectives

additional to those associated with the primary objective of the procurement system [28]. Procurement system objectives, as internal policy objectives, arise from a need for a procurement system to obtain the best value for money that maximises the probability of success in deploying low cost, reliable, high performance, and maintainable products or service [28].

There is a general assumption that those tasked with the development of a procurement system know and understand the fundamentals of systems engineering. INCOSE [21] contends that the perspectives of what a system should be depends on the discipline of the person involved. Guidelines and toolkits [23] are generally focused relative to the rules that will be governing the procurement system instead of the underlying fundamentals of systems development. Issues are confused and lost between systems and policy. Seymour [29] maintains that the flawless operation of a system, as designed, is more important.

It is therefore argued that a procurement system starts out as a process of elimination, which should lead to the single most important objective of procurement, which is, selecting the most suitable contractor to deliver a product or service at the right quantity, quality, time, place, and price. It is, therefore, paramount to design a procurement system, using system design fundamentals, so that it flawlessly performs its primary function of sourcing the best contractor. As soon as the procurement system proves itself flawless and robust in doing what it was designed to do, different scenarios can be introduced. A scenario may occur because of certain legislation, policy, special contractual requirements, or conditions.

A different set of rules will then be developed for each scenario to guide it through the procurement system. These rules may also describe the type or level of 'right' that is to be achieved for each of the procurement system outcome objectives applicable to each scenario. This enables the system to deal with each scenario on its own merit while remaining within the primary set of rules for achieving its primary objectives. It would also eliminate the need for developing different procurement systems to deal with different scenarios. The emphasis should, however, be on developing a robust system, using system engineering fundamentals, which will be able to deal with any scenario.

Construction procurement

The cidb [30], citing the Standard for Uniformity in Construction Procurement (SUCP), defines construction procurement as procurement in the construction industry, including the invitation, award, and management of

contracts, with contractor selection as the most important element [31]. Still, Chan, [32] citing Rwelamila and Meyer (1999) refers to the selection and use of an appropriate procurement system as a significant factor for the success of a construction project. As a key means to attain project goals, Ratnasabapathy and Rameezdeen [33] maintain that different procurement systems need to be used for different projects and that appropriate selection of procurement systems may help to avoid problems. Identifying significant factors affecting the selection of procurement systems and the development of a model, enabling a realistic selection process, is considered essential to the success of a project.

Reference is made to several authors, such as the National Economic Development Office (1985), Skitmore and Mardson (1988), Masterman (1992), Chan et al. (2001), Cheung et al. (2001) and Luu et al. (2003), who have all strived to develop a systematic approach for procurement selection [33], while Ibiyemi et al. [18] maintain that procurement systems must be appropriate to circumstances.

Contrary to this, it has already been argued that a procurement system starts out as a process of elimination to select the most suitable contractor and only then considers procurement mission objectives, while Emuze and Smallwood [34], citing Tookey et al. (2002), argue that clients and their advisors select procurement systems illogically and inappropriately. It, therefore, appears that despite all attempts to develop systems for selecting the perfect contractor, the question remains: "Why then do facility owners continue to select non-performing contractors?" [31]

Procurement policy issues

Concerns have been raised whenever procurement is used as an instrument of socio-economic policy and is therefore not without controversy [35]. ISO [28] considers government procurement, used as an instrument of policy, as a risk that may not only undermine procurement good governance objectives but also compromise a procurement system's good governance objectives.

The risks of using procurement as an instrument of socio-economic policy may be detrimental to achieving good governance as well as the very procurement mission objectives it is trying to serve in meeting policy and organisational objectives. Mauro [36] maintains that much public corruption can be traced back to government interventions, such as policy changes aimed at stabilising, liberalising, deregulating, and privatising the economy.

The following deficiencies affecting the delivery of GSH may be traced back to government policy [37]:

- Lack of coherent strategic direction;
- Lack of conducive policy environment;
- Lack of good governance and decision-making structures;
- Inefficient internal systems;
- Inefficient processes and procedures;
- Inefficient performance review mechanisms, and lack of capacity.

Procurement policy issues relative to construction

The government's policy to set the subsidy amount, makes it difficult for established contractors to comply with social and economic objectives, and places emerging contractors at a disadvantage, as their peculiar difficulties cannot be addressed. The policy that requires municipalities to use emerging contractors and black economic empowerment has failed municipalities and caused GSH delays or non-delivery [38]. This may even contribute to the skills shortage in the GSH sector.

Lizarralde and Root [39], citing Keivani and Werna (2001), propose that GSH policies be oriented towards facilitating informal contractor activity, maintaining that current policies and construction practices make it difficult for them to participate in the GSH programme, however, the same seems true for established contractors. It, however, remains to be seen how construction practices can make it difficult to participate in the GSH sector unless the participants lack the requisite skills.

The government, since 2005, have recognised that involving larger established contractors may assist in addressing the GSH backlog [40]. However, established contractors left the GSH sector, even before 2005, and have not returned in large numbers [40].

Established contractors submit various reasons for leaving the GSH sector, such as:

- Substandard tender documentation [40];
- The public / private sector partnership envisaged in 1995 and 2005 not materialising [37];
- Doubting government's sincerity to meaningfully participate with the private sector [41];
- Considering GSH as a high risk / low margin sector[41]
- Government expecting contractors to deliver GSH at

no profit [41];

- No confidence in any attempts to involve the private sector [40];
- Profitability issues, as subsidy increases do not keep up with building cost increases [42];
- Payment delays on GSH projects [43]
- Fixed subsidy amount hampering established contractors in complying with socio-economic objectives [28].

The cost of corruption

Allwright [44] maintains that the absence of notable convictions under the Public Finance Management Act and the Municipal Finance Management Act raises concerns that incidences of corruption, bribery of public officials, kickbacks in public procurement and the embezzlement of public funds have skyrocketed, and efforts to stem its growth have been ineffective. The awarding of tenders to incapable and inexperienced contractors has been listed as a factor of failure in the delivery of quality GSH, which is a result of a lack of: procurement regulation compliance, monitoring deliverables, and linking payment to successful delivery [38]. Bank et al. [37] argue that legislation and policies, based on ideologies, may have been ill-conceived and have great potential to cause corruption and systems failure. Public corruption can be traced back to government legislative and policy interventions; however, it does not merely concern individual greed and incompetence, but points to the failure of systems and ideologies, which points to the failure of a procurement system and general government systems [36].

Bank et al. [37] describe the issues affecting GSH delivery in the Eastern Cape Province as a lack of:

- coherent strategic direction;
- conducive policy environment;
- good governance and decision-making structures;
- efficient and effective internal systems;
- processes and procedures;
- performance review mechanisms, and capacity.

Failed procurement

Supply-chain management has the supposition that emerging contractors are experienced and capable; however, this notion has failed municipalities and led to delayed GSH delivery or non-delivery [38]. This has led to calls from some government officials to place a price and time factor on GSH projects targeted for emerging contractors [5]. Factors that may have contributed to the failure of delivering quality GSH and contributed to general dissatisfaction include the

awarding of tenders to incapable, inexperienced contractors [38]. While some of the failures on the N2 Gateway Project can be attributed to political influence [42], an analysis of building cost increases reveals that the subsidy amounts consistently lagged BCI increases up to 2009 and appears to be a factor of failure relative to profitability.

Effective procurement

Pillay et al. [38] maintain that the appointment of competent and experienced building contractors has led to success in GSH delivery

Factors that contribute to successful and timely delivery of quality GSH thus contributing to community satisfaction, include [38]:

- Tight contracts;
- Clear up-front assessment of budgets for external consultants and contractors;
- Linking payment to contractors with regular monitoring of quality;
- Access to competent and professional external service providers;
- Municipalities having the requisite technical skills;
- Municipalities having access to additional funding to complete projects;
- Overall good management;
- Logistical matters working in favour of the project;
- Easy access to areas under development;
- Infrastructure services in place before building commences;
- Appointing experienced, open and helpful contractors;
- Municipalities working closely with contractors, including conducting weekly site visits, and monthly meetings;
- Officials that are in close communication with the municipal executive;
- A supportive mayor;
- Calling urgent meetings to address problems;
- Having a green-fields site;
- Community agreement and support;
- On-time payment of contractors;
- Proper supply-chain management protocols, and consistent monitoring.

Griffith [45] identifies nine critical success factors for the best value in the public procurement of construction works to maximise efficiency in the procurement and

management approach. These include cost, duration, quality, responsiveness, risk, client satisfaction, added value to core business, safety, and environmental safeguards.

RESEARCH METHOD

This paper forms part of a larger study, which adopted a post-positivist philosophy, embracing a quantitative approach; however, it only reports on part of the study. This approach offered the best probability of collecting useful data to produce appropriate evidence that enabled answering the initial research question as unequivocally as possible [46], but is also considered most suited for objectively uncovering data that can be used to create meaning and new knowledge [47].

Electronic mailing was used to disseminate questionnaires among 2 884 randomly selected potential respondents. According to Leslie [48], citing McNamara (2006), the overall purpose of a questionnaire is to, quickly and easily, gather a large amount of data from people in a non-threatening way. The advantages of using questionnaires include that they can be completed anonymously, are inexpensive to administer, are easy to compare and analyse, are administered to many people, and used to obtain ample data. The study made use of non-metric nominal data, which can be labelled, but not calculated or compared and ordinal data using scales, which can be compared, but not added, subtracted, or calculated [49]. Therefore, answer options available to respondents in the questionnaires included: single choice, multiple choice, and five-point Likert-type scales. Likert-type scales are often used in the social sciences to gauge attitudes, emotions, opinions, personalities, and descriptions of people’s environment [50]. Lane et al. [51] explain Likert-type scales as a set of ordered score values without defining the distance between values.

The electronic questionnaire was initially developed as a paper-based exercise under the guidance of a focus group of experts. The questionnaire was based on the participants’ demographics and the five areas of concern. The questions and instruments used included demographic questions using mask inputs and multiple-choice checklists, as well as questions related to the areas of concern, using ordinal scales. Finally, the questionnaire was converted into an electronic format using LimeSurvey® (Version 1.91 + Build 10951).

Because this survey was conducted among South African industry stakeholders, which include distinct groups or ‘strata’, it was decided to adopt the stratified sampling procedure to make the sample more representative of the population [52].

During the stratified sampling process, the researcher identified members who belong to certain groups and draws random samples from each subgroup, ensuring the samples are proportional to the sizes of the population [59]. This method of sampling ensures an unbiased estimate of the population mean, which means that on average, the value of the sample mean will equal the population mean [53].

For this study, two stakeholder groups were identified:

- Government officials
- Service providers, which were subdivided into

construction contractors, built environment (BE) professionals and resource suppliers.

A database of potential respondents was obtained, which consisted of 277 143 decision-makers in 46 000 organisations across various job titles, covering six management levels, and 17 business functions in 10 sectors of the economy [54]. This ensured that the participants for the electronic survey were sampled from a diverse array of South African decision-makers in the construction sector.

The database was sorted relative to the four groups, and questionnaires were sent and received, as indicated in Table 1.

Although the sample of participants consisted of both those that had experience in GSH, and those without exposure, these two groups were separated by means of ‘gatekeeper’ questions in the questionnaire itself.

TABLE 1
QUESTIONNAIRES DISSEMINATED AND RETURNED

Stakeholder group (Self-categorised by respondent)	Questionnaires		
	Sent	Started	Completed
Government officials (project related)	288	34	18
Construction contractors (building & civil)	893	76	29
BE professionals (CBE professional practices)	1 202	137	57
Resource suppliers (material, plant, & finance)	501	37	17
Total	2 884	284	121

Source [55]

The electronic survey was administered as follows:

- A formal email was sent, briefly explaining the purpose of the survey and containing the URL link to the questionnaire with a unique token number to limit one use only;
- The link was kept open for four weeks until 2 December 2014, and
- The results on the server were exported as Microsoft Excel files in CSV format for safe-keeping and presented to the statistician for preparation and analysis.

The data analysis was administered as follows:

- In preparation for analysis, the database was scrutinised for dual sets of data, prepared, coded and cleaned-up of any anomalies that may have affected the analysis;
- The statistical features of Microsoft Excel were used to process the data
- While the survey produced two levels of analysis, including contingency and frequency distribution tables, this paper only reflects the inferential statistics as the second level, reflecting: Cronbach's alpha coefficients; one-sample t-tests; Cohen's 'd'; ANOVA, and Scheffé test.

The reliability of an instrument is closely associated with its validity, which means that an instrument cannot be valid unless it is reliable [56]. Cronbach's alpha is considered an index of reliability and providing such a measure of internal consistency of scales and is used to establish internal reliability. Ensuring reliability seeks to achieve similar results if a questionnaire is repeated with the same participants soon after the previous, and consistency in the responses to the questionnaire.

FINDINGS AND DISCUSSION

Introduction to the findings

Although this paper generally focuses on the first set of hypotheses, the demographics section in the questionnaire revealed interesting phenomena, which assisted in validating the relevance of the sample group [55]. In summary, the conclusion was that respondents were: mostly mature, experienced individuals with at least 10 years of working experience; highly educated, mostly qualified in the built environment, and business sciences, with sufficient knowledge to make meaningful inputs to a BE

study; in appropriate current positions to make a discerning contribution to the study, and occupiers of positions in the GSH in the past to make a discerning contribution to the study by providing valid reasons for leaving the GSH sector. For conciseness, demographic features are not presented in detail as this part of the larger study was quite extensive.

The second part of the questionnaire considered questions relative to the first set of hypotheses, which were aimed at revealing the appropriateness of GSH procurement policy relative to its effect on the construction sector, thereby placing emphasis on government policies and the effect it has on GSH supply. By implication, the government's worldview relative to housing supply will be challenged by testing the impact that GSH policies have in terms of contractor operations and success. This was performed by obtaining the perspectives of respondents from four groups. These consisted of three private sector groups, all acting as representatives of the construction sector and government officials acting as proxy agents for Government.

The hypotheses testing started out by first considering the Cronbach's alpha for each factor, to measure the internal consistency of the scale and thus establish validity. Thereafter, a one-sample t-test was used to compare the sample mean (\bar{x} or M) for each factor in terms of the hypothesised population mean (μ), indicated in the test statistics table as $H1$. Any $H1$ value within the parameters $2.60 \leq M \leq 3.40$, at this early stage of the test, is considered insignificant, which meant the null hypothesis was retained, and no further testing was required. Any $H1$ value less than 2.60 and greater than 3.40 is considered applicable for further testing by means of the t-test to establish significance. For this study, the t-test was performed in terms of all four groups simultaneously. However, because this study relies on comparisons for its outcome, it was decided to also show the p-value for individual groups as part of the combined results table, and an initial indication of how the individual group perspectives differ from the population mean and each other. Should the test statistic vastly differ from the sampling error in the population parameter, it can be concluded that the sample came from a different population and that the statistical probability (p-value) may be calculated. Obtaining a p-value of less than 5% means that the null hypothesis is rejected. This leaves the researcher with an alternative hypothesis. Whenever the null hypothesis is rejected, the decision to do so constitutes an effect, and although hypothesis testing can identify whether an effect exists, it gives no indication of how large the effect is. Cohan's d was therefore used to measure the size of the effect (score shift) in a population and to describe how far scores shifted above or below the population mean.

Whenever a null hypothesis is retained, it means that respondents have a similar world view as Government, which gives this decision some legitimacy and significance. However, when a null hypothesis is retained, it does not necessarily mean that there is no difference in the opinions of the different groups. The t-test, therefore, gives an indication of whether respondents have similar perspectives relative to issues as hypothesised for the population, and for this study is considered the government's world view relative to the effect of policy on GSH supply. However, while the t-test can compare a single sample mean to a specified parameter, it cannot compare the sample means between two or more groups.

The ANOVA test was therefore introduced to identify differences in mean perspectives among the four groups by comparing mean score variances within and across groups. Two tables are produced to reflect the result of an ANOVA test, of which the first produces a record of descriptive statistics. The second table produces a record of the inferential statistics. A p-value of less than 5% means that there is a significant difference between groups. Although this gives an indication of whether there is a difference between groups, it does not indicate between which groups there is a difference, and how large the difference is.

To do this, the Scheffé test for pairwise comparisons was introduced. Six sets of comparisons had to be performed to ensure that each group was compared with at least three other groups. A Scheffé p of less than 5% indicates that

there is a significant difference between the two groups, which means the Cohan's d can be calculated. A Scheffé p equal to or greater than 5% indicates there is no significant difference, which means the result is not applicable for calculating and interpreting Cohan's d.

Table 2 presents a framework for operational definitions of constructs in the hypotheses, which include question numbers and dependent variables (Vd) as it is discussed from hereon. The independent variables (Vi) are indicated with the main hypotheses.

Hypothesis testing

The main hypothesis reads as follows: Government housing procurement policies are inappropriate for application in the GSH sector. This hypothesis relates to housing procurement policy and practice as the main concern and covers six statistical hypotheses relative to issues of government policy and process suitability; the marginalisation of construction; emerging contractor business competency, and corruption.

For conciseness, to highlight the process of inferential analysis used for this study, the testing of only the first sub-hypothesis will be demonstrated by means of results tables and discussed in detail. Thereafter only the results of the remaining sub-hypotheses will be presented as indicated in Table 9 and discussed. The findings and discussion for each statistical hypothesis are presented according to the objectives for this paper as indicated earlier.

TABLE 2
FRAMEWORK FOR OPERATIONAL DEFINITIONS

H1	Government housing procurement policies are inappropriate for application in the GSH sector (Vi = Policy practices)		
No.	Hypothesis	Question	Factor / Variable (Vd)
H1.1	Housing procurement policies are inappropriate for application in the GSH sector.	23a	Policy suitability concern
		23b	Policy suitability frustration

H1.2	The housing procurement process is inappropriate for the GSH sector.	25	Policy acceptance
		27	Policy experience
		28a	Policy risk concern
		28b	Policy risk frustration
H1.3	Political priorities marginalise construction in the GSH sector.	29	Maximum benefit
		30	Contractor performance
		31	Contractor participation
		32	Contractor success
H1.4	Emerging contractors appointed in the GSH sector lack construction business competencies.	34b	Contractor CM competency
		35b	Contractor business traits
H1.5	Emerging contractors appointed in the GSH sector lack construction resource capacity.	36a	Contractor resources ownership
		36b	Contractor access to resources
		37	Contractor resource competence
		39	Contractor lack of resources
H1.6	Policy practices contribute to corruption in the GSH sector.	40	Corruption risk
		41	Good governance
		42b	Corruption proliferation

Source [55]

Objective one: Determine whether the government's housing procurement policies are appropriate for application in the GSH sector.

Hypothesis 1.1 is statistically formulated as:

H0: Housing procurement policies are appropriate for application in the GSH sector.

H1: Housing procurement policies are inappropriate for application in the GSH sector.

This statistical hypothesis was tested by means of two questions. The process started out by producing Table 3, which shows the dependent and independent variables for each question, together with the Cronbach's alpha for each set of data.

TABLE 3
VARIABLES FOR HYPOTHESIS 1.1

Question	Independent variable	Dependent variable	Cronbach's alpha	
23a	Government policy practices	Policy suitability concern	0.82	(Excellent)
23b	Government policy practices	Policy suitability frustration	0.84	(Excellent)

Source [55]

The Cronbach's alpha obtained for these two questions were found to be sufficient for summarising the results obtained from question 23a and 23b to produce the descriptive statistics for conducting the t-test in Table 4.

TABLE 4
ONE-SAMPLE T-TEST COMPARING SAMPLE MEAN BY FACTOR - HYPOTHESIS 1.1

Q No.	n	M	S.D.	H1	t	df	p	Cohen's d	All			
									Contr.	Prof.	Supp.	Gov.
23a	240	3.44	0.96	$\mu > 3.40$	0.61	239	0.541	n/a	0.075	0.843	0.058	
23b	235	3.31	1.00	$n/a (2.60 \leq M \leq 3.40)$			0.154		0.84	23a	23a	23a

Source [55]

The test statistics from Table 4 for both questions fail to reveal statistically significant (Q23a: $t = 0.61, p = 0.541, df = 239$) results. However, when the data is disaggregated, relative to the four groups and tested separately, there appears to be a difference.

Therefore, when an ANOVA test is invoked, to determine whether the four groups differ from each other, the test statistics show that there is a difference (Table 5: $dfB = 3, dfW = 236, F = 5.29, p = .002$ and Table 7: $dfB = 3, dfW = 236, F = 3.06, p = .029$) between the four groups. This prompted the use of the post-hoc Scheffé tests, which revealed the test statistics as indicated in Table 6 and Table

8. In all cases where a difference ($\mu_i > \mu_j$) was revealed, it was found between the private sector and public sector groups.

Therefore, although the t-test may have indicated that the null-hypothesis be retained, it was the ANOVA and Scheffé tests that revealed the difference in the private sector and public sector opinion relative to the issue of whether housing procurement policies are appropriate for application in the GSH sector. The null hypothesis was therefore rejected in favour of the alternative, which states that housing procurement policies are inappropriate for application in the GSH sector.

TABLE 5
ANOVA – QUESTION 23A BY GROUP - HYPOTHESIS 1.1

Source of Variation	SS	df	MS	F	p	Sig.
Between groups	13.99	3	4.66	5.29	.002	Yes
Within groups	208.04	236	0.88			
Total	222.03	239				

Source [55]

TABLE 6
SCHEFFÉ TEST – QUESTION 23A BY PAIRED GROUP - HYPOTHESIS 1.1

Group 1	Group 2	M1-M2	Scheffé p	Cohen's d	
Contractors	DHS officials	0.73	.007	0.74	Medium
Contractors	Professionals	0.19	.650	n/a	
Contractors	Suppliers	-0.12	.953	n/a	

DHS officials	Professionals	-0.54	.049	0.57	Medium
DHS officials	Suppliers	-0.85	.006	0.81	Large
Professionals	Suppliers	-0.31	.440	n/a	

Source [55]

TABLE 7
ANOVA – QUESTION 23B BY GROUP - HYPOTHESIS 1.1

Source of Variation	SS	df	MS	F	p	Sig.
Between groups	8.86	3	2.95	3.06	.029	Yes
Within groups	223.07	231	0.97			
Total	231.93	234				

Source [55]

TABLE 8
SCHEFFÉ TEST – QUESTION 23B BY PAIRED GROUP - HYPOTHESIS 1.1

Group 1	Group 2	M1-M2	Scheffé p	Cohen's d	
Contractors	DHS officials	0.38	.425	n/a	
Contractors	Professionals	-0.05	.990	n/a	
Contractors	Suppliers	-0.40	.346	n/a	
DHS officials	Professionals	-0.43	.235	n/a	
DHS officials	Suppliers	-0.77	.031	0.73	Medium
Professionals	Suppliers	-0.34	.399	n/a	

Source [55]

Objective two: Determine whether the housing procurement process is appropriate for the GSH sector

Hypothesis 1.2 is statistically formulated as:

H0: The housing procurement process is appropriate for the GSH sector.

H1: The housing procurement process is inappropriate for the GSH sector.

This statistical hypothesis was tested by means of four questions. The Cronbach's alpha obtained for these four questions were found to be 0.95, 0.92, 0.94 and 0.94, which was sufficient for summarising the results.

The results from the one-sample t-test to compare means by factor showed that the test statistics for all four questions, using the combined data from all groups, are significantly different ($p < .05$ and $d \geq 0.20$) from that of the neutral stance. This means that results for Questions 25 ($t = -4.3$, $p = <.0005$, $df = 216$, $d = 0.29$ Small), 27 ($t = -3.49$, $p = .001$, $df = 115$, $d = 0.32$ Small), 28a ($t = 6.96$, $p = <.0005$, $df = 215$, $d = 0.47$ Small), 28b ($t = 3.83$, $p = <.0005$, $df = 214$, $d = 0.26$ Small) all reveal that the null-hypothesis is rejected in favour of the alternative.

However, it was also notable that the p-values for the disaggregated groups also differed, which prompted the ANOVA test to be invoked to determine whether the four groups differ from each other. The test statistics from the ANOVA test revealed differences for Questions 27 ($dfB = 3$, $dfW = 112$, $F = 6.89$, $p = <.0005$), 28a ($dfB = 3$, $dfW = 212$, $F = 12.93$, $p = <.0005$) and 28b ($dfB = 3$, $dfW = 211$, $F = 4.54$, $p = .004$), however, for Question 25 ($dfB = 3$, $dfW = 213$, $F = 2.54$, $p = .058$) the test fails to determine whether a difference exists. This meant that the post-hoc Scheffé tests were only performed in terms of Questions 27, 28a, and 28b. The test statistics from the pairwise comparisons clearly reveal differences ($\mu_i > \mu_j$) of medium to large effect size between private sector and public sector respondents.

Therefore, besides the t-test revealing a difference relative to respondents' perspectives, the ANOVA and post-hoc test also revealed that these differences are predominantly between private sector and public sector respondents. The null-hypothesis is, therefore, rejected by the BE private sector in terms of the t-test and / or the ANOVA and post-hoc tests in favour of the alternative, which suggests that the government's housing procurement processes are inappropriate for the GSH sector.

Objective three: Determine whether the political priorities marginalise construction in the GSH sector.

Hypothesis 1.3 is statistically formulated as:

H0: Political priorities do not marginalise construction in the GSH sector.

H1: Political priorities marginalise construction in the GSH sector.

This statistical hypothesis was tested by means of four questions. The Cronbach's alpha obtained for these four questions were found to be 0.81, 0.85, 0.89, and 0.86, which was sufficient for summarising the results.

The results of the descriptive statistics for conducting the one-sample t-test to compare means by factor by using the combined data from all groups, show that the test statistics for two of the four questions are significantly different from that of the neutral stance. The results for Questions 29 ($t = -3.51$, $p = .001$, $df = 193$, $d = 0.25$ Small) and 30 ($t = -5.56$, $p = <.0005$, $df = 192$, $d = 0.40$ Small), is an indication that the null-hypothesis is rejected, while the results for Question 31 ($t = 1.04$, $p = .301$, $df = 192$) and 32 ($t = -0.93$, $p = .355$, $df = 192$) suggest that the null-hypothesis is not rejected.

However, it was also notable that the p-values for the disaggregated groups do reveal a difference between groups. The ANOVA test was invoked, which revealed that the test statistics for Questions 29 ($dfB = 3$, $dfW = 190$, $F = 10.2$, $p = <.0005$), 30 ($dfB = 3$, $dfW = 189$, $F = 7.63$, $p = <.0005$), 31 ($dfB = 3$, $dfW = 189$, $F = 11.26$, $p = <.0005$), and 32 ($dfB = 3$, $dfW = 189$, $F = 3.11$, $p = .028$) all reject the null-hypothesis. The test statistics from the post-hoc Scheffé test for all questions revealed differences, of medium to large effect size, between private sector and public sector respondents. However, the test statistic for Question 29 also reveals a difference in the perspectives of contractors and suppliers.

Based on the ANOVA and post-hoc tests, which revealed significant differences between private sector and public sector opinions, the null-hypothesis was rejected in favour of the alternative, which suggests that political priorities marginalise construction in the GSH sector.

Objective four: Determine whether contractors, typically appointed in the GSH sector, exhibit construction business competencies.

Hypothesis 1.4 is statistically formulated as:

H0: Emerging contractors appointed in the GSH sector do not lack construction business competencies.

H1: Emerging contractors appointed in the GSH sector lack construction business competencies.

This statistical hypothesis was tested by means of two questions. The Cronbach's alpha was 0.97 and 0.92, which were sufficient for summarising the results.

The results of the descriptive statistics for the one-sample t-test show that] the test statistic for only one of the two questions (Q34b: $t = -2.91$, $p = .004$, $df = 163$, $d = 0.23$ - Small) was significantly different from that of the neutral stance. The null-hypothesis ($\bar{x} = \mu$) for Question 34b is therefore rejected in favour of the alternative ($\bar{x} < \mu$). Question 35b was not tested as the mean score for this question appears to fall within the parameters $2.60 \leq M \leq 3.40$, which suggests that there is no difference in the respondents' perspective. The null-hypothesis ($\bar{x} = \mu$) for Question 35b is therefore retained.

It is notable that the p-values for the disaggregated groups again reveal a difference between groups, where the result for government officials showed a neutral stance. However, when the ANOVA test is used, it appears that the test statistics for both Questions 34b ($dfB = 3$, $dfW = 160$, $F = 2.29$, $p = .080$) and 35b ($dfB = 3$, $dfW = 159$, $F = 0.89$, $p = .450$) fail to detect a significant difference in the mean scores of the four groups, which suggests that all respondents are of the same mind regarding this issue. This also means that the post-hoc test, cannot be performed.

In the final analysis the null-hypothesis in terms of Question 34b was rejected in favour of the alternative, which hypothesises that government policy practices affect the level of construction management competency appointed in the GSH sector, while, the null-hypothesis for Question 35b was retained.

Objective five: Determine whether contractors, typically appointed in the GSH sector, exhibit construction resource capacity.

Hypothesis 1.5 is statistically formulated as:

H0: Emerging contractors appointed in the GSH sector do not lack construction resource capacity.

H1: Emerging contractors appointed in the GSH sector lack construction resource capacity.

This statistical hypothesis was tested by means of four

questions. The Cronbach's alpha for these questions were 0.91, 0.90, 0.96, and 0.79, and considered sufficient for summarising the results.

The test statistics, in terms of the t-test for three questions, were found to be significantly different from that of the neutral stance. The results for Questions 36a ($t = -2.48$, $p = .014$, $df = 155$, $d = 0.20$ Small), 37 ($t = -9.47$, $p = <.0005$, $df = 155$, $d = 0.76$ Medium), and 39 ($t = 3.71$, $p = <.0005$, $df = 155$, $d = 0.30$ Small), therefore, indicate that the null-hypothesis ($\bar{x} = \mu$), in terms of these questions, is rejected, while the null-hypothesis for Question 36b is retained, since the mean score falls within the parameters $2.60 \leq M \leq 3.40$. It is notable that the p-values for the disaggregated groups reveal a difference between groups. However, when the ANOVA test is applied, the test statistics for all four questions fail to reveal any significant difference between the groups, relative to questions 36a ($dfB = 3$, $dfW = 152$, $F = 1.21$, $p = .310$), 36b ($dfB = 3$, $dfW = 152$, $F = 0.66$, $p = .577$), 37 ($dfB = 3$, $dfW = 152$, $F = 1.93$, $p = .128$) and 39 ($dfB = 3$, $dfW = 152$, $F = 2.14$, $p = .098$), which suggests that all respondents are of the same mind regarding this issue. This also obviates the use of the post-hoc test.

Because the test statistics from the ANOVA test were not able to reveal any differences between groups, the hypothesis test reverted to the t-test. Based on the t-test, the null-hypothesis, in terms of Questions 36a (contractor resources ownership), 37 (resource competency), and 39 (lack of resources), was rejected in favour of the alternative, which states that emerging contractors appointed in the GSH sector lack construction resource capacity. The null-hypothesis, which states that emerging contractors appointed in the GSH sector do not lack construction resource capacity, in terms of Question 35b (contractor access to resources) is retained.

Objective six: Determine whether government procurement policy practices impact corruption in the GSH sector.

Hypothesis 1.6 is statistically formulated as:

H0: Policy practices do not contribute to corruption in the GSH sector.

H1: Policy practices contribute to corruption in the GSH sector.

This statistical hypothesis was tested by means of three questions. The Cronbach's alpha obtained for these four questions were found to be 0.92, 0.79, and 0.80, which was sufficient for summarising the results.

The test statistics, in terms of the t-test for Questions 40 ($t = 8.91, p = <.0005, df = 144, d = 0.74$ Medium), and 42b ($t = 4.38, p = <.0005, df = 141, d = 0.37$ Small), indicate that the null-hypothesis ($\bar{x} = \mu$) is rejected, while it is retained for Question 41 since the mean score falls within the parameters $2.60 \leq M \leq 3.40$. However, it is notable that the p-values for the disaggregated groups reveal a difference between groups, which prompted the use of the ANOVA and post-hoc test. The test statistics from the ANOVA test reveal that there is a difference between groups for two of the questions and thus the null-hypothesis ($\mu_1 = \mu_2 = \mu_3 = \mu_4$) is rejected for Questions 40 ($dfB = 3, dfW = 141, F = 4.41, p = .005$), 41 ($dfB = 3, dfW = 140, F = 5.66, p = .001$), but retained in terms of Question 42b ($dfB = 3, dfW = 138, F = 1.98, p = .121$). When the Scheffé test is performed, the test statistics for both questions 40 and 41 clearly reveal differences, within a medium to large magnitude, in all cases between the private sector and public sector perspectives

Besides the t-test revealing a difference relative to respondents' perspectives, the ANOVA and post-hoc test contributed to revealing that these differences are all between private sector and public sector perspectives. The null-hypothesis is therefore rejected by the BE private sector in terms of the t-test and / or the ANOVA and post-hoc tests in favour of the alternative, which suggests that government policy practices contribute to corruption in the GSH sector.

The results from the hypothesis testing are summarised in Table 9. In summary, the statistics from nineteen questions were subjected to hypothesis testing, in terms of the t-test and / or the ANOVA and Scheffé tests. The hypothesis testing resulted in rejecting seventeen null-hypotheses in favour of their alternative hypotheses. Two null-hypotheses, related to contractor business traits and contractor access to resources were retained, are therefore not seen as aspects of policy practice that impact the supply of GSH.

In conclusion, the hypotheses testing relative to the objective of this study resulted in the following:

- Null-Hypothesis 1.1 – Rejected in favour of the alternative: The government's housing procurement policies are inappropriate for application in the GSH sector;
- Null-Hypothesis 1.2 – Rejected in favour of the alternative: The government's housing procurement processes are inappropriate for the GSH sector;
- Null-Hypothesis 1.3 – Rejected in favour of the alternative: The government's political priorities

marginalise construction in the GSH sector;

- Null-Hypothesis 1.4 – Partly rejected in favour of the alternative: The government's policy practices affect the level of construction management competency appointed in the GSH sector. The test statistics of one out of two questions, on issues of contractor business traits, resulted in retaining the null-hypothesis;
- Null-Hypothesis 1.5 – Mainly rejected in favour of the alternative: Emerging contractors appointed in the GSH sector lack construction resource capacity. The test statistics of one out of four questions, on issues of contractor access to resources, resulted in retaining the null-hypothesis, and
- Null-Hypothesis 1.6 – Rejected in favour of the alternative: The government's policy practices contribute to corruption in the GSH sector.

A final analysis reveals that most (89%) of the statistical null-hypotheses were rejected. This means that the main hypothesis is mostly rejected in favour of the alternative, which suggest that the government's housing procurement policies are inappropriate for application in the GSH sector.

The study verifies literature that procurement should be approached as a system first and then as a policy. Thus, policy should never override practice. It also confirms literature that current policies make it difficult for established contractors to participate in the GSH programme and places emerging contractors at a disadvantage, which do not address their peculiar difficulties relative to competency and resources.

The notion is confirmed that government supply-chain management assumes emerging contractors are experienced and capable, but that this has failed municipalities and led to contractor failure on numerous projects. The study moreover indorses the literature that public corruption can be traced back to government legislative and policy interventions, which points to the failure of systems and ideologies. It is confirmed that the current procurement process is flawed and permits loopholes that lead to fraud and corruption, which result in political priorities that marginalise construction.

TABLE 9
SUMMARISED RESULTS FOR THE HYPOTHESES TESTING

Hypothesis No.	Question No.	t-test		ANOVA			Pairwise difference (Scheffé)							
		Retain H0	Reject H0	Extent	Insig. Diff.	Sig. Diff.	Contr. vs. Gov.	Contr. vs. Prof.	Contr. vs. Supp.	Gov. vs. Prof.	Gov. vs. Supp.	Prof. vs. Supp.	H0	
H1.1	23a	.541				.002	M				M	L		Reject
	23b	H0				.029						M		Reject
H1.2	25		<.0005	S		.058								Reject
	27		.001	S		<.0005					L	L		Reject
	28a		<.0005	S		<.0005	L				L	L		Reject
	28b		<.0005	S		.004	M				M	M		Reject
H1.3	29		.001	S		<.0005	L			M	L			Reject
	30		<.0005	S		<.0005	L				L			Reject
	31	.301				<.0005	L				M	L		Reject
	32	.355				.028	M							Reject
H1.4	34b		.004	S		.080								Reject
	35b	H0				.450								Retain
H1.5	36a		.014	S		.310								Reject
	36b	H0				.577								Retain
	37		<.0005	M		.128								Reject
H1.6	39		<.0005	S		.098								Reject
	40		<.0005	M		.005	M				L	L		Reject
	41	H0				.001	L					L		Reject
	42b		<.0005	S		.121								Reject
Hypothesis 1:		Government housing procurement policies are inappropriate for application in the GSH sector.											Apply	

Source [55]

CONCLUSIONS AND RECOMMENDATIONS

Although South African citizens have the constitutional right to adequate habitable housing, and Government the legislated responsibility to provide permanent housing, the process from inception to delivering a house appears riddled with issues of quality, delays, private and public sector incompetence, corruption, and citizen dissatisfaction. This study focused on the government's housing procurement policy relative to its suitability for application in the construction sector, as a possible reason for these issues.

Literature confirms that these issues do exist, but also that current housing procurement policies may be inappropriate for application in the construction sector, which has its own long-established peculiar ways of effectively dealing with the building process, whereas the government has certain ideological preferences and objectives to achieve, which forms the basis for their procurement policy. The government's procurement policy, therefore, appears flawed in terms of construction sector practices, and political priorities appear to marginalise construction. It is furthermore confirmed that housing delivery is ideologically and politically designed, and executed, while practicalities relative to the construction process to supply housing may not have been considered in developing the procurement policy. The decision to adopt a post-positivist philosophy embracing a quantitative approach and using questionnaires appears to have been the most appropriate to deal with the research problem. Using different methods of inferential analysis, such as the one-sample t-test, ANOVA, and Scheffé test, allowed the researcher to delve down to the extent of determining where the difference in the perception of public and private construction sectors is located.

The statistics from seventeen questions, subjected to hypothesis testing, resulted in rejecting their associated null-hypotheses in favour of the alternative hypotheses. The null-hypotheses associated with two questions were retained. It can therefore be concluded that:

- The government's housing procurement policies are inappropriate for application in the GSH sector (Objective 1);
- The government's housing procurement processes are inappropriate for the GSH sector (Objective 2);
- The government's political priorities marginalise construction in the GSH sector (Objective 3);
- Contractors typically appointed in the GSH sector partly

exhibit construction business competencies (Objective 4);

- Contractors typically appointed in the GSH sector mainly do not exhibit construction resource capacity (Objective 5), and
- The government's policy practices contribute to corruption in the GSH sector (Objective 6).

It can subsequently be concluded that the government housing procurement policies are mostly inappropriate for application in the GSH sector. This means that respondents mostly disagree with the notion that government policy practices do not impact the supply of GSH, but moreover, assert that political priorities, through current policy formulation, marginalise construction in the GSH sector. According to respondents from the construction sector, the government's current procurement policies have resulted in reduced participation and the departure of established contractors in the GSH sector, and the appointment of emerging contractors who partially do not have the requisite construction management competencies and mainly do not have construction resource capacity, which result in their failure to perform and deliver maximum benefit to the government, and generally lead to contractors' subsequent business failures.

The main problem in GSH will culminate in the house, as the final product, and be a measure of the success of the government's entire housing campaign. The success of the government's housing campaign hinges on the supply of habitable houses. The construction sector is the supplier of such houses. Any undue influence toward the long-established practices of the construction sector will influence a contractor's ability to supply GSH.

It is therefore recommended that the South African government consider the following to ensure it is sufficiently responsive to the needs of the construction sector to deliver maximum benefit:

- Critically reassess current housing procurement policies;
- Critically reassess current housing procurement processes and practices;
- Consulting with the construction sector to mitigate marginalising the sector;
- Develop a robust procurement system to ensure the most suitable contractor is appointed who will deliver GSH at the right quantity, quality, time, place, and price;
- Focus housing delivery on successful supply during the construction phase, and
- Critically reassess current procurement policies, processes, and practices to eradicate loopholes to fraud and corruption, and establish good governance.

References

- [1] Republic of South Africa (RSA) (1996) Constitution of the Republic of South Africa Act 108 of 1996. Pretoria: Government Printers.
- [2] Leigh Burgoyne, M. (2008) Factors affecting housing delivery in South Africa: A case study of the Fisantekraal housing development project, Western Cape, Masters in Community and Development dissertation. Stellenbosch: University of Stellenbosch.
- [3] Ross, N., Bowen, P.A. & Lincoln, D. (2010) Sustainable housing for low-income communities: lessons for South Africa in local and other developing world cases, *Construction Management and Economics*, 28(5), 433-449.
- [4] Department of Human Settlements (DHS) (2009) National housing code, Part 3: Technical and general guidelines. Pretoria: Government Printer.
- [5] de Nobrega, C. (2007) The challenge of delivering quality housing in the Eastern Cape. Grahamstown: Rhodes University, Public service accountability monitor (PSAM).
- [6] Khaki, I. (2009) Housing in South Africa: The challenge to provide sustainable, integrated, affordable housing. MBA Study project. Stellenbosch: University of Stellenbosch.
- [7] Doloi, H. (2008) Application of AHP in improving construction productivity from a management perspective, *Construction Management and Economics*, 26(8), 841-854.
- [8] Ndaba, D. (2010) Fight against housing corruption begins to gain traction with over 900 arrests, *Engineering News*, 16 April. [Online]. Available: <http://www.engineeringnews.co.za/article/fight-against-housing-corruption-begins-to-gain-traction-with-over-900-arrests-2010-04-16/searchString:Fight+against+housing+corruption+begins+to+gain+traction+with+over+900+arrests> [7 February 2017]
- [9] Dlamini, S. (2010) COSATU president, speech delivered at the civil society conference, 28 October. South Africa.
- [10] Aigbavboa, L.O. & Thwala, W.D. (2011) 'Housing experience of South African low-income beneficiaries.' Proceedings of the 47th associated schools of construction annual international conference, Omaha, USA, 6-9 April 2011.
- [11] Mabhula, T. (2009) Sustainable settlements: Quality monitoring still wanting, *Transformer*, October / November 2009, 15(5), 14-15.
- [12] Mkuzo, T.Z. (2011) An assessment of the quality of housing delivery in the Nelson Mandela Bay Municipality: The beneficiaries' perspective (2008-2010). Master of Arts dissertation. Port Elizabeth: Nelson Mandela Metropolitan University.
- [13] Madzidzela, L. (2008) An analysis of factors affecting housing delivery in the Nyandeni local municipality with specific reference to the extension 4 housing project: A case study of Ward 21 in Ngqeleni. Master of Public Administration dissertation. Port Elizabeth: Nelson Mandela Metropolitan University.
- [14] Lebeta, R.G. (2009) Housing policy and project implementation the case of Cosmo City integrated housing project, Masters dissertation. Johannesburg: University of the Witwatersrand.
- [15] Oladapo, M.A. (2001) 'A framework for cost management of low-cost housing'. Proceedings of the international conference on spatial information for sustainable development, Nairobi, Kenya, 2-5 October 2001, 2-5.
- [16] Wentzel, L. (2010) An analysis of quality assurance in low-cost housing construction. MTech dissertation. Cape Town: Cape Peninsula University of Technology.
- [17] Govender, J.N. & Watermeyer, R.B. (2000) 'Potential procurement strategies for construction industry development in the SADC region', Proceedings of the second international conference on construction industry development, Botswana national construction industry council in association with the faculty of engineering technology, University of Botswana under the auspices of CIB, Gaborone, Botswana.
- [18] Ibiyemi, A.O., Adenuga, A.O. & Odusami, K.T (2009) Comparative analysis of design & build and traditional procurement methods in Lagos, Nigeria, *Journal of Construction*, 2(2), 2-6.
- [19] Watermeyer, R.B. (2011a) Report: Standardising construction procurement systems. *Structural Engineer*, 89(20), 18 October 2011, 13-15.
- [20] Watermeyer, R.B. (2011b) 'Regulating public procurement in Southern Africa through international and national standards.' Proceedings of the public procurement regulation in Africa conference, (Vol. 25) Stellenbosch, South Africa, 25 October 2011, 5-9.
- [21] International Council on Systems Engineering (INCOSE) (2004) Systems engineering handbook: A 'what to' guide for all SE practitioners. Version 2a. Seattle, USA: INCOSE Technical Board.
- [22] Groenewald, D. (2015) Information management, In: Nieuwenhuizen, C. (ed.) Business management for entrepreneurs. 3rd ed. Cape Town, South Africa: Juta & Company Pty Ltd, 211-239.
- [23] Construction Industry Development Board (cidb) (2006) Toolkit 2006: Infrastructure delivery management guidelines. Module 5: Construction Procurement. Ver. 4.0. Pretoria: cidb.
- [24] International Standards Organisation (ISO) (2008a) Construction procurement - Part 3: Standard conditions of tender. Geneva: ISO.
- [25] Badenhorst-Weiss, H. (2015) The purchasing function, In: Nieuwenhuizen, C. (ed.) Business management for entrepreneurs. 3rd ed. Cape Town, South Africa: Juta & Company Pty Ltd, 161-182.
- [26] Treasury of the Republic of Cyprus (TRC) (2008) Public procurement best practice guide. Cyprus: Republic of Cyprus, Treasury of the Republic, Public procurement directorate. [Online]. Available: <http://www.publicprocurementguides.treasury.gov.cy/OHS->

- EN/HTML/index.html?signs.htm. [27 March 2016].
- [27] Department National Treasury (NT) (2012) Standard for a construction procurement system. Pretoria: NT.
- [28] International Standards Organisation (ISO) (2008b) Construction procurement - Part 1: Processes, methods, and procedures. Geneva: ISO.
- [29] Seymour, R. (2001) Humans innovating technology series: What is a system? Reston: International technology education association.
- [30] Construction Industry Development Board (cidb) (2009a) Board notice 12 of 2009: Standard for uniformity in construction procurement. Government Gazette, 30 January 2009. Pretoria: cidb.
- [31] Dalrymple, J., Staples, W., Bryar, P., Boxer, L., Shutt, G., Collin, J., Oliver, J., Swainston, M., Walker, D. & Sidwell, T. (2002) Feasibility study linking best-value procurement assessment to outcome performance indicators. Brisbane: Cooperative Research Centre for Construction Innovation (CRC).
- [32] Chan, C.T.W. (2007) Fuzzy procurement selection model for construction projects, *Construction Management and Economics*, 25(6), 611-618.
- [33] Ratnasabapathy, S. & Rameezdeen, R. (2006) 'A multiple decisive factor model for construction procurement system selection'. Proceedings of the annual research conference of the royal institution of chartered surveyors (RICS), London, UK: University College, 7-8 September 2006.
- [34] Emuze, F. & Smallwood, J. (2011) 'Improving project delivery in South African construction: engineers' perspectives.' Proceedings of the 6th Built Environment Conference, Johannesburg, South Africa, 31 July - 2 August 2011.
- [35] Bolton, P. (2006) Government procurement as a policy tool in South Africa, *Journal of Public Procurement*, 6(3), 193-217.
- [36] Mauro, P. (1997) Why worry about corruption. February 1997, Washington, D.C., USA: International Monetary Fund.
- [37] Bank, L., Makubalo, L. & Maqasho, L. (2010) Housing delivery and state subsidies: A rapid assessment of service delivery and socio-economic survey in the Eastern Cape. East London: Fort Hare institute of social and economic research (FHISER), University of Fort Hare: East London.
- [38] Pillay, U., Rule, S., Rubin, M. & Ntema, L. (2010) A rapid verification study on the informal settlements and backyard shacks' backlog and trends within the Eastern Cape. April 2010. Bisho, South Africa: Human Sciences Research Council, Eastern Cape Provincial Department of Housing.
- [39] Lizarralde, G. & Root, D. (2008) The informal construction sector and the inefficiency of low-cost housing markets, *Construction Management and Economics*, 26(2), 103-113.
- [40] Maritz, T. (2005) Efficiency in the provision of production specifications for the South African construction industry, *Acta Structilia*, 12(1), 63-82.
- [41] Muller, J. (2005) Affordable housing: Private sector back in the mix, *Financial Week*, 25 May 2005, 16.
- [42] Centre on Housing Rights & Evictions (COHRE) (2009) N2 Gateway project: Housing rights violations as 'development' in South Africa. Geneva: COHRE.
- [43] Department of Human Settlements (DHS) (2005), Housing indaba: Social contract for rapid housing delivery, September 22-23. Cape Town: DHS.
- [44] Allwright, P. (2013) COVER: Extent of corruption in South Africa's public sector. [Online]. Available: <http://www.cover.co.za/risk-management/extent-of-corruption-in-s-as-public-sector> [22 May 2013].
- [45] Griffith, A. (2007) Key considerations for delivering best value in the small building works portfolio of large client organizations, *Construction Management and Economics*, 25(8), 903-909.
- [46] Creswell, J.W. (2014) Research design: Qualitative, quantitative, and mixed methods approaches. 4th ed. London: SAGE Publications, Inc.
- [47] Williams, C. (2007) Research methods, *Journal of Business & Economic Research*, 5(3), 65-72.
- [48] Leslie, V. (2015) Research guidance booklet: A guide to carrying out and writing an action research report. Warwick, UK: Warwick University. [Online]. Available: http://www2.warwick.ac.uk/study/cll/courses/professionaldevelopment/wmccett/research_projects/action/resources/research_guidance_booklet-vron_3.doc [28 March 2016].
- [49] Zaiontz, C. (2014) Real statistics using Excel [Online]. Available: <http://www.real-statistics.com/> [27 March 2016].
- [50] Gliem, J.A. & Gliem, R.R. (2003) 'Calculating, interpreting, and reporting Cronbach's Alpha reliability coefficient for Likert-type scales.' Proceedings of the 22nd Midwest research-to-practice conference in adult, continuing, and community education, The Ohio State University, Columbus, USA, 8-10 October 2003.
- [51] Lane, D.M., Scott, D., Hebl, M., Guerra, R., Osherson, D. & Zimmer, H. (2013) Introduction to statistics. Rice University, University of Houston. [Online]. Available: http://onlinestatbook.com/Online_Statistics_Education.pdf [28 March 2016].
- [52] Daniel, J. (2012). Sampling essentials: Practical guidelines for making sampling choices. California: SAGE Publications Inc.
- [53] Gravetter, F.J. & Wallnau, L.B. (2013) Essentials of statistics for the behavioral sciences. 8th ed., Belmont, USA: Wadsworth.
- [54] Data Solutions (2014) The interactive direct B2B database. 3 March 2014. Killarney, South Africa: Barbier Brener Quinan cc.
- [55] Bekker, J.P. (2017) Improving the supply of subsidised housing in South Africa. Doctor of philosophy in construction management thesis. Port Elizabeth: Nelson Mandela University.
- [56] Tavakol, M. & Dennick, R. (2011) Making sense of Cronbach's alpha, *International Journal of Medical Education*, 2011(2), 53-55.

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IMPLEMENTATION OF HEALTH AND SAFETY (H&S) ON DEPARTMENT OF PUBLIC WORKS' (DPW) CONSTRUCTION PROJECTS

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Abstract

Purpose of the paper

The study was conducted to determine the extent to which health and safety (H&S) is implemented on Department of Public Works (DPW) construction projects, and to identify measures to improve the implementation of H&S during government construction projects. This was stimulated by the concept that the DPW is the major custodian of state-owned properties both in this country and abroad. One of the roles of the DPW is to regulate and promote the construction sector.

Design/ Methodology/ Approach

A quantitative approach in the form of self-administered questionnaires was adopted. Building construction projects undertaken by the DPW in the Nelson Mandela Bay metro, which includes Port Elizabeth, Uitenhage, Despatch, and Colchester, were included in the study conducted among DPW's construction project managers (CPMs), contractors' site managers (SMs), and workers.

Findings

The salient findings include: H&S training is undertaken, however, hazard identification and risk assessment (HIRA) training is infrequent; H&S non-compliance occurs; workers were deemed to be the cause of construction accidents

due to alleged carelessness, unsafe acts / behaviour, poor discipline, and inadequate supervision; ergonomics problems are encountered; limited injuries are experienced, and stress is experienced.

Practical implications

The conclusions constitute implications as they generally reflect an agenda for change: the DPW is committed to H&S; the H&S culture, H&S training, and supervision are not optimum on DPW projects; there is potential for more severe injuries, and the contributors to the experience of stress are multi-stakeholder in terms of origin. The recommendations in turn reflect the required interventions: the DPW should continue to focus on realising optimum H&S on projects; the DPW should place more emphasis on HIRA during both the design and construction processes; contractors should maintain an optimum level of H&S awareness, ensure close supervision, monitor worker compliance with safe work procedures (SWPs), and deliver daily H&S task instructions (DH&STIs), and multi-topic toolbox talks, and the contributors to the experience of stress should be interrogated, particularly project deadlines.

What is original/value

The study and the paper have provided insight with respect to the status and H&S practices on DPW projects, including the identification of the interventions required to address shortcomings.

Keywords: Construction, Department of Public Works, Health and Safety, Projects

INTRODUCTION

The report 'Construction Health & Safety Status & Recommendations' highlighted the considerable number of accidents, fatalities, and other injuries that occur in the South African construction industry ^[1]. The report cited the high-level of non-compliance with H&S legislative requirements, which is indicative of a deficiency of effective management and supervision of H&S on construction sites as well as planning from the inception / conception of

projects within the context of project management. The report also cited a lack of sufficiently skilled, experienced, and knowledgeable persons to manage H&S on construction sites. However, the reference to project management, and the promulgation of the Construction Regulations in July 2003, amended in 2014 ^[2], which realised multi-stakeholder responsibility for construction H&S, clients included, indicate that construction H&S is not solely the contractor's problem.

The former South African Minister of Public Works, Thulas Nxesi, at the launch of the Construction Regulations (CR) by the Department of Labour (DoL) on 10 February 2014 expressed concern with regards to H&S, and noted that the H&S of employees must be an absolute priority, and that it is unacceptable that, on average, two South African construction workers die every week ^[3].

Given the abovementioned, and that limited, if any research has been conducted relative to H&S on public sector projects, a study was conducted to determine the extent to which H&S is implemented on government construction projects, with the focus being on the Eastern Cape Department of Public Works, in the Nelson Mandela Bay Metro, which includes the Port Elizabeth, Uitenhage, Despatch, and Colchester areas. Hence, the focus is on government-procured construction projects, building contractors registered on the DPW's provincial and national databases in the form of SMEs and workers, and DPW construction project managers (CPMs).

LITERATURE REVIEW

Background of the Department of Public Works (DPW) in South Africa

The National Department of Public Works (NDPW) ^[4] states that the DPW is one of the oldest government departments in South Africa, dating back to the early years of the arrival of Jan Van Riebeeck in 1652. The DPW is responsible for policy formulation, determining regulatory frameworks, including setting norms and standards, and overseeing the implementation of these related functions ^[5]. According to the DPW ^[5], the roles of the DPW is to regulate, promote the construction sector, and to ensure that the other government departments have built environments that meet their financial, technical, and social requirements. It does this by providing, developing,

and maintaining accommodation for these departments ^[5]. Therefore, failure to perform these roles will create difficulties for the other departments and undermine the statutory duties of the state. Therefore, it is essential that the DPW endeavours to improve the level of H&S compliance in the construction industry within its own jurisdiction as well as via statutory bodies such as the CBE, cidb, and Agrément South Africa ^[6]. It is critical that the DPW views H&S issues as a priority and sets appropriate H&S standards ^[6]. Furthermore, the OH&S Act and the Construction Regulations impose responsibilities on the DPW as the client to ensure the H&S of contractors and their workers. The former Minister of the DPW, Nkosinathi Nhleko, expressed concern regarding H&S contraventions in the construction sector, emphasising the need to build capacity in terms of inspections on all construction projects to prevent the collapse of private buildings and public infrastructure ^[7]. The cidb ^[1] maintains that promoting a positive H&S culture by conducting H&S inspections and audits on construction projects contributes to the elimination of occupational injuries, disease, loss, and the prevention of damage to the environment.

South African H&S legislation and regulations

The Occupational Health and Safety Act No. 85 of 1993 ^[8], and the Construction Regulations 2014 ^[2] prescribe a range of duties for clients, construction project managers (CPMs), designers, quantity surveyors (QSs), and contractors, and their collective employees.

In terms of the South African Construction Regulations ^[2], clients are required to, inter alia, conduct a baseline risk assessment (BRA), and evolve an H&S specification therefrom, which is then provided to designers. The H&S specification should identify hazards and H&S requirements relative to the project concerned. Designers in turn are required to, inter alia: consider the H&S specification; submit a report to the client before tender stage that includes all the relevant H&S information about the design that may affect the pricing of the work, the geotechnical-science aspects, and the loading that the structure is designed to withstand; inform the client of any known or anticipated dangers or hazards relating to the construction work, and make available all relevant information required for the safe execution of the work upon being designed or when the design is changed; modify the design or make use of substitute materials where the design necessitates the use of dangerous procedures or materials hazardous to H&S, and consider hazards relating to subsequent

maintenance of the structure and make provision in the design for that work to be performed to minimise the risk. Design hazard identification and risk assessment (HIRA) is necessary to mitigate design originated hazards, and evolve appropriate responses, which process should be structured and documented.

Thereafter, clients must include the H&S specification in the tender documentation, which in theory should have been revised to include any relevant H&S information included in the designer report. Thereafter, they must, inter alia: ensure that potential principal contractors (PCs) have made provision for the cost of H&S in their tenders; ensure that the PC to be appointed has the necessary competencies and resources; ensure that every PC is registered for workers' compensation insurance cover and in good standing; discuss and negotiate with the PC the contents of the PC's H&S plan and thereafter approve it; take reasonable steps to ensure that each contractor's H&S plan is implemented and maintained; ensure that periodic H&S audits and documentation verification are conducted at agreed intervals, but at least once every 30 days; ensure that the H&S file is kept and maintained by the PC, and appoint a competent person in writing as an agent when a construction work permit is required.

Although South Africa's construction H&S-related legislation and regulations are globally relevant and in the case of the latter are modelled on the United Kingdom's CDM Regulations, implementation thereof is critical. This is emphasised by Lees and Austin ^[9], who argue that although there are volumes of regulations designed to improve H&S performance, without implementation, these regulations will not achieve the objectives.

Non-compliance with H&S legislation and regulations

The report 'Construction Health & Safety Status & Recommendations' cites the statistics emanating from a series of national 'blitzes' conducted by the Department of Labour Inspectorate on 1 415 South African construction sites ^[1]. 52.5% of the contractors were non-compliant with the Occupational Health and Safety Act and the Construction Regulations. A total of 1 388 notices were issued, 86 (6%) being improvement notices, 1 015 (73%) contravention notices, and 287 (21%) prohibition notices.

Ahmed and Othman ^[10] state that a critical review of the causes of non-compliance with H&S legislation and regulations are negligence and carelessness among the workers (48%), unskilled workers (35%), inadequate use of PPE (19%), inadequate supervision (13%). The impact

of construction accidents includes personal suffering on the part of the injured workers, construction delays, and reduced productivity. Therefore, training is perhaps the most effective intervention that can influence and alter risk-taking behaviour, and it would be the most valuable tool that organisations can use to mitigate such behaviour ^[11].

Schaufelberger and Yu Lin ^[12] in turn, state that research relative to construction accidents has shown that approximately 90 per cent of accidents on construction sites are due to unsafe behaviour, while about 10 per cent are due to unsafe job-site conditions. Unsafe behaviour may result from the workers' state of mind, fatigue, stress, or physical condition.

Contributing factors in accidents

A 100 accidents were reviewed during a study conducted by Haslam, Hide, Gibb, Gyi, Pavitt, Atkinson, & Duff ^[13]. 'Immediate accident circumstances and shaping factors' are the first category of contributing factors. Problems arising from workers, which includes all site-based personnel, or the work team, especially worker actions or behaviour and worker capabilities, were judged to have been involved in over 70% of the accidents. Workplace factors, most notably poor housekeeping and problems with the site layout and space availability, were considered to have contributed 49% of the accident studies. Local hazards on site were a feature in many of the 100 accidents reviewed. Shortcomings with equipment, including personal protective equipment (PPE), were identified in 56% of the incidents.

'Originating influences' are the second category of contributing factors, in which case inadequacies with risk management were considered to have been present in 94% of the accidents. In terms of 'construction design and processes', Haslam et al. state that the elimination or reduction of risks through design or alternative methods of construction is highly desirable. In terms of 'project management', a clear influence from problems with project management was identified in only 25% of the accident studies, although this is likely to have been because the precise effects are difficult to corroborate. In terms of 'risk management', deficiencies related thereto were identified in most of the 100 accidents studied. Accidents invariably involve an inadequately controlled risk, which is indicative of a failing of management. In terms of 'client and economic influences', there was limited direct evidence of the influence of client requirements or the economic climate on the accidents studied, although they undoubtedly do affect construction H&S. The findings relative to 'H&S education and training' were three-fold: H&S being overlooked in the context of heavy workloads and other priorities;

taking shortcuts to save effort and time, and inaccurate perception of risk. Underlying each of these are inadequate H&S knowledge, which indicates deficiencies with H&S education and training.

A study conducted in Iran determined that the frequency and severity of construction injuries is attributable to a combination of factors ^[14]; demographics and organisation factors; type of accidents factors related to the work conditions and equipment; unsafe acts and unsafe conditions such as poor housekeeping; nature of accidents; failure in H&S training and H&S control measures, and temporal and locational influences. Given the abovementioned, a combination of interventions is required to mitigate accidents.

Within the context of South Africa, the report 'Construction Health & Safety Status & Recommendations' highlights the major sources of poor construction H&S performance as lack of management commitment, supervisory environment, and training and competence level ^[1]. A South African case study, which included four large projects, determined that workers' decisions, and workers' behaviour predominate among five factors causing accidents, injuries, and fatalities on construction sites ^[15].

A further South African study conducted in Gauteng province, determined that contractors working long hours predominated in terms of the contribution of nineteen factors to fatalities and disabling injuries, which was followed by a cluster of five factors consisting of contractor's H&S culture, contractors taking short cuts, not adhering to H&S standards, lack of training of contractors on how to perform HIRA, ineffective use of safety management plan practices, and more focus on production and less on H&S ^[16].

The synergy between H&S and the other project parameters

A study conducted among construction CPMs investigated, inter alia, the extent to which inadequate or the lack of H&S negatively affects the other project parameters. Productivity (87.2%) predominates, followed by quality (80.8%), cost (72.3%), client perception (68.1%), environment (66.0%), and schedule (57.4%) ^[1].

Clearly there is a direct motivation for contractors to optimise H&S, however, there is an indirect motivation for clients in that, inter alia, the cost of accidents (COA), poor productivity, and rework, are included in a contractor's 'cost structure' and thereby are included in contractors' tender sums and the value of completed construction.

In terms of quantifying the negative impact of inadequate H&S in monetary terms, research conducted in South Africa construction estimated the total CoA to be approximately 5% of the value of completed construction ^[1]. Furthermore, it is estimated that the cost of H&S is estimated to be between 0.5% and 3.0% of total project costs. Therefore, H&S is in essence a profit centre ^[1].

Strategies for implementing H&S on government construction projects

Tender documents and procurement procedures are very important instruments for raising the standard of H&S on building-construction projects, by ensuring compliance with the existing legislation and the conditions of a project ^[17]. The Construction Regulations stipulate that the client is responsible for ensuring that potential principal contractors (PC) submitting tenders have made adequate provision for the cost of H&S measures ^[2]. Furthermore, the client is required to discuss and negotiate with the PC the contents of the H&S plan, and thereafter approve the H&S plan for implementation .

According to Du Toit ^[11], H&S training is a very important aspect of the H&S programme as it is a legal requirement in terms of the OHS Act 85 of 1993. H&S training begins with induction and should be ongoing throughout a worker's career ^[11]. Thorough control measures, such as regular H&S inspections and audits are essential for the sustainability of appropriate implementation of H&S. The monitoring and control of H&S implementation is necessary to ensure full compliance with H&S regulations, which is crucial in terms of optimising H&S performance ^[18].

A study conducted among South African grades 4 to 9 cidb registered contractors, 32.2% of which were grade 7 general building and civil engineering categories, determined that there was a high-level of H&S self-regulation ^[19]. The study recommended that the DOL should encourage the use of voluntary self-regulation to augment the infrequent and ineffective DOL Inspectorate enforcement regime and provide incentives such as preferential procurement for contractors that self-regulate. Furthermore, such H&S self-regulation should be used as a tool to rate contractors and that contractors should be mandated to advertise their H&S self-regulation scores alongside their cidb grade.

Occupational stress on construction projects

Consistently high levels of stress increase the risk of injuries on construction projects ^[20]. Nawaz, Mufti and Shakir

^[21] state that working hours on construction projects are usually longer than in other industries due to the tight time constraints associated with projects. This proves to be onerous for high-level managers and workers. Consequently, extended working hours, work overload, project deadlines, and reduced family time are four noteworthy stressors in the construction industry ^[21]. A study conducted among construction professionals in Palestine, determined that 'I work for long hours', 'I have a lot of responsibility in my job', and 'I am often required to work on multi-tasks at the same time' predominate among eighteen task stressors, and 'my job is dangerous' predominates among seven physical stressors ^[22].

Stress also occurs when an individual perceives that the job demands are impossible to meet or be accomplished, and that is the moment when the strain originates and demotivates the employees ^[21]. According to the Chartered Institute of Building (CIOB) study ^[23] the causes of stress are: lack of feedback (56.8%); poor communication (55.7%); inadequate staffing (55.0%); too much work (64.1%); ambitious deadlines (59.7%); pressure (59.9%), and conflicting demands (52.2%). Clearly, work stress has a profound impact on the job performance of the employees working in the construction industry.

RESEARCH

Research method

The study sought to determine the status in terms of the implementation of H&S, specifically on DPW construction projects. The study further sought to identify measures to improve the implementation of H&S on government construction projects. The study adopted a quantitative approach, as the purpose of the study was to examine the implementation of H&S on DPW construction projects.

According to Du Toit ^[11], quantitative research focuses on a large sample base, targeting a specific population with questionnaires, to obtain numerical data that answers specific questions. Leedy and Ormrod ^[24] contend that the quantitative research method seeks to gather realistic data and studies the relationship between the data. A self-administered closed-ended questionnaire survey was conducted among CPMs, SMs, and workers to gather the empirical data.

Target population

The target population comprised CPMs, SMs, and workers involved with building construction projects undertaken by the DPW in the Nelson Mandela Bay metro, which includes Port Elizabeth, Uitenhage, Despatch, and Colchester. According to Yin ^[25], a population is made up of all feasible elements, subjects and observations related to the researcher's area of interest. A pilot study was conducted before the actual study, and it was determined that there were seven building construction projects managed by the DPW in the Nelson Mandela Bay metro. The researcher established the population to be two hundred and ten.

Sampling method and size

The selection of the sample stratum was based on the number of building construction projects that were being undertaken by the DPW in the Nelson Mandela Bay metro. Purposive sampling was selected, because the research sub-problems required well-informed members of the population, hence, the selection of the contractors' site managers, the workers that were working on the construction sites, as well as the DPWs' CPMs to provide information regarding the H&S-related issues and challenges they were experiencing on construction sites.

According to the Survey Research Centre of the Institute of Social Research of the University of Michigan cited in Leedy and Ormrod ^[18], sampling is the process of choosing from a much larger population, a group that needs to be selected to make general statements, so that the selected part is representative of the entire group.

One hundred and five (105) respondents formed an ideal sample size for this study. This followed the guidelines of Leedy and Ormrod ^[18], namely, if the population size is fewer than 100 people, there is little point in sampling, but if the population is between 100 to around 500, 50% of the population should be sampled. Therefore, the sample size targeted was 50% in each group, as reflected in Table 1. The registered building construction projects in the database, and in the procurement plan of the DPW, are categorised in groups from A to G, according to the capacity limited by the value of the work / project, and the cidb grading for contractors, beginning from Group A and ending with Group G. The 105 questionnaires distributed included the questionnaires that were distributed to the 16 DPW's CPMs, 10 contractors' site managers, and the 79 workers on the construction sites. 102 Questionnaires were completed and returned. Table 1 summarises the response rates.

TABLE 1
SURVEY SAMPLE SIZE AND RESPONSE RATES PER PROJECT GROUP

Group	cidb \ Grading	Population (No.)	50% Sample (No.)	Circulated (No.)	Returned (No.)	Response rate (%)
A	9 & 8 PE	40	20	20	19	95.0
B	8 & 7 PE	32	16	16	16	100.0
C	7 & 6 PE	28	14	14	14	100.0
D	6 & 5 PE	20	10	12	12	100.0
E	5 & 4 PE	18	9	10	9	90.0
F	4 & 3 PE	16	8	9	9	100.0
G	3 & 2 PE	14	7	8	8	100.0
CPMs		42	21	16	15	93.8
Total		210	105	105	102	97.1

Table 2 presents a summary of the survey sample size and response rates per respondents' occupations.

TABLE 2
SURVEY SAMPLE SIZE AND RESPONSE RATES PER RESPONDENTS' OCCUPATIONS

Data collection method	Sample	Response (No.)	Response Rate (%)
Questionnaires (DPW's CPMs)	16	15	93.8
Questionnaires (Contractors' Site Managers)	10	8	80.0
Questionnaires (Contractors' workers)	79	79	100.0
Total	105	102	97.1

Data analysis and interpretation of findings

The data was manually captured in Microsoft Office Excel 2013, and then transposed to Microsoft Office Word 2013 tables. The data analysis entailed the computation of descriptive statistics in the form of frequencies, and a measure of central tendency in the form of a mean score (MS) to rank the fixed response items, the latter due to closed-ended questions with five-point Likert scales, and an 'unsure' response option.

Limitations

Although the study aimed at determining the status in terms of the implementation of H&S on DPW construction projects, the focus was narrowed to the Eastern Cape, and then specifically the Nelson Mandela Bay metro. Hence, the focus is on government-procured construction projects, building contractors registered on the DPW's provincial and national databases, and construction CPMs. Furthermore, the study only included building construction projects.

Respondents' demographic details

Table 3 presents the distribution of the respondents by age and gender. It is notable that 35% of males are ≤ 20 years and 64% are > 20 years of age, while 32% and 68% of females are, respectively. Clearly, the respondents are mature and should understand the dynamics of their work environment.

TABLE 3
AGE AND GENDER OF THE RESPONDENTS

Age	Response			
	Male (No.)	Male (%)	Female (No.)	Female (%)
≤ 20	27	35.0	8	32.0
> 20 ≤ 49	22	29.0	9	36.0
> 49 ≤ 59	20	26.0	8	32.0
> 59 ≤ 60	4	5.0	0	0.0
> 60	4	5.0	0	0.0
Total	77	100.0	25	100.0

Table 4 indicates the respondents' level of education / qualification(s). 53.2% of male respondents, and 36.0% of the female respondents' highest qualification is Grade 11. This is followed by 19% male, and 32% female respondents relative to National Diploma, respectively. 18.2% of male

and 16.0% of female respondents' highest qualification is Grade 12. Therefore, 71.4% of males' and 52.0% of females' highest qualification is secondary school-level, and 28.6% of males and 48.0% of females have a tertiary-level qualification.

TABLE 4
QUALIFICATIONS OF RESPONDENTS

Highest qualification	Male (No.)	Male (%)	Female (No.)	Female (%)
Grade 11	41	53.2	9	36.0
National Diploma	15	19.5	8	32.0
Grade 12	14	18.2	4	16.0
BTech	5	6.5	4	16.0
Honours	1	1.3	0	0.0
PhD (Project Management)	1	1.3	0	0.0
Total	77	100.0	25	100.0

Table 5 indicates the number of years the respondents have worked in construction. It is notable that 28.4% of the respondents have worked in construction for ≤ 2 years and 71.6% have worked for > 2 years. Furthermore, 49.0%

of the respondents have worked in construction for ≤ 6 years and 51.0% have worked for > 6 years. Therefore, the respondents can be deemed to have had sufficient experience to make informed responses.

TABLE 5
5 NUMBER OF YEARS THE RESPONDENTS HAVE WORKED IN CONSTRUCTION

Period (Years)	No.	Percentage
≤ 2	29	28.4
> 2 ≤ 6	21	20.6
> 6 ≤ 9	11	10.8
> 9 ≤ 10	9	8.8
> 10 ≤ 20	5	4.9
> 20	27	26.5
Total	102	100.0

Research findings

Respondents in the form of site managers were requested to record the number of injuries experienced on their projects and the number of hours worked, which records are understandably challenging in terms of actual recording and access, and hence the findings are not presented. However, they were also required to indicate the extent to which the categories of workers, including supervisors, experienced injuries over the year preceding the survey.

Table 6 indicates that according to 88.2% of respondents, general workers experienced first aid injuries, followed by skilled workers (50.0%), semi-skilled workers (37.5%), and supervisors (12.5%). Similarly, in terms of medical aid, general workers were identified by 25.0% of site managers, and in terms of temporary disablement injuries by 37.5% of site managers. Clearly, workers experience mostly first aid injuries, followed by temporary disablement, and medical aid injuries.

TABLE 6
6 EXTENT OF INJURIES TO WORKERS ACCORDING TO SITE MANAGERS

Category	Response (%)		
	First aid	Medical aid	Temporary disablement
Supervisors	12.5	0.0	0.0

Skilled workers	50.0	0.0	12.5
Semi-skilled workers	37.5	12.5	25.0
General	88.2	25.0	37.5

Table 7 indicates that 72.7% of injuries were minor injuries, followed by temporary disabling injuries (18.2%), and severe injuries (9.1%).

TABLE 7
TYPES OF INJURIES EXPERIENCED ACCORDING TO SITE MANAGERS

Type	Frequency	Percentage
Minor injuries	24	72.7
Severe injuries	3	9.1
Temporary disabling	6	18.2
Permanent disabling	0	0.0
Fatal	0	0.0
Total	33	100.0

Table 8 indicates the frequency of causes of accident(s) on construction projects in terms of percentage responses to a scale of 1 (never) to 5 (always), and MSs ranging between 1.00 and 5.00. It is notable that only 10 / 13 (76.9%) causes have MSs > 3.00, which indicates that in general these causes of accidents can be deemed to be frequently the cause of construction accidents, as opposed to infrequently. It is notable that only 4 / 13 (30.8%) of MSs are > 4.20 ≤ 5.00, which indicates the causes can be deemed to be the cause of accidents between often to always / always. Workers' carelessness predominates, followed by workers' unsafe acts / behaviour, workers' poor discipline, and inadequate supervision. It is notable that a peak of accidents often remains, appear to be workers' carelessness, workers' unsafe acts / behaviour, and workers' poor discipline, most are caused by intensely rooted unsafe behaviour patterns. Inadequate supervision is often cited as having an impact on construction accidents.

A further 4 / 13 (30.8%) MSs, namely those ranked fifth to eighth, are > 3.40 ≤ 4.20, which indicates they can be deemed to be the cause between sometimes to often / often. Furthermore, the MSs all occur in the lower half of the range – unsafe conditions, non-compliance with H&S rules, inadequate management, and non-compliance with SWPs. The causes ranked ninth to twelfth (30.8%) have MSs > 2.60 ≤ 3.40, which indicates they can be deemed to be the cause between rarely to sometimes / sometimes - multiple factors e.g. human, mechanical, and environmental, non-continuous monitoring with regular evaluation of H&S performance, inadequate risk management procedures e.g. SWPs, and non-identification of all H&S hazards.

Inadequate workers' H&S training has a MS ≥ 1.00 ≤ 1.80, which indicates that it can be deemed to be a cause between never to rarely. Clearly, H&S training is conducted frequently, as opposed to infrequently.

TABLE 8
CAUSES OF CONSTRUCTION ACCIDENTS

Cause	Response (%)						MS	Rank
	Unsure	Never	Rarely	Some-times	Often	Always		
Workers' carelessness	0.0	0.0	0.0	17.5	26.1	56.5	4.39	1
Workers' unsafe acts / behaviour	0.0	0.0	0.0	21.7	21.7	56.5	4.35	2
Workers' poor discipline	0.0	0.0	4.3	17.5	21.7	56.5	4.30	3
Inadequate supervision	0.0	0.0	4.3	17.5	21.7	56.5	4.30	4
Unsafe conditions	4.3	0.0	17.5	21.7	26.1	30.5	3.73	5
Non-compliance with H&S rules	0.0	0.0	21.7	21.7	30.5	26.1	3.61	6
Inadequate management	0.0	4.3	13.0	17.5	52.2	13.0	3.57	7
Non-compliance with SWPs	0.0	0.0	26.1	30.5	17.3	26.1	3.43	8
Multiple factors e.g. human, mechanical, and, environmental	17.4	8.7	17.4	21.7	26.1	8.7	3.11	9
Non-continuous monitoring with regular evaluation of H&S performance	0.0	8.7	21.7	30.5	30.5	8.7	3.09	10
Inadequate risk management procedures e.g. SWPs	0.0	13.0	21.7	30.5	30.5	4.3	2.91	11
Non-identification of all H&S hazards	4.3	17.5	21.7	26.1	26.1	4.3	2.77	12
Inadequate workers' H&S training	0.0	39.2	47.8	13.0	0.0	0.0	1.65	13

Table 9 indicates the frequency of H&S training on construction projects in terms of percentage responses to a scale of annually to weekly, and MSs ranging between 1.00 and 5.00. It is notable that only two (50.0%) types of H&S training have MSs above the midpoint of 3.00, which indicates that toolbox talks and general H&S training can be deemed to be conducted frequently as opposed to infrequently.

Toolbox talks predominates, and has a MS > 4.20 ≤ 5.00, which indicates that they can be deemed to be conducted between fortnightly to weekly / weekly. General H&S training

has a MS > 3.40 ≤ 4.20, which indicates that it can be deemed to be conducted between monthly to fortnightly / fortnightly. Hazard identification and risk assessment (HIRA) training has a MS > 2.60 ≤ 3.40, which indicates that it can be deemed to be conducted between quarterly to monthly / monthly. Induction has a MS ≥ 1.00 ≤ 1.80, which indicates that it can be deemed to be conducted annually to quarterly. Induction is primarily conducted on newly appointed workers, and visitors visiting construction sites

TABLE 9
FREQUENCY OF H&S TRAINING ON CONSTRUCTION PROJECTS

Type	Response (%)						MS	Rank
	Unsure	Annually	Quarterly	Monthly	Fortnightly	Weekly		
Toolbox talks	5.7	6.9	5.7	6.9	10.3	64.5	4.27	1
General H&S	5.7	9.2	5.7	10.3	11.5	57.6	4.09	2
Hazard identification and risk assessment (HIRA)	6.9	5.7	23.0	46.0	11.5	6.9	2.90	3
Induction	10.3	63.2	11.5	9.2	4.6	1.2	1.54	4

Table 10 indicates the facilitators of H&S training conducted on construction projects in terms of percentages. In-house predominated in terms of all types of training. It is notable that induction and toolbox talks are conducted solely in-house.

Consultants only conduct 16.1% of HIRA and 26.4% of general H&S training. It is notable that H&S training is predominantly conducted in-house on construction projects, which indicates commitment to, and involvement and participation in H&S by contractors.

TABLE 10
FACILITATORS OF H&S TRAINING

Type	Response (%)	
	In-house	Consultants
Induction	88.5	0.0
Toolbox talks	88.5	0.0
HIRA	82.9	17.1
General H&S	70.6	29.4

Table 11 indicates the actions undertaken by the DPW relative to construction project H&S, in terms of percentage responses to a scale of never to always, and MSs ranging between 1.00 and 5.00. It is notable that 11 / 12 (91.7%) actions have MSs above the midpoint of 3.00, which indicates that these actions can be deemed to be undertaken frequently by the DPW, as opposed to infrequently.

The actions ranked first to ninth (75.0%) have MSs > 4.20 ≤ 5.00, which indicates that they can be deemed to be undertaken between often to always / always.

The action (8.3%) ranked tenth has a MS > 3.40 ≤ 4.20, which indicates that it can be deemed to be undertaken sometimes to often / often. This is notable, as in terms

of the Construction Regulations, the client is required to determine whether the PC submitting a tender has made adequate financial provision for H&S, or not.

The last two (16.7%) actions ranked eleventh to twelfth have MSs > 2.60 ≤ 3.40, namely a baseline risk assessment (BRA) is provided to the designer(s), and HIRA is conducted prior to the bidding process, which indicates they can be deemed to be undertaken rarely to sometimes / sometimes. HIRA should be conducted by the client in the form of the BRA, and an H&S specification based thereon should be provided to the designer(s), designers should conduct HIRA during the design process, and contractors should conduct HIRA in addition to reviewing the H&S specifications provided by clients.

TABLE 11
ACTIONS UNDERTAKEN BY THE DPW RELATIVE TO CONSTRUCTION PROJECT H&S

Action	Response (%)						MS	Rank
	Unsure	Never	Rarely	Some-times	Often	Always		
The tender documents schedule H&S requirements	4.3	0.0	0.0	0.0	13.0	82.6	4.86	1
The PC submits an H&S plan to the DPW prior to commencing work on site	0.0	0.0	0.0	0.0	17.4	82.6	4.83	2
The DPW discusses the H&S plan with the PC and approves it before work commences on site	0.0	0.0	0.0	0.0	17.3	82.6	4.83	3
An H&S specification is provided to the principal contractor (PC) at bidding stage	4.3	0.0	0.0	0.0	26.1	69.6	4.73	4
The PC ensures that all the workers have a valid medical certificate of fitness specific to the construction work to be performed	0.0	0.0	0.0	8.7	13.0	78.3	4.70	5
The bills of quantities (BOQ) facilitate detailed pricing of H&S	0.0	0.0	0.0	8.7	17.4	73.9	4.65	6
H&S requirements are documented prior to the bidding process	0.0	0.0	0.0	0.0	34.8	65.2	4.65	7
The PC submits a consolidated H&S file upon completion of the contract	0.0	0.0	4.3	8.7	8.7	78.3	4.61	8

The DPW ensures that the PC to be appointed has the H&S competencies and resources to carry out the construction work	4.3	0.0	8.7	0.0	17.4	69.6	4.55	9
The DPW reviews whether the PC submitting a tender has made adequate financial provision for H&S	0.0	4.3	13.0	8.7	21.7	52.3	4.05	10
A baseline risk assessment (BRA) is provided to the designer(s)	0.0	8.7	34.8	4.3	26.1	26.1	3.26	11
HIRA is conducted prior to the bidding process	0.0	21.7	34.8	8.7	17.4	17.4	2.74	12
Inadequate workers' H&S training	0.0	39.2	47.8	13.0	0.0	0.0	1.65	13

Table 12 indicates the frequency of H&S inspections by the DPW's H&S Agents in terms of percentage responses to a scale of never to consistently, and a MS between 1.00 and 5.00. Given that the MS is above the midpoint of 3.00, H&S inspections can be deemed to be conducted frequently as opposed to infrequently. However, given that the MS is $> 3.20 \leq 4.20$, the H&S inspections can be deemed to be

conducted between sometimes to often / often. However, the MS of 4.19 is marginally below the upper point of the range, and if it was 0.02 more, then H&S inspections would have been deemed to be conducted between often to consistently / consistently. The latter mentioned frequency range constitutes the ideal.

TABLE 12
FREQUENCY OF H&S INSPECTIONS BY THE DPW'S H&S AGENTS

	Response (%)					MS	
	Unsure	Never	Rarely	Some-times	Often		Always
	4.0	0.0	0.0	17.0	4.0	35.0	4.19

Table 13 indicates the frequency of H&S audits on DPW's construction projects in terms of percentage responses to a range annually to weekly, and a MS between 1.00 and 5.00. It is notable that the MS is > 3.00 , which indicates that H&S audits can be deemed to be conducted frequently

as opposed to infrequently. However, given that the MS is $> 2.60 \leq 3.40$, H&S audits are deemed to be conducted between quarterly to monthly / monthly. The requirement in terms of the Construction Regulations ^[2] is monthly.

TABLE 13
FREQUENCY OF H&S AUDITS ON DPW'S CONSTRUCTION PROJECTS

Unsure	Response (%)					MS
	Never	Rarely	Some-times	Often	Always	
6.0	0.0	0.0	80.0	7.0	7.0	3.22

Table 14 indicates the extent to which tender documents address the implementation of H&S on construction projects in terms of percentage responses to a range not addressed to extensively addressed, and a MS between 1.00 and 5.00. It is notable that the 4.31 MS is above the midpoint of 3.00, which indicates that in general tender

documents can be deemed to address the implementation of H&S on construction projects to a greater as opposed to a limited extent. However, given that the MS is $> 4.20 \leq 5.00$, tender documents can be deemed to be addressed to extensively addressed / extensively addressed on construction projects.

TABLE 14
EXTENT TO WHICH TENDER DOCUMENTS ADDRESS THE IMPLEMENTATION OF H&S ON CONSTRUCTION PROJECTS

Unsure	Response (%)					MS
	Not addressed	Slightly addressed	Fairly addressed	Addressed	Extensively addressed	
0.0	0.0	0.0	8.7	51.8	39.5	4.31

Table 15 indicates the extent to which various parameters are negatively affected by inadequate H&S in terms of percentage responses relative to a scale of 1 (minor) to 5 (major), and MSs ranging between 1.00 and 5.00. It is notable that all the MSs are above the midpoint of 3.00, which indicates that in general the respondents can be deemed to perceive the parameters to be negatively affected by inadequate H&S. However, 5 / 7 (71.4%) MSs $> 4.20 \leq 5.00$, which indicates that the extent to which

the parameters are negatively affected by inadequate H&S can be deemed to be between near major to major / major - schedule (time), contractor's reputation, environment, cost (contractor), and productivity . 2 / 7 (28.6%) MSs $> 3.40 \leq 4.20$, which indicates that inadequate H&S can be deemed to negatively affect client's reputation and quality between some extent to a near major extent / near major extent.

TABLE 15
THE EXTENT TO WHICH VARIOUS PARAMETERS ARE NEGATIVELY AFFECTED BY INADEQUATE H&S

Parameter	Unsure	Response (%)					MS	Rank
		Minor.....Major						
		1	2	3	4	5		
Schedule (time)	0.0	0.0	0.0	4.3	30.4	65.3	4.61	1
Contractor's reputation	0.0	0.0	0.0	13.0	26.1	60.9	4.48	2
Environment	0.0	0.0	0.0	8.7	34.8	56.5	4.48	3
Cost (Contractor)	4.3	0.0	0.0	8.7	34.8	52.2	4.45	4
Productivity	0.0	0.0	4.3	13.0	21.8	60.9	4.39	5
Client's reputation	4.3	8.7	8.7	8.7	30.4	39.2	3.86	6
Quality	0.0	0.0	13.0	13.0	52.2	21.8	3.83	7

Table 16 indicates the frequency that factors contribute to occupational stress in the construction industry in terms of percentage responses to a scale of never to consistently, and MSs ranging between 1.00 and 5.00. It is notable that all the MSs are above the midpoint of 3.00, which indicates that the respondents perceive the factors to contribute to occupational stress frequently, as opposed to infrequently. 4 / 6 (66.7%) factors have MSs > 4.20 ≤ 5.00, which indicates that they can be deemed to contribute to occupational stress between often to consistently / consistently.

Two (33.3%) factors, namely construction site H&S, and insufficient skills have MSs > 3.40 ≤ 4.20, which indicates that they can be deemed to contribute to occupational stress between sometimes to often / often

TABLE 16
FREQUENCY THAT FACTORS CONTRIBUTE TO OCCUPATIONAL STRESS IN THE CONSTRUCTION INDUSTRY

Factor	Response (%)						MS	Rank
	Unsure	Never	Rarely	Some-times	Often	Consis-tently		
Project deadlines	0.0	0.0	0.0	11.7	29.3	59.0	4.47	1
Inadequate managerial support	8.9	0.0	0.0	16.6	24.5	50.0	4.37	2
Insufficient communication	2.9	0.0	2.0	14.7	26.4	54.0	4.36	3
Insufficient clarity regarding responsibilities	0.0	0.0	0.0	16.7	44.1	39.2	4.23	4
Construction site H&S	4.9	4.9	6.8	19.7	24.5	39.2	3.91	5
Insufficient skills	0.0	0.0	2.9	19.7	67.6	9.8	3.84	6

DISCUSSION

The extent to which various parameters are negatively affected by inadequate H&S, emphasises the importance of the implementation of H&S on DPW construction projects. This finding mirrors the findings of previous South African studies [1], and constitutes an incentive for clients to play a role in the implementation of H&S on construction projects due to the impact of optimum H&S performance on overall project performance.

Furthermore, clients hold the greatest potential leverage as they have the authority to influence the behaviour of others. For this reason, clients are the best candidates to lead the construction industry towards the consistent achievement of healthy and safe projects.

The extent of injuries to workers amplifies the need for optimum H&S, as the outcome of incidents is fortuitous, and therefore, given the extent of first aid injuries, there is

potential for more severe injuries. Furthermore, the extent to which factors contribute to occupational stress indicates the multi-stakeholder origin of the causes, inter alia, project deadlines, which are courtesy of primarily clients, although clients are advised by CPMs, designers, and QSs.

Given that the predominating causes of accidents are worker-related, it can be deduced that the H&S culture, H&S training, and supervision on projects, are not optimum on DPW projects, which are the responsibility of management. This deduction is reinforced by the ranking of inadequate supervision, unsafe conditions, non-compliance with H&S rules, inadequate management, and non-compliance with SWPs, which are also management related.

The frequency of H&S training, reinforced by the facilitators of H&S training, alludes to contractor commitment to H&S, however, the frequency of HIRA training is likely to contribute to the worker-related behaviours, which was identified as the predominating cause of accidents. HIRA training should be conducted more frequently than quarterly to monthly / monthly and supported by a related toolbox

talk on a frequent or refresher basis. HIRA is the basis for mitigating hazards and risks and assuring healthy and safe work and is emphasised by the Occupational Health and Safety Act [8] and the Construction Regulations [2].

The H&S actions undertaken by the DPW relative to projects indicates client commitment to H&S, and client compliance with the Construction Regulations, however, there is a need for enhanced HIRA on their part. The conclusion regarding client commitment to H&S is reinforced by the frequency of H&S inspections and audits by the DPW's H&S Agents, and the extent to which tender documents address the implementation of H&S on construction projects.

CONCLUSIONS

Inadequate H&S negatively affects the other project parameters, and therefore overall project performance. Therefore, H&S can be deemed to be the catalyst for the synergy between the project parameters.

Clients have the greatest potential leverage in terms of H&S, and given that they are required to initiate H&S interventions and interface with other stakeholders in terms of the Construction Regulations, they should provide leadership in terms of H&S.

Workers experience injuries, and given the extent of first aid injuries, there is potential for more severe injuries. Furthermore, occupational stress is experienced on projects, the causes of which are multi-stakeholder in terms of origin. Although the predominating causes of accidents are worker-related, it is management's responsibility to manage the site environment, and therefore it can be concluded that the H&S culture, H&S training, and management and supervision are not optimum on DPW projects.

H&S training is presented frequently, and mostly in-house, which leads to the conclusion that contractors are committed to H&S. The frequency of HIRA training leads to the conclusion that it may be a contributory factor to workers' carelessness, unsafe acts / behaviour, and poor discipline.

Given the frequency of actions undertaken by the DPW relative to construction project H&S, the DPW can be deemed to be committed to H&S. This conclusion is underscored by the frequency of actions by other stakeholders, which stakeholders clients are required to interface with, and / or monitor.

RECOMMENDATIONS

The DPW should continue to focus on realising optimum H&S on projects, and ensure that it is addressed as a value, which implies that H&S is always considered and / or referred to during the six stages of projects. The DPW should place more emphasis on HIRA, commencing with the BRA, and engender focus on HIRA during both the design and construction processes.

An optimum multi-stakeholder H&S culture should be evolved on projects, and contractors should maintain an optimum level of H&S awareness through frequent and re-fresher HIRA training, to engender H&S compliance by workers. Furthermore, close supervision should be pervasive, and should include monitoring worker compliance with SWPs. Daily activities should be preceded by daily H&S task instructions (DH&STIs), and multi-topic toolbox talks that relate to current activities should be delivered on a weekly basis.

The contributors to the experience of stress should be interrogated, particularly project deadlines, which result in a myriad of problems, inter alia, cost overruns, incidents and accidents, poor productivity, quality non-conformances and related rework, and schedule overruns. Stress should be collectively addressed through an industry-wide programme, which includes the interventions required at industry, organisation, and project level.

References

- [1] Ghaffarianhoseini, A., Berardi, U., AlWaer, H., Chang, S., Halawa, E., and Clements-Croome, D., (2016). What is] Construction Industry Development Board (cidb). (2009) Construction health and safety in South Africa: Status and recommendations. cidb, Pretoria.
- [2] Republic of South Africa (RSA) (2014) No. R. 84 Occupational Health and Safety Act, 1993 Construction Regulations 2014. Government Gazette No. 37305. Pretoria.
- [3] Department of Labour (DoL) 2014. Address by the former Minister of DPW, T.W. Nxesi, MP, on the occasion of the launch of Construction Regulations on 10 February 2014. DoL, Pretoria.
- [4] National Department of Public Works (NDPW) (2005) Strategic Plan [Unpublished report]. NDPW, Pretoria.
- [5] Department of Public Works (DPW) (2015) 2015-2020 Strategic Plan. DPW, Pretoria.
- [6] Department of Public Works (DPW) (2014) 2013 / 14 Annual Report. DPW, Pretoria.
- [7] Department of Public Works (DPW) (2017) Minister Nkosinathi Nhleko on building capacity of inspections to tackle occupational health and safety contraventions, [online]. DPW, Pretoria. Available from: <https://www.gov.za/speeches/minister-nkosinathi-nhleko-building-capacity-inspections-tackle-occupational-health-and> [Accessed 6 August 2020]
- [8] Republic of South Africa (RSA) (1993) Occupational Health and Safety Act No. 85 of 1993. Pretoria.
- [9] Lees, H. and Austin, J. (2011) "The case for behaviour-based safety in construction." Proceedings of the Institution of Civil Engineers. Management, Procurement and Law, 164(1), 3-7.
- [10] Ahmed, A. and Othman, E. (2012) "A study of the causes and effects of contractors' non-compliance with the health and safety regulations in the South African construction industry." Journal of the Egypt Institution of Architectural Engineering, 8(3), 180-191.
- [11] Du Toit, W.J. (2012) The relationship between health and safety and human risk-taking behaviour in the South African electrical construction industry. Unpublished Thesis. Department of Construction Management, Nelson Mandela Metropolitan University, Port Elizabeth.
- [12] Schaufelberger, J. and Yu Lin, K. (2014) Construction Project Safety. John Wiley & Sons, New York.
- [13] Haslam, R.A., Hide, S.A., Gibb, A.G.F., Gyi, D.E., Pavitt, T., Atkinson, S. and Duff. A.R. (2005) Contributing factors in construction accidents, Applied Ergonomics, 36, 401-415.
- [14] Ahmad, S., Iraj, M., Abbas, M. and Mahdi, A. (2016) "Analysis of occupational accidents induced human injuries: A case study in construction industries and sites." Journal of Civil Engineering and Construction Technology, 7(1), 1-7.
- [15] Mollo, L.G., Emuze, F. and Smallwood, J. (2018) The Integration of Safety Management System to Reduce Accidents on Construction Sites. In: Proceedings of the Joint CIB W099 and TG59 Conference 'Coping with the Complexity of Safety, Health, and Wellbeing in Construction', Salvador, Brazil, 1-3 August 2018, 197-205.
- [16] Aghimien, D., Aigbavboa, C., Oke, A. and Ontlametse, K. (2018) Factors Contributing to Disabling Injuries and Fatalities in the South African Construction Industry. In: Proceedings of the Joint CIB W099 and TG59 Conference 'Coping with the Complexity of Safety, Health, and Wellbeing in Construction', Salvador, Brazil, 1-3 August 2018, 336 - 344.
- [17] Wells, J., and Hawkins, J. (2011) "Briefing: Promoting construction health and safety through procurement." Proceedings of the Institution of Civil Engineers - Management, Procurement and Law, 164(4), 165-168.
- [18] Lutchman, C., Maharaj, R. and Ghanem, W. (2012) Safety management. A comprehensive approach to developing a sustainable system. 1st Ed. CRC Press, New Jersey.
- [19] Windapo, A.O., Umeokafor, N.I. and Olatunji, O.A. (2018) Self-Regulation Amongst South African Contractors in Achieving Legislative Requirements on Occupational Health and Safety. In: Proceedings of the Joint CIB W099 and TG59 Conference 'Coping with the Complexity of Safety, Health, and Wellbeing in Construction', Salvador, Brazil, 1-3 August 2018, 187-196.
- [20] Dopkeen, J.C. and Dubois, R. (2014) Stress in the Workplace: A Policy Synthesis on Its Dimensions and Prevalence. University of Illinois, Chicago, Illinois.
- [21] Nawaz, U., Mufti, N.A. and Shakir, M.A. (2014) "Job stress evaluation during project life cycle on working employees." Journal of Science, 66(4), 376-380.
- [22] Enshassi, A. and Al.Swaity, E. (2018) Professionals' Perspectives Regarding Stressors in the Construction Industry. In: Proceedings of the Joint CIB W099 and TG59 Conference 'Coping with the Complexity of Safety, Health, and Wellbeing in Construction', Salvador, Brazil, 1-3 August 2018, 266 - 273.
- [23] Campbell, F. 2006. Occupational Stress in the Construction Industry. Ascot: Chartered Institute of Building (CIOB).
- [24] Leedy, P.D. and Ormrod, J.E. (2010) Practical research: Planning and design. 9th Ed. Pearson Educational International, New Jersey.
- [25] Yin, R.K. (2009) Case study research: design and methods; 3rd Edition. Sage, London.

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FACTORS INFLUENCING LABOUR UNREST: A CASE OF CONSTRUCTION EMPLOYEES AT AN EXPANDED PUBLIC WORKS PROGRAMME

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Abstract

Purpose of the paper

The study explores the influence of the lack of employee benefits, collective bargaining and communication on labour unrest at the construction site in KwaZulu-Natal, Durban (South Africa).

Design

The research is conducted at the informal settlement in Durban where most of the construction employees who worked at the Expanded Public Works Programme reside. A sample of 50 from 58 construction employees was drawn using cluster sampling. Data was collected using a self-developed questionnaire and analysed using descriptive and inferential statistics.

Findings

The results of the study reflect that there exist significant relationships between collective bargaining, communication, employee benefits and labour unrest respectively. The descriptive statistics and mean analyses reflect that the labour unrest at the EPWP because workers at the EPWP were most unhappy with poor collective bargaining, (mean = 4.22), followed by the lack of employee benefits (Mean = 3.87) and lastly, the lack of communication (Mean = 3.69). This clearly reflects that project managers need to apply their minds

and develop and exercise skills in collective bargaining, provide proper employee benefits to employees and enhance communication skills to engage with employees.

Value

The study contributes to the better understanding of these factors influencing labour unrests and the negative effects they may have on the organisation if they are not dealt with accordingly. Recommendations based on the results of the study are presented, which when effectively implemented has the potential to reduce labour unrest in the construction industry in the future.

Keywords: Employee benefits, collective bargaining, communication, labour unrest, expanded public works programme

INTRODUCTION

Many organisations are affected by labour unrest which is perceived as a contagious disease that has a negative effect on the economy of South Africa¹. However, in most instances, labour unrest is caused by the fact that employers increase profits at the expense of their employees with insufficient resources². Furthermore, employees are expected to work hard so that they increase production and development in their organisations³. Labour unrests also occur because of the failure of collective bargaining, the lack of effective communication and insufficient employee benefits⁴. The increased incidence of labour unrest could be associated with the fact that there are poor employer-employee relationships which affect communication and collective bargaining between employers and employees⁵. Different forms of labour unrest are directed towards the employer with the aim of getting the organisation to fulfil employees' demands⁶.

Communication and collective bargaining are seen as closely interrelated to one another because parties in the employment relationship cannot negotiate through collective bargaining if there is poor communication between them⁷. Collective bargaining and communication are the key foundations upon which employment relationships are built.

Collective bargaining and communication assist employers and employees to resolve disputes that may arise between them⁸. Collective bargaining is emphasised in Section 23 (1) of the South African Constitution, which states that employers and employees in the employment relationship need to agree on terms and conditions of employment through collective bargaining. Employment relationships are about interactions between the parties (employers, employees, and the State) who must take one another into consideration. Employee benefits directly influence labour unrests that occur in organisations. Employee benefits are regulated by the Basic Conditions of Employment Act (BCEA) 75 of 1997. Employers are entitled to remunerate their employees as long as they perform the duties which they are allocated to perform⁹.

Recent articles indicated that the government introduced the Expanded Public Works Programme (EPWP) which afforded temporary employment to South African youth. As part of the EPWP, the South African National Roads Agency Limited (SANRAL) provided temporary employment to South African youth. The debut of the EPWP has contributed to labour unrest in the public sector due to the lack of employee benefits, poor communication and poor collective bargaining between employers and employees. This article explores the extent to which the lack of employee benefits, collective bargaining and communication influence the incidence of labour unrest in the construction industry where temporary employment is offered. Construction industries need to secure industrial peace in order to ensure that they attract and retain investments¹⁰. Violent strikes in South Africa have impacted negatively on the ability of investors to invest in South African organisations¹¹.

The role of the construction industry in reducing unemployment in South Africa is undeniable. In addition, the construction industry not only contributes to a sizeable proportion of South Africa's GDP and GNP but also, through the EPWP, contributes to necessary employment opportunities and to economic growth. Productivity has been deteriorating in construction sites due to labour unrests in South Africa. This has been a double-edged sword and has negatively impacted both the cost and quality of construction as well as the livelihood and morale of workers (Construction Industry Development Board (CIDB), 2015). In 2013, R6.6 billion were lost in wages due to staff participation in strikes and compensation and other disputes caused work stoppages of around 77 working days with some of the longest strike actions taking place for more than 60 days (CIDB, 2015). Evidently, the significance of this study in South Africa is obvious as if we can understand and effectively manage employee benefits,

communication and collective bargaining in construction, we can nurture a happier, more productive workforce, win output hours to lost hours in unrest and certainly contribute better to the country's GDP and GNP.

An overview of labour unrest in South Africa "Labour unrest is widely understood as a result of failure of effective collective bargaining between employers and employee representatives"¹². Labour unrest can take various types, namely, strikes, lockouts, picketing, protest action and boycott¹³. However, strikes themselves can also take various forms, which include go-slows, secondary strikes, sympathy strikes, rotating strikes and overtime ban. Different countries have their own statutory laws which grant them the right to strike¹⁴. In some countries this right is conferred by their Constitutions. Statutory laws of different countries give employers the right to lockout, even though there are few countries providing this right as compared to the right to strike. In such countries where the right to strike is conferred, it is acknowledged that this right may be done in accordance with the statutory laws and must align with the requirements of the statutory laws. The main procedure is that notice must be given prior to the commencement of a strike or lockout and in some countries like Italy, South Africa, Namibia, Ghana, Sweden, Spain, Finland and Denmark courts do not recognise the strikes without prior notice¹⁵. In some countries, however, like France, no notice is required before the commencement of a strike.

It cannot be disputed that the impact of strikes in general are negative¹⁶. Employers can choose not to remunerate employees who are on strike because services are not rendered during the course of a strike and employers lose their businesses. According to Burchill¹⁷, the occurrence of strike action always guarantees a loss on both employers and employees. From the business point of view, the closing down of the employers business in no hesitation, means disaster to the public. It is important to highlight the right to strike within the context of the South African employment relationships¹⁸. It is also significant to outline that whilst this right is exercised, it causes tense labour relationships between the employers and employees¹⁹. When the strike is taking place, not only striking employees are affected, but also those who are not part of the strike. The primary intention of a strike relates to some occupational nature of disputes with the employer²⁰. The right to strike is utilised by employees to protect their employment interests.

The LRA 66 of 1995 came into effect in 1995 and had requirements in some of its sections that notice should be issued before the commencement of a strike, a secondary

strike, and lock-out or protest action²¹. Some of these sections which require notice are Section 64(1)(b), (c), (d), Section 66(2)(b) and Section 77(1)(b) and (d). In the South African history of employment law, this was the first time in which such requirement was put into practice. These sections demand that prior notice must be given before the commencement of the protected strike²². Section 213 of the LRA 66 of 1995 does not prohibit strikes and protest action that are a threat to peace. These strikes are banned elsewhere in the LRA 66 of 1995²³. Section 67 (8) of the LRA 66 of 1995 state that striking employees are held contractually liable for all the offences committed during the strike and may be interdicted from continuing with the strike²⁴. Striking employees who disrupt peace, may be dismissed for misconduct, and be charged for criminal conduct²⁵. The forms of strikes and protest action recognised in the South African law are in accordance with international law. The variety of strike methods ranging from complete strikes, partial strikes, go-slows, grasshopper strikes, work to rule strikes, obstruction of work and overtime are recognised by both the South African law and international law²⁶. All forms of strikes that threaten peace are prohibited by the ILO and the LRA 66 of 1995²⁷.

be adopted by construction SMEs to achieve sustainable construction project delivery. The structure of the paper presents brief discussion concerning pertinent review of literature relating to cost management techniques adopted in construction projects delivery. The subsequent sections outline the research methodology employed to achieve the objective of the study as well as the data presentation and discussion. The final section presents the conclusions and recommendations of the study.

Employee Benefits

Employee benefits are defined as benefits that are given to employees such as salaries, wages, the ability of the organisation to pay for medical care of its employees, bonuses and paid leave for present employees²⁸. The employee benefits are regulated by the BCEA 75 of 1997. Under collective agreement, all employees in the workplace are entitled to be remunerated and be granted benefits which they are entitled to receive and when they are due; as long as they tender service and carry out the activities that are they are supposed to undertake²⁹. However, the Courts have categorised benefits as different from remuneration. Judges in the Labour Courts distinguished between benefits and remuneration. Judges held that benefits may include all material advantages which the employee

accrues by the virtue of employment contract³⁰. Benefits are terms of service and are the only terms included in the definition of unfair labour practice³¹. If the contract of employment is silent about the employee benefits but the employee feels he/she is entitled to benefits, he/she cannot claim that he/she is treated unfairly³². Employees cannot compel employers to grant them benefits if they do not perform their contractual duties as indicated in the collective agreement³³.

Collective Bargaining

If not the key foundation of employment relations, collective bargaining forms an integral part of it³⁴. Collective bargaining is the process where employers and employees negotiate working conditions and remuneration and as a result the outcome of these negotiations depends on which party exercises more power over the other³⁵. Collective bargaining is viewed as a process between employers and employees to reach consensus and is characterised by a speed to reach mutual understanding because of economic, social and legal pressures³⁶. The bargaining process is regulated by power which determines who wins in the negotiation process. Reaching consensus between the parties is possible if there is effective negotiation in order to control and resolve disputes that may arise in the workplace. Reaching consensus helps to promote harmonious employment conditions and effectively assist in maintaining positive employment relationships³⁷. Collective bargaining as a negotiation process is very important in the workplace because it resolves challenges arising in the workplace. "Collective bargaining permits employees to voice their concerns and opinions in the workplace and allows employers to recognise their work"³⁸. The intention of collective bargaining is for employers and employees to negotiate and reach mutual understanding in order to strengthen the employer-employee relationship. Failing to bargain collectively in South African labour law constitutes an unfair labour practice³⁹.

The labour relations issues that arise in the place of employment are characterised by the failure to bargain collectively between employers and employees in the workplace. For this reason, the South African Courts imposed bargaining as a duty to regulate labour issues that arise as a failure of collective bargaining⁴⁰. Bargaining in good faith means that the party in dispute shows sincere intention to achieve a resolution by not exhibiting behaviours that suggest a predetermined position⁴¹. Collective bargaining in South Africa is understood in two different ways. Firstly, the LRA 66 of 1995 explains it as a duty to

bargain collectively, while the South African Constitution refers to a right to engage in collective bargaining⁴².

Communication

Communication is a process whereby a sender transmits a message to a receiver, who then interprets the message and bestows it with meaning⁴³. Communication is significant in the employment relationship, because it ensures that common understanding is achieved in pursuing the desired outcome. Communication comprises verbal (both written and oral) and non-verbal communication both of which take place in the employment relationship. Effective communication guarantees the development of trust and is a forerunner for harmonious employment relationship⁴⁴. Grunig⁴⁵ states that, on average, people spend four fifths of their employment life communicating. Communication is one aspect that employers and employees cannot manage without. Effective communication is the result of trust established in the workplace between the employers and employees⁴⁶. "Effective communication guarantees the development of trust, as a forerunner for harmonious labour relationship"⁴⁷.

Employers and employees should create a harmonious, conducive environment in which they listen and understand each other. Labour relationships take into consideration employees, not only as factors of production but also as individuals who bring their own needs, expectations and goals to the place of employment. Informal and formal communication takes place daily either through telephonic or face-to-face interactions. According to Petty and Cacioppo⁴⁸, communication is significant in creating the right atmosphere for trust, negotiations and effective bargaining. Listening skills make effective communication possible⁴⁹. However, no matter how much energy one party uses in order to communicate their needs, beliefs and concerns with the other, if the other party is not willing to listen and receive the information accordingly, communication will not be possible. People do not listen to understand/communicate but listen to respond and this usually happens when people are in conflict/loggerheads⁵⁰.

RESEARCH METHODOLOGY

Research approach

The research methodology has been designed to undertake a quantitative, cross-sectional study to assess the factors that influence labour unrests at an Expanded Public

Works Programme, that is, a construction site in KwaZulu-Natal, Durban (South Africa). These factors are employee benefits, collective bargaining and communication. The Expanded Public Works Programme was selected for the study as it is one of government's key programmes aimed at providing poverty and income relief through temporary work for the unemployed. The EPWP is a nationwide programme covering all spheres of government and state-owned enterprises (SOEs)

Respondents

The population comprised of 58 construction employees residing in an informal settlement near the construction site from which a sample of 50 construction employees was drawn using cluster sampling. Cluster sampling was used because all the EPWP employees resided in a cluster close to the construction site and were in close proximity to the local Chief who guided interaction with this community. The composition of the sample may be described in terms of job category, age, gender, marital status and level of formal education of construction employees. The majority of respondents who worked at the construction site are construction employees (52%), male (56%), have never been married (56%), are between the ages 30–39 years (50%) and have matriculated (62%).

Measuring instrument

Data was collected using a self-developed questionnaire consisting of five sections relating to the objectives of this study. The questionnaire was designed by the researchers to tap into items of interest and an established questionnaire was not used. The questionnaires were not self administered as many of the participants were illiterate and needed clarification from the researcher and local Chief. Section one related to the biographical information of respondents (job category, age, gender, marital status, level of education and number of dependents) and was measured using a nominal scale. Section two comprised of seven items which were phrased to assess employees' perceptions on their employee benefits. Section three consisted of six items that tapped into employees' views on the degree of collective bargaining in their employment process. Section four included four items which were designed to tap into employees' perceptions of the nature of communication in their jobs during the time of employment.

Section five of the questionnaire consisted of one open ended question that allowed employees to report the things that they may want to say regarding the factors that influenced labour unrest at the construction site. The items

in Sections 2, 3 and 4 were constructed using a five point Likert scale ranging from Strongly Disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4) and Strongly Agree (5). In-house pre testing was adopted to assess the suitability of the research instrument. Pilot testing was also undertaken by administering the questionnaire to eight construction employees using the same protocols as would be used in the final administration.

A pilot study was conducted with questionnaires already translated into isiZulu due to the illiteracy level of some respondents who were not versed in the English language. Each questionnaire had a consent form attached to it outlining the nature and purpose of the entire project and that participation in the study was voluntary with no monetary benefits. The feedback from the pilot testing confirmed that the questionnaire was appropriate in terms of construction, wording and relevance.

Administration of the measuring instrument

The questionnaires were administered personally by the researcher with the assistance of a local chief who was aware of the construction employees who worked at the construction site and, therefore, allowed opportunity for building rapport and clarification.

Statistical analysis

Descriptive (means, standard deviations) and inferential (Wilcoxon Signed Ranked Test) statistics were used to analyse the quantitative data. The dimensions that formed the basis of the study were derived based on recurring themes that surfaced when conducting the literature review. These themes and the references corresponding to these mindsets are reflected in Table 1

TABLE 1
THEMES UNDERINNING THE STUDY

Dimensions	Sources
Lack of employee benefits	
Poor remuneration	Mugho, 201751; Calvin, 201752;
Poor medical care	Ong'ayo, G., Ooko, Wang'ondu, Bottomley, Nyaguara, Tsofa, Williams, Bejon, Scott, and Etyang, 201953;
Pension contribution	McGaughey, 201854; Fadlon, Laird, and Nielsen, 201655; Kotun, Adeoye, and Alaka, 201656
Poor availability of health and wellness programs	Jones, Molitor, and Reif, 201957; Song, and Baicker, 201958; Williams, 201959
Poor retirement benefits	Biggs, 201960; Fiiwe, 202061; Fitzpatrick, 201562
Lack of disability insurance	Low, and Pistaferrri, 202063
Lack of overtime remuneration	Papagiannaki, 201464; Liu, Chen, H., Yang, and Hou, 201965; Rasmussen, 201566

RESULTS

Descriptive statistics

Employee perceptions of employee benefits, collective bargaining and communication were assessed using descriptive statistics. The higher the mean score, the greater the level of dissatisfaction with the dimension having the potential to influence labour unrest at the construction site (Table 1 to Table 3).

TABLE 1
DESCRIPTIVE STATISTICS: THE INFLUENCE OF THE LACK OF EMPLOYEE BENEFITS ON LABOUR UNREST

Dimension	Mean	Std. Dev.	Min.	Max.
Lack of employee benefits	3.87	0.757	1	5
Poor remuneration	4.64	0.485	4	5
Poor medical care	2.78	1.093	1	5
Pension contribution	3.00	0.833	1	5
Poor availability of health and wellness programmes	3.74	0.723	2	5
Poor retirement benefits	4.58	0.609	2	5
Lack of disability insurance	4.10	0.735	2	5
Lack of overtime remuneration	4.24	0.822	2	5

From Table 1 it is evident that the lack of employee benefits (Mean = 3.87) is contributing to labour unrest. To assess exactly what benefits the employees are unhappy with, frequency analyses were undertaken. Evidently, employees are most dissatisfied with their remuneration, followed by retirement benefits, lack of disability insurance, poor availability of health and wellness programmes and lack of overtime remuneration and believe that these factors

contributed the most to labour unrest at the construction site. Whilst some unhappiness was expressed in terms of poor medical care and lack of pension contributions, these factors were overshadowed by the other factors in contributing to labour unrest at the construction site.

TABLE 2
DESCRIPTIVE STATISTICS: THE INFLUENCE OF ASPECTS OF COLLECTIVE BARGAINING ON LABOUR

Dimension	Mean	Std. Dev.	Min.	Max.
Poor collective bargaining	4.22	0.532	1	5
Poor negotiation processes	4.44	0.501	4	5
Lack of a conflict control tool	4.14	0.535	2	5
Poor bargaining councils	3.52	0.839	2	5
Lack of a communication process	4.26	0.443	4	5
The failure to reach consensus between the parties	4.80	0.404	4	5
The failure to bargain collectively between the parties	4.18	0.388	4	5

From Table 2 it is evident that poor collective bargaining (Mean = 4.22) is contributing to labour unrest. Evidently, employees are most dissatisfied with the poor negotiation processes, followed by the lack of a conflict control tool, poor bargaining councils, lack of communication processes, failure to reach consensus and failure to bargain collectively between the parties.

TABLE 3
DESCRIPTIVE STATISTICS: THE INFLUENCE OF ASPECTS OF COMMUNICATION ON LABOUR UNREST

Dimension	Mean	Std. Dev.	Min.	Max.
Lack of communication	3.69	1.172	1	5
Poor listening skills	3.04	1.029	1	5
Lack of trust between the parties	4.52	0.544	3	5
Lack of understanding of the language	2.58	0.785	1	5
Poor communication	4.60	0.606	3	5

From Table 3 it is clear that lack of communication (Mean = 3.69) is contributing to labour unrest. Evidently, employees are most dissatisfied with listening skills, followed by lack of trust between the parties, and poor communication and are convinced that these factors contributed to labour unrest. While some happiness was expressed in terms of lack of understanding of the language between the parties, this factor was dominated by the other factors in contributing to labour unrest at the construction site.

Inferential statistics

Inferential statistics were used to test the hypotheses of the study as follows:

Hypothesis 1

There is significant agreement that the lack of employee benefits significantly influences labour unrest on the construction site in KwaZulu-Natal (Table 4). bargaining and communication were assessed using descriptive statistics. The higher the mean score, the greater the level of dissatisfaction with the dimension having the potential to influence labour unrest at the construction site (Table 1 to Table 3).

TABLE 4
WILCOXON SIGNED RANKED TEST: DIMENSIONS OF EMPLOYEE BENEFITS

Dimension of employee benefits	Z	p
Poor remuneration directly influenced labour unrest at the Umgeni Road Construction Site.	-6.398	0.000*
Poor medical care directly influenced labour unrest at the construction site.	-1.405	0.160
Lack of pension contributions directly influenced labour unrest at the site.	0.000	1.000
Poor availability of health and wellness programs directly influenced labour unrest at the Umgeni Road construction site.	-5.074	0.000
Poor retirement benefits for the employees at the Umgeni Construction Site directly influenced labour unrest.	-6.285	0.000
Lack of disability insurance for the construction employees directly influenced labour unrests at the Umgeni Construction site.	-5.733	0.000
Lack of overtime remuneration for the employees at the Construction site directly influenced labour unrest during the course of employment.	-5.754	0.000

Table 4 reflects that there is significant agreement that the lack of specific employee benefits (poor remuneration, poor availability of health and wellness programs, poor retirement benefits, lack of disability insurance, and lack of overtime remuneration) significantly influences labour unrest in the construction site at the 1% level of significance. Furthermore, Table 4 indicates there is no significant agreement amongst employees that poor medical care and lack of pension contributions significantly influences labour

unrest at the construction site. Hence, hypothesis 1 may only be partially accepted.

Hypothesis 2

There is significant agreement that poor collective bargaining significantly influences labour unrest at the construction site in KwaZulu-Natal (Table 5).

TABLE 5
WILCOXON SIGNED RANKS TEST: DIMENSIONS OF COLLECTIVE BARGAINING

Dimension of employee benefits	Z	p
Poor negotiation processes directly influenced labour unrest at the Umgeni Construction site.	-6.358	0.000*
Lack of a conflict control tool influenced labour unrest at the Umgeni Construction site.	-6.298	0.000*
Poor bargaining councils directly influenced labour unrest at the Umgeni Construction site.	-3.743	0.000*
Lack of a communication process such as collective bargaining influenced labour unrest at the Umgeni Construction site.	-6.496	0.000*
The failure to reach consensus between employers and employees led to labour unrest at the Umgeni Construction site.	-6.298	0.000*
The failure to bargain collectively between the parties influenced labour unrest at the Umgeni Construction site.	-6.583	0.000*
Lack of overtime remuneration for the employees at the Construction site directly influenced labour unrest during the course of employment.	-6.617	0.000*

Table 5 indicates that there is significant agreement that the lack of all the specific aspects of collective bargaining (poor negotiation processes, lack of a conflict control tool, poor bargaining council, lack of a communication process, the failure to reach consensus and the failure to bargain collectively) significantly influences labour unrest in the construction site at the 1% level of significance.

Hence, hypothesis 2 may be accepted.

Hypothesis 3

There is significant agreement that poor communication significantly influences labour unrest at the construction site in KwaZulu-Natal (Table 6).

TABLE 6
WILCOXON SIGNED RANKS TEST: DIMENSIONS OF COMMUNICATION

Dimension of employee benefits	Z	p
Poor listening skills between employers and employees influenced labour unrest at the Umgeni Construction site.	-0.287	0.774
Lack of trust between the parties directly influenced labour unrest at the Umgeni Construction site.	-6.292	0.000*
Lack of understanding of the language between the parties influenced labour unrest at the Umgeni Construction site.	-3.362	0.001*
Poor communication between the parties influenced labour unrest at the Umgeni Construction site.	-6.257	0.000*

From Table 6 it is evident that there is significant agreement that the lack of specific aspects of communication (lack of trust between the parties, lack of understanding of the language and poor communication) significantly influences labour unrest in the construction site at the 1% level of significance. Furthermore, Table 6 indicates that there is no significant agreement amongst employees that

poor listening skills between employers and employees significantly influences labour unrest in the construction site. Hence, hypothesis 3 may only be partially accepted.

The results of the study are graphically represented in Figure 1.

FIGURE 1
GRAPHICAL REPRESENTATION OF THE FINDINGS OF THE STUDY

LACK OF, OR POOR, COLLECTIVE BARGAINING	<ul style="list-style-type: none"> Labour unrest is widely understood as a result of failure of effective collective bargaining between employees and employee representatives. The lack of, or poor collective bargaining is the greatest cause of labour unrest at this construction site (Mean = 4.22). In this site, employees were mostly unhappy with remuneration, followed by retirement benefits, poor availability of health wellness programmes, lack of overtime remuneration. Unhappiness was also expressed in terms of poor medical care and the lack of pension contributions.
LACK OF, EMPLOYEE BENEFITS	<ul style="list-style-type: none"> Employee benefits influence labour unrest that occur in organisations. The lack of, or poor, employee benefits is the second largest cause of labour unrest at this site (Mean = 3.87). Employee benefits are regulated by the Basic Conditions of Employment Act 75 of 1997. In this study, employees are most dissatisfied with the negotiation process, followed by the lack of a conflict control tool, poor bargaining councils, lack of communication processes, failure to reach consensus and failure to bargain collectively between the parties. There is significant agreement that the lack of specific employee benefits (remuneration, availability of health and wellness programmes, retirement benefits, disability insurance, overtime remuneration) significantly influences labour unrest at the construction site.
LACK OF, OR POOR, COMMUNICATION	<ul style="list-style-type: none"> Poor communication is the smallest cause of labour unrest at this construction site (Mean = 3.69) but still formidable enough to cause worker unhappiness and poor morale. At this site, employees were most unhappy with listening skills, followed by the lack of trust between parties, and poor communication in general and are convinced that these issues contributed to the labour unrest at the site. Some unhappiness was also expressed about the lack of understanding of language between parties.
INTERRELATIONSHIPS BETWEEN EMPLOYEE BENEFITS, COLLECTIVE BARGAINING AND COMMUNICATION	<ul style="list-style-type: none"> Collective bargaining and communication are closely related to one another because parties in the employment relationship cannot negotiate collective bargaining if there is poor communication. Collective bargaining and communication are the foundations upon which employment relationships are built. Collective bargaining and communication assist employers and employees to resolve disputes that arise between them. In this study it was found that significant relationships exist between employee benefits, collective bargaining, communication and the labour unrest respectively. There is significant agreement that the lack of specific aspects of communication (trust between the parties, understanding of the language, communication) significantly influences labour unrest in this construction site.

DISCUSSION OF RESULTS

Within the jurisdiction of this study, the influence of three aspects on labour unrest are assessed, namely, employee benefits, collective bargaining and communication and/or the lack of these dimensions.

Employee benefits and labour unrest

Employee benefits were assessed in terms of remuneration, medical care, pension contributions, availability of health and wellness programs, retirement benefits, disability insurance and overtime remuneration.

Remuneration

From the results of the study, poor remuneration was found to have the greatest influence on labour unrest at the construction site. Similarly, Bhorat, Kanbur and Stanwix⁶⁷ noted that under the collective agreement between the parties, construction employees are entitled to be remunerated in terms of benefits as long as they tender service and carry out the duties expected from them.

Failure from the employers to remunerate their employees may lead to labour unrest because employees may feel that they are being exploited and do not get benefits which they deserve. Hanson⁶⁸ found that dissatisfied employees are not productive which causes the decline in the production sector; therefore, good remuneration make employees feel satisfied and be productive in the construction industry.

Retirement benefits

The results reflect that poor retirement benefits had the second highest influence on labour unrest at the construction site. Similarly, Hansen⁵³ found that it is significant that construction employees are provided with retirement plans that will cater for their needs even after the completion of the contract. The arrangement between the construction employees and their employers at the construction site was that they will be given bonuses towards the end of the project, which they were not given; as a result, they concluded that the retirement benefits were poor. Likewise, Fitzpatrick⁶⁹ discovered that no employee wants to be poor when their contract is terminated and employees who perceive that the retirement benefits are poor quit their jobs to find jobs with better retirement benefits.

However, Brassey⁵⁵ states that younger employees still do not cite their retirement benefits plans as the major factor that determines their stay with current employers.

Overtime remuneration

The lack of overtime remuneration was found to have the third highest influence on labour unrest at the construction site. Rasmussen⁵⁶ states that construction employees cannot be compelled to work overtime unless there is a contract agreement compelling employees to work overtime signed by both employers and employees in employment and be remunerated for such overtime because the failure to do so leads to labour unrest. "When employees work overtime, they need to be remunerated for those hours they have worked"⁵⁷. However, Collins et al.⁷⁰ and Barrett⁷¹ found that the lack of overtime remuneration is considered the least factor that contributes to labour unrest since employment relationships are characterised of other major issues that need to be dealt with accordingly.

Disability insurance

From the results, the lack of disability insurance was found to have the fourth highest influence on labour unrest at the construction site. Poor work performance have different causes and is defined as the inability of the employees to perform their duties in a satisfactory manner. Similarly, Von Wachter, Song and Manchester⁷² indicated that incapacity caused by injury at the workplace is deemed compensation/disability insurance by the employer. However, incapacity on the grounds of injury may be temporary or permanent and if an employee is temporarily not able to perform his or her duties, the employer must investigate the extent of injury before any disability insurance is concluded. Furthermore, French and Song⁷³ found that employers are compelled to think of possible means of adapting the work of the employee in order to accommodate that injured employee. This requires that employers consult with employees and examine the extent of disability and how it impacts on the performance of the employee. "Any form of insurance can be awarded to employees for the fact that the disability occurred on the workplace"⁷⁴.

Availability of health and wellness programmes

Based on the results of the study, poor availability of health and wellness programmes was found to have the fifth highest influence on labour unrest at the construction site. Likewise, Arena, Guazzi, Briggs, Cahalin, Kaminsky and Babu⁷⁵ found that health and wellness programmes are related to higher productivity in the workplace with

lesser absenteeism. It is the duty of the employers to provide health and wellness programmes to its employees. Furthermore, Eldredge, Markham, Kok, Ruiters and Parcel⁷⁶ found that employers must encourage their employees to focus on the main health behaviours such as physical exercise, eating healthy, lesser stress and ceasing drugs. The logic behind encouraging wellness programmes is that increasing healthy habits now can decrease the risks of bad health later. However, Lonnides et al.⁷⁷ found that poor health and wellness programmes cannot be associated with organisational production since, for example, some mining industries are able to meet targets having poor health and wellness programmes.

Pension contribution

In this research, the lack of pension contribution was found to have the sixth highest influence on labour unrest at the construction site. Similarly, Hanson⁷⁸ found that if employees are guaranteed their pension contributions, they fully devote their services to the organisation. These employees do not retire early because they believe the longer their services, the higher the retirement benefits especially in formal sectors. However, Habermas⁷⁹ states that contract construction workers do not necessarily strike for pension contributions as long as they are remunerated well every month.

Medical care

Medical care was found to have the least influence on labour unrest at the construction site. In contrast, Hanson⁶⁸ found that the medical care of employees is significant since employees cannot work/perform on their best ability if there is poor medical care. Furthermore, Grogan⁸⁰ stated that employees who are medically looked after are productive and carry out their activities in a satisfactory manner. Employers must medically take care of their employees in order to reduce the risks of bad health at a later stage.

Collective bargaining and labour unrest

Collective bargaining is assessed in terms of the negotiation process, conflict control tool, bargaining councils, the communication process, the ability to reach consensus and bargain collectively.

Ability to reach consensus

In this study, failure to reach consensus was found to have the greatest influence on labour unrest at the construction site. Reaching consensus between employers and employees is possible if they negotiate effectively in order to control and resolve disputes that may arise in the workplace.

Similarly, Brown⁷⁰ found that reaching consensus helps promote harmonious employment conditions and demands compromise between the parties in order to produce harmonious workplace conditions. Similarly, Eldredge et al.⁷¹ revealed that reaching consensus effectively helps maintain positive employment relationships and to maintain peace in employment. However, peace was not possible at the URICS because both parties failed to reach consensus on matters of mutual interest.

Negotiation process

The study found that poor negotiation processes had the second highest influence on labour unrest at the construction site. Du Plessis and Fouché⁸¹ state that negotiation assists parties to reach consensus and reduce conflict which may lead to labour unrest. "Collective bargaining as a negotiation process is aimed at a sustainable economic position and the employer-employee relationship"⁸². The behaviour of the parties involved in the negotiation process is closely monitored. However, if collective bargaining is accepted as an interactive approach, which is a human relationship, then it is understandable why conflict exists in the negotiation process.

Communication process (collective bargaining)

In this research, the lack of a communication process (collective bargaining) was found to have the third highest influence on labour unrest at the construction site. Habermas⁸³ found that communication is a significant process of collective bargaining and it reveals all the challenges that are inherently related to communication. However, as a process of collective bargaining, communication is dependent on successful verbal language that is used in the communication process in order to resolve matters of concern between the parties. The study conducted by Xiaoyu⁸⁴ supports the findings of the research by stating that failure to communicate accordingly between the parties leads to unnecessary conflict and this conflict leads to labour unrest.

Ability to bargain collectively

This study discovered that the failure to bargain collectively was found to have the fourth highest influence on labour unrest at the construction site. In South African labour law, failing to bargain collectively constitutes an unfair labour practice. Similarly, Deakin and Morris⁸⁵ found that the labour relations issues that arise in the place of employment are characterised by the failure to bargain collectively between the parties in the employment relationship. For this reason, the South African courts imposed bargaining

as a duty to regulate labour issues that may arise as a failure of bargaining. Katz⁸⁶ also emphasised that parties are encouraged to bargain in good faith.

Conflict control tool

In this study, the lack of conflict control tool was found to have the fifth highest influence on labour unrest at the construction site. Likewise, Negrey⁸⁷ found that collective bargaining is widely known to be a process of controlling conflict between employers and employees in the employment relationship. Similarly, Johnson⁷⁹ and Trif⁸⁰ also stated that collective bargaining as a conflict control tool reduces tensions between the parties and, therefore, promotes harmonious employment relationships.

Bargaining councils

Poor bargaining councils were found to have the sixth highest influence on labour unrest at the construction site. Similarly, Villanueva⁸⁹ also found that bargaining councils control the employment relationship between employers and employees in sectors of industry where they are provided jurisdiction. Brassey⁸⁹ also points out that bargaining councils conclude collective agreements, and settle the disputes between the parties that fall within their jurisdiction. However, bargaining councils are voluntary in their formation and Section 28 of the LRA 66 of 1995 set out the functions of bargaining councils which include concluding collective agreements, enforcing these agreements and preventing disputes.

Communication and labour unrest

Communication is assessed in terms of listening skills, trust, understanding of the language and the nature of communication itself.

The nature of communication itself

From the results of the study, poor communication was found to have the greatest influence on labour unrest at the construction site. Coleman⁹⁰ found that communication between employers and employees is important to produce harmonious employment relationships and decreased labour unrest. Poor communication cannot produce positive employment relationships. The findings by Petty and Cacioppo⁹¹ support that effective communication plays a vital role in reducing the possibility of conflict and strikes thereby promoting the survival of the entire organisation.

Trust between the parties

In the current study, the lack of trust between the parties (employer and employees) was found to have the second highest influence on labour unrest at the construction site. Grunig⁸⁵ confirms that effective communication requires the development of trust as a fore-runner for harmonious labour relationships. Employers and employees should create a harmonious and conducive environment where they listen and understand each other. Habermas⁹² also confirms that communication is significant in creating the right atmosphere for trust, negotiations and effective bargaining. Arguably, Broadbent⁹³ found that lack of trust on its own cannot be considered to contribute to labour unrest because conducive employment environment can be created in the absence of trust between the parties as long as the parties communicate effectively.

Listening skills

In this study, 'poor listening skills' was found to have the third highest influence on labour unrest at the construction site. Similarly, Birdwhistell⁹⁴ and Barchiesi⁹⁵ found that poor listening skills makes effective communication impossible. However, no matter how much energy one party uses in order to communicate their needs, beliefs and concerns with the other party, if the other party is not willing to listen and receive the information accordingly, communication will not be possible. Generally, all people are poor listeners because they listen and think about responses at the same time. However, Broadbent⁹⁶ also found that people do not listen to communicate but listen to respond and this usually happens when people are in conflict/loggerheads. Rather than listening to what the other person is saying, many people already process their response that is against what the other person is saying.

Understanding of the language

This study discovered that the lack of understanding of the language was found to have the fourth highest influence on labour unrest at the construction site. However, Petty and Cacioppo⁹⁷ and Brown⁹⁸ found that the lack of understanding of the language cannot be considered a major factor that contributes to labour unrest because trade unions are at liberty to hire interpreters during negotiations if language is an issue. If there are paid interpreters during negotiations, then it is difficult to understand that the lack of understanding of the language can lead to labour unrest.

RECOMMENDATION

Based on the results of the study, recommendations are made on how each of the factors that influence labour unrest can be managed in order to produce harmonious employment relations at the workplace working towards attaining organisational goals.

Employee benefits

Remuneration

Employers must sufficiently remunerate employees in order to create harmonious employment relationships and a conducive working environment. Not adequately remunerating employees is a form of exploitation; therefore, employers must adequately remunerate employees for the services tendered. In addition to providing proper remuneration, it sends a positive message to remunerate employees in kind, for example, a packet of biscuits on the last Friday of the month to make sessional labour feel part of the group.

Medical care

Despite medical care having the least influence it should be provided because employees cannot perform at their best if they are not medically taken care of. Employers must medically look after their employees since employees cannot perform on their best ability if there are not medically looked after. A primary medical examination of basic vitals can be arranged for these employees every two months, for example, checking blood pressure and blood sugar levels will go a long way to signaling to these employees that the employer cares about their well-being.

Collective bargaining

Failure to reach consensus

Employers and employees must negotiate and reach consensus accordingly on matters of mutual interest and there is need to have respect between the parties so that negotiation processes are conducted smoothly and consensus reached immediately. Perhaps employers can encourage participation, co-operation and egalitarianism so that employees have a sense that their opinions are also valued.

Bargaining councils

Regardless of bargaining councils having the least influence on labour unrest it must be used proactively by both parties and function accordingly within an organisation because they conclude collective agreements and settle the disputes that fall within their jurisdiction. Bargaining councils must be used more often in settling disputes so that employees familiarise themselves with its operations and build confidence in the process.

Communication

Poor communication

Communication is key in addressing issues arising between employers and employees. Employers and employees must effectively communicate with each other in order to reach consensus and resolve labour issues between them. The above issues can be addressed with effective communication between the parties; therefore, employers are encouraged to use communication as a tool to create harmonious employment relationships. The local chief at the construction site can be used in ensuring effective communication because they are valued and respected by the employees.

Understanding of the language

Despite understanding of the language having the least influence on labour unrest it should be taken into consideration and company interpreters must be made available so that both parties are able to communicate effectively without any difficulties. Social gatherings can be arranged at least every two weeks where employers and employees learn each other's languages, especially English since it is the main language that is mostly used in organisations. In that way, all employees will understand English and will not have a problem communicating with it.

The recommendations of the study are graphically depicted in Figure 2 using the same colour coding from Figure 1.

FIGURE 2
GRAPHICAL REPRESENTATION OF THE RECOMMENDATIONS OF THE STUDY

<p>LACK OF, OR POOR, COLLECTIVE BARGAINING</p>	<ul style="list-style-type: none"> • Pay employees sufficiently and the industry related wages as good remuneration makes employees feel satisfied and productive. • This will create harmonious relationships and conducive working environments. • Ensure that all the contractual obligations are met as only contractual agreements signed by both the employer and employee can compel an employee to work overtime. • In the case of injury as to whether it is temporary or permanent, assess degree of disability, offer a form of insurance since the disability occurred at the workplace. • Provide health and wellness programmes to employees. Focus on main health behaviours of employees in health and wellness programmes, such as, physical exercises, eating healthy, lesser stress, nutrition, easing the use of alcohol and drugs. • Improve health habits to reduce the risk of bad health later • Provide medical care, for example, the examination of basic vitals every quarterly through an on-site clinic as this shows that the organisation cares. • Provide pension contributions as this increase employee dedication and commitment. It also increases tenure as the workers believe their longer services will result in higher retirement benefits. • Think about remunerating employees in kind too, for example, giving a packet of biscuits on pay day or on a Friday in the month will add a lot of joy. • Provide in medical care as it decreases risks of bad health at a later stage.
<p>LACK OF, EMPLOYEE BENEFITS</p>	<ul style="list-style-type: none"> • Employee benefits influence labour unrests that occur in organisations. • The lack of, or poor, employee benefits is the second largest cause of labour unrest at this construction site (Mean = 3.87). • Employee benefits are regulated by the Basic Conditions of Employment Act 75 of 1997 • In this study employees are most dissatisfied with the negotiation processes, followed by the lack of a conflict control tool, poor bargaining councils, lack of communication processes, failure to reach consensus and failure to bargain collectively between the parties. • There is significant agreement that the lack of specific employee benefits (remuneration, availability of health and wellness programmes, retirement benefits, disability insurance, overtime remuneration) significantly influences labour unrest at the construction site.
<p>LACK OF, OR POOR, COMMUNICATION</p>	<ul style="list-style-type: none"> • Poor communication is the smallest cause of labour unrest at this construction site (Mean - 3.69) but is still formidable enough to cause worker happiness and poor morale. • At this site, employees were most unhappy with listening skills, followed by the lack of trust between the parties, and poor communication in general and are convinced that these issues contributed to the labour unrest at the site. • Some unhappiness was also expressed about the lack of understanding of the language between the parties. • Communicate effectively to reach consensus and resolve issues. This may be achieved with the help of the local Chief and understanding of language or using interpreters/translators.

INTERRELATIONSHIPS BETWEEN EMPLOYEE BENEFITS, COLLECTIVE BARGAINING AND COMMUNICATION

- Collective bargaining and communication are closely related to one another because parties in the employment relationship cannot negotiate through collective bargaining if there is poor communication. Collective bargaining and communication are the foundations upon which employment relationships are built.
- Collective bargaining and communication assist employers and employees to resolve disputes that arise between them.
- In this study, it was found that significant relationships exist between employee benefits, collective bargaining communication and labour unrest respectively.
- Reach consensus on matters of mutual interest, nurture respect to achieve smooth negotiation processes and encourage co-operation, participation and egalitarianism.
- Use bargaining councils to proactively settle disputes.
- Ensure specific aspects of communication (trust between the parties, understanding of the language, effective communication).

RECOMMENDATIONS FOR FUTURE RESEARCH

The study used a sample of 50 respondents that were drawn from a population of 58 construction employees who worked at the construction site. However, for the purposes of more accurate generalisability of the findings and consistency, a larger sample size can be used for future research in order to make the findings more generalizable and accurate. The respondents who participated in this study were only restricted to construction employees who have worked at the URICS. However, future research should survey construction employees residing in other informal settlements in order to obtain a wider perspective of the issues leading to labour unrest. Future research should also be conducted on other factors influencing labour unrest in the construction industry besides employee benefits, collective bargaining and communication. The researcher believes there are other numerous factors that influence labour unrest besides employee benefits, collective bargaining and communication that are researchable.

CONCLUSION

The overall intention of the research was to explore the factors that influenced labour unrest during the course of employment at the construction site in KwaZulu-Natal (Durban, South Africa) which was an EPWP aimed at developing citizens in the local community. The construction employees residing in the informal settlement in KwaZulu-Natal constituted the target sample of this research. The research has shown that employee benefits (poor remuneration), collective bargaining (failure to reach consensus), and communication (poor communication) have a significant influence on the labour unrest that occurred during the course of employment at the construction site in KwaZulu-Natal. Positive employer-employee relations, proper collective bargaining and effective communication are amongst other things that are crucial for success within the industry. Of significance, it is essential that co-workers and, employers and employees support each other in order to promote positive employment relationships.

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AN INTERPRETIVE STRUCTURAL MODELLING ANALYSIS OF SOCIAL VALUE IMPLEMENTATION BARRIERS IN INFRASTRUCTURE DELIVERY SYSTEMS

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Abstract

The debate concerning the contributions of infrastructure assets to economic growth persists in contemporary society. Also, the delivery of infrastructure assets has been identified as veritable platforms for implementing socio-economic policies. Social value (SV) happens to one of such policy which has attracted the attention of the construction industry. However, till date, research into SV implementation performance remains underreported in extant literature. This study set out to bridge this gap through an investigation into the criticality of SV implementation barriers within an IDS by interrogating the nature of interrelationships existing among these barriers. This qualitative study utilized a focus group discussion group session for eliciting the perspectives of a purposively selected sample of key industry actors with extensive experience. Eight discussants participated in the focus group discussion group sessions. The data emanating from the session was subjected to further analysis using the Interpretive Structural Modelling (ISM) to ascertain the relationships between the SV implementation barriers and subsequently, determine the levels of criticality thereof. Findings from the study indicate that poor policy interpretation, poor government support and unnecessary complexity of the implementation process proved to be most critical when compared to other barriers. This study holds significant implications for policy makers and industry practitioners as it provides them with valuable knowledge to enable the development of protocols for engendering successful SV implementation in the IDS.

Keywords: Barriers, Infrastructure, Interpretative Structural modelling, Social Value

INTRODUCTION

Notwithstanding the importance of infrastructure and infrastructure investments in bringing about economic growth [1, 2, 3], an escalating degree of infrastructure deficit persists. Scholars have proposed that this deficit will require an estimated \$92 billion per annum over an undisclosed number of years to bridge this gap [4]. Furthermore, the World Bank opines that an estimated \$1 trillion infrastructure investment over the next ten years will be needed to bridge this gap [4]. Studies have shown that countries are experiencing a tremendous infrastructure gap which negates their quest to achieve national competitiveness, or better still, provide an improved quality of living for its citizenry [5, 6, 7]. The Covid-19 pandemic has further exacerbated the economic woes being witnessed by countries in this region [8].

There is need for infrastructure delivery systems (IDS) to contribute towards enabling added value to their host environments [9]. This proposition stems from the observation made by Awuzie and McDermott [10] wherein they posit that the way an infrastructure planning and delivery system is organized impacts on the degree of benefits accruing to the host community and/or local economy. Also, the positioning of sustainable development at the epicentre of global developmental discourse has accentuated the need for consideration to be given during the delivery of infrastructure to facilitate the implementation of the social value agenda [11, 12, 13, 14]. In furtherance to this, a noticeable increase in the advocacy for public and private sector infrastructure clients, to leverage their pivotal position during strategic procurement of infrastructure to champion social value (SV) implementation has been observed [11]. These advocacies are premised on the presumption that SV tenets can sustain social cohesion and inclusion as well as economic growth within the 'local' economy. However, these advocacies do not exempt infrastructure clients from delivering assets with precise effectiveness and efficiency as well as the project management success parameters. In apparent realization of the significant budgetary outlays allocated to infrastructure delivery, successive

governments have encouraged steps towards ensuring that this expenditure is used to create and add value to the environment where such assets are being delivered ^[13]. SV remains one of such opportunities for value-add which has been brought to the front burner recently.

To underscore the importance of SV in the infrastructure sub-sector of any economy, several countries have legislated different approaches for ensuring that a significant proportion of the expenditure is retained in the local economy and devoted to creating added value therein ^[15]. The Nigerian context is no exception as the government has sought to leverage on significant infrastructure investments in the upstream sub-sector of the oil industry to facilitate this agenda. The introduction of the Nigerian Oil and Gas Industry Content Development [NOGICD] Act is one of such steps ^[16]. Studies reiterate that recent investments in oil and gas infrastructure by the government and its joint venture [JV] partners have not significantly impacted upon the development of the local supply chains ^[17]. The lack of skills within the public sector to widespread corruption and poor project governance regimes have been identified as militating against the attainment of these objectives ^[17, 18, 19]. The successful implementation of SV during the delivery of infrastructure projects has continued to pose a challenge. This is particularly the case in the developing country where significant infrastructure deficits have been recorded. However, paucity of literature exists concerning studies seeking to investigate the ability of an IDS to deliver on optimal social value implementation in developing countries like Nigeria.

During the delivery of infrastructure, successful SV implementation occurs within an enabling project governance and organizational framework-the IDS ^[20]. These frameworks have been considered central to the implementation of project and/or client objectives and requirements ^[9, 20]. This study contributes towards bridging the research gap by analyzing the interrelationships existing between the barriers to SV implementation within these IDS using the NOGICD implementation exemplar in Nigeria's oil and gas industry using an interpretive structural modelling approach [ISM].

The rest of the paper is structured into 6 sections. Section 1 consists of a review of relevant literature concerning the contribution of infrastructure to economic growth, definition of the SV concept, the role of an IDS in SV implementation and the barriers to SV implementation in the IDS context. In section 2, the research method utilized in the study is described. Section 3 highlights the steps adopted during the development of the ISM model whilst the discussion of

the emergent model is discussed in Section 4. The study's conclusion is presented in Section 6.

LITERATURE REVIEW

Unravelling the Contribution of Infrastructure to Economic Growth

The relationship between infrastructure and economic growth has been buttressed, severally ^[21, 22]. Studies highlight the nexus between the presence of adequate and resilient infrastructure stock and economic growth ^[22, 23]. Conversely, the absence of infrastructure will negate economic growth. Governments in emerging economies have devoted a significant proportion of capital expenditure towards infrastructure investments. Also developed economies like the United Kingdom have made considerable investments towards the development and redevelopment of infrastructure assets as a way of stimulating the local economy and engendering growth ^[24, 25]. Shi et al. ^[21] trace China's economic growth to the unprecedented increment in the nation's infrastructure expenditure. Kodongo and Ojah ^[5] attest to the influence of infrastructure spending on economic growth. More specifically, they reiterate the likelihood of access to infrastructure and quality thereof, to influence economic growth through trade competitiveness and capital flows across the borders.

Although there appears to be a consensus among various commentators and scholars on the important contribution made by the delivery of infrastructure to the local environment, there is a sharp dichotomy between those who believe that this economic contribution results from the impact of the completed asset on productivity, either directly or indirectly, and others who agree that whereas the finished asset does contribute towards enhancing the levels of productivity within the area, the process of procurement and subsequent delivery of these assets if properly organised and governed possesses the capability of contributing immensely towards achieving sustainable economic growth within the local economy as well. Proponents of the former school of thought posit that achieving a high degree of cost-effectiveness in the delivery of the infrastructure asset, particularly in austerity times, will allow for savings made to be ploughed into other economic activities ^[6, 26, 27]. Also, these authors argue that the decision on which

infrastructure asset to be delivered in such instance would be hinged upon the perceived contribution of that particular asset to the growth of the local economy when compared to alternative projects.

Conversely, the proponents of the latter school of thought, in addition to the conditionalities stressed by the other school of thought, maintain that societal issues such as unemployment, paucity of skilled labour, ensuring low carbon footprints, the low rates of SMEs admissibility into the global and regional supply chains etc. can be addressed by infrastructure clients across the lifecycle of these projects ^[19, 28]. The power wielded by infrastructure clients during the procurement and delivery of these assets has been referred to as serving as a leverage for boosting SV implementation in projects ^[29]. Infrastructure Client Organizations [ICOs] through legislations are being tasked to drive the attainment of SV alongside other project success criteria like time, cost, and quality, when engaging with project teams and suppliers alike.

Understanding the Social Value (SV) Concept-

The term, 'Social Value' (SV) continues to defy a commonly accepted definition ^[11, 12, 14, 15]. Different scholars have sought to define the concept based on the expectations of the knowledge domain within which their work is situated ^[14]. For example, Wood and Leighton ^[29] defined SV as the 'soft' non-financial impact of organisations, programmes of work and investments, which may include, but is not limited to, communities, individual and, in some cases, environmental wellbeing. According to Cartigny and Lord ^[15], the Social Value Act (2012) views SV as the maximization of additional outcomes developed through the procurement of goods and services which surpasses the initial benefit of the goods and services themselves. As such, a widely accepted definition of SV remains mainly subjective. For this study, SV for public clients is defined as the additional outcomes accruing from infrastructure delivery programmes towards their local communities. Such outcomes range from employing local suppliers, using local workers, to creating sustainable apprenticeships opportunities, among others.

Whilst there are various facets for engaging with SV, this study focuses on the aspects prescribed in the local content development policy -the NOGICD Act as operationalized within the Nigerian Oil and Gas sector. These aspects consist of job creation, skills enhancement, local economic impacts, social investments, business ethics, security,

diversity, etc. Therefore, this study unravels the relationships existing between the factors hindering successful SV implementation within IDS operating in the study's context.

Infrastructure Delivery Systems and Social Value Implementation

An IDS is described as an architecture which encompasses a plethora of interorganizational and multi-layered relationships existing between stakeholder organization involved with the various stages of the infrastructure delivery lifecycle ^[20]. The heightening complexity within the IDS is caused by the differences in the autonomy requirements of project participants and the degree of embeddedness within organisational and inter-organisational settings. These features demand the integration of project activities within organisation command and control routines and/or inter-organisational coordination efforts ^[30, 31]. These systems have been likened to project-based organizations (PBO). PBO structures have been described as effective models for managing projects in situations suggestive of increasing complexity like what obtains in the infrastructure sub-sector of the construction industry ^[32]. Scholars posit that a PBO like the IDS organise their structures, strategies, and capabilities around project needs which often cut across organizational and sectoral boundaries ^[31, 32]. The PBO structures and business processes are shaped around variables like the changing profile of projects, such as size, level of complexity, and the duration of such projects.

Based on the foregoing, the difficulty in implementing secondary objectives such as SV through such complex systems can be discerned. This difficulty is often occasioned by the inability of numerous stakeholder organizations to evolve a common ontology concerning the project objectives, especially when they are prescribed by legislation, within the IDS. But an IDS remains a veritable platform through which such objectives like SV can be readily implemented. As such, an understanding of the interrelationships existing between the factors with the potential to negate optimal SV implementation within an IDS will facilitate the development of an effective protocol for managing the implementation process. This is what this study set out to achieve. Also, the study demonstrates the utility of the interpretive structural modelling (ISM) approach as a management tool for showcasing the nature of interrelationships between SV implementation barriers. This illustration of the relationships allows system managers and administrators to decide on a logical, and cost-effective procedure for tackling these barriers.

RESEARCH METHODOLOGY

The objective of this study is to determine the interrelationships existing between these barriers using the ISM. A detailed explanation of the ISM approach is provided in the study to enable replication. The study adopts a qualitative research approach wherein data collection was carried out using a focus group discussion forum^[33]. The focus group discussion was conducted across a digital platform – Zoom- with a set of purposively selected discussants. A purposive, snowballing approach was adopted as a sampling technique for the identification and subsequent recruitment of discussants

^[34, 35]. Based on a set of criteria set by the author, 12 potential discussants were identified and approached via email. They were informed about the study's rationale and the role that they were expected to play in enabling the accomplishment of the study's objective. A reminder email was sent out to the same cohort after a fortnight interval. Three persons responded in the affirmative to the first round of emails whereas two more responded to the reminder email, indicating their willingness to participate in the focus group. Subsequently, the author implored them to identify and invite other persons who may be able to contribute to the study. This plea led to the inclusion of 3 more discussants, bringing the total number of discussants to 9. The demographics of the discussants is provided in Table 1.

TABLE 1
DEMOGRAPHICS OF DISCUSSANTS

No.	Organizational Role in IDS	Position of Discussant	Code	Years of experience
1	Infrastructure Client	Programme Director	PD	18
2	Infrastructure Client	Project Manager	PM	13
3	Regulator	Senior Manager – Nigerian Content	SM	10
4	EPC Contractor	Project Manager	EPM	15
5	EPC Contractor	Procurement Lead	EPL	20
6	EPC Contractor	Manager- Nigerian Content	MNC	9
7	Supplier (Construction/Earthworks Works)	Project Manager	SPM	15
8	Supplier (Piping/Tunnelling Works)	Site Engineer	SE	12

A doodle containing different dates and timeslots was created and emailed to the discussants to indicate their availability to participate in the Zoom meeting. In this instance, Zoom served as a typical synchronous

online discussion forum^[36]. Consensus was easily reached regarding the date and time for the discussion. The author communicated the date and timeslot to the discussants. They were also provided with a detail introduction to the study outlining the study's objectives,

the list of barriers- see Table 2, as derived from the findings of a previous study seeking to identify factors influencing SV implementation in an IDS within the same study context. See Table 3.

TABLE 2
LIST OF BARRIERS

No.	Barriers	Description
1	Poor policy interpretation	The inability of representatives of the organizations working within an IDS to interpret sections of the NOGICD policy.
2	Poor information exchange	Non- adherence to communication pathways as established by the contract strategy adopted for the IDS.
3	Prevalence of Silo Knowledge	Unwillingness of organizations within the IDS share relevant knowledge between themselves
4	Poor collaboration	Lack of collaboration between public sector and private sector actors within the IDS
5	Poor government support	Absence of incentives like tax holidays, import duty waivers etc. to encourage private sector actors
6	Absence of industrial base in the local context	Lack of in-country manufacturing and industrial capabilities thereby necessitating importation
7	Ill-defined organisational identity	The absence of a common ontology among collaborating organizations within an IDS concerning SV-related project deliverables
8	Lack of transparency	Lack of clearly defined pathway for collaboration between the parties, particularly regarding procurement
9	Lack of access to funds	High interest rates which makes in-country borrowing less attractive and negates the competitiveness of local firms
10	Lack of resource capabilities	Absence of adequate and/or relevant plant and machinery stock in-country
11	Lack of skilled manpower	Absence of qualified personnel to carry out project-related activities
12	Poorly structured and managed supplier organisation	Non-existence of a well-structured project supply chain
13	Unnecessary complexity of the process	Duplication of regulatory processes between different public sector entities.

Source: Authors' compilation (2020)

TABLE 3
SV IMPLEMENTATION BARRIERS EXTRACTED FROM A PREVIOUS STUDY

Barriers	IDS1	IDS2
	Lack of agreement between members concerning definitions, interpretations and measurement criteria contained in the policy.	Lack of consensus observed between parties to the IDS about the appropriate criteria for measuring local content development performance
	Poor information sharing during supplier workshops.	No established platform for information exchange within the IDS.
	Prevalence of knowledge/information silos within the operator organization.	Not Observed
	Suppliers wrongfully thought they were just beneficiaries of the successful implementation of the act rather than parties to the successful implementation.	Misinterpretation of the sections of the Act, particularly definitions.
	Absence of government encouragement (lack of incentives).	Lack of government support.
	Absence of industrial base in-country	Absence of industrial base in-country
	Ill-defined organizational identity for IDS1	Ill-defined organizational identity for IDS2
	Corruption and lack of transparency in the key processes	Allegations of corrupt practices among members of the delivery system
	Nigerian content ranked least in the selection of EPCM contractor by the Operator as cost effectiveness was more important than the engagement of local suppliers/labour	The EPC contractor did not favour Nigerian content development in the award of contracts.
	Lack of access to cheap funds by suppliers	Lack of access to affordable finance for the suppliers.
	Not Observed.	Late payment of suppliers
	Lack of resource capabilities to actively monitor progress of content development	Lack of effective apparatus for monitoring progress of content development
	Lack of skilled manpower	Absence of skilled manpower locally (In-country).
	Poorly structured and managed supplier organisations	Poorly structured and managed supplier organisations
	Requirement of performance bonds from suppliers	Requirement of performance bonds from suppliers
	Poorly structured and managed supplier organisations	Poorly structured and managed supplier organisations
	Presence of several agencies within System 4 performing the same functions contributed to unnecessarily complex processes.	Presence of several agencies within System 4 performing the same functions contributed to unnecessarily complex processes
Not Observed.	No interorganizational interface between NigCorp and the Suppliers within IDS2	

Source: Authors' compilation (2020)

The ISM protocol which the discussants were expected to discuss was included in this correspondence to prepare them before the scheduled discussion. An abridged version of the ISM protocol is provided in Table 3

TABLE 4
ABRIDGED VERSION OF ISM PROTOCOL

No.	Pairwise-relationship	Type of relationship	Response
1	Poor policy interpretation - Poor information exchange	Does poor policy interpretation influence poor information exchange	Yes/No
2	Poor policy interpretation- Prevalence of knowledge silos	Does poor policy interpretation influence prevalence of knowledge silos	Yes/No
3	Poor policy interpretation- Poor collaboration	Does poor policy interpretation influence poor collaboration	Yes/No
4	Poor policy interpretation-Poor government support	Does poor policy interpretation influence poor government support	Yes/No
5	Poor policy interpretation- Absence of industrial base in the local context	Does poor policy interpretation influence absence of industry base in the local context	Yes/No
6	Poor policy interpretation- Ill-defined organizational identity	Does poor policy interpretation influence ill-defined organisational identity	Yes/No
7	Poor policy interpretation- lack of transparency	Does poor policy interpretation influence lack of transparency	Yes/No
8	Poor policy interpretation- Lack of access to funds	Does poor policy interpretation influence lack of access to funds	Yes/No
9	Poor policy interpretation- Lack of resource capabilities	Does poor policy interpretation influence lack of resource capabilities	Yes/No
10	Poor policy interpretation- Lack of skilled manpower	Does poor policy interpretation influence lack of skilled manpower	Yes/No
11	Poor policy interpretation- Poorly structured and managed supplier organisation	Does poor policy interpretation influence poorly structured and managed supplier organisation	Yes/No
12	Poor policy interpretation- Unnecessary complexity of the Process	Does poor policy interpretation influence unnecessary complexity of the process	Yes/No

This is referred to as an abridged version because the complete version contains questions seeking a confirmation of the existence of a pair-wise relationship between each barrier and the remaining barriers or otherwise. The rules governing the interaction, particularly as it concerned anonymity and the recording of the session was disclosed in this communication. The discussants acquiesced to the guidelines and expressed their understanding of the task at hand. The discussion lasted for three hours during which the author acted as a facilitator. The extensive knowledge of the industry possessed by the discussants made the discussion an insightful one. The discussion followed the conventional focus group procedure. The facilitator inquired into the pair-wise relationships and the discussants gave their opinions concerning each relationship and proceeded to indicate their YES/NO verdict in the chat box. The author articulated these responses and deployed them towards the development of the ISM diagram.

Interpretive structural modelling (ISM)

ISM is a qualitative and interpretive method to generate solutions for complex problems. It remains a valuable management tool due to the provenance of its ability to identify the importance of each variable with reference to the problem being investigated. Its utility for decision-making in organizations and projects alike has been noted [37]. The authors acknowledge the ability of the ISM to organize and link variables associated with a complex situation to facilitate a better understanding of the situation by using pair-wise comparison and transitive logic. The ISM methodology organizes a set of different directly related elements into a comprehensive structured model

According to Poduval and Pramod [38], the ISM method is characterized by the following attributes:

1. It is interpretive because the judgement of a certain group or experts decides whether and how the different elements are related;
2. It is structured according to the perceptions of a group of experts on the existence of a pair-wise relationship between variables;
3. The depiction of these relationships in a digraph model makes it a modeling technique;
4. It provides order and direction detailing as it were, the complexity of relationships among various elements of a system
5. It engenders a group learning process.

The utility of the ISM can be ascertained in any or a combination of the following instances:

1. When an understanding of the big picture and wider context are required
2. When it is difficult to know how to approach the problem
3. When understanding the interaction between the various issues involved in a situation has become imperative

The various steps involved in the ISM method are extracted from Poduval and Pramod [38] and Awuzie and Abuzeinab [39] and are as follows:

Step 1.

Identification of variables relevant to the problem. This can be done through secondary data or primary data such as interviews, survey or focus group

Step 2.

Establishing contextual relationship type such as influence or drive depending on the problem

Step 3.

Development of a structural self-interaction matrix (SSIM) by pair-wise comparison. This step will be carried out by experts on the problem context. The participants must decide upon the pairwise relationship between the variables. The existence of a relation between any two variables (i and j) and the associated direction of the relation is questioned. Four symbols are used to denote the direction of the relationship between the variables i and j:

- V** – for the relation from i to j but not in both directions - $i \longrightarrow j$
- A** – for the relation from j to i but not in both directions - $j \longrightarrow i$
- X** – for both direction relations from i to j and j to i; and $i \longleftrightarrow j$
- O** – if the relation between the variables does not appear to be valid $i \not\longleftrightarrow j$.

Step 4.

Reachability matrix is developed from the SSIM and the matrix is checked for transitivity. The transitivity of the contextual relation is a basic assumption made in ISM. It states that if a variable X is related to Y and Y is related to Z, then X is necessarily related to Z. Reachability matrix is a binary matrix since the entry V, A, X and O of the SSIM are converted into 1 and 0 as follows: V, X = 1 & A, O = 0

Step 5.

Classification of variables based on their driving and dependence power using MICMAC (Matriced'Impacts croises-multiplication applique' and classment) analysis

Step 6.

The reachability matrix obtained in step 4 is partitioned into different levels

Step 7.

Based on the relationships given above in the reachability matrix, a directed graph is drawn, and the transitive links are removed.

Step 8.

The ISM model developed in Step 7 is reviewed to check for conceptual inconsistency and necessary modifications are made.

PRESENTATION OF FINDINGS

Findings from the analysis of the focus group discussion forum shows the existence of contextual relationships requiring further analysis to structure the pattern of interrelationships between the barriers. The ISM approach was employed to achieve this structure

ISM model development

The application of ISM typically provided the stakeholder organisations operating within the IDS as represented by the discussants with a framework to reassess the perceived SV implementation barriers whilst improving their understanding of the linkages among key issues of concern. The ISM modelled the hierarchy of these barriers. The driver power-dependence matrix provided some valuable insights about the relative importance and interdependencies existing between these barriers. In this section, a detailed account of the conduct of the steps associated with the development of the ISM model is provided in subsequent sections.

Development of SSIM from Barriers

The views articulated by the discussants concerning the contextual relationships in the ISM protocol were reviewed based on 4 symbols ordinarily used for highlighting the relationship between any two barriers (i and j):

1. V: factor i will influence factor j but not in both directions;
2. A: factor j will influence factor I but not in both directions;
3. X: factor i and j will influence each other; and
4. O: factor i and j are unrelated.

The focus group discussion feedback was used to develop the structural self-interaction matrix (SSIM) based on the relationships identified. See Table 5. From the emergent SSIM, the absence of a relationship between some barriers (i.e. with a symbol of O) can be discerned.

The SSIM was consequently converted to binary values by substituting V, A, X and O with 1 and 0 per case to develop the initial and final reachability matrix.

The rules for such substitution are provided below:

1. If the (i, j) entry in the SSIM is V, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry becomes 0.
2. If the (i, j) entry in the SSIM is A, then the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry becomes 1.
3. If the (i, j) entry in the SSIM is X, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry also becomes 1.

If the (i, j) entry in the SSIM is O, then the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry also becomes 0. See Table 6

TABLE 5
STRUCTURAL SELF-INTERACTION MATRIX (SSIM)

Barriers		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13
Poor policy interpretation	B1	V	X	V	X	X	O	O	V	V	O	O	V	X
Poor information exchange	B2	X	X	X	X	X	O	O	A	A	A	A	A	A
Silo knowledge	B3	X	X	V	X	X	V	X	X	O	O	O	X	A
Poor collaboration	B4	X	X	X	V	X	O	A	A	O	A	A	A	A
Poor government support	B5	X	X	O	X	V	V	O	X	V	X	X	O	X
Absence of industry base in the local context	B6	O	O	A	O	A	V	A	A	A	A	A	O	A
Ill-defined organisational identity	B7	O	V	X	V	O	V	V	O	O	O	O	O	O
Lack of transparency	B8	A	V	V	V	V	V	O	V	X	O	O	V	A
Lack of access to funds	B9	O	O	O	O	A	V	O	X	V	V	V	V	A
Lack of resource capabilities	B10	O	V	O	V	A	V	O	O	A	A	X	V	A
Lack of skilled manpower	B11	O	V	O	V	O	V	O	O	A	V	V	X	O
Poorly structured and managed supplier organisation	B12	A	V	V	V	O	O	O	A	A	A	A	V	O
Unnecessary complexity of the Process	B13	X	V	V	V	X	V	O	V	V	V	O	O	V

Source: (Author's fieldwork, 2020)

TABLE 6
FINAL REACHABILITY MATRIX

Barriers		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	Driver Power
Poor policy interpretation	B1	1	1	1	1	1	0	0	1	1	0	0	1	1	9
Poor information exchange	B2	1	1	1	1	1	0	0	0	0	0	0	0	0	5
knowledge Silo	B3	1	1	1	1	0	1	1	1	0	0	0	1	0	8
Poor collaboration	B4	1	1	1	1	1	0	0	0	0	0	0	0	0	5
Poor government support	B5	1	1	0	1	1	1	0	1	1	1	1	0	1	10
Absence of industry base in the local context	B6	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Ill-defined organisational identity	B7	0	1	1	1	0	1	1	0	0	0	0	0	0	5
Lack of transparency	B8	0	1	1	1	1	1	0	1	1	1*	1*	0	0	9
Lack of access to funds	B9	0	1	0	1	0	1	0	0	1	1	1	1	0	7
Lack of resource capabilities	B10	0	1	0	1	0	1	0	0	0	1	0	1	0	5
Lack of skilled manpower	B11	0	1	0	1	0	1	0	0	0	1	1	1	0	6
Poorly structured and managed supplier organisation	B12	0	1	1	1	0	0	0	0	0	0	0	1	0	4
Unnecessary complexity of the Process	B13	1	1	1	1	1	1	0	1	1	1	0	1	1	11
Dependence		6	12	8	12	6	9	2	5	5	6	4	7	3	85/85

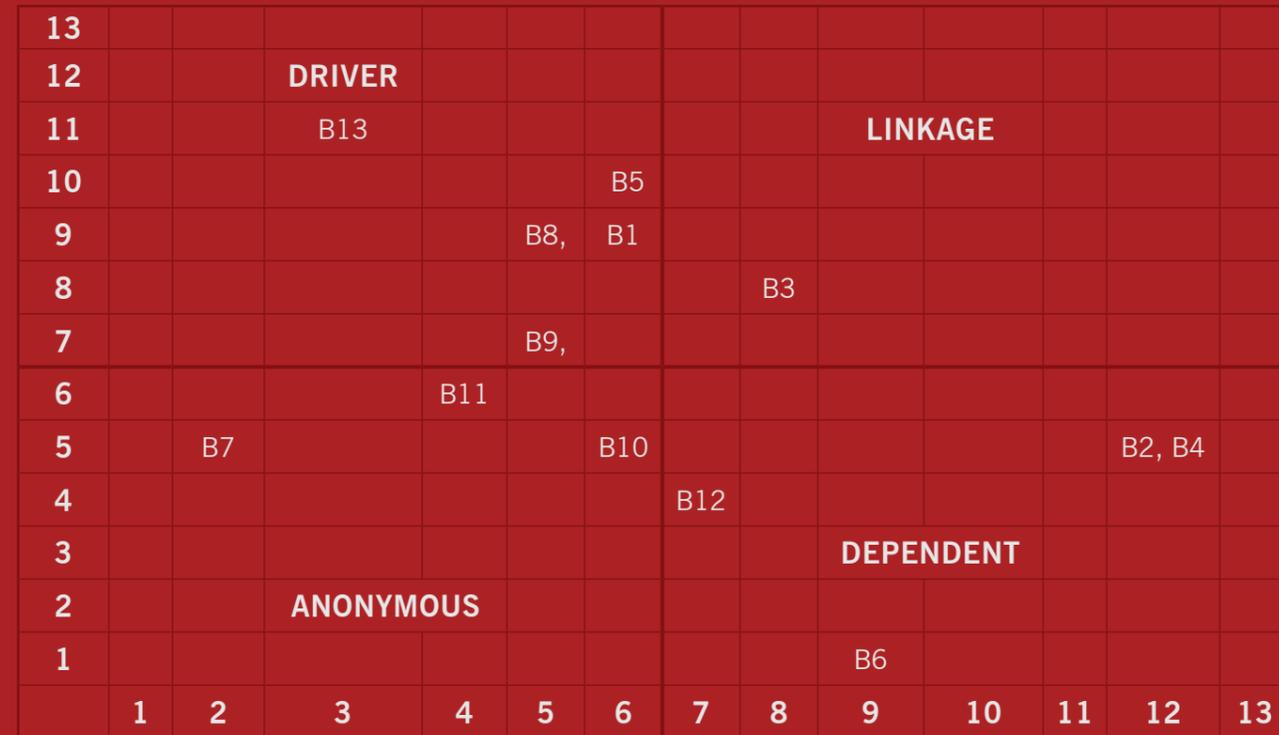
Source: (Author's fieldwork, 2020)

Classification of SV implementation barriers – MICMAC analysis

The 13 barriers are subsequently analysed using the Matriced'ImpactsCroises-Multiplication Appliquée an Classement (MICMAC). The MICMAC ascertains the degree of the relationships between the various factors using the power and the dependence matrix.

The sum of scores along each corresponding row determines the power of a driver, whereas the sum of the scores along each corresponding column determines the dependence of a driver. The MICMAC uses scores from the final reachability matrix Table 6 for analysis. The MICMAC result classifies the barriers into four clusters. See Figure 1. The MICMAC categorises factors into independent, linkage-dependent, and autonomous clusters.

FIGURE 1
DRIVING POWER AND DEPENDENCE DIAGRAM



Source: (Author's construct, 2020)

The MICMAC analysis results show the following:

1. The barriers located in the independent cluster are B1, B13, B8 and B9 and B5. The independent cluster contains strong factors with weak dependence.

Hence, highly relevant for consideration by the strategic organisations because they possess the capability to influence other factors in the system. These factors can therefore be considered fundamental barriers negating SV implementation performance.

2. The barriers located in the dependent cluster are B2, B4, B12 and B6. The factors in the dependent cluster contain weak factors with strong dependence which means that they need support from other barriers in the system to influence SV implementation. These barriers can be considered as outcome or resultant factors because they depend on other factors from the base of the ISM model.
3. The barriers located in the autonomous cluster are B7, B10, B11. The autonomous cluster which contains

weak and dependent barriers, though they may have a few strong links that are relatively disconnected from the system. These barriers have little influence on SV implementation performance because they are either not powerful to facilitate others or depend on others to function and so can be overlooked.

4. Finally, B3 is in the Linkage cluster. The linkage cluster contains factors that are both strong and dependent. These factors are deemed unstable, as any action on them could affect them and other factors in the system.

From the final reachability matrix, the level partitions are established. These partitions are assigned following the iteration process of the factors (Tables 7-10). When the reachability set consists of the driver itself and other driver(s) that it may facilitate) and the intersect set are same 40,41, a level is established. Iterations were conducted and any level partitioned is subsequently removed from further consideration. This process is continued until the levels of all the factors are established. The iterations are as presented in Tables 7-10.

TABLE 7
ITERATION 1

Barriers	Reachability	Antecedent	Intersection	Level
B1	1,2,3,4,5,8,9,12,13	1,2,3,4,5,13	1,2,3,4,5,13	
B2	1,2,3,4,5	1,2,3,4,5,7,8,9,10,11,12,13	1,2,3,4,5	
B3	1,2,3,4,6,7, 8,12	1,2,3,4,5,7,8,10,12,13	1,2,3,4,7,12	
B4	1,2,3,4,5	1,2,3,4,5,7,8,10,11,12,13	1,2,3,4,5	
B5	1,2,4,5,6,8,9,10,11,13	1,2,3,4,5,8,13	1,2,4,5,8	
B6	6	3,5,6,7,8,9,10,11,13	6	
B7	2,3,4,6,7	3,7	3,7	
B8	2,3,4,5,6,8,9,10,11	1,3,5,8,9,13	5,8,9	
B9	2,4,6,8,10,11,12	1,5,8,9,13	8	
B10	2,4,6,10,12	5,8,9,10,11,13	10	
B11	2,4,6,10,11,12	5,8,9,10,11	10,11	
B12	2,3,4,12	1,3,9,10,11,12,13	3,12	
B13	1,2,3,4,5,6,8,9,10,12,13	1,5,13	1,5,13	

Source: (Author's construct, 2020)

TABLE 8
ITERATION 2

Barriers	Reachability	Antecedent	Intersection	Level
B1	8,9, 13	13	13	
B3	7	7,8,10,13	7	
B5	8,9,10,11,13	8,13	1,2,4,5,8	
B7	7	7	7	
B8	8,9,10,11	8,9,13	8,9	
B9	8,10,11	8,9,13	8	
B10	10	9,10,11,13	10	
B11	10,11	9,10,11	10,11	
B13	8,9,10,13	13	13	

Source: (Author's construct, 2020)

TABLE 9
ITERATION 3

Barriers	Reachability	Antecedent	Intersection	Level
B1	8,9,13	13	13	
B5	8,9,13	8,13	8,13	
B8	8,9	8,13	8,9	
B9	8	8,9,13	8	
B13	8,9,13	13	13	

Source: (Author's construct, 2020)

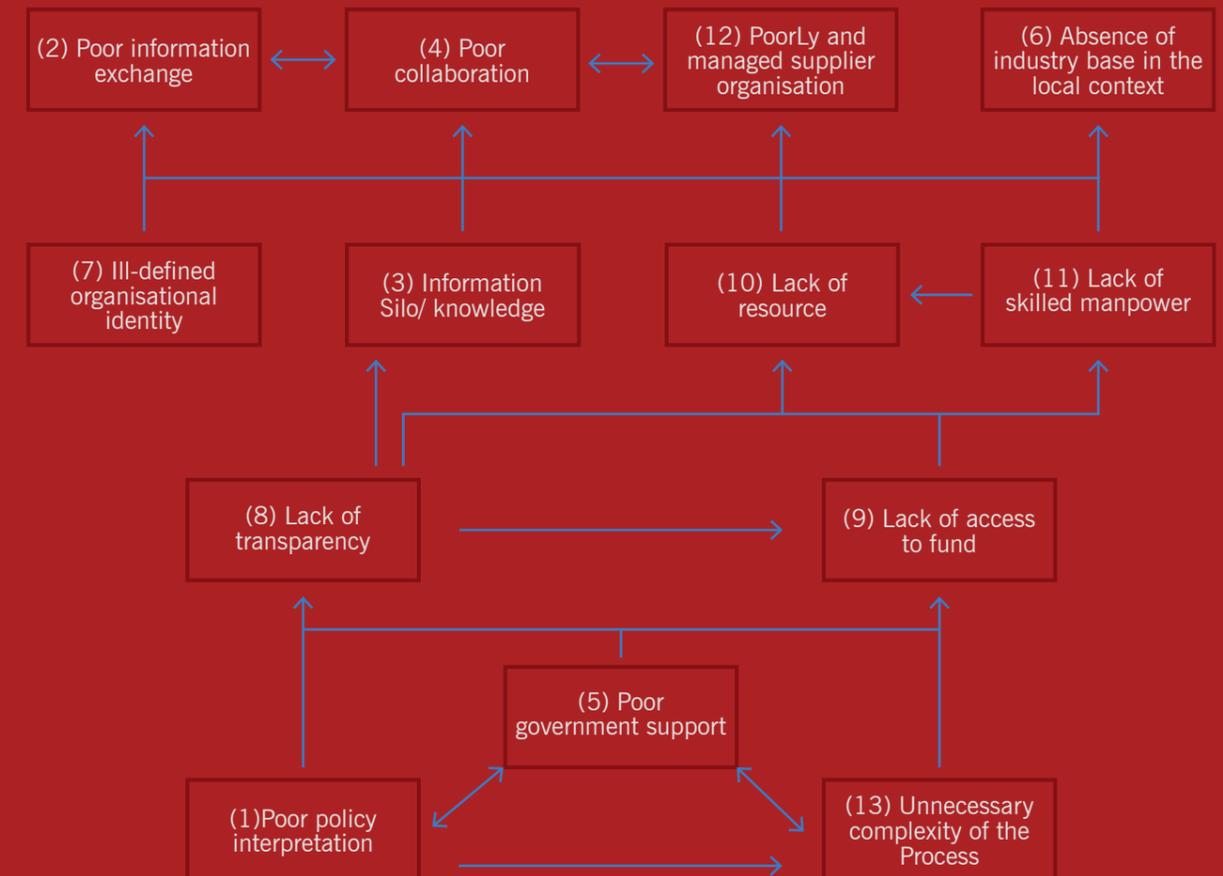
TABLE 10
ITERATION 4

Barriers	Reachability	Antecedent	Intersection	Level
B1	13	13	13	V
B5	13	13	13	V
B13	13	13	13	V

Source: (Author's construct, 2020)

From the level partitions, and an ISM diagram highlighting the nature of interrelationships existing across multiple (4) levels was developed. See Figure 2

FIGURE 2
ISM DIAGRAPH



Source: (Author's construct, 2020)

The extant interrelationships between the various SV implementation barriers as provided in Figure 2 are explained below.

Unnecessary complexity of the Process (B13), Poor government support (B5), and Poor policy interpretation (B1) are located at the base of the ISM model. These barriers have bilateral links whereas facilitating each other and are highly relevant barriers driving poor SV implementation in the IDS as they drive other barriers both directly and indirectly. B13, B5 and B1 as shown, directly facilitate lack

of access to funds (B9) and lack of transparency (B8) on Level 3. At Level 3, where the lack of access to funds (B9) and lack of transparency (B8) are located. B8 and B9 both have bilateral links and are connected directly to the base. B8 and B9 both have direct connections to three barriers in Level 2 (B3, B10 and B11) while B9 only facilitates two barriers (B10 and B11).

Four barriers namely (B3) Silo knowledge, (B10) Lack of resource capabilities, (B11) Lack of skilled manpower, and (B7) ill-defined organisational identity are located at

Level 2. B10 and B11 have bilateral links but do not have any interaction with B7 and B3. Furthermore, B7 has no connection to the base of the ISM model. However, all four barriers directly facilitate the occurrence of barriers at Level 1. At Level 1, four factors, (B2) Poor information exchange (B12) Poorly structured and managed supplier organisation and B4 Poor collaboration (B6) Absence of industrial base in the local context are located. B2, B4, and B12, B4 have bilateral relationships however B6 has no direct interactions with B2, B12 nor B6 at Level 1. These three factors all depend on all other factors from the base of the ISM diagram within the IDS.

Discussion of Findings

Summarily, the study's findings reflect the current views of stakeholders on the interrelationships between 13 barriers negating optimal SV implementation performance of the IDS. Extant studies have sought to explore the barriers to SV and social procurement implementation on construction projects across the globe. For instance, Awuzie and McDermott^[20] deployed a viable systems methodological framework -the Viable Infrastructure Delivery System Model- (VIDSM) to carry out a comprehensive diagnosis of an IDS to determine SV implementation barriers. Loosemore et al^[42] and Hurt-Suwan and Mahler^[28] highlighted the barriers confronting effective implementation of social procurement, especially as it affects the inclusion of disadvantaged populations in the Australian and New Zealand contexts, respectively. Also, Ogunsanya et al.^[43] have identified the barriers negating sustainable procurement- a phenomenon which shares some semblance with SV- within the Nigerian construction industry. Similarly, Wirahadikusumah et al.^[44] established factors- inclusive of barriers-influencing the incorporation of sustainability principles on construction projects. Alotaibi et al.^[45] also established the critical barriers negating social responsibility implementation within mega-construction projects in Saudi Arabia. Also, a plethora of studies have deployed the ISM to carry out an analysis of related phenomenon like barriers of sustainable practices implementation^[46], barriers to the implementation of corporate social responsibility practices in construction organizations^[47] and for analyzing the barriers to green supply chain implementation in construction organizations. But there are no studies known to this author which have sought to carry out an ISM analysis of SV implementation barriers within an IDS. This is indeed a salient contribution to the project management and governance literature as well as the SV in construction knowledge domain and beyond.

The use of the ISM facilitated the structuring of a hierarchy relationship of the barriers thereby aiding the design and development of the model. The relationship of these barriers as depicted in the model shows that poor policy interpretation, poor government support as well as unnecessary complexity of the process will directly lead to lack of transparency and access to funds in the process with further links to all the other factors in the IDS process. With the lack of transparency and access to funds in the process development of information silos, lack of skilled manpower as well as resource capabilities is inevitable. Consequently, poor collaboration, poor information exchange, poorly structured and managed supplier organisations and absence of industry base in local context becomes the results that would be experienced. These resultant outcomes as shown at the stop of the model hierarchy are often highlighted as the challenges but in fact are result of other actions operating within the system. Findings from the study show that poor policy interpretation, poor government support as well as unnecessary complexity of the process are the main sources of the challenges experienced within the IDS hence, both project sponsors and the management must consider these three barriers.

Conclusion

This study set out to analyze the interrelationships existing between SV implementation barriers. It leveraged on the barriers which had been identified in a previous study which focused on the implementation of an SV variant, a local content development policy governing capacity development among indigenous entities and in Nigeria's oil and gas industry. The instrumentality of the ISM was brought to bear in engendering the analysis utilizing data elicited from a focus group discussion group comprising of key role players in the IDS operating within the sector. The analysis of these SV implementation barriers established the criticality of certain barriers whilst relegating some barriers as being non-critical. Also, it highlighted the dependence of certain barriers on other barriers whilst presenting autonomous barriers accordingly.

Findings from the study highlight the criticality of poor policy interpretation, poor government support and unnecessary complexity of relevant processes as critical SV implementation barriers. This study holds significant implications for policy makers and industry practitioners as it provides them with valuable insight into the nature of relationships between SV implementation barriers. Such knowledge will assist in the development of protocols for engendering successful SV implementation in the IDS.

References

- Holmgren, J. & Merkel, A. 2017. Much ado about nothing?—A meta-analysis of the relationship between infrastructure and economic growth. *Research in Transportation Economics*, 63, 13-26.
- Babatunde, S. A. 2018. Government spending on infrastructure and economic growth in Nigeria. *Economic research-Ekonomiska istraživanja*, 31, 997-1014.
- Wang, C., Lim, M. K., Zhang, X., Zhao, L. & Lee, P. T.-W. 2020. Railway and road infrastructure in the Belt and Road Initiative countries: Estimating the impact of transport infrastructure on economic growth. *Transportation Research Part A: Policy and Practice*, 134, 288-307.
- Gravito, L., Alli, A., Haddon, J. & Usanase, A. 2017. Infrastructure financing in sub-Saharan Africa-best practices from ten years in the field. Boston, Massachusetts: Boston Consulting Group and African Finance Corporation
- Kodongo, O. & Ojah, K. 2016. Does infrastructure really explain economic growth in Sub-Saharan Africa? *Review of Development Finance*, 6, 105-125.
- Serebrisky, T., Suárez-Alemán, A., Pastor, C. & Wohlhueter, A. 2017. Increasing the efficiency of public infrastructure delivery: Evidence-based potential efficiency gains in public infrastructure spending in Latin America and the Caribbean. Washington, DC: Inter-American Development Bank,.
- Gurara, D., Klyuev, V., Mwase, N. & Presbitero, A. F. 2018. Trends and challenges in infrastructure investment in developing countries. *International Development Policy* | *Revue internationale de politique de développement* [Online], 10. Available: <http://journals.openedition.org/poldev/2802> [Accessed 10/09/2020].
- Morsy, H., Balma, L. & Mukasa, A. N. 2020. 'Not a Good Time': Economic Impact of COVID-19 in Africa. Abidjan: Working Paper Series 338. African Development Bank Group. URL: [http://www ...](http://www...)
- Davies, A., Macaulay, S. C. & Brady, T. 2019. Delivery model innovation: Insights from infrastructure projects. *Project Management Journal*, 50, 119-127.
- Awuzie, B. O. & McDermott, P. 2012. Using a systems viability approach to investigate the social and economic impact of energy infrastructure investments on local construction supply chain development-A case of Nigeria's Niger Delta region. In: Javernick-Will, A. & Mahalingam, A. (eds.) *Engineering Project Organisation Society Conference*. Rheden, Netherlands.
- Awuzie, B., Farag, F. & McDermott, P. 2018. Achieving social value through construction frameworks: the effect of client attributes. *Proceedings of the Institution of Civil Engineers-Management, Procurement and Law*, 171, 25-31.
- Barraket, J. & Loosemore, M. 2018. Co-creating social value through cross-sector collaboration between social enterprises and the construction industry. *Construction management and economics*, 36, 394-408.
- Cartigny, T. & Lord, W. 2018. Evaluating social value in the UK construction industry. *Proceedings of the Institution of Civil Engineers-Management, Procurement and Law*, 172, 8-16.
- Kalyviotis, N., Rogers, C. D., Tight, M. R., Hewings, G. J. & Doloi, H. 2018. Defining the Social Value of Transport Infrastructure. *Infrastructure Asset Management*, 7, 111-119.
- Cartigny, T. & Lord, W. 2017. Defining social value in the UK construction industry. *Proceedings of the Institution of Civil Engineers-Management, Procurement and Law*, 170, 107-114.
- Ehondor, H. U. 2009. SS: Agbami field development: Agbami Nigerian content execution: successes, challenges, and lessons learned. *Offshore Technology Conference*, 4-7 May 2009 Houston Houston: Offshore Technology Conference, 2846-2853.
- Aigboduwa, J. E. & Oisamoje, M. D. 2013. Promoting small and medium enterprises in the Nigerian oil and gas industry. *European Scientific Journal*, 9, 244-261.
- Ihua, U. B. 2010. Local content policy and SMEs sector promotion: The Nigerian oil industry experience. *International Journal of Business and Management*, 5, 3-13.
- Awuzie, B. O. & McDermott, P. 2019. *Infrastructure Delivery Systems: Governance and Implementation Issues*, Singapore, Springer.
- Awuzie, B. & McDermott, P. 2016. A systems approach to assessing organisational viability in project based organisations. *Built Environment Project and Asset Management*, 6, 268-283.
- Shi, Y., Guo, S. & Sun, P. 2017. The role of infrastructure in China's regional economic growth. *Journal of Asian Economics*, 49, 26-41.
- Palei, T. 2015. Assessing the impact of infrastructure on economic growth and global competitiveness. *Procedia Economics and Finance*, 23, 168-175.
- Luiz, J. 2010. Infrastructure investment and its performance in Africa over the course of the twentieth century. *International Journal of Social Economics*, 37, 512-536.
- Villalba-Romero, F. & Liyanage, C. L. 2016. Implications of the use of different payment models: The context of PPP Road Projects in the UK. *International Journal of Managing Projects in Business*, 9, 11-32.

25. Kappeler, A. & Nemoz, M. 2010. Public-Private Partnerships in Europe-before and during the recent financial crisis. Luxembourg: European Investment Bank.
26. Liou, R.-W., Hsu, S. M., Lin, H.-C., Hsieh, T.-Y., Chang, C.-C. & Hsu, S.-H. 2018. An economy-wide analysis of the impact of increasing government infrastructure investment on macro-economy, fiscal balance and income distribution: a dynamic computable general equilibrium approach. *Taiwan Economic Forecast and Policy*, 48, 41-77.
27. Zheltenkov, A., Syuzeva, O., Vasilyeva, E. & Sapozhnikova, E. Development of investment infrastructure as the factor of the increase in investment attractiveness of the region. In: Vera, M. & Zdenka, P., eds. *International Scientific Conference Energy Management of Municipal Transportation Facilities and Transport*, 10-13 April 2017 Khabarovsk, Russia. IOP Conference Series: Earth and Environmental Science, 012122.
28. Hurt-Suwan, C. J. P. & Mahler, M. L. 2020. Social procurement to reduce precarious employment for Māori and Pasifika workers in the construction industry. *Kōtuitui: New Zealand Journal of Social Sciences Online*, 1-16.
29. Wood, C. & Leighton, D. 2010. Measuring social value: the gap between policy and practice. *Undercurrent*, 7-9.
30. Sydow, J., Lindkvist, L. & Defillippi, R. 2004. Project-based organizations, embeddedness and repositories of knowledge. *Organization Studies*, 25, 1475-1489.
31. San Cristóbal, J. R., Fernández, V. & Díaz, E. 2018. An analysis of the main project organizational structures: Advantages, disadvantages, and factors affecting their selection. *Procedia computer science*, 138, 791-798.
32. Miterev, M., Mancini, M. & Turner, R. 2017. Towards a design for the project-based organization. *International Journal of Project Management*, 35, 479-491.
33. Nyumba, T., Wilson, K., Derrick, C. J. & Mukherjee, N. 2018. The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and evolution*, 9, 20-32.
34. Gentles, S. J., Charles, C., Ploeg, J. & Mckibbin, K. A. 2015. Sampling in qualitative research: Insights from an overview of the methods literature. *The qualitative report*, 20, 1772-1789.
35. Sharma, G. 2017. Pros and cons of different sampling techniques. *International journal of applied research*, 3, 749-752.
36. Stewart, K. & Williams, M. 2005. Researching online populations: the use of online focus groups for social research. *Qualitative Research*, 5, 395-416.
37. Chauhan, A., Singh, A. & Jharkharia, S. 2018. An interpretive structural modeling (ISM) and decision-making trail and evaluation laboratory (DEMATEL) method approach for the analysis of barriers of waste recycling in India. *Journal of the Air & Waste Management Association*, 68, 100-110.
38. Poduval, P. S. & Pramod, V. 2015. Interpretive structural modeling (ISM) and its application in analyzing factors inhibiting implementation of total productive maintenance (TPM). *International Journal of Quality & Reliability Management*, 32, 308-331.
39. Awuzie, B. O. & Abuzeinab, A. 2019. Modelling organisational factors influencing sustainable development implementation performance in higher education institutions: An interpretative structural modelling (ISM) approach. *Sustainability*, 11, 4312.
40. Haleem, A., Sushil, Qadri, M. A. & Kumar, S. 2012. Analysis of critical success factors of world-class manufacturing practices: an application of interpretative structural modelling and interpretative ranking process. *Production Planning & Control*, 23, 722-734.
41. Obi, L. I., Arif, M. & Kulonda, D. J. 2017. Prioritizing cost management system considerations for Nigerian housing projects. *Journal of Financial Management of Property and Construction*. 22 (2), 135-153.
42. Loosemore, M., Alkilani, S. & Mathenge, R. 2020. The risks of and barriers to social procurement in construction: a supply chain perspective. *Construction Management and Economics*, 38, 552-569
43. Ogunsanya, O. A., Aigbavboa, C. O., Thwala, D. W. & Edwards, D. J. 2019. Barriers to sustainable procurement in the Nigerian construction industry: an exploratory factor analysis. *International Journal of Construction Management*, 1-12.
44. Wirahadikusumah, R., Abduh, M., Messah, Y. & Aulia, M. 2019. Introducing sustainability principles into the procurement of construction works—case of Indonesian developers. *International Journal of Construction Management*, 1-13.
45. Alotaibi, A., Edum-Fotwe, F. & Price, A. D. 2019. Critical barriers to social responsibility implementation within mega-construction projects: The case of the Kingdom of Saudi Arabia. *Sustainability*, 11, 1755.
46. Raut, R., Narkhede, B. E., Gardas, B. B. & Luong, H. T. 2018. An ISM approach for the barrier analysis in implementing sustainable practices. *Benchmarking: An International Journal*. 25 (4). 1245-1271
47. Zhang, Q., Oo, B. L. & Lim, B. T. H. 2019. Drivers, motivations, and barriers to the implementation of corporate social responsibility practices by construction enterprises: A review. *Journal of cleaner production*, 210, 563-584.

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TABLE
COMPONENTS OF EXPENDITURE

Component	Expenditure (%)
Cleaning works	40,9
Mechanical services	37,7
Building works	13,6
Civil works	7,8
Total	100,0

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