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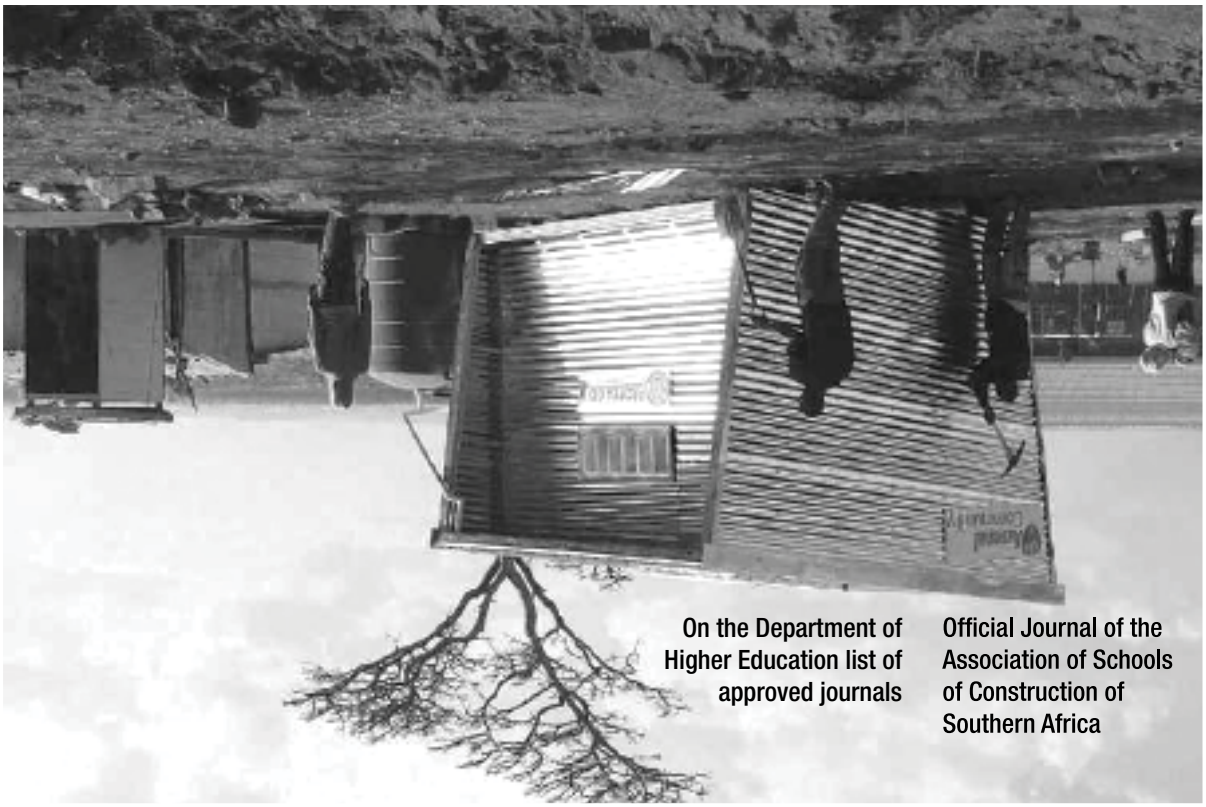

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Dear Industry Stakeholder,

Dear Journal of Construction Stakeholders,

ASOCSA has just completed another successful conference. The Built Environment Suite of Conferences Number 10 has just been completed in Port Elizabeth ending on the 2nd August. It has been decided that the next Conference will be held in Durban from the 6th-8th August 2017.

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Further I wish you well for the rest of the year and will write to all again with the publication of the next issue of JoC.

Ferdinand
F C Fester
President ASOCSA
August 2016

JOURNAL OF CONSTRUCTION

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EDITORIAL

The 2nd issue of Volume 9 of the Journal of Construction (JoC) comprises four papers which cover various topics in construction contributed by South African authors.

Firstly, Okoro, Musonda and Agumba assess the safety of construction workers in Gauteng, South Africa. Secondly, Babalola, Buys and Ncwadi investigated how the interest rate influences private sector spending in the South African construction sector. Thirdly, Matete, Emuze and Smallwood explore the perceived implementation issues of the permit-to-work requirement of the construction regulations in South Africa. Finally, Aigbavboa and Musundire examined the efficiency of contractors' all risk insurance policy in the South Africa construction industry.

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CONTENTS

SAFETY PERFORMANCE EVALUATION OF CONSTRUCTION WORKERS IN GAUTENG, SOUTH AFRICA

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PURPOSE:
This paper presents findings on an assessment of safety performance of construction workers in the Gauteng province of South Africa.

ABSTRACT

Purpose
The health and safety (H&S) of construction workers has been a subject of much deliberation and justifiably so, since construction workers are invaluable in construction processes. The paper presents findings on an assessment of safety performance of construction workers in the Gauteng province of South Africa.

Methodology
A field questionnaire survey was conducted to collect data regarding safety performance on sites. Participants were selected using heterogeneity and convenience sampling techniques. Data were analysed using Statistical Package for the Social Sciences, version 22 software. Mean values and standard deviation were computed.

Findings
The results of the study indicated that medical treatment beyond on-site first aid and limited work days were minimal among the participants. It was also found that poorer safety performance with regard to risk assessment before engaging in tasks and accepting any kind of work prevailed.

Research limitations/implications
The study included participants in only one province of South Africa and so the results may not be generalisable. Secondly, the study employed a quantitative approach which does not reveal further information about the reasons for some unsafe behaviours. Therefore, future studies could conduct a more in-depth study using qualitative or mixed methods.

Practical implications
The study provides evidence which could be beneficial in the psychometric evaluation of construction workers' safety behaviours on construction sites in order to identify and manage antecedents and consequences of unsafe behaviours.

What is original/value of the paper
The current paper identifies potential areas for improvement in construction workers' safety performance. Construction employers and stakeholders would be enabled to develop measures to check the identified safety indicators and behaviours among their workers.

Keywords: Construction workers, Safety performance, South Africa

INTRODUCTION

The construction industry contributes immensely to the development of many economies. The sector accounts for about 10% of the global gross domestic product (GDP), 7–10% of the GDP in developed economies and 3–6% in underdeveloped economies[1,2,3]. It contributes about 4% to the GDP of South Africa[4]. Not only is the industry a great contributor to GDP, but it is also the second largest employer worldwide (after agriculture)[5], accounting for 7% of global employment, approximately 180 million construction workers worldwide[1,5,] which is made up of about 75% in developing countries. In South Africa, the construction sector employs approximately 8% percent of the total labour force[6]. The construction sector provides much needed employment for many of the world's poorest and most vulnerable people[5] and by so doing, alleviates poverty and improves living standards.

However, despite the undeniable contribution of the sector, its safety performance continues to be a source of concern. This is in spite of government efforts to deal with the problem

in the form of legislations and regulations[1,7]. Proper attention to workers' health and safety is beneficial and crucial since construction workers, especially craft workers (who are the focus in this study) are important human resources involved in the actual construction activities. Hence, more consideration should be given to the subject since injuries and fatalities can be reduced, employability of workers can be improved and productivity increased. Assessing safety performance of construction workers is an important consideration for improving H&S performance in the industry[8].

Attention has been given to construction worker safety performance and behaviours, for instance, a study which investigated unhealthy behaviour of Spanish workers outside the work environment[9]; and a Ghanaian study which acknowledged that construction workers contributed to poor safety performance through non-adherence to safety procedures, refusal to wear personal protective equipment (PPE) or mere disregard for safety regulations, but focused on approaches to encourage construction worker safety performance sites[10]. More recently, the perceptions of Washington carpenters about reporting work injuries only were explored[11]. It appears that little literature has been devoted to actual safety performance and behaviours of the workers on worksites which contribute to the reported poor safety performance records, especially in South Africa. The objective of the present study is to evaluate safety performance of workers on construction sites in the Gauteng province of South Africa. Information on workers' safety behaviour would aid in identifying potential areas of improvement, which will inform subsequent development of strategies to stimulate proactive behaviours, and thus reduce the risk and occurrence of accidents on construction sites. Stimulating healthy behaviour is essential to achieve safe workplaces[9,10].

REVIEW

Health and safety performance in construction

Occupational accidents have been a source of immense consideration in many countries for over 100 years[12,13]. Although a decline in the number of fatal injuries in recent years has been indicated, statistics still report unacceptably high rates of accidents, injuries and fatalities[13,14,15]. Compared to other industries, the construction industry has the highest rates of fatalities and injuries, being responsible for 30 to 40% percent of world's fatal injuries[1,16]. According to the International Labour Organisation (ILO), one in every six work-related fatal accidents occurs on a construction site[15].

In Britain, the construction industry accounts for 27% of fatal injuries and 10% of reported major injuries[17]. Provisional statistics from the HSE indicated that there were 46 fatal injuries in construction in Britain, approximately 12% of total fatal injuries to both workers and passers-by[15]. In the United States of America (USA), the sector accounted for approximately 18% of total fatal work injuries in 2012, having recorded a total of 775 fatal injuries[14].

In South Africa, the situation is no different. The building and construction sector is one of the high risk sectors. Construction motor vehicle accidents alone were 984 in 2010 and 892 in 2011[16]. Construction related fatalities total about 150 a year and the industry suffers about 400 accidents a year[19]. According to the Department of Labour, in 2010, there were 9858 accidents and 93 fatalities; in 2011, 8099 accidents and 50 fatalities were recorded, and 258 accidents and 56 fatalities in construction were reported in 2012, in the construction sector in South Africa[19].

It is notable that construction H&S performance is universally poor, even in industrialized countries. The status quo established from even unreliable statistics of accidents is unacceptable, specifically with the South African construction industry which has seen an increase in accidents in recent years[20]. There is a collective need to improve H&S performance in order to benefit all and sundry. Effective improvement strategies therefore need to be identified if the status quo is to be positively altered, especially since accidents cost human lives and incalculably devastating economic effects. The economy, employers and insurance companies not only face directly related accident costs (such as medical, hospital and rehabilitation expenses, workers compensation payments, and higher insurance premiums or even loss of insurability), but also long-term follow-up costs (for instance, loss in wages, loss of morale, legal costs, training costs, loss of skill/efficiency, administrative time, costs to repair damaged property), which are less obvious and usually greater than direct costs[21].

Measuring of health and safety performance

Traditionally, safety performance has been measured by such metrics as the Occupational Health and Safety Administration (OSHA) record of accidents, injury and ill-health statistics[22,23]. However, it has been argued that measuring H&S performance by the frequency of accidents and injuries is not always appropriate[22]. This is particularly true in settings where there is a low probability of accidents but where major hazards are present, such as construction worksites[22]. Further, gross under-reporting of accident and injury statistics renders such historical records unreliable and deceptive as indicators of safety performance. In some organizations, under-reporting occurs probably because health rates as a measure, particularly when related to reward systems, can lead to such events not being reported so as to 'maintain' performance. Hence, injury rates often do not reflect the potential severity of an event, merely the consequence; they reflect outcomes, not causes[22].

Therefore, in addition to accidents, injuries and ill-health statistics, other safety performance indicators which are related to worker safety performance have been identified from various studies, although these studies dwelt heavily on safety management systems. An injury or illness that requires medical treatment beyond simple first aid is an Occupational Safety and Health Administration (OSHA) recordable injury[24]. First aid involves a particular level of treatment such as cleaning and covering of wounds, use of non-prescription medication, etc; whereas medical treatment occurs when an injury or disease requires a higher degree of management and care to ensure a full recovery, for instance, suturing of wounds, treatment of fractures, and prescribing and providing drugs to manage symptoms[25,26]. Medical treatment beyond on-site first aid is therefore an indicator of safety performance.

Other recordable indicators include restricted work, days away from work, significant injuries or illnesses diagnosed by physician and lost work day incidents[24]. Days away from work, restricted duty and transferred duties are related to injuries which are severe enough that workers are away from work, placed on restricted duty or assigned a lighter job as a result of the injury. Concurring with this view, the ILO stated that loss of working capacity or inability to perform normal or routine work functions on the next calendar day after an injury reflects poor worker safety performance[27]. Statistics on the days away from work or on restricted duty due to an injury are useful when analyzing how much loss is incurred from injuries[24]. Lost work day(s) or lost time injuries are also useful in interpreting solutions to lowering the number of injuries and fatalities per year[24,28]. Absence from work due to an injury, for more than three consecutive working days is considered serious and compensable[13,27].

Further, use of correct PPE was cited as an indicator of safety

behaviour. This is one of the basic practices required for safety on construction sites[29]. It is a performance issue which belongs to self protection category and can be used to indicate safety performance levels of firms[25,29,30]. Workers face bodily harm when they do not wear PPE (and correctly). For instance, cement burns could be sustained without protective gloves and boots while cementing; falls from heights could occur with weak scaffolding and lack of safety belts; injuries could be sustained on fingers, eyes, head, or feet due to absence of PPE, and so on[29].

Another performance issue which is critical is the assessment of risks involved in a given task before embarking on it. The identification of the tasks, hazards and the risks of a job prior to work enables implementation of protective measures to ensure that work is done safely[31].

In addition, near-misses or close calls were shown to be indicators of safety performance[23,25,30]. Reporting of the near-misses and/or accidents is also crucial in reflecting workers' attitude and commitment to safety at the workplace. However, some workers may be reluctant or indecisive about reporting accidents or near-misses because sometimes there is no mechanism for compensation for injuries, and/or they may blame their luck which made them victims of the accident[32].

The above-mentioned indicators relate to construction workers, prior to or after an incident. This implies that some indicators may be trailing (also called lagging indicators), providing data about incidents after the fact[23]; whereas others may be prevailing (called leading indicators), potentially leading to an injury or incident[25]. Both leading and lagging indicators reflect safety performance[23,33]. The above-discussed indicators were considered suitable and thus adopted in the present study because the use of a set of safety performance indicators, in lieu of one measure in isolation or indeed a small number of random measures, provides a greater indication of safety performance[34]. In addition, the interpretations are related to the system and its operational context and are representative of what is to be measured and thus were deemed to be valid[35,36]. Furthermore, good safety performance indicators should be quantifiable and permit statistical inferential procedures[36].

METHODS

Questionnaire design

After an extensive survey of literature related to H&S performance in the construction industry, a 5-likert scale questionnaire was developed. Worker safety performance measures were identified and used to draft a questionnaire containing 10 questions. The questionnaire was phrased in English language, with response categories ranging from "on every project", "more than two times", "two times", "once before" to "never", which were assigned weights 1, 2, 3, 4 and 5, respectively.

Data collection

The draft questionnaire was pilot-tested, reviewed and revised by experts before being self-administered to construction workers on construction sites. The results of the pilot study are however not included in the current paper as it was necessary to rephrase and simplify some of the questions before the main study. The participants included in the main study were selected through heterogeneity and convenience sampling. Heterogeneity sampling was employed because the aim was to include as many diverse views as possible[37]. Eight construction sites in Midrand, Samrand, Centurion and Johannesburg were selected through convenience sampling. The participants included workers who were actively engaged in the physical construction activities as opposed to the site managers and supervisors. This group was chosen purposively as they were the most susceptible to poor safety performance on construction sites. Purposive sampling is based entirely on the judgment of the researcher and there is greater chance of personal bias, which could however, give good results if done with care[10].

Ethical considerations were attended to while conducting the research. A cover letter accompanied the questionnaire to explain the purpose of the study to the workers and their managers and supervisors, from whom permission was obtained prior to administering the questionnaire. The participants were informed that participation was voluntary and that they were free to withdraw at anytime while responding to the questions. Anonymity and confidentiality of responses were assured and strictly kept to. Out of a total of 220 questionnaires distributed, 183 were returned and used for the empirical analysis.

Data analysis

As stated earlier, the response categories used in the study ("on every project", "more than two times", "two times", "once before" and "never") were assigned 1, 2, 3, 4 and 5 in reverse, respectively. Therefore, higher scores represent a higher safety performance. Mean (M) and standard deviation (SD) values were computed for the variables. The mean is the average score obtained from all weighted responses on the 5-point likert scale. The mean scores were compared based on interval ranges or values between the points. Likert scale data can be analyzed with an interval measurement scale as this reflects meaningful relative distances between points[37]. Standard deviation values reflect the extent to which individual responses are digressed from the mean.

Validity and reliability

Various measures were taken to ensure that the variables developed from extant literature and subsequent results are valid and reliable. Through a detailed literature review and synthesis, expert reviews and validation as well as pilot-testing of the questionnaire, construct validity of the theoretical variables was achieved[38]. Additionally, through the inclusion of construction workers in different parts of Gauteng, generalisation (external validity) was enhanced[38]. Cronbach's alpha was used to statistically assess the internal consistency reliability of the scale. The alpha index was 0.83, indicating good internal reliability[39]. The questionnaire was considered to be reliable and representative of what was to be measured[36,39].

RESULTS AND DISCUSSION

Respondents were asked to indicate the extent to which statements regarding their safety performance on construction sites related to them. From table 1, it can be seen that 78% of the participants had *never been treated medically for injuries (beyond first aid on site)* (M=4.63, SD=1.262) or *been asked to do limited work after an injury* (M=4.60, SD=1.418), respectively. With their highest recorded Ms, it can be deemed that medical treatment and limited work days were minimal among the participants, since higher scores represent better safety performance (as stated earlier). On the other hand, *failure to wear PPE* (M=4.24, S=0.972), f*ailure to consider possible risks in a task* (risk assessment) (M=4.05, S=0.871), and a*ccepting any kind of work, not minding the risk involved* (M=3.69, S=0.951) recorded the lowest Ms, suggesting poorer safety performance.

Although 67% (a seemingly good percentage) of the respondents reported that they *never failed to wear PPE*, 33% reported otherwise. A possible explanation for the 33% responses could be that the workers felt uncomfortable wearing PPE while working, a view articulated in a study among Latino residential roofers in which participants believed that wearing PPE made them uncomfortable and hindered their productivity, and thus jeopardising work safety[40].

Table 1 Findings on safety performance of the study participants

Measures	Responses (%)					Mean	SD
	On Every Project	More than two times	Two times	Once Before	Never		
	1	2	3	4	5		
Been treated medically for injuries (beyond first aid on site)	2	2	4	14	78	4.63	1.262
Been asked to do limited work after an injury	1	5	5	12	78	4.60	1.418
Been involved in incidents or near-misses	2	5	3	16	74	4.53	1.615
Been away from work for more than three days due to an injury	3	4	6	12	75	4.53	.994
Failed to report an accident or incident	3	5	4	13	75	4.52	1.048
Been injured at work	3	6	6	22	63	4.35	1.023
Been sick at work	2	8	8	25	58	4.29	.843
Failed to wear personal protective equipment (PPE)	6	9	7	11	67	4.24	.972
Failed to consider possible risks in a task	10	11	6	11	62	4.05	.871
Accepted any kind of work, not minding the risk involved	19	9	9	10	53	3.69	.951

It is noteworthy that 19% of the participants *accepted any kind of work on every project*, regardless of risks involved. It can be deemed that the participants in this category have no misgivings about engaging in dangerous tasks as long as they are employed. The construction industry has no difficulty attracting labour even where the wages are very low[41]. This further suggests that construction workers are low-paid and probably have no choice but to take any job even without considering the risks involved, as evinced by the 10% who reported failure to consider possible risks on every project.

It is also notable that the responses were concentrated on the "never" category. This suggests that the respondents can be deemed to have had no incidence with regard to safety performance on construction sites. Such work injury records may either reflect safe work conditions or under-reporting[11]. Workers may be inclined to conceal incidences for fear of repercussions from management or fellow workers. That 75% of workers *never failed to report an accident or incident* corroborates findings from the study among Washington carpenters which reported that the same proportion of the participants felt that they could report work-related injuries without fear of retribution, while some (nearly half) considered it best not to report minor injuries[11]. In many developing countries, scores of accidents and injuries go unreported[10]. Formal and informal policies and practices on jobsites such as close and strict supervision and monetary rewards could increase reporting of injury[10,11].

CONCLUSION

The study sought to evaluate the safety performance of construction workers. This objective has been met. By identifying aspects of safety workers may be lacking in performance, the study has highlighted possible areas for improvement in construction workers' safety performance. Construction stakeholders and employers would be enabled to develop measures to check the identified safety indicators and behaviours among their workers. Continuous behavioural orientation and instruction could also engender positive thinking and behavioural change. Formal and informal policies could be effective in encouraging and motivating construction workers to improve on their safety performance. Construction workers' recalcitrant and sheer nonchalant safety behaviours could also be altered with incentives or monetary rewards.

The present study has some limitations. It includes only participants in one province of South Africa and so the results may not be generalizable. Additionally, the study employed a quantitative approach which does not reveal further information about the reasons for some unsafe behaviours (especially with regard to the leading safety indicators). Therefore, future studies could conduct a more in-depth study using qualitative or mixed methods. More investigation is required to validate or refute the skewed responses in the "never" category. Future studies could as well expand the number of workers and explore differences in safety behaviour among different construction trades.

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INFLUENCE OF INTEREST RATE ON PRIVATE SECTOR SPENDING IN THE SOUTH AFRICAN CONSTRUCTION SECTOR: AN AUTO-REGRESSION DISTRIBUTED LAGS (ARDL) APPROACH

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PURPOSE:
This paper examines the influence of interest rate on the contribution of private-sector construction to the development of the South African economy.

ABSTRACT

Purpose of this paper
This paper examines the influence of interest rate on the contribution of private-sector construction to the development of the South African economy.

Design/methodology/approach
The methodology adopted for the study was an ex post facto survey research because it was based on existing data. Annual data of the construction contributions, GDP, inflation rate and interest rate were collected between 1984 and 2011. The data were extracted from the published sources of the South African National Reserve Bank (SARB), Statistics South Africa (Stats. SA) and Quantec South Africa.

Findings
The study uses autoregressive distributed lags (ARDL) to prove that there is a long-run causal relationship between private sector spending in construction and macroeconomic variables, namely GDP, Real Exchange Rates, GDP in construction sector, interest rates and inflation rate in South Africa.

Originality/value of the paper
The study makes use of ARDL to discover the long run and short run relationship between both the dependent and independent variables.

Keywords: Construction, ARDL, Construction, Interest Rate, Private sector spending and South Africa.

INTRODUCTION

Without doubt, the interest rate is crucial to the economic development of any nation. Indeed, interest rates and interest rate spreads are good indicators of growth and development in any economy. Consequently, the decision to invest in the private sector of any nation would depend on the possible return, which is a function of interest rate conditionality[1]. It has been shown that interest rate is a function of macroeconomic variables such as economic growth, inflation rate and foreign exchange. One study found that following a 100 basis point increase in the nominal interest rate, there was a reduction of 0.54 per cent in nominal Gross Domestic Product (GDP)[2]. It has also been suggested that private sector expenditure contributes positively to the national economy in situations of low inflation, low interest rate and a stable foreign exchange rate, as these conditions provide the employment opportunities that aid multi-sectoral growth.

The growth rate of the South African economy is regarded as slow and features the highest level of unemployment among the G-20 countries[3]. There is no doubt that the South African economy is facing some serious challenges of infrastructure, particularly electricity, causing the manufacturing subsector to go into recession[4]. It is thus clear that the rapid depreciation of the rand is negatively affecting the economy and the accumulation of funds[4]. Some of the reasons provided for the slow pace of economic growth in South Africa include firstly, the short-run labour market adjustments are not within the reach of the monetary policy in South Africa and secondly, some factors beyond the control of the monetary policy are responsible for the mass sack of workers[3]. Therefore the soundness of monetary policy determines the effectiveness of interest rate impact on private sector contributions in any economy.

When precautionary saving motives are strong owing to large income risks because of unemployment, the monetary authority fails to effectively stimulate demand. This suggests that there is a strong relationship among interest rate, savings,

unemployment, economic growth and investment generation in any sector of an economy[5]. The Organization for Economic Co-operation and Development (OECD) asserts that in a given economy it is the private sector – comprising the individual, households or businesses – that is regarded as the engine of growth. The OECD identifies five key factors, including a reliable institutional framework and good policies, which can aid private sector growth, namely providing incentives and a conducive environment for entrepreneurship and investment; increasing productivity through competition and innovation; providing an adequate mechanism for harnessing international economic linkages; improving market accessibility and functioning; and reducing risk and vulnerability to external shocks. All of these factors can be linked to a reliable policy on the interest rate in an economy and would influence private sector performance in economic development[6].

Given the crucial role the interest rate plays in the pursuit of sustainable economic growth and development, therefore, the aim of this study is to examine the impact of the interest rate on the contribution of private sector spending in construction to economic development in South Africa.

THEORETICAL REVIEW

The interest rate is determined by the supply of and demand for funds. Supply of funds is a function of the society's preference for current as against future consumption. The effectiveness of this market mechanism is statutorily vested in the financial sector with a sound monetary policy[7]. Since the pre-Keynesian era, the role of capital or capital accumulation in economic growth, development and sustainability has been recognised; during this period the classical ideology monopolized economic policy formulation[7]. The Keynesian liquidity preference theory explains the operation of the interest rate mechanism in a given economy. The theory emphasises three main issues in achieving economic stability. Firstly, aggregate demand is affected by public and private sector decisions; further, private sector decisions cause an adverse macroeconomic imbalance. This leads to low demand, which can only be corrected through adequate fiscal stimulus packages. Secondly, Keynesians believe that prices and wages react slowly to changes in supply and demand; subsequently they cause periodic shortages and surpluses, especially in labour. Thirdly, when there is a change in aggregate demand, this would also have a short-run effect on the output and employment in an economy[8]. The importance of liquidity preference was recognised by the Central Bank as a controlling mechanism for financial assets in order to set the rate of interest based on the demand for money[9].

The Keynesian theory of liquidity preference is also called the loanable fund theory. According to the loanable theory the interest rate is determined on the basis of investment demand and real saving. From the loanable theory, a low interest rate would attract increased investment and high interest rates would cause decrease in investment. At equilibrium the interest rate equals the volume of saving and investment[10]. This again makes it clear that the interest rate is an important instrument used by monetary authorities to control inflation in an economy. For example, if money increases, disequilibrium will set in and cause excess money supply in an economy. This phenomenon will cause consumers to purchase other financial assets such as bonds, thereby bidding their prices up. As a result of the negative relationship between bonds and interest rate, increases in bond prices will result in decrease in interest rates. This occurrence will lead to increase in aggregate demand and output in the economy[11].

A well-managed macroeconomic environment contributes significantly to private-sector performance in the construction industry of any nation. In terms of sustainability and growth, it may be argued that the private sector in construction – with favourable interest rate policies – can contribute enormously to ensure a stable macroeconomic environment, especially in some emerging and developed countries[12]. For example, the private sector spending in construction in Malaysia has contributed significantly to the growth and sustainability of the economy through its revenue generation, capital formation, employment generation and socioeconomic development – because of the country's favourable macroeconomic environment[13].

The importance of the interest rate in the decision making process especially when an investor is considering an investment are as follows: firstly, the interest rate of the return must be greater than the interest rate charged; secondly, it must also allow for risk before decision-makers can accept the proposal to build[14]. The speed of recovery of the construction industry may be affected by several factors, including the level of investment demand for construction; this, in turn, depends partly on interest rates[14]. However, the interest rate is critical, being an important determining factor for both the supply and demand sides of the construction business owing to its proximity to finance and the fact that the loans needed by the private sector for project financing are generally determined by the interest rate[15]. Indeed, private sector spending in construction is one of the cyclical components of GDP and one that is very sensitive to the interest rate, the degree of sensitivity varying between countries[16].

Two factors that can support the construction sectors' prospects in the short term in South Africa are as follows: firstly, public-sector infrastructural projects especially at local government levels; secondly, fall in interest rates[17]. Following a study on the United States' construction industry, when the interest rate and the inflation rate remained at a historically low level this created an environment that should encourage investments in construction, since the cost of financing developments is low and successful developers can offer better rates of return than can be found in many other forms of investment[18].

RESEARCH METHODOLOGY

The study examines the influence of interest rate on the contribution of private-sector construction to the development of the South African economy. The study utilises secondary data sources owing to the nature of the data involved and because of the well-developed knowledge in the field of economics, as economic data can easily be sourced from national statistical sources. The data used in the study were extracted from the published sources of South African national statistics bodies such as the South African Reserve Bank (SARB), South African Statistics (STATSSA), and Quantec South Africa (Quantec SA). The data were grouped on a quarterly basis from 1984 to 2011.

The variables used in the study were defined as follows:

- Private Sector Spending in Construction (Private_SP): This is the total cost of completed projects by private sector in South Africa between the period of the study 1984 and 2011. It is measured in million rand.
- Real Interest Rate (INT_RATE): The real interest rate is the nominal interest rate adjusted foe expected inflation rate and is measured as the difference in the nominal interest rate and the expected inflation rate in the economy. It is measured in percentage.
- Real Exchange Rate (RER): The real exchange rate is defined as the nominal exchange rate that takes

into account the inflation difference among nations. It is the rate at which a country currency is compared with the currencies of other countries.

- Gross Domestic Products (GDP): GDP is used to assess level of performance of a country economy with another country: South Africa GDP is measured in billion rand.

- Gross Domestic Products in Construction Sector (GDP_CONSTR): The output total of the construction sector over a period of time. It is measured in million rand.

- Inflation Rate (INFL_RATE): Inflation rate is based on the consumer price index. It is a percentage change in the price of goods and services in the economy within a given period of time.

Data for the study were subjected to the Auto-Regression Distributed Lag (ARDL) model developed by renowned economists[19]. This approach can be used to test both long-run and short-run dynamics in a study's variables. For a number of reasons the approach is simple to use compared to other integration techniques. Firstly, the ARDL bound test does not require variables to be integrated of the same order, that is, they can be either I (0) or I (1). Secondly, the test solves the serial correlation and endogeneity problems by specifying appropriate lags, while the long-run and short-run parameters can be estimated simultaneously. Thirdly, the ARDL bound test has superior small sample properties[20].

RESULTS AND DISCUSSIONS

Estimation of the ARDL model

The steps for the estimation of the ARDL model for the study are as follows: determine whether the variables are stationary and that the variable is not of second difference (I (2)); select optimal lag; test for long-run relationship by using Wald test statistics and run an ordinary least squares model; save the residual and copy it as error correction term (ECT) and run an ordinary least squares model including ECT as one of the regressors; ensure ECT is negative and significant. These steps are followed by the explanation of the results and the diagnostics test.

From the above steps, the stationary/unit root tests for the study revealed that all the variables are of first difference (I (1)). The next step is the selection of the optimal lag model. The variable for the ARDL model estimates is PRIVATE_SP as the dependent variable; other variables are INFL_RATE; INT_RATE; RER; GDP; and GDP_CONSTR as the independent variables. The model can be expressed as follows:

PRIVATE_SP = F (INFL_RATE; INT_RATE; GDP; RER; GDP_CONSTR)

Where PRIVATE_SP is Private sector spending in construction.
INFL_RATE is inflation rate in the economy.
INT_RATE is the interest rate in the economy or repo rate. GDP is the gross domestic products in the economy.
GDP_CONSTR is the construction sector contribution to the economy.
RER is the real exchange rate in the economy. Exchange rate of rand to dollar.

For the selection of the optimal lags, the values of Akaike (AIC) and Schwards (SIS) information criteria were considered for various models and the one with the lowest values of AIC and SIS was picked. The results of the optimal lag selection are summarised on Table 1

Table 1: Results of optimal lag selection

NO OF LAG	AIC	SIC	COMMENT
1	-2.14	-1.18	Not the lowest lag
2	-2.09	-1.61	Not the lowest lag
3	-2.17	-1.45	Not the lowest lag
4	-2.56	-1.76	The lowest lag
5	-2.49	-1.52	Not the lowest lag
6	-2.47	-1.33	Not the lowest lag

From Table 1 above, a model with four lags is optimal and is thus the best for producing a reliable and acceptable model. The next step is to determine a long-run model or bound testing using four lags. The results are shown on Table 2 below.

Table 2: Determination of long-run model

Variables	Coefficient	T-statistic	Probability
C1=CONSTANT	0.571	1.337	0.185
C2=PRIVATE_SP(-1)	-0.256	-2.534	0.013
C3=PRIVATE_SP(-2)	-0.347	-3.346	0.001
C4=PRIVATE_SP(-3)	-0.173	-1.598	0.115
C5=PRIVATE_SP(-4)	0.289	-2.847	0.006
C6=GDP(-1)	-0.223	-2.521	0.014
C7=GDP(-2)	-0.179	-2.120	0.037
C8=GDP(-3)	-9.450	-2.735	0.007
C9=GDP(-4)	-7.470	-2.219	0.029
C10=RER(-1)	0.179	1.391	0.168
C11=RER(-2)	0.273	1.937	0.056
C12=RER(-3)	-0.053	-0.407	0.685
C13=RER(-4)	0.008	0.060	0.951
C14=GDP_CONSTR(-1)	0.480	0.672	0.009
C15=GDP_CONSTR(-2)	0.462	2.652	0.009
C16=GDP_CONSTR(-3)	0.421	2.532	0.013
C17=GDP_CONSTR(4)	0.547	3.261	0.001
C18=INT_RATE(-1)	0.089	4.208	0.001
C19=INT_RATE(-2)	0.011	0.566	0.573
C20=INT_RATE(-3)	0.0142	0.860	0.392
C21=INT_RATE(-4)	-0.025	-1.804	0.075
C22=INFL_RATE(-1)	0.130	1.333	0.186
C23=INFL_RATE(-2)	0.007	0.066	0.947
C24=INFL_RATE(-3)	0.275	2.632	0.010
C25=INFL_RATE(-4)	0.085	0.776	0.440
C26=PRIVATE_SP(-1)	-0.038	-1.900	0.061
C27=GDP(-1)	0.179	3.874	0.002
C28=RER(-1)	-0.023	-0.324	0.746
C29=GDP_CONSTR(-1)	-0.189	-3.691	0.001
C30=INT_RATE(-1)	-0.028	-1.391	0.168
C31=INFL_RATE(-1)	-0.133	-3.089	0.003

Table 2 presents the results of the Wald test for the long-run relationship between the dependent variable and the independent variables in the model under consideration that contains four lags. The model estimation is followed by testing the long-run relationship using the Wald test; the hypotheses are as stated below:

Null hypothesis is that C(26)=C(27)=C(28)=C(29)=C(30) =C(31)=0

Alternative hypothesis is that C(26)=C(27)=C(28)=C(29)=C(30)=C(31)≠0

Table 3: Results of the Wald test for the long-run relationship

Test Statistic	Value	Df	Probability
F-statistic	5.1267	(6.70)	0.0002
Chi-square	30.7602	6	0.0000

From the result on Table 3, the F-statistics is 5.126701 and the probability is 0.0002 while the Chi-square value is 30.76020 with a probability value of 0.0000. However, to determine whether the variables have a long-run association or not, the F-statistic 5.126701 is compared with the Pesaran critical value at 5 a percent level. The model is an unrestricted intercept with no trend. From the Pesaran table, the lower bound value is 3.79 and the upper bound value is 4.85. The guiding principle for acceptability on the Pesaran table is that if the F-statistic is more than the upper bound level value we reject the null hypothesis and accept the alternative hypothesis. Therefore, the Wald test F-statistic shows 5.126701 to be greater than the Pesaran upper bound value of 4.85. That is 5.12> 4.85. From the Wald test the six variables in the model – PRIVATE_SP, GDP, RER: INT_RATE, INFL_RATE and GDP_CONSTR – have a long-run relationship and can thus move together in the long run. The next step is to develop a model of the short run with an error correction term as one of the regressors.

Development of short run and error correction term (ECT)

Table 4 opposite presents the results of the short run and error correction term (ECT). ECT (-1) is incorporated into the above model to form a long-run component. ECT (-1) is the speed-up adjustment towards the long run and it must be simultaneously negative and significant. However, from Table 4 the following observation was made on the short-run association between the dependent variables and the independent variables: that only INT_RATE (-1), (-2), (-3) and (-4) can jointly cause short-run causality with PRIVATE_SP. The other variables of GDP, RER, GDP_CONSTR and INFL_RATE did not have a short-run association with PRIVATE_SP.

From the estimation technique used in this study, it was discovered that there are both short-run and long-run relationships between the interest rate and private sector spending in construction in South Africa. The result of the estimation follows the Keynesian theory of liquidity preference or loanable fund theory. There is a negative relationship between the interest rate and private sector spending in construction. A low interest rate in the economy attracts increased investment from the private sector in construction, while high interest rates will cause a decrease in investment from private-sector construction to the economy. Variables such as inflation rate, exchange rate, economic growth and interest rate jointly influence private sector spending in construction. These variables are subject to control by monetary policy. It therefore follows that the soundness of monetary policy determines the effectiveness of the interest rate and the contribution of private sector spending in construction. Further, the estimation technique used makes it clear that volume of saving in the private sector affects the level of investment in construction and the interest rate in an economy. According to the Keynesian theory of liquidity preference, real investment is negatively related to interest rate and volume of saving will depend on the level of investment. Other things being equal, a low interest rate will increase investment or volume of saving. In addition, when the interest rate is high investment will decrease and volume of saving will also decrease because the cost of capital has gone up.

Table 4: Results of short run and ECT

Variables	Coefficient	T-statistic	Probability
C1=CONSTANT	0.004	0.392	0.696
C2=PRIVATE_SP(-1)	0.250	1.857	0.067
C3=PRIVATE_SP(-2)	-0.093	-0.970	0.335
C4=PRIVATE_SP(-3)	0.110	1.054	0.296
C5=PRIVATE_SP(-4)	0.573	5.161	0.000
C6=GDP(-1)	0.035	0.517	0.607
C7=GDP(-2)	0.041	0.594	0.554
C8=GDP(-3)	-0.038	-0.519	0.605
C9=GDP(-4)	-1.031	0.354	0.724
C10=RER(-1)	0.116	0.870	0.387
C11=RER(-2)	0.231	1.627	0.108
C12=RER(-3)	-0.197	-1.440	0.154
C13=RER(-4)	0.051	0.368	0.714
C14=GDP_CONSTR(-1)	-0.015	-0.114	0.910
C15=GDP_CONSTR(-2)	-0.011	-0.075	0.941
C16=GDP_CONSTR(-3)	-0.017	-0.119	0.906
C17=GDP_CONSTR(4)	0.069	0.482	0.631
C18=INT_RATE(-1)	0.054	3.391	0.001
C19=INT_RATE(-2)	-0.043	-2.402	0.019
C20=INT_RATE(-3)	-0.011	-0.716	0.476
C21=INT_RATE(-4)	-0.039	-2.702	0.009
C22=INFL_RATE(-1)	0.099	0.670	0.505
C23=INFL_RATE(-2)	-0.121	-1.107	0.272
C24=INFL_RATE(-3)	0.229	2.054	0.044
C25=INFL_RATE(-4)	-0.125	-1.068	0.289
C26= ECT(-1)	-0.538	-2.851	0.006

CONCLUSIONS AND RECOMMENDATIONS

From the ARDL model used in the study, it was established that interest rate influences the contribution of private-sector construction to the South African economy. It was found that interest rate has a long-run relationship with private sector spending in construction. Further, the result of the short-run and error-correction term as well as the interest rate can jointly cause short-run causality with private sector spending in construction. However, from the findings of the study, although interest rate is significant and important in determining both the supply and demand sides of the construction business because of its proximity to finance, this will depend on the general economic performance. The growth of the South African

economy is slow and among the G-20 countries it has the highest unemployment rate. Consequently, the South African macroeconomic environment must be made more favourable for private investment generation towards increasing savings. The monetary authority must improve the policies of government so that the economy can grow faster so as to improve the present state of the economy and fast-track the contribution of the private sector in construction to the South African economy.

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EXPLORING PERCEIVED IMPLEMENTATION ISSUES OF THE PERMIT-TO-WORK REQUIREMENT OF THE CONSTRUCTION REGULATIONS IN SOUTH AFRICA

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PURPOSE:
"... the reported research project investigated the implications of the 2014 Construction Regulations that replaced the 2003 regulations in South Africa."

ABSTRACT

Purpose
Regulations are designed to encourage changes in individual outcomes. Such outcomes could be changes in conditions of work that leads to reduced accidents, injuries, and fatalities in the construction industry. Following this premise, the reported research project investigated the implications of the 2014 Construction Regulations that replaced the 2003 regulations in South Africa.

Methodology
With exploratory sequential mixed method research design that obtained the perceptions of project actors that are active in the industry, the study examines the contents of the regulations; the intentions of the permit-to-work requirement of the regulations; and the ability of the Department of Labour (DoL) to enforce compliance. The exploration focuses on the procurement system of the national Department of Public Works (DPW) in South Africa as a major client of the industry.

Findings
The study shows that though the interviewees were relatively familiar with the revised regulations, their ability to implement the permit-to-work requirement is a concern. The concerns focus on the capacity of the DoL to process permits when required. This perception indicates that there would be cost implications for project actors when implementing the permit-to-work requirement and this cost factor could delay project initiation, planning, and delivery.

Value
The issues that have been highlighted have to be addressed in practice so that the health and safety (H&S) improvement intentions of the revised regulations would not be marginalised.

Keywords: Client, compliance, construction, health and safety, regulations, South Africa

INTRODUCTION

The National Development Plan lists the ten critical actions to be achieved by 2030 in South Africa has been highlighted[1]. Number seven on the list is public infrastructure investment at 10% of the gross domestic product (GDP). The investments, which are to be financed by tariffs, taxes, and loans, will focus on transport, energy, and water. The infrastructure plan indicates that the construction industry will play a significant role in the infrastructure investment space in South Africa in this decade and beyond. However, many project sites are productive workplaces that are dangerous if people do not follow H&S procedures[2]. While there have been insinuations that fatalities are linked to the 'high price' environment – chasing profits causes accidents that result in injury and death[3] – the reality is that improving health and safety (H&S) is a profit incentive[4]. This incentive is a reason for clients, designers, contractors, regulators, and everyone involved in the delivery of construction project to work without the fear of harm in an environment that is noted for accidents and injuries[5]. Harm through injuries and fatalities has made construction H&S the focus of industry stakeholders and role players in South Africa[6]. For example, the H&S features that are to be designed into a project must be identified so that the completed facilities will meet the objective of being a healthy and safe place for its users[2].

To turn the tide of injuries and fatalities in construction, regulations and legislation are used by most countries in industrial systems. The same approach is adopted in South Africa where clients are mandated to take up their responsibilities regarding construction

H&S. Construction firms, the government, and unions are showing increased concern on H&S, which is essential if the industry is to remain sustainable in the long run[3]. The role of clients is important as the construction process starts with a client's decision to procure a facility or infrastructure to satisfy a particular need[7].

Description of the research question

The identification of gaps in the 2003 edition of the Construction Regulations led to the revision of the regulations in South Africa. The revised regulations were promulgated in 2014 with clear intentions to bridge the identified gaps. One reason for the gaps is the lack of consistent and uniform standards of compliance with H&S. Also, contractors perceive regulations as an additional burden with which they have to conform, and which give rise to unnecessary costs[6]. In an attempt to avoid this perceived extra cost, contractors tend not to comply fully with H&S regulations. For instance, contractors are not compelled by the client to notify the DoL before commencing projects where required. The use of qualified H&S agents or officers is deemed to be a way to improve compliance (this is an example of unnecessary cost from the viewpoints of contractors), and the revised regulations is an attempt to promote this perception. The non-compliance of contractors has now been stopped with the introduction of the permit-to-work requirement in the revised regulation. The central research question is: '*What are the issues that could work against the implementation of the permit-to-work requirement of the revised Construction Regulations in South Africa*.'

The research assessed the level of readiness by the DPW regarding the permit-to-work requirement of the revised regulations. Table 1 summarizes the scope and application of the Construction Regulations 2014. The study assessed the existence of issues that could thwart the execution of the permit-to-work requirement while also advancing possible ways of addressing them so that negative impact on the procurement of projects by the national DPW in South Africa could be avoided. Given the limits placed on the findings of the study regarding sampled perceptions, the research is exploratory in nature. The study explored the topic because the issues around the implement of the permit-to-work requirement are not widely known at the time of the field work. Primarily, the study examined the ways in which survey results resonate with interview results

Understandings from the reviewed literature

The study was conducted against the background of the introduction of the newly promulgated Construction Regulations (2014) in South Africa. The Construction Regulations 2014 5(1) (a) requires that a client prepares a baseline risk assessment for an intended construction work project, while section 9(1) states that a contractor must, before the commencement of any construction work and during such work, have risk assessment performed by a competent person appointed in writing [8]. This clause indirectly calls for the client to use a specialist H&S resource to compile H&S plan, specifications and risk assessment for the relevant project so that complete compliance could be promoted.

These new requirements are necessary as the construction industry in South Africa is known to has an unacceptably high level of injuries and fatalities, which result in considerable human suffering. The findings of the literature review reveal that construction contractors do not comply fully with Construction Regulations in South Africa[9]. The main implication of the findings for the different stakeholders involved in construction is non-compliance with H&S regulatory requirements by contractors because of cost implications[10]. As a consequence, the literature suggests that H&S in South African construction lags behind that of developed countries[11].

To remedy the situation, contract award mechanism is used by clients to promote H&S management. It has been suggested that clients are in a unique position to drive H&S performance improvement by prequalifying contractors based on H&S practices[9]. The motivation for a change lies with clients because of their influence on appointed contractors. The H&S culture of clients influences the H&S performance of contractors and as such clients should (1) have programmes to monitor and analyse H&S implementation; (2) have clear project H&S goals; (3) schedule H&S as a key contract prequalification criterion for all parties to be involved in a project; (4) schedule H&S in all contracts; (5) conduct regular H&S performance measurement; (6) have their own H&S committee; and (7) conduct hazard identification and risk assessments[12]. Because individual regulation will often comprise a complex chain of interventions, interactions, and impacts, complying with the H&S regulations involves upfront costs, which should not take precedence over the wellbeing of construction operatives and the public[10]. In fact, compliance with the Construction Regulations has presented significant tests involving cost, compliance, and design and implementation capacity[13]. Clients such as the DPW should, therefore, reflect and based their practice upon the implementation H&S regulations in the construction industry.

In brief, the Construction Regulations (2003) have had a positive impact on the sector despite the need for amendments to promote optimum H&S throughout all phases of a project, in particular during the concept, initiation, and detailed design phases[14]. The Construction Regulations (2003) have had a desired 'upstream,' 'midstream,' and 'downstream' impact9. Notwithstanding this, the Construction Regulations (2003) have been reviewed and revised to produce the 2014 Construction Regulations, which forms the basis of this study. The Construction Regulations 2014 3(6) state that a client must ensure that the principal contractor keeps a copy of the construction work permit contemplated in sub-regulation (1) in the Occupational H&S file for inspection by an inspector, the client, the client's authorised agent, or an employee.

RESEARCH METHODOLOGY

In terms of research design, the reported study utilised a sequential mixed method research design, which is aimed at cancelling the weaknesses of both qualitative and quantitative method of research[15]. The review of the literature resulted in the formulation of both open and closed ended questions used in the questionnaire that was distributed to building and civil engineering contractors. The contractors were active Free State-based CIDB grade level 6-9 civil engineering (CE), and general building (GB) contractors. The Free State-based CIDB grade level 6-9 contractors were 112 in terms of population (51 (GB) + 67 (CE)). Given the adoption of face-to-face and onsite distribution of the questionnaire, a limited respondents took part in the survey. The contact mode of questionnaire distribution was utilised to enhance the response rate within the group. The questionnaire was distributed to a sample of 28 contractors in the areas of CE (14) and GB (14) contractors. A response rate of 71.4% was achieved with analysed questionnaires, which were 20 in number. As opposed to random sampling technique used for within population generalisation purposes, the selection of the survey participants was based on informed participation and familiarity with issues concerning the regulations. This approach conforms to the purposive sampling method[16].

The initial approach involved identifying and profiling the target respondents. The survey (instrument) posed questions, which allowed participants to choose options ranging from disagreement to agreement. The questions were structured to be suitable for construction stakeholders who participated

in construction projects at various levels. The majority of the questionnaires were administered on construction sites, while a few of them were given to contractors in their offices. All the contractors gave consent before questionnaires could be delivered. The questionnaire consisted of ten questions, each with several sub-questions, and referred to the implications of the Construction Regulations (2014) about the DPW procurement system.

Open-ended semi-structured questions were also developed to guide face-to-face interviews that followed the questionnaire survey. In analysing the textual data that emerged from the interviews, the inductive data analysis approach was used[17]. In other words, the study builds patterns from the bottom up by arranging the unit of information. Codes and categories were sorted, compared, and contrasted until analysis produced no new codes or categories and all the data were accounted for in the core categories of the data. Hand-written transcripts were read several times while audio-recordings were listened to several times to obtain an overall comprehension of the findings. Both hand-written and audio records were typed with precise information being recorded. From each transcript, significant phrases or sentences that pertain directly to the lived experience of interviewees were identified; data were reduced to themes and quotes, and relationships among the categories were also noted.

Table 1: Summary of scope and application of the Construction Regulations 2014

The Construction Regulations 2014
OCCUPATIONAL HEALTH AND SAFETY ACT, 85 of 1993
Scope of application
2. (1) These Regulations are applicable to all persons involved in construction work. (2) Regulations 3 and 5 are not applicable where the construction work carried out is in relation to a single-storey dwelling for a client who intends to reside in such dwelling upon completion thereof.
3. Application for construction work permit.
3. (1) A client who intends to have construction work carried out, must at least 30 days before that work is to be carried out apply to the provincial director in writing for a construction work permit to perform construction work if the intended construction work will: (a) exceed 180 days; (b) will involve more than 1800 person days of construction work; or (c) the works contract is of a value equal to or exceeding thirteen million rand or Construction Industry Development Board (cidb) grading level 6. (2) An application contemplated in sub-regulation (1) must be done in a form similar to Annexure 1. 3) The provincial director must issue a construction work permit in writing to perform construction work contemplated in sub-regulation (1) within 30 days of receiving the construction work permit application and must assign a site specific number for each construction site. (4) A site specific number contemplated in sub-regulation (3) must be conspicuously displayed at the main entrance to the site for which that number is assigned. (5) A construction work permit contemplated in this regulation may be granted only if: (a) the fully completed documents contemplated in regulation m5(1)(a) and (b) have been submitted; and (b) proof in writing has been submitted— (i) that the client complies with regulation 5(5) (ii) with regard to the registration and good standing of the principal contractor as contemplated in regulation 5(1)(j); and (iii) that regulation 5(1)(c), (d), (e), (f), (g) and (h) has been complied with. (6) A client must ensure that the principal contractor keeps a copy of the construction work permit contemplated in sub-regulation (1) in the H&S file for inspection by an inspector, the client, the client's authorised agent, or an employee. (7) No construction work contemplated in sub-regulation (1) may be commenced or carried out before the construction work permit and number contemplated in sub-regulation (3) have been issued and assigned. (8) A site specific number contemplated in sub-regulation (3) is not transferrable.
Source: Republic of South Africa. (2014)[8]

The eight interviewees were selected because they are active in the industry. The built environment professionals were approached as they are engaged in DPW projects in various capacities. Such capacities include Principal Agents by being the client's first line of contact, being crucial regarding H&S compliance in the construction industry, and overseeing management of construction projects on behalf of clients. They also design, document, and monitor construction projects, therefore their role in the total project implementation requires that they work with other appointed contractors in the implementation of the Construction Regulations (2014). The DoL was approached and a representative interviewed by being the regulatory authority to enforce the permit-to-work system of the Construction Regulations (2014). The voice of the regulator, in this case, the DoL, was found to be vital and informative.

DATA ANALYSES AND INTERPRETATIONS

Questionnaire

For the questionnaire survey, a 5-point Likert scale measurement was used to obtain the opinions of the respondents and to analyse the results. In terms of analysis and interpretation of mean scores (MSs), the respondents were asked to rate their perceptions relative to the Construction Regulations (2003) and the Construction Regulations (2014) on: 1 = Strongly Disagree; 2 = Disagree ; 3 = Neutral; 4 = Agree; 5 = Strongly agree. An 'unsure' option was provided in each Likert scale question so that respondents are not compelled to provide responses to questions in which they have limited knowledge and understanding. Microsoft Excel was used to compute descriptive statistics for the study. The spreadsheet facilitated the capturing and analysis of the data obtained from the completed questionnaires. The Microsoft Excel Ranking function was also used to compute the rank of MSs recorded in the data analysis. The limited responses and sample favor non-parametric and descriptive statistics that has been used in the study.

Face-to-face Interviews

For the face-to-face interviewees, the principal researcher served as a contact for the interview. The respondents were reminded of the voluntary nature of participation as well as the ethics of research regarding confidentiality. The interviews were tape recorded and transcribed verbatim with the permission of the interviewees who were eight in number. The eight interviewees include a representative of the DoL who is a Chief Director, an Assistant Director in the DPW, a Specialist H&S inspector, a professional Architect, a professional Quantity Surveyor, and one professional Civil Engineer. All the interviewees are involved in DPW projects in the Free State province. They are also well informed about the implementation of the Construction Regulations8,18 and its impact on construction H&S in South Africa.

RESULTS

Questionnaire responses

The respondents were asked to indicate the type of organisation they work for by responding to a choice of two pre-selected types of construction industry development board (CIDB) contractors, namely general building (GB) and civil engineering (CE) contractors. The responses show that nine respondents, which constituted 45% of the interviewees selected GB, while another nine (45%) selected CE. When asked to indicate the number of years they have been involved in construction, the majority of the respondents have been involved for 6-10 years, while the categories 11-15 years and 21-25 years have been in the industry for three years. Furthermore, when asked to indicate the highest formal qualification, only six respondents did not hold a post-Matric qualifications and then, about gender, three of the respondents were female. The majority of the interviewees have a formal tertiary education. A further demographic information shows that majority of the respondents were found to be between the ages of 31 and 40 years, while only one respondent was below the age of 25 years.

Questionnaire results

Table 2 to 5 has been tabulated regarding the descriptive analysis explained above. When asked whether the Construction Regulations should promote compliance with H&S in the industry, the respondents strongly agreed that the Construction Regulations should improve H&S conformity in the industry; and they also agree that industry role players are relatively familiar with the Construction Regulations (2003) (Table 2). Their extent of concurrence aligns with the MSs of 4.63 and 4.17 shown in Table 2. In addition, the respondents agree that compliance with the Construction Regulations (2014) requires specific competencies, the Construction Regulations (2014) realised notable revisions and requirements, and industry role players are relatively familiar with the Construction Regulations (2003) and the permit-to-work system enforced by DoL in August 2015 is based on the Construction Regulations (2014). The respondents were neutral concerning the familiarity of project actors with the Construction Regulations (2014).

Table 2: Contractors' perceptions related to the Construction Regulations

Statement	MS	Rank
The Construction Regulations should promote H&S compliance in the industry	4.63	1
Industry role players are relatively familiar with the Construction Regulations (2003)	4.17	2
Compliance with the Construction Regulations (2014) requires specific competencies	3.89	3
The Construction Regulations (2014) realised notable revisions and requirements	3.77	4
Industry role players are relatively familiar with the Construction Regulations (2003)	3.75	5
Permit-to-work system to be enforced by DoL in August 2015 is based on the Construction Regulations (2014)	3.63	6
Industry role players are relatively familiar with the Construction Regulations (2014)	2.93	7

Table 3: Contractors' opinions regarding the permit-to-work system as applied in the Constructions Regulations (2014)

Statement	MS	Rank
Delayed project initiation has economic and social impacts on the community	4.50	1
DoL has engaged project actors on the implementation of the permit-to-work system	3.62	2
Permit-to-work could delay project initiation and planning	3.55	3
Awareness about the permit-to-work system to be enforced by DoL in August 2015 is high	2.94	4
Clients' deliverables are vulnerable to the requirements of the permit-to-work system	2.33	5

Table 3 indicates that the respondents strongly agreed that delayed project initiation has economic and social impacts on the community; the DoL has engaged project actors on the implementation of the permit-to-work system, and permit-to-work could delay project initiation and planning. Based on the concurrence, the respondents can be deemed to strongly disagree with the timing of the permit-to-work requirement of the Construction Regulations (2014). The two statements that achieved MSs below 3.00 are awareness about the permit-to-work system enforced by the DoL in August 2015, and clients' deliverables are vulnerable to the requirements of the permit-to-work system. The perception that delayed project initiation has economic and social impacts on the community received the highest MS in Table 3.

The respondents were asked to rate how they perceive the likely impact of the Construction Regulations (2014) on public sector procurement practices in South Africa. Table 4 indicates that the respondents strongly agree that the Construction Regulations (2014) has strengthened inclusive H&S roles and responsibilities for public sector clients while realising enhanced roles within a project team. The respondents also agree that the H&S competency level required for compliance with the Construction Regulations (2014) will influence procurement method choice and implementation. In this regard, they agree that design-by-employer procurement method would be the most affected by the permit-to-work requirement. However, the respondents appear to disagree with the proposition that design and build procurement method would be the hardest hit by the permit-to-work requirement.

Table 4: Contractors' perceptions regarding the impact of the Construction Regulations (2014) on public sector procurement practices in South Africa

Statement	MS	Rank
The Construction Regulations (2014) strengthened inclusive H&S roles and responsibilities for public sector clients	4.64	1
The Construction Regulations (2014) realises strengthened roles within a project team	4.53	2
H&S competency level required for compliance with the Construction Regulations 2014 will influence procurement method choice and implementation	4.12	3
Design-by-employer procurement method would be the most affected by the permit-to-work requirement	4.07	4
Design and build procurement method would be the most affected by the permit-to-work requirement	2.60	5

The respondents were asked to rate their concurrence with the education and training requirements of H&S regarding compliance with the Construction Regulations (2014). Table 5 indicates that the respondents strongly agree that continuous professional development (CPD) programs should be offered to enhance the understanding and implementation of the permit-to-work requirement in the short term. The table further shows that the respondents agree that professionals and workers who are responsible for the implementation of permit-to-work requirement of the Construction Regulations (2014) need specific learning related to implementation. In fact, the respondents were of the opinion that the permit-to-work requirement should form a module/topic in tertiary H&S subjects offered in South Africa in the long term.

Table 5: Contractors' perceptions regarding education and training requirements regarding compliance with the Construction Regulations (2014)

Statement	MS	Rank
In the short term, continuous professional development (CPD) programs should be offered to enhance the understanding and implementation of the permit-to-work requirement	4.72	1
Professionals and workers who are responsible for the implementation of permit-to-work requirement of the Construction Regulations 2014 need specific learning related to implementation	4.21	2
In the long term, the permit-to-work requirement should form a module / topic in tertiary H&S subjects offered in South Africa	4.05	3

Interview results

In addition to the questionnaire results, the study also obtained in-depth comprehensions through face-to-face interviews. The interviews addressed overall compliance with the Construction Regulations and the DoL enforcement of the Construction Regulations (2014). Interviewees were asked questions about their knowledge of the Construction Regulations, the impact of the Construction Regulations (2014) regarding client/contractor procurement issues, enforcement of compliance with the permit-to-work requirement, and education and training demands about H&S competency as elaborated in this section.

Familiarity with the Construction Regulations

When interviewees were asked to rate their familiarity with construction regulation, Respondent 1 perceives that his level of familiarity with both regulations (2003 & 2014) is advanced. He mentioned that he started work at the DoL in 2004, and has since been applying the regulations. He has also acquired experience and training concerning the 2003 Regulations. In contrast, Interviewee 2 indicates that he cannot say he is familiar with the regulations as he mentioned that it is one of those things that one comes across, but he never had a chance to go through the document itself. Interviewee 3 also said that she is not familiar with the regulations. Respondent 4, however, suggested that the 2003 version of the Construction Regulations was under-regulated whereas he finds that total 'over-regulation' is reflected in the Construction Regulations (2014). Interviewee 5 indicated that he is familiar with the 2003 and 2014 versions of the regulations. Respondent 7 stated that he has a sound level of familiarity with both versions of the regulations. Respondent 8 indicated that his level of familiarity with the 2003 Construction Regulations is low while he said he is more familiar with the 2014 Construction Regulations.

Awareness of the construction permit-to-work system

The knowledge level of the construction permit-to-work system was also asked in the interviews. In response, Interviewee 1 said he is aware of the new permit-to-work system. He further mentioned that DoL has a new organogram system that caters for the production of required permits. Interviewee 2 indicated that he does not know about the 2015 regulations, though he mentioned that he knows that for each construction site, the contractor needs to get a letter to inform the DoL of the project. Also that in every project that they undertake, they typically tell the contractor to notify the DoL. Interviewee 4 confirmed that he knows about the permit-to-work requirement and he opines that it is more a case of over-regulation. Respondent 5 also

confirmed that he is aware of the permit-to-work requirement. Respondent 7 mentioned that he is also mindful of the fact that they want to enforce the requirement, but he is not aware of how it will be implemented. Responding positively, Interviewee 8 said he is very conscious of the permit-to-work requirement.

Required competencies for Construction Regulations implementation

Regarding the required skills for the application of the regulations, Interviewee 1 stated that there are professionals that are needed regarding the Construction Regulations. A competent construction health and safety agent (CHSA) will be needed to draft a baseline risk assessment and specification on behalf of the client. He also mentioned that another key professional is a qualified construction manager who has the overall responsibility for management and supervision of the project on site. He further emphasized that a qualified construction health and safety manager (CHSM) or construction health and safety officer (CHSO) for the principal contractor must also be appointed. However, Interviewee 2 said communication on the required competency had not been achieved. Interviewee 4 had this to say: "*I give competence 50%*".

Respondent 5 mentioned that if the consultants, the clients, and the contractor are not competent, the Construction Regulations will not work. Respondent 7 opined that competency in the country is a problem: he does not think South Africans have the required skills and that contractors are not well skilled. Interviewee 8 perceived that if architects continue to lack knowledge of Construction Regulations, and current design parameters are not in line with H&S, and also if contractors who have to implement the Construction Regulations as well as those who monitor compliance are inexperienced, then the problem with the required competency persists.

Influence of the Construction Regulations 2014 in the industry

Perceptions of the ability to the regulations to positively influence stakeholders in the industry were sought from the interviewees. In response, Respondent 1 mentioned that the Construction Regulations (2014) require the client, the principal contractor and key competent individual to take responsibility in a project. He said it would assist in the reduction of the number of fatal accidents on construction sites. He further mentioned that the role of the DoL had been strengthened; they now have more power regarding sanctioning responsible people. Interviewee 2 said he believes stakeholders will be influenced and mentioned that they raise the level of awareness of the clients and hold some discussions with the clients, telling them to set aside a budget for H&S.

Interviewee 4 opined that implementation would introduce increased costs. Interviewee 5 said he does not think implementation will have any influence; according to him, pre-contract issues will remain the same. While Interviewee 7 mentioned that there would be a positive impact, he anticipates project delays, and more paperwork. Interviewee 8 said that implementation would take some time and a lot of training: it needs stringent measures, and the DoL must carefully monitor non-conformance, otherwise the legislation would be meaningless.

Promotion of compliance to Construction Regulations

Compliance is a crucial matter for the success of any regulation. Based on the importance of conformity, the interviewees were requested to comment on how Construction Regulations will ensure that stakeholder complies with H&S requirements in the industry. Interviewee 1 said that the client key issues are the responsibility related to the application for a permit; that whoever they appoint has the capacity; that they have the funds to complete the job, and that they appoint a responsible person to ensure compliance on the site on his behalf. The client will have to ensure H&S auditing, the availability of site-specific H&S specifications and baseline risk assessment. Regarding designers, he thinks their design must be less risky; take minimal risks; supply the client with risks that are attached to the design work in the form of a report, and ensure designs are safe. On principal contractors, he mentioned that they need to receive site-specific H&S specifications from the client, develop their own H&S plan in line with H&S specifications, appoint a competent construction manager, prepare a risk assessment by a qualified person, ensure all workers undergo medical fitness testing, appoint sub-contractor who will comply with legislation in the same way as they do, and finally notify the DoL of their intention to commence with the project. Interviewee 2 commented that,

"*It boils down to cost for stakeholders, and obviously some of these things it is a bit of misunderstanding or misjudging from one party, we wish if they were all thought of during the project inception, then they could have been avoided, but at the end of the day they are not forming part of the inception, the implementation at a later stage couldn't come at a cost, most of the time the client is not interested.*"

Interviewee 3 says that before a designer shifts issues of H&S elsewhere, when a designer sees something that has an impact on H&S, he/she should raise it with the contractor. He believes only the principal-agent (PA) should handle matters of H&S, and that only a PA needs to pay attention to such. He mentioned that H&S is now main contractors' priority, since it is included in their tendering and they have to comply with it. They also have to give an H&S plan and a method statement. He said it is compulsory in their case, as they need to understand it and have a plan relating to how they are going to execute it. Interviewee 4 said clients, designers and principal contractors would comply with law. Respondent 5 had this to say:

"*I don't know why they intended to involve the clients; I think occupational health and safety consultants must deal with the Construction Regulations and contractors. I don't think designers should be included in the Construction Regulations*".

He agreed that principal contractors should be involved in promotion H&S, since it is their responsibility, and they are the people who have to comply with the law. Interviewee 6 opines that although clients are employers, since this regulation is meant for contractors, the client must be informed to comply. He mentioned that designers (i.e. architects and engineers) should only be aware of the requirement since they rely on H&S specialists to enforce the regulations. He said principal contractors should be fully informed to comply with the regulations.

Interviewee 7 gave his view by saying :

"*I don't think clients are that concerned with regulations, they are not really interested. We have to be careful when we design, and think about how the contractors will build our designs; we have to think through contractors' capability. I think the more the principal contractor is experienced, the more they can conform and become more responsible, and they should belong to associations that can check on them.*"

Interviewee 8 is certain that the requirement for a client to appoint a registered H&S agent is a point of difference from the previous regulations. He also opined that designers have to become competent in H&S matters regarding documentation and designs whereas contractors will have to absorb the cost of training existing workers, hiring registered H&S professionals and generally improving the compliance of their activities with the regulations.

Cost associated with the implementation of Construction Regulations 2014

Interviewee 1 confirmed that there would be extra charge for project stakeholders regarding implementing the new inclusions in the Construction Regulations. For the client, he opined that the appointment of H&S agents had cost implications and whenever a project is delayed or halted owing to the lack of permit-to-work, it will cost the client money. This applies to the contractors as well regarding delivery time for projects. The designers also have to become more mindful of their design as they will be questioned if a design poses risks to workers on site. Interviewee 2 also confirms that clients will incur costs during the implementation, and opined that clients are likely to transfer such costs to contractors owing to fruitless expenses that are likely to result from the first-hand experience of the expenses thereof. Moreover, he believes that client-related costs may relieve contractors of the financial burden, while he seems to be undecided when it comes to designer costs implications.

Interviewee 4 offered his opinion by saying "*There shouldn't be costs, but there will be costs*".

Respondent 5 confirmed that there would be many overall cost implications for all project stakeholders. Respondent 7 also confirmed the perceived additional cost for project stakeholders, even though he is not sure whether the DoL will charge the client for processing a permit. In his opinion, other expenses may arise from the employment of experienced people and increased attendance of project meetings. Interviewee 8 contended that he could not pre-empt, mainly because if people are being told timely, then they must plan well.

Implementation of the permit-to-work requirement

Seven open-ended question were asked regarding the implementation of the permit-to-work requirement of Construction Regulations 2014. The first question was about how it could be enforced. In responding to this question, interviewee 1 noted that no construction would be permitted to begin without the site-specific official number allocated to it. The prohibition notice should be served to the contractor to stop immediately. And if not displayed then, the DoL could issue a contravention notice, and the contractor would have to comply within specified time. Also, interviewee 1 commented that the procedure to follow would entail the issuance of a letter, which will acknowledge the permit request. Efforts should also be made to issue the number within 30 days. According to the interviewee, contractors must also insist on the first-page copy of their permit to be stamped as proof of submission. However, the issue of possible backlog in applications was flagged. Interviewee 1 noted that the DoL might experience delays from the non-availability or slow progress in the appointment of personnel to process permits. In particular, Interviewee 1 said:

"*The proposed plan is to have a principal inspector per province who shall assess the H&S specifications, baseline risk assessment and costs, and make recommendations to the specialist inspector for granting the permit*".

He also noted that technology could assist the DoL to overcome implementation challenges regarding speed and database maintenance.

Regarding proactive measures that could tackle resistance to regulatory changes, Interviewee 1 was of the opinion that the DoL would conduct information and advocacy sessions, targeted at the clients and principal contractors. According to him, the DoL will also strive to accelerate compliance levels by lobbying voluntary associations and legal councils regarding encouraging their members to comply. Education and training are another key aspects that can impact compliance positively. The views expressed by the interviewees shows that interviewee 1 opines that the government wants to enhance H&S competency at the workplace to improve it regarding information received from clients and contractors. Respondent 2 noted that issues of H&S are more about public awareness and education. He believed that H&S must start at home, not in the workplace: people must refrain from making H&S a work situation. Interviewee 3 held the view that training is essential to afford them the necessary knowledge required for implementation of the regulations. She said that as the CHSA may be well knowledgeable, she is more concerned about contractors who may lack the necessary competency. Interviewee 4 indicated he has limited views.

Respondent 5 was of the opinion that accredited bodies are required to offer H&S training. Respondent 6 maintained that H&S is over complicated:

"*the system must be simplified to involve all stakeholders and site workers*".

Respondent 7 noted that skills development is an on-going challenge and that skills levels must be enhanced. Interviewee 8 said he is positive regarding H&S education and training, although he is of the view that additional training is needed to improve the comprehension of the details of the revised regulations.

DISCUSSION

Discussion on questionnaire results

The exploratory survey reveals that industry role players are relatively familiar with the 2003 Construction Regulations, which is aligned to the findings of the CIDB that the Construction Regulations are perceived to have had a widespread impact, and in particular, increased H&S awareness and greater consideration by project managers, and general contractors[9]. It also suggests that the Construction Regulations should promote compliance with H&S in the industry, and that compliance with the 2014 Construction Regulations requires specific competences. Also, CPD programs should be offered to enhance the understanding and implementation of the permit-to-work requirement.

The study also reveals that practitioners who are responsible for the implementation of the permit-to-work requirement of the 2014 Construction Regulations need specific learning. Relevant H&S education and training at all levels in the industry will empower people to make the important general and H&S contributions. This includes the tertiary education of all built environment disciplines. This study suggests that the permit-to-work requirement could form a module/topic in tertiary H&S subjects offered in South Africa, in the long term. The study suggests that the competency level required for compliance with the 2014 Construction Regulations will influence the procurement method choice and implementation. The study also suggests that permit-to-work could delay project initiation and planning, and that delayed project start has economic and social impacts on the community.

Discussion on interview results

The interview results reveal that the participants in this study are relatively familiar with Construction Regulations (2014). The interviewees are likewise aware of the permit-to-work requirement, and the importance of the regulations. The significance of awareness is highlighted by the CIDB, which reports that a pre-requisite for enhancing H&S management and leadership is knowledge of (1) H&S regulatory requirements and the responsibilities of various stakeholders; and (2) the tools and techniques that can be used to enhance construction H&S

performance[9]. The survey respondents and the interviewers were equally confident about the implementation of the Construction Regulations (2003) even though they accepted that perception that there would be cost implications for project actors when implementing the Construction Regulations (2014). Their opinions align with the established notion that the extent of compliance with H&S regulatory requirements is related to perceived cost savings and unrelated to the degree of risk, which the regulation is trying to prevent[10]. For instance, the recruitment of competent professionals to oversee H&S is a cost that must be budgeted for by the client regarding the regulations. As far back as 2009, the CIDB already affirm that a major distinguishing feature of the H&S legislative framework in South Africa and particularly the Construction Regulations includes the introduction of a new participant to the construction process, namely the client-appointed H&S agent that is tasked on behalf of the client to coordinate the other members and documents to facilitate better management of H&S on construction projects[9]. Further, the study also found that permit-to-work requirement will have a possible impact on project initiation and planning, a situation that would also have cost implications for the system. Also, the DoL is likely to experience backlogs, which may eventuate through the non-availability of personnel required for processing permits.

Exposition on permit-to-work requirements of the Construction Regulations

In South Africa, the legal framework that provides for enforcement and implementation of the Construction Regulation is the Occupational Health and Safety Act, 85 of 199319. The Act states that :

"*8(1) every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees."*

The first edition of the Construction Regulations was promulgated in South Africa in 2003. The Construction Regulations (2003) 3(1)(a) required a principal contractor to notify the DoL of his / her intention to commence with construction works. Regarding this regulation, the main contractor had to provide the client with a well-documented H&S plan based on clients' specifications.

In terms of the Construction Regulations (2014), the application of a permit-to-work requirement for the client is an essential legislative requirement, while notification of construction works remains. Regarding the two, when one is not applicable, the other shall apply. The Construction Regulations (2014) 3(1) require that a client applies for a construction work permit 30 days before construction work is to be carried out, while section 4(1) requires that a principal contractor notifies the DoL of his/her intention to perform any construction works seven (7) days before the work can be performed. The client, designer and principal contractor's responsibility on H&S has been strengthened by this regulation: the Construction Regulations 2014 5(1) (a-d, f, g, h, j, l) require the client to prepare a site-specific H&S specification based on the baseline risk assessment. The client is also required to provide the designer with an H&S specification, and the designer must take the specification into consideration during the design stage and include H&S specifications in the tender document. Furthermore, the client is required to ensure that potential principal contractors submitting bids make provision for the cost of H&S measures, that he/she is competent, is registered and in good standing with the compensation fund, and then discuss and negotiate with principal contractors H&S.

CONCLUSION

This study explored implementation issues around the permit-to-work requirement of the construction regulations in South Africa. The study examined the extent of knowledge of the regulations; the anticipated issues that could derail proper implementation of the permit-to-work requirement; and education and training demands of the requirement. Based on the findings of the study, it can be argued that the newly introduced clauses in Construction Regulations (2014) have far-reaching implications for the implementation of construction projects in South Africa.

In response to the central research question of the reported study, the realisation of the aim of the study shows that clients may likely experience delays before they can obtain a permit, while waiting for the processing and outcome of a permit application submitted to the DoL Clients may also encounter delay if competent H&S professionals are not available to be appointed. Increased costs and time are likely to affect infrastructure planning and delivery in the case of the DPW and other related public sector client agencies. Also, clients need to employ H&S practitioners internally to take responsibility and initiate coordination of project teams in ensuring implementation of the Construction Regulations (2014). Industry stakeholders are aware of the permit-to-work requirement, though they may not have been quite aware of how the permit will be processed/ implemented. The study established that the regulations had strengthened clients H&S roles and responsibilities, therefore clients would have to hire a CHSA directly, and internal procedures should accommodate a CHSA. Public sector clients appear not to be ready to fulfill the requirements of section 3 of the Construction Regulations (2014). This is a discovery regarding the implementation of section 3 of the new regulations. And participants in this study expressed concern about the implementation of the permit-to-work requirement because of the need for specific H&S competencies that are not readily / widely available in the construction industry of today.

RECOMMENDATIONS

The study suggests that project actors in South African construction should work together to achieve compliance with the legislation. This approach could start with the client and associated regulatory agencies. For instance, the DoL should strive for best practice in the enforcement of the regulations by considering: the recruitment of labour inspectors with university degrees, and registration of labour inspectors with relevant statutory councils. At the centre of implementation of the new regulation is the registration of H&S practitioners, who are expected to have acquired specific levels of competency. It is also suggested that universities should develop construction H&S curricula that are aligned with the intentions of the regulations, especially about the need to cope with the demands of the permit-to-work requirements. The DoL may also consider an online permit system for ease of processing of permit applications and for achieving a reasonable turnaround time for permit approvals. This suggestion could support the implementation of the framework shown in Figure 1.

Although this study utilised an exploratory mixed method research design, the findings far are not exhaustive. Further research should assist in reducing some of its limitations. In particular, future studies should target the 'how' that would benefit the implementation of the permit-to-work requirement of the regulations. More so, there is a need for a study that will monitor the actual implementation of the new version of Construction Regulations so that clear evidence of its impact regarding compliance and change in the industry could be produced. Another area of future research pertains to the 'why' of the limited internal construction H&S professionals in government departments who procures construction services regularly. While service providers can be used for multiple jobs, it is important for a client body to be intelligent regarding its requirement and compliance with regulations.

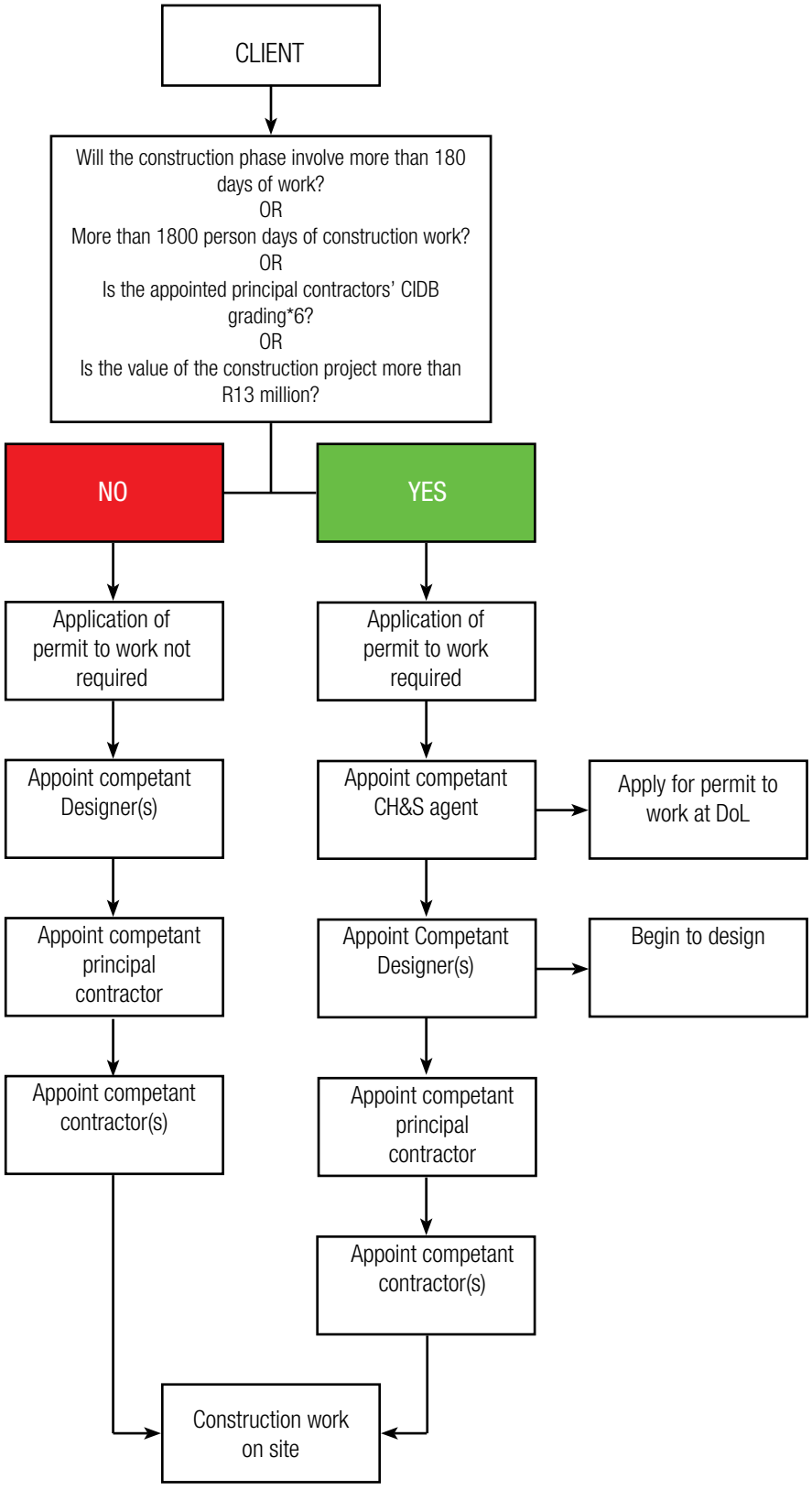

Figure 1: Framework of application and permit-to-work system

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ASSOCIATION OF SCHOOLS
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EFFICIENCY OF CONTRACTORS' ALL RISK INSURANCE POLICY IN THE SOUTH AFRICA CONSTRUCTION INDUSTRY

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PURPOSE:
"... the objective of this article is to identify the factors that affect the efficiency of CAR from the insurer's perspective in the South Africa construction industry. The study further explored the contractors and professional perspective on the efficiency of CAR insurance policy in the South Africa construction industry. "

ABSTRACT

Purpose
Contractors' All Risks (CAR) insurance is a unique insurance cover, which insures all losses on a construction contract unless the risk are excluded in the construction contract. The benefit to the insured under this type of insurance policy is that construction risk burdens are shifted to the insurer who is required to show that the causes of the loss falls within specifies perils. Hence, the objective of this article was to identify the factors that affect the efficiency of CAR from the insurer's perspective in the South Africa construction industry. The study further explored the contractors and professional perspective on the efficiency of CAR insurance policy in the South Africa construction industry.

Methodology
The data used for the study were derived from both primary and secondary sources. The secondary data were derived from the review of literature, whilst the primary data were collected through a structured questionnaire survey distributed to a sample of 69 professionals who have experience and taken CAR insurance policy and are currently using CAR in mitigating against construction risk in various construction projects.

Findings
Findings from the study revealed that the significant factors affecting the efficiency of CAR from the insurer's pecspective in the South Africa construction industry include: a lack of background understanding of construction works, lack of risk management knowledge and expertise in managing CAR and the lack of understanding of contractor's / construction risk. Whilst the contractor's and professionals pespective on the efficiency of CAR policy included that: CAR policy protect the client's interests effectively; CAR protect the contractor's interest effectively and that CAR assist the contractor in risk management by recognising potential risks and reducing the probability of such risks amongst others.

Limitations
The respondents were from one province, therefore the findings cannot be generalised for all the entire South Africa construction industry.

Value
The study contributes to the body of knowledge on the use of CAR in the management of construction risk in the South Africa construction industry.

Keywords: Contractor, Contractors'All Risk (CAR), construction risk management, insurance

INTRODUCTION

Risk is inherent in any business venture, much more to the construction industry. Vital organizational resources are invested in business opportunities in the hope of obtaining a favourable financial return[1]. Risk lies in the possibility that such a return might not be realized; hence, risk management is crucial in a project. The rapid growth of the construction sector in South Africa since the end of the apartheid era and with the hosting of the 2010 FIFA world cup, brought new challenges due to the risks involved in design and production. South Africa construction enterprises are experiencing significant developments and structural reforms. South Africa construction companies are mostly privately and publicly owned whose risks, losses and profits are undertaken by the individuals and the enterprise managing directors. The changing business environment in the South Africa construction industry requires all contractors to manage risks adequately thus protecting the client's from any form of loss.

Construction risk refers to a variety of situations involving many unknown, unexpected, frequently undesirable and often unpredictable factors[2]. While, Perry and Hayes[3] also referred to risk as an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective. Risk is the exposure to loss, gain, or the probability of occurrence of loss/ gain multiplied by its respective magnitude[4], and it carries the possibility of loss, injury, disadvantage or destruction from a given task[5]. On the other hand, construction risk have the potential for unexpected consequences of an activity[6]. Hence, construction risk management is widely recognized as one of the most important procedures and capability areas in the field of project management[7]. Because construction projects are unique and dynamic, the construction operation involves numerous uncertainties, multiple intricacies, varies techniques, and divergent environments with uncertainties. Thus, recognising and managing the potential risk factors, which can considerably differ from project to project depending on several conditions, plays a crucial role in enhancing the performance and accomplishing of construction project goals.

Construction risk management has been the subject of numerous research studies. One of the earliest attempts to study construction risks and systematically identify their sources can be credited to the work of Chapman and Cooper[8], whose study presented the "*risk engineering*" approach, that incorporated different techniques and tools, such as PERT, decision trees, and probability distributions. Managing risk involves creating awareness of uncertainty, qualifying the risks, managing the controllable risks, and minimizing the impact of uncontrollable risks by risk allocation[1]. The ineffective implementations of risk management are often caused by[1]:

- a lack of formalized risk management procedures, including risk identification,
- analysis and control[9];
- a lack of continuity of risk management in the different stages in the project life
- cycle, including conceive, design, plan, allocate, execute, deliver, review and
- support;
- poor integration between risk management and other key processes, including
- design, estimating, planning, production, logistics, cost analysis, manufacturing,
- quality assurance, reliability, schedule analysis, support (e.g. maintainability),
- and test and evaluation; and
- a lack of interaction among different parties, including clients, contractors,
- Insurers, and suppliers.

A major form of mitigating against construction risk in South Africa, include risk transfer to a third party. Transferring risk is normally through subcontracting, insurance and modifying contract conditions. Amongst these methods, the use of insurance is one of the commonly used risk transferring methods in the construction industry. Hence, the contractor's all risk insurance policy have become a major risk mitigating tool in the South Africa construction industry. Generally, specialised insurance policies is one of the main methods of construction risk transfer in the construction industry world wide[10]. For instance, research have revealed that in the Sri Lankan construction industry risk is managed through insurance[11]. Risk if, not managed properly, impacts negatively on the construction industry, hence the need to assess the efficiency of the generic solutions for risk management such as insurance. Therefore, the objective of this study is to identify the factors that affect the use of CAR in mitigating against construction risk in the South Africa construction industry. The study further explored the contractors and professional perspective on the efficiency of CAR insurance policy in the industry South Africa construction industry. The next section of the study discusses the subject matter of the research and thereafter, the methodology used for the study is presented before the presentation of the research findings, and subsequently, some conclusion and recommendation are made.

CONTRACTOR'S ALL RISK INSURANCE

Contractors' All Risks (CAR) insurance is an all-inclusive insurance cover used in construction contracts. CAR is a short term insurance policy, which insures "*the works*" in a construction contract. The first CAR policy is said to have been issued in 1929 to cover the construction of the Lambeth Bridge across the Thames in London. Further to that, a special policy was created in Germany in 1934, but the real development of the policy took place with economic recovery and the construction boom after the Second World War[12]. In South Africa, the Contractors' All Risk policy is also often referred to as the '*Builder's risk*' or the '*Course of construction policy*'.

For a number of years each contractor participating in a particular project had to buy his own insurance cover and the same did apply for the employer/principal. The handling of claims however got rather cumbersome particularly in cases where an accident originating in one contractors work ensued in damage to another contractors work and thus in actual fact became an issue of third party liability claim. Today the contractor's all risk policy (contrary to an individual contractor's policy) is to provide coverage for material damage the subject project might suffer from an insured peril and encompasses all "*named*" contractors and subcontractors participating in the project and also the employer/principal. For instance the FIDIC "*Conditions of contract*" informs that the contractor is obliged to insure the project and such insurance shall be in the joint names of the contractor and the employer. The contractor negotiates with the insurer the cover on behalf of all parties who might become involved in the project at the project site. He obviously has been entrusted by the various parties involved to do so and this within the scope as defined in the "*conditions of contract*". He automatically assumes a certain responsibility to present to the insurer the necessary underwriting information and to pass on to all parties supposed to benefit from that cover the full extent of the policy conditions and warranties (if any).

There are broadly two types of construction risks insurance. The first covers damage to property, such as damage to buildings and other structures being constructed or to the existing building in which the construction is being carried out[13]. The second type of CAR covers liability for third party claims for injury and death or damage to third party property. Modern forms of contractors' all risks policies in the South Africa construction industry covers both. CAR's basic principle is that the insurance covers those losses not covered by an "*excluded peril*". The Contractor's All Risks Insurance is specially designed to cover engineering projects involving both constructions of the building and other civil engineering works that are being carried out. CAR insurance provides coverage against any unforeseen and sudden physical loss or damage from any cause, other than those specifically excluded. The main characteristic of the CAR policy is that unlike other insurance policies, the CAR clause is not limited by reference to specified perils; in other words, everything is covered unless it is excluded, expressly or by implication[11]. CAR policy is usually combined with (but must be distinguished from) Public liabilities or Third party liabilities policies in the South African setting. CAR is designed to provide cover for all the parties involved in a construction project, hence, the policy is usually acquired in the joint names of the Client or the Principal

agent and the Contractor. Other interested parties, such as funders, often ask to be added as a joint name. The theory is that if damage occurs to the insured property then, regardless of fault, insurance funds will be available to allow for reinstatement[13]. The effect of joint names insurance is that each party has its own rights under the policy and can therefore claim against the insurer. Each insured should comply with the duties of disclosure and notification. However, insurer has no right of subrogation against the other insured party, which means that the insurer is not able to recover sums paid to one co-insured under the policy by pursuing a subrogated action in the name of the other insured[13,14,15]. The CAR insurance has a standard format regarding cover although different insurance companies may have different special wordings to suit their clients. Some significant features and benefits of the Policy include:

- Covers permanent and temporary works being carried out;
- Covers contractors' tools, plant, equipment (including spare parts), site huts and scaffolding;
- Covers cost of recovery of property that is immobilised or embedded in soft ground providing it is not due to mechanical or electrical failure of the property;
- Covers materials in transit to or from or, held in storage at contract site;
- Policy provides cover as standard in Great Britain. Republic of Ireland, Northern Ireland, Isle of Man, and the Channel Islands;
- Covers the cost of professional fees incurred during the reinstatement of property;
- Unlimited cover for the cost of debris removal;
- Cover applies during any maintenance periods specified in contract;
- Cover for the cost of rewriting plans and specifications (this is project specific);
- Provides cover (to a specified limit per employee) for the loss of employees' tools and effects;
- Contents cover (to a specified limit) for loss and damage to contents of show houses; and
- Optional extension to cover continual hiring in fees.

The CAR insurance not only transfer risks, it also assists the contractor in risk management by recognising potential risks and assist in the reduction of the probability of such risks. The readiness of the insurer to write an insurance coverage reflects favourably on the insured's efforts at risk prevention[15]. Construction risk management practice of the past largely focused on hazard insurance and probable loss. But today it focuses on the broad issues of general management. Among the insurance covers used in construction, Contractors' All Risk (CAR) policy has been accepted worldwide as a comprehensive cover by which all the material damages and third party damages are covered[11]. The CAR policy used in South Africa is almost the same as that of other countries. The next section of the research discusses the methodology used in conducting the research.

METHODOLOGY

The research method adopted in reaching the research objectives is quantitative in nature as a self-administered questionnaire survey was conducted. The questionnaire survey led to the compilation of the primary data, while the secondary data were derived from the review of literature. The primary data was collected through the use of a structured questionnaire. These respondents included 29 contractors, 31 construction professionals (20 quantity surveyors and 10 construction project managers) and 9 insurance companies that we willing to participant in the study. These were jointly considered in order to meet the research objectives. The construction professionals and contractors were randomly selected amongst their peers from an initial population group of 50 constractors and 50 construction professionals who have experience in the use of CAR policy. Whilst, the insurance companies that are known for undertaking CAR were surveyed. A list of construction professional who works within the greater Johannesburg Metropolitan Municipality was obtained from the respective professional councils and the Council for the Built Environment; whilst the list of contractors was obtained from the Construction Industry Development Board. This approach concurs with previous work that showed that the inclusion of construction professionals and contractors, is essential for successful project delivery- which applies to the current study[16]. From the slected popultion, random sampling was used to select the professionals and the contractors from the list obtained. Random sampling is the probability whereby people, place or things are randomly selected[17]. From the list of construction professionals and contractors, 100 were randomly selected. This yardstick was considered vital for the survey in order to have a true assessment of the factors that affect the efficiency of CAR from the insurer's pespective and the perespective of the contractors and professional on the overall efficiency of CAR insurance policy in the South Africa construction industry.

Because all professionals as contained on the list had an equal chance to be drawn and participate in the survey. Out of the 109 questionnaires sent out (both for contractors, construction professionals ad the insurance copy), 69 were received back representing 63.0% response rate. This was considered satisfactory for the analysis based on the assertion by Moser and Kalton[18], that the result of a survey could be considered as biased and of little value if the return rate was lower than 30% to 40%. Because the sample size for this study was relatively small, all groups of respondents were combined together in the analysis in order to obtain significant results. The data were analysed by calculating frequencies and the mean item score (MIS) of the rated factors. However, before the calculation of the MIS, an internal consistence check was conducted using the consistence and reliability statistic measure of the Cronbach's Alpha. According to Tavakol and Dennick[19] the Cronbach's alpha measures the internal consistency of a test or scale, and it describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test. The current study adopted the Cronbach's Alpha to check the questionaire items internal consistence; and a minimum of 0.70 alpha was set for the study. However, the consistence test using the Cronbach's Alpha within the questionnaire items were found to be between 0.883-0.920. The alpha scores were thus supported by other studies where is was found that an alpha of 0.8 is a reasonable goal[20,21]. Hence the current study proceeded with analysis as it was found that the internal consistence tests revealed that the Cronbach's Alphas was within the acceptable values; meaning that all items in the study were measuring the same concept and all the items were inter-related.

Although the empirical study is based on a relatively small sample of 69 construction professionals, contractors and insurance copanies, the findings provide an insight into the general perception of the factors that affect the efficiency of CAR from the insurer's pespective and the perespective of the contractors and professional on the overall efficiency of CAR insurance policy in the South Africa construction industry. The calculations of the MIS is explained in the next section. The research was conducted between the months of July to October, 2014. The questionnaire was designed based on the information gathered during the literature review and does not form part of an existing survey instrument.

Mean Item Score (MIS)

A five point Likert scale was used to determine the efficiency of CAR in mitigating construction risk and likewise the factors which affect the use of CAR insurance policy in the South Africa construction industry with regards to the identified factors from the extant review of literature. The adopted scale was as follows:

(1) = Strongly disagree; (2) = Disagree; (3) = Neutral; (4) = Agree; and (5) = Strongly agree. The five-point Likert scale scores were transformed to an MIS for each of the identified factors as scored by the respondents. The indices were then used to determine the rank of each item. These rankings made it possible to cross compare the relative importance of the items as perceived by the respondents.

The computation of the MIS was calculated from the total of all weighted responses and then relating it to the total responses on a particular aspect. This was based on the principle that respondents' scores on all the selected criteria, considered together, are the empirically determined indices of relative importance. The index of MIS of a particular factor is the sum of the respondents' actual scores (on the 5-point scale) given by all the respondents' as a proportion of the sum of all maximum possible scores on the 5-point scale that all the respondents could give to that criterion. Weighting were assigned to each responses ranging from one to five for the responses of '*strongly disagree*' to '*strongly agree*'. This is expressed mathematically in Equation 1.0. The relative index for each item was calculated for each item as follows[22]:

Equation 1.0:

$$MIS = \frac{1n1 + 2n2 + 3n3 + 4n4 + 5n5}{\sum N}$$

Where; n1 = Number of respondents for strongly disagree; n2 = Number of respondents for disagree; n3 = Number of respondents for neutral; n4 = Number of respondents for agree; n5 = Number of respondents for strongly agree; N = Total number of respondents. Following the mathematical computations, the criteria were then ranked in descending order of their relative importance index (from the highest to the lowest). The next section of the article presents the findings of the survey and some discussion.

FINDINGS AND DISCUSSION

Efficiency of the CAR policy- Contractors and Professional perspective

Based on the ranking (R) of the weighted averages, the mean item scores (MIS) for the listed perception of the efficiency of CAR from the contractors and professionals pespective in the South Africa construction industry were identified (see Table 1). The survey findings revealed that the six list factors as assessed by the questionnaire, were all significant. The most important efficiency of the use of CAR in the industry as indetified were that: CAR policy protect the client's interests effectively (MIS=3.80; SD=0.71; R=1); CAR policy protect the contractor's interest effectively (MIS=3.71; SD=0.90; R=2); and that CAR assist the contractor in risk management by recognising potential risks and reducing the probability of such risks (MIS=3.68; SD=0.91; R=3) as shown in Table 1.

Whilst the two least rated usage of CAR as shown in Table 1 are that CAR effectively covers work in progress (MIS=3.46; SD=1.04; R=5) and that CAR serves the procurement needs by covering material related risks (MIS=3.20; SD=1.13; R=6).

Factor affecting the efficiency of CAR policy – insurer's perspectives

Furthermore, when the perspectives of the Insurer's were solicited on the factors which affect the efficiency of CAR, result emanating from the analysis revealed that the most significant factors were (see Table 2): lack of background of construction (MIS=4.33; SD=0.78; R=1); lack of risk management knowledge and expertise in managing or administering CAR (MIS=4.25; SD=0.87; R=2); lack of understanding of contractor's/ construction risk (MIS=4.17; SD=1.11; R=3) and lack of risk assessment (extend to known) (MIS=4.08; SD=0.74; R=4).

Table 1: Contractors and Professional perspective on the efficiency of CAR

Use of CAR	Rank	MIS	SD
Contractor's all risk policy protect the client's interests effectively	1	3.80	0.74
Contractor's all risk policy protect the contractor's interest effectively	2	3.71	0.90
CAR assist the contractor in risk management by recognising potential risks and reducing the probability of such risks	3	3.68	0.91
CAR covers liability for the third parties	4	3.60	1.04
CAR effectively covers work in progress	5	3.46	1.04
CAR serves the procurement needs by covering material related risks	6	3.20	1.13

Table 2: Factors affecting efficiency of CAR - insurer's perspective

Use of CAR	Rank	MIS	SD
Lack of background understanding of construction works	1	4.33	0.78
Lack of risk management knowledge and expertise in managing or administering CAR	2	4.25	0.87
Lack of understanding of contractor's/ construction risk	3	4.17	1.11
Lack of risk assessment (extend to known)	4	4.08	0.74
Construction projects are too vulnerable to loss.	5	3.33	1.07
Lack of qualification to undertake construction project risks	6	3.33	0.98
It is a one chance business since construction insurance is a once off policy with no renewal applicable like property which is issued every year.	7	3.08	1.16
Complex risks which are often inter-related	8	3.0	1.13
Too many insured parties, (client, principal, main contractor, third party although for the project only)	9	2.83	1.03
Difficulty for the insurer to design an insurance policy	10	2.45	1.03

The least rated factors related to: too many insured parties, (client, principal, main contractor, third party although for the project only) – (MIS=2.83; SD=1.03; R=9) and difficulty for the insurer to design an insurance policy (MIS=2.45; SD=1.03; R=10).

Findings from the study concurs with the work based on the Sri Lanka construction industry[11]; which revealed that the client's requirement is the most significant motivation for the use of the CAR policy as opposed to the contractor's own interest. Also, the contractor's own interest was rated low which may have a bearing to the fact that contractors are not paying attention[15] and must consider "what happens if" in order to trigger their personal interest in obtaining the CAR insurance. The findings for the study

was further supported by the work of Liu et al., which informed that Chinese contractors do not use insurance because of the high influence of the environment which the Chinese government has caused contractors not to have a realistic attitude towards risk. The implications for the results arising from the findings support the fact that construction risk transfer to a third party (insurance company) can be a cost effective way of managing risks[23]. The findings further infers that CAR do not only transfer construction risks but also assist the contractor and the construction team in risk management by covering identified potential risks and reducing the probability of such risks happening at the long run[24]. The result relating to the insurer's perspective thus infers that the willingness of the insurer to write a CAR policy is reflected favourably on the insured's efforts at risk prevention[15]. Although, scholars have advocated that the transfer of construction risk through the use of insurance cover does not eliminate hazards or unsafe work practices that are the sources of a majority of losses in the construction industry. Meaning that CAR or other insurance policies should not be considered an alternative to safe work practices in the construction industry. But, they are only used to transfer certain risks from clients, contractors, subcontractors and other parties involved in the construction project so that contingent funding can available in times of crisis.

CONCLUSION

The study investigated the factors that affect the efficiency of CAR from the insurer's perspective and the perespective of the contractors and professional on the efficiency of CAR insurance policy in the South Africa construction industry. The most critical efficiency of CAR's were identified to be that CAR policy protect the client's interests effectively; CAR policy protects the contractor's interest effectively; and that CAR assist the contractor in risk management by recognising potential risks and reducing the probability of such risks. Furthermore, the study found that the insurer's factors which affect CAR's usage in the industry are: lack of background of construction; lack of risk management knowledge and expertise in managing or administering CAR; lack of understanding of contractor's/ construction risk and lack of risk assessment (extend to known). The study concludes that there are a number of usefulness in the use of the CAR insurance in mitigating against construction risk in the South Africa construction industry. These usage have the potentials to greatly reduce risk for all parties to the construction projects in South Africa. When properly implemented, it will give the industry an advantage to meaningfully enhance profitability, productivity, compatibility and delivery of construction jobs which will boost the South Africa national economic growth and performance of the construction industry. Hence, it is therefore recommended in order to increase the efficiency of use of CAR insurance, insurance companies should investigate the site in order to assess the risk and before computing the premium. Also, the contractors need to maintain a good records of accidents throughout the project to enable them see the need to protect their own interest and ceding their responsibility to an insurance company. Also, insurance companies and contractors should maintain a cordial relationship by means of active communication especially with underwriters, loss adjusters, which will assist in knowledge sharing that will be mutually exclusive in the formation of the policy. Also, contractors should implement maximum safety measures as a priority especially if it can be foreseen as a potential risk of damage.

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Acknowledgements
A short acknowledgement section of one paragraph is permissible at the end of the text.

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Conclusions should state concisely the most important propositions of the paper, as well as the recommendations of the authors based on the propositions.

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Illustrations must accompany the manuscript and should be included in the text. Photographs, standard forms and charts must be referred to as Figure 1, Figure 2, etc. They should be numbered in the order in which they are referred to in the text. The figure identification and accompanying description and any reference should be one line space immediately below the figure and linked to the left margin.

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Tables should only have horizontal lines, the heading and bottom lines being in bold. All words should be in upper and lower case lettering. The headings should be aligned to the left of their column, start with an initial capital and be in bold. Units should be included in the heading. Any explanations should be given at the foot of the table, not within the table itself.

Table 1 : Component of expediture

Component	**Expenditure (%)**
Cleaning Works	40.9
Mechanical Services	37.7
Building Works	13.6
Civil Works	7.8
Total	**100**

Source[1]

Symbols, abbreviations and conventions

Symbols, abbreviations and conventions in papers must follow the recommended SI units. Where non-standard abbreviations are used, the word(s) to be abbreviated should be written out in full on the first mention in the text, followed by the abbreviation in parentheses.

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[2] Stone, P.A. (1980) *Building Design Evaluation: Costs-in-use.* E & FN Spon, London.

[3] Barrett, S. (1981) "Implementation of public policy." *In Policy and Action*, Barrett, S. and Fudge, C. (eds), Chapman & Hall, London, 1-33.

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