African Journal of Business and Economic Research (AJBER)

- **Indexed at: EBSCO, ProQuest, J-Gate and Sabinet**
- **Accredited by IBSS**

Vol. 12, (Issues 2 & 3), Aug/Dec 2017
pp 113-147

Internal and External Locus of Control of Engineering Workforce in a Power Distribution Utility: Implications for Job Performance

Disebo Modise
Research Development and Postgraduate Studies
Central University of Technology, Free State
Private Bag X20539
BLOEMFONTEIN 9300
Email: modised@cut.ac.za

Patient Rambe
Business Support Studies
Central University of Technology, Free State
Private Bag X20539
BLOEMFONTEIN 9300
Email: prambe@cut.ac.za

Abstract

In view of the high risk, high voltage environments which the Eskom Bloemfontein engineering workforce (engineers, technologists, and technicians) is exposed to in the design, installation and maintenance of coal-fired power plants, sub-stations, transmission lines and electrical equipment, their psychological dispositions especially locus of control (LOC) should be an interesting area of research interest. The influence of LOC of the engineering workforce on improved job performance is critical to eliminating power related risks, accidents and deaths emanating from work-related fatigue, job stress and exhaustion. This study adopts a revised Rotter's LOC Scale questionnaire to explore the combined influence of internal and external locus of control on

organisational performance. The results demonstrate a positive relationship between internal locus of control and job performance. It also demonstrates that a sizable number of the Eskom engineering workforce are easily influenced by external forces, with implications for the job performance of the engineering workforce.

Keywords: *Locus of control, Job performance, Engineering workforce, ESKOM*

Introduction

The study examines internal and external locus of control and their influence on job performance of the Eskom engineering workforce in their work environment. Locus of control (LOC), "the extent to which individuals believe that they have control over their own destiny" (Asiedu-Appiah *et al.*, 2014:44), is a critical requirement to Eskom's engineering workforce comprising engineers, technologists, and technicians. This workforce's electricity infrastructure installation and maintenance work unfolds in high risk, high voltage environments comprising coal-powered power plants, sub-stations, high voltage transmission and distribution lines, generators and highly charged electrical equipment. Since locus of control is "a psychological concept" that captures "how strongly people believe they have control over the situations and experiences that affect their lives" (Adams *et al.*, 2008:109), the effective planning and execution of electricity infrastructure design, installation, maintenance, repair and overhaul demands recourse to internal locus of control. Effective performance of such work and elimination of work-related accidents, injuries and deaths demands the engineering workforce to persistently display appropriate psychological dispositions attributable to LOC. As O'Connell, *et al.* (2015) suggest high locus of control is associated with effective performance, reduced stress and reduced accidents in the work environment.

While the highly stressful nature of engineering work and its impact of job performance is acknowledged in literature (Rasi *et al.*, 2014), the influence of internal and external locus of control on job performance of the Eskom engineering workforce remains speculative. For instance, Munir and Sajid (2010) claims that despite the increasing interest in locus of control-job performance relationship over the years, the findings remain inconclusive and sometimes contradictory. While Asiedu-Appiah *et al.* (2014) insists that locus of control exerts a significant and positive

impact on performance, April *et al*., (2012) contests this position arguing that locus of control exerts a weak and sometimes negative effect on job performance. The problem, therefore, is the inconclusive evidence on the relationship between locus of control and job performance, which complicate knowledge of the exact relationship that exist between these variables.

Although work related injuries, accidents and fatalities at Eskom have multiple causes (e.g. human error, failure to adhere to safety procedures, fatigue, exhaustion, boredom), there is no doubt that low LOC at work is a potential contributing factor to mishaps and lower performance. A study conducted by Rana *et al*., (2011) on the effects of LOC on learning performance indicates that low LOC at work contributes to lower job performance as individuals with external locus of control are less careful, affected by the group members, easily influenced by external forces, less self-confident, and display unsteady performance. Eskom Safety performance statistics highlights that a total of 202 lost-time injuries (LTIs) including occupational diseases was reported in 2015/16 (Eskom Integrated Report, 2016). Despite Eskom's commitment to safety, the corporation experienced an increase in both employee and contractor fatalities-four employee fatalities and 13 contractor employee fatalities (Eskom Integrated Report, 2016). In view of these work-related incidents, there is scope to explore the relationship between internal and external locus of control and effective job performance at Eskom. Since the characterisation of job performance at Eskom incorporates a "zero harm" policy, understanding LOC-job performance relationship would be critical to eliminating various harm and fatalities in the work environment. This study, therefore, seeks to address the following questions: (i) What are the main components of internal and external locus of control of the Eskom engineering workforce in Bloemfontein? (ii)What is the influence of locus of control on the job performance of the Eskom engineering workforce in their work environment?

Case Background

Eskom is mandated to generate, transmit, and distribute 70% of electricity to industrial, mining, commercial, agricultural, redistributors, and residential customers of the country's future electricity. Eskom, as the single official state-sanctioned buyer, has to procure all the electricity generated by renewable energy independent power producers (IPPs) at

prices negotiated by the Department of Energy (DoE), which is guided by the renewable energy feed-in tariff process (REFIT) (Eskom Holdings SOC Ltd 2015). Despite the huge national strategic role of Eskom, the company has multiple power generation and distribution challenges, which have recently manifested in blackouts leading to the under-production of mining companies, economic stagnation (at 2% in 2015 rather than the projected 5%), decline in productivity in different economic sectors, malfunctioning of traffic lights, traffic congestions and increased accidents.

The power supply and distribution challenges have attributed to Eskom's inability to diversify energy sources, which led to its dependence on coal-powered plants; Eskom's dependence on small, cheaper, but unreliable suppliers of coal to drive its coal-fired power plants; the public enterprise's failure to attract relevant critical skills; delays in the completion of the Medupi and Kusile coal-fired power stations; and increased demand for electricity due to economic growth (Van der Nest, 2015). Although macro challenges such as continuous exodus of Eskom's top management, which triggers a lack of consistent policy direction, capacity building and utilisation constraints and demands for electricity that outstrip supply are often cited as main causes of Eskom's woes, these challenges exert pressure on the engineering work force to develop increased locus of control if their job performance is to improve significantly. Asgari and Vakili (2012) caution that organisations in developing countries require increased efficiency through creating environments which employees feel confident to achieve organisational objectives through the effective deployment of their knowledge, experience, abilities and capabilities.

The need for high locus of control at Eskom should be conceived considering the incidences of work-related injuries, accidents and casualties in the work environment despite the institution of its Zero Harm Programme in the Year 2009 (Eskom Annual Report, 2009). For instance, although the fatalities of Eskom employees and contractors increased from 10 to 17, and public fatalities fell from 27 to 25 in the year 2014/15 and 2015/16 respectively (Eskom Integrated report, 2016), this remains inconsistent with the company's intention to eliminate accidents and deaths at the line of duty. In the same vain, in the Year 2015/16 Eskom lost 13 employees and contractors to electrical contact, victims being between or under objects, struck by or against an object, falls from heights and contact with heat (Eskom Integrated report, 2016).

While the cause of these accidents may vary from failure to observe safety procedures, human error, negligence and fatigue, engineering workforce' self-efficacy and self-belief in their capacity to effectively execute their roles and responsibilities in a safe environment (i.e. locus of control) cannot be underscored.

Literature Review

It is uncontested that the engineering profession is a very stressful and challenging profession, which demands more than just a demonstration of intellectual capacity to include individual's self-belief in their capacity to influence outcomes (i.e. locus of control). This stressful nature is conceived in view of the complicated, resource constrained educational backgrounds of most engineering graduates from South African tertiary institutions. The capacity of students to exert their self-efficacy and to influence outcomes should be conceived in view of the current deficiencies of the tertiary education systems' curriculum. For instance, the engineering education curriculum delivered in South African universities tends to be heavily theorised and lacks a strong practical orientation that taps into the self-efficacy and success motivation behaviours of students (i.e. their locus of control) (see. Council on Higher Education Report 2013:16). In most cases, employers have complained that while these students are strong theoretically grounded, they often lack self-efficacy to effectively implement engineering work, which has a strong practical orientation and problem-solving foundation (Laguador, 2013:301).

In view of this lack of a strong orientation towards self-efficacy and achievement orientation there is need for a sustainable practically-grounded partnership between South African higher education institutions and industry such as Eskom. Such partnership could manifest in continual work-based simulations and work placements in the engineering industry that allow engineering students to articulate their LOC in work-related situations with implications for improved job performance (Procknow, 2012:31). This is critical the organisational sustainability as LOC has been found to influence many job performance-related factors. In a US-based study, Ng *et al.* (2006) explored the influence locus of control on job-related factors and found that its positive relationship with job attitudes, employee well-being, coping behaviour, withdrawal intentions, withdrawal behaviour,

perceptions of the work environment and job performance. Similarly, Modise's (2016) masters study, which examined the influence of engineers' self-leadership and LOC on job performance demonstrated that engineers deal with stressful scenarios on a constant basis, which often contribute to their fatigue, burnout, loss of concentration and focus in their work environment. Gangai et al.'s (2016) study reviewed the association between LOC and job satisfaction of employees and reported that employees' job satisfaction in the workplace is one of the important objectives of human resource managers and practitioners, if performance and productivity are to be improved. Collectively, these studies point to the need for engineers to exercise high LOC if there are to optimise their performance in the work environment.

Defining Locus of Control

Locus of control refers to one's belief in his or her abilities to control life events (Strauser, 2002:20; Hillol & Poonam, 2014). It is an aspect of personality that deals with individuals' generalised expectancies that they can or cannot control reinforcements in their lives (O'Connell & Spector, 1994). In other words, locus of control is defined as one's belief that his/her own power or forces are influential in any positive or negative situation occurring during their life (Sardogan, 2006:184). Two forms of locus of control can be distinguished in literature namely, internal and external locus of control.

On the one hand, individuals who have internal LOC think that they have a big role to play in affecting the events which influence their lives. Furthermore, they assess themselves as possessing power over the attitude they want to display by having the positive ego concept, and believe that they can direct their lives in whatever way they desire (Gülveren, 2008). They believe that they are the masters of their destiny and are therefore, often confident, alert, and active in attempting to control their external environments. Moreover, they tend to see a strong connection between their actions and the consequences of those actions (Thomas et al., 2006:107). Hence, they are more likely to believe that performing well at work will lead to positive work outcomes such as increased pay or promotion (Muhonen & Toekelson, 2004:21).

On the other hand, individuals with external locus of control relate the events affecting their lives to perceptions that are out of their control, such as chance, fate, and fortune. They also believe that such events

cannot be predicted and controlled (Kücükkaragöz, 1998; Rastegar & Heidari, 2013). Individuals with external LOC are less careful, affected by the group members, easily influenced by external forces, less self-confident, and display erratic as well as unsteady performance (April et al., 2012). The external LOC-oriented individuals believe that they do not have direct control over their destiny and see themselves in a passive role with regard to the external environment (Thomas et al., 2006:107). They are also more likely to attribute their success at work to external forces such as chance or fate.

Individuals lay out two LOC attitudes, as internal and external, by considering that the reinforcements they have from their previous experiences result from their own attitudes or external forces (Cetin, 2008). These differences between internal and external locus, in accordance with the qualities of an individual. Table 1 presents the behavioural qualities displayed by employees with internal and external LOC. Individuals with external locus of control tend to assess their externally controlled worlds and make a little effort to make socio-economic conditions better. The people with an external LOC often employ external beliefs as a defence mechanism for the expected inadequacies. Individuals with internal and those with external LOC search for information about their environment differently.

Table 1: The differences among the individuals with external and internal LOC

VARIABLES	INTERNAL LOCUS OF CONTROL	EXTERNAL LOCUS OF CONTROL
ABILITIES	Individuals with internal LOC have a tendency to choose activities in which they can display their abilities.	Individuals with external LOC prefer activities in which they can show the role of chance in their lives.
RESPONSIBILITY	They feel that they are responsible for their own decisions, and perceive that their fate is not affected by factors out of their control, but by their own decisions.	They try to increase good conditions in their life and also make an effort to reduce the level of bad conditions.
CHANGE	They belief that they have control over their fate, prevents them from getting suspicious of the changing environment since they feel responsible for their own	They usually view change as a danger as they do not feel in control of the forces affecting their lives. They prefer to be at a status where they can be passive in case of change.

	actions.	
ENVIRONMENT	They have more control over their environment and display a better learning performance. When the information is about their own conditions, they actively search for new information. They also use the information better if they want to solve a complicated problem.	Those with external LOC tend to comply more as they cannot control their environment. They display more compliance attitudes than individuals with internal LOC.
STRESS	It can be concluded that possessing internal LOC can help employees cope with stress and other difficulties in business.	Employees with external LOC cannot cope with the stress and difficulties in a proper way.
JOB SATISFACTION	Job satisfaction for individuals with internal LOC is higher than a person with external LOC. They can do better business and benefit or get prizes in return. They tend to improve or progress faster and get more wages.	External LOC has a negative correlation with job satisfaction. However, it is in a positive correlation with mental and physical health.
WORK MOTIVATION	They mostly believe that their efforts will end with a good performance. They are more self-confident and trust their abilities. They have more expectation that their good performance will be awarded and tend to perceive their status in business as proper and fair.	If there is no prize for performance, they are not motivated to perform.

Source: Demirkan and Selcan (2006:36)

Those with internal LOC have an internal compulsion to acquire more information about their environment, and are active when it comes to seeking and achieving justice in social activities, when compared with those with external locus of control (Demirkan, 2006; Zaidi & Mohsin 2013).

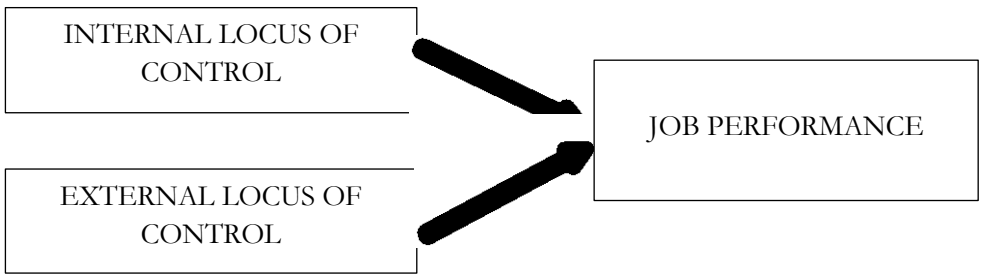
Locus of control and job performance

The growing literature on LOC examines its influence on employee well-being and job performance (Ng *et al*., 2006; Thomas *et al*., 2006); job satisfaction (Vijayashree and Jagdischchandra, 2011; Gangai *et al*., 2016). Internal LOC clearly generates a positive relationship with performance (Thomas *et al*., 2006:107), and is believed to stimulate innovative behaviors among organisational employees (Prattom & Savatsomboon, 2012:1063). Gangai et al.'s (2016) study examined the association between LOC and job satisfaction among employees and revealed that employee LOC is critical to improved job performance and productivity. Another study conducted by Vijayashree and Jagdischchandra (2011) states that internal/external LOC impacts on job satisfaction. In particular, their study revealed a positive correlation between internal LOC and job satisfaction as well as between external locus of control and job satisfaction. In the case of external LOC and job satisfaction, there exists a partial positive correlation. Wang et al. (2010) also postulates a relatively stronger relationship between general LOC and general criteria than between work LOC. They also found out that the general LOC was more strongly related to life satisfaction and copying with problems than work LOC.

Proposed Conceptual Framework

As illustrated in Figure 1, the implication of internal LOC and external LOC on performance is of a compound nature. It is never an either (internal LOC-job performance) or (external LOC-job performance) scenario, but rather a combined influence of two forms of LOC) on job performance. While these two components of LOC may directly impact job performance, they may not necessarily have the same weight. The postulation of this paper is that internal locus of control seems to have more statistically significant influence on job performance than external locus of control.

Figure 1: The Implication of Internal and External LOC on Job performance



Internal LOC seems to have a greater influence on job performance such that if it is well regulated, the impact of external LOC on job performance will be of little significance and hence, may have little effect on job outcomes. Moreover, given the high technical and practical nature of the engineering tasks and assignments that demand a lot of self-efficacy, personal choices, it would be assumed that internal LOC remains at the heart of engineering work. However, the reliance of engineering work on work-related specifications, institutional regulations and safety procedures means that these environmental factors may mediate the internal LOC-performance relationship. Overall, however, this study contends that internal locus of control has more dominance on job performance at the operational levels (engineers) while both internal and external locus of control becomes more dominant at middle (i.e. middle managers) and senior management (i.e. Eskom Board and Top Management) levels given their higher interaction with the external environment than the lower levels. Without LOC, organisational employees such as leaders will be more limited in their ability to improve organizational performance.

Methodology

The research followed a quantitative, cross-sectional and descriptive research design. A cross sectional, survey design allows the researcher to compare many different variables at the same time (Zikmund *et al.*, 2013:396) to provide a broader picture of the phenomenon under study at that time. The data collected related to the engineering workforce' (engineers, technologists and technicians) internal and external LOC and

job performance indicators. A survey ideally meets the researchers' intentions to identify and examine general patterns in a society without having to deal with the whole population (Curtis and Curtis, 2011). Since the engineering workforce comprised a small group of professionals whose size was known, sampling was considered unnecessary. This largely because probability sampling works well when a large sample size is involved and the intention of researcher is to make some generalisations about the characteristics and nature of the population based on the sample traits. On the contrary, non-probability sampling works well when the sample size is too small to allow for logical generalisations about the population based on the sample.

In the case of this study, the sample was neither too large to allow for broader generalisations beyond the scope of the organisations under study (drawing on simple random sampling) nor too small enough to apply non-probability sampling techniques. For this reason, all sample elements were considered in this study drawing on a census. Just like convenience sampling, a census is appropriate in exploratory research where the researcher is interested in securing inexpensive and quick narrative on the nature of phenomenon and approximation to the truth (Maree & Pietersen, 2016). A census was also appropriate for this study because it was economical in terms of time (as all researchers were full time university employees) and in terms of finance. That said, the challenge of a census is its extent of generalisation due to the small sample size.

Research Instrument

The structured questionnaire was an adapted version of Rotter's LOC Scale questionnaire. The questionnaire was validated for reliability using Cronbach's alpha coefficient. The Cronbach's alpha coefficient for internal LOC was 0.706 and that for external LOC was 0.434. The Cronbach's alpha coefficient for locus of control (overall) was 0.688. Based on Kumar (2011:196), these statistics demonstrate that questionnaire items were reliable. The averages and percentages of the internal LOC and overall locus of control variables were calculated. The means and mean percentages of each of the items are presented in Table 2. The mean percentages of internal LOC and overall locus of control are 77.88% and 69.11% respectively. These measures are all high and above

50%. This means that most these engineers identify highly with LOC locus of control.

Table 2: Descriptive statistics.

Variables	Mean	Mean %
Internal Locus of control	58.41	77.88
Locus of control (overall)	76.02	69.11

Target Population

Eskom Bloemfontein is a distribution head office for the Free State Operating Unit. Nationally, there are 8 other distribution operating units, one for each province and each with its own head office. Eskom Bloemfontein was chosen as it exemplifies an organisation under siege at the time of the investigation. This organisation, just like other distribution centres, exhibited multiple symptoms of organisational dysfunctions and complexities which could be associated with poor self-leadership and weak internal locus of control. These were inter alia: 1) continued blackouts due to the failure to make appropriate projections about electricity demand, 2) cost overruns because of delays in completion of / electrification/infrastructural projects and, 3) poor electricity distribution across residential areas, which resulted in electricity theft.

Eskom Bloemfontein Human Resources department had a total population of 134 full-time engineering personnel comprising 30 full-time graduate engineers, 34 technologists and 70 technicians. The distribution Free State operating unit also has various offices, for example, the Customer Network Centre whose staff (especially technicians and support staff) deals with line maintenance and fault fixing. The Control Plant offices oversee the control devices and safety settings of Eskom's hardware and this work is executed by technologists and support staff. Lastly, the Hubs are contact offices for customers to open accounts and log queries etc. Though as it may, the Head Offices normally contain the highest concentration of engineers. Given the uniformity of services offered by the operating units and distribution centres, the challenges they experienced were similar notwithstanding the

variations in their resource base and contextual circumstances. However, urban distribution centres and operating units tended to encounter higher public pressure on their services and high demand for electricity from diverse consumers comprising manufacturing and mining companies, retailers, agro-processers, city dwellers, and informal settlements.

Given the small size of the target population, census was considered. A census is considered appropriate when the entire population is very small or it is unreasonable to include the entire population. The census, therefore, seeks to include every unit of the population available (Grim *et al*., 2010) to increase the level of validity of results even though the extent of generalisation about the population is a problem. Of the 134-engineering workforce, there were (i) 30 full-time graduate engineers, (ii) 34 technologists; and (iii) 70 technicians. And of the 107 employees who successfully completed the questionnaire, there were 29 graduate engineers, 28 technologists and 50 technicians, thus representing 80% of the target population.

Findings

Since the study employed an adapted version of Rotters' LOC Scale questionnaire, the researchers sought to determine if their adapted instrument will have the same dimensions as the predetermined version. The results of the exploratory factor analysis demonstrate that the extent of validity of internal locus of control items ranged from acceptable (0.328, 0.317, 0372), satisfactory (0.411, 4.408, 0.538, 0.513; and very satisfactory (0.618, 0.668, 0.675, 0.675), except for three items (0.199, 0.270, 0.188) (See Table 4). Apart from one item that was unacceptable (0.131), the rest of external locus of control items ranged from satisfactory (0.441, 0.445, 0.475, 0.512) to very satisfactory (0.646, 0.614) (see Table 5). The data analysis involved descriptive analysis and inferential statistics. Descriptive statistics comprising frequencies, measures of central tendency (the mean) and measures of variation (standard deviation and percentage analysis) were used to summarise the responses to the survey questions. According to Neuman (2011:386) descriptive statistics provide a summary of the main features of a set of data collected from a sample of participants. Inferential statistics such as Spearman's rho correlation coefficient and Regression equations were also used to test the influence of locus of control on job performance.

According to Gray (2007:335), inferential statistics enable a researcher to make appropriate inferences from descriptions, in order to decide whether the descriptions can also be applied to the population from which the sample is drawn. The study sought to establish whether descriptions on the relationship between LOC and performance could be generalised to engineers in other engineering environments.

The analyses of demographic factors focused on age, gender, marital status, level of education, ethnic background, and rank in occupational hierarchy and years of experience. The first demographic which is the gender of the respondents on Table 3 illustrates that a majority (55.14%) of the respondents were male, whilst (44.86%) were female. The moderate dominance of males over females could be attributed to the higher levels of exposure and participation of males in Science, Technology, Engineering and Mathematics (STEM) subjects at high school and university compared to their female counterparts.

Table 3: Demographic information.

Demographic information	Category	Frequency	Percentage
Gender	Female	48	44.86%
	Male	59	55.14%
Age Group	21 - 30 Years	41	38.32%
	31 - 40 Years	32	29.91%
	41 Years & above	34	31.78%
Ethnicity	Black Africans	70	65.42%
	White	29	27.36%
	Indian & Others	8	7.55%
Marital Status*	Single	44	41.12%
	Married	63	58.88%
Educational Level	Matric & Certificate	9	8.41%
	Diploma	33	30.84%
	Honours	21	19.63%
	Masters	14	13.08%
	Others	30	28.04%

Engineers Hierarchy	Technicians	50	46.73%
	Technologist	28	26.17%
	Graduate Engineer	29	27.10%
Years of experience on the job	0 - 5 Years	27	25.23%
	6 - 10 Years	28	26.17%
	11 - 15 Years	24	22.43%
	Over 15 Years	28	26.17%

* - combined Never married, Divorced/separated and widowed and named it Single. This is for more plausible comparability for marital status groups

The second demographic is the age of the respondents on Table 3 shows that there is a moderate balance in the three age groups of Eskom's engineering work force, which comprises technicians, technologists and engineers. About 38.3% of this engineering work force is a youthful population aged between 21-30 years, and this group is followed by the 41 and above age group, which comprises (31.78%). The 31-40 group has the lowest percentage (29.91%-32). It can be inferred from these demographics that, while there is a balanced representation of various age groups in the engineering workforce at Eskom, Bloemfontein, all the respondents belonged the economically active population. The third demographic which is the ethnicity background of respondents on Table 3 demonstrate that 65.42% of the respondents were black Africans, 27.36% were white, and 7.55% were Indians and other minority groups. A synopsis of these results shows that Eskom had more black African technicians, technologists and engineers than any other race at the time of the study.

The fourth demographic on Table 3 is the educational level of respondents which illustrate a variety of qualifications across the sample. A sizable number 30.84% of the respondents had diplomas, 28.04% have other qualifications, while 19.63% have honours degrees and a further (13.04%-14) have master's degrees. This finding coheres with the recruitment and appointment regulations for lower jobs at Eskom, where although having a higher qualification is considered desirable, the successful performance of many lower technical occupations may not necessarily require postgraduate qualifications. The demographic information under the engineering hierarchy of Eskom workforce in Table 3 illustrates that 46.73% of the respondents are technicians, with 27.10% being graduate engineers and small percentage 26.17% are

technologists. Since becoming an engineer requires a university engineering degree, while appointment as a technician or technologist requires a lower qualification, it is clear that lower educational attainments (certificates and diplomas) are less intellectually demanding than a degree in engineering.

Internal locus of control

This section establishes whether respondents had internal LOC or external LOC to address the research question on the main components of internal and external LOC of Eskom engineers. Results in Table 4 reveal an average of 98.11% of the respondents have the power to determine the attitude they want to display at work and 93.46% of respondents agree that their work life is determined by their own actions at work. A total of 91.59% have a big role in shaping the events which influence their work life and 90.65% work hard to develop their knowledge, skills and abilities. Furthermore, 87.85% value a participative management style, and 86.92% emphasise striving for achievement. All these findings point to a very strong sense of internal LOC.

Table 4: Internal Locus of Control

Internal locus of control		Frequency distribution						Descriptive		Latent factor
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Agree/Strongly agree	Mean	Standard deviation	Factor loading
Can certainly determine what will happen in my work environment.	n	2	9	41	32	23	51.40%	3.61	0.98	0.328
	%	1.87%	8.41%	38.32%	29.91%	21.50%				
Have a big role in shaping events which influence my work life.	n	0	1	8	56	42	91.59%	4.30	0.65	0.317
	%	0.00%	0.93%	7.48%	52.34%	39.25%				

Have the power to determine the attitude I want to display at work.	n	1	0	1	45	59	98.11%	4.52	0.62	0.675
	%	0.94%	0.00%	0.94%	42.45%	55.66%				
Work life is determined by own action.	n	1	1	5	47	53	93.46%	4.40	0.71	0.668
	%	0.93%	0.93%	4.67%	43.93%	49.53%				
Strong connection between work based actions and consequences.	n	1	3	15	50	38	82.24%	4.13	0.83	0.513
	%	0.93%	2.80%	14.02%	46.73%	35.51%				
People who perform their job well deserve to be rewarded.	n	13	17	21	30	26	52.34%	3.36	1.33	0.411
	%	12.15%	15.89%	19.63%	28.04%	24.30%				
Conceive supervisors in high regards.	n	9	25	29	30	14	41.12%	3.14	1.17	0.372
	%	8.41%	23.36%	27.10%	28.04%	13.08%				
Value participative management style.	n	1	0	12	49	45	87.85%	4.28	0.74	0.618
	%	0.93%	0.00%	11.21%	45.79%	42.06%				
Have autonomy and control of work activities.	n	2	4	16	53	31	79.25%	4.01	0.88	0.535
	%	1.89%	3.77%	15.09%	50.00%	29.25%				
More likely to experience work stress.	n	14	28	31	23	11	31.78%	2.90	1.19	0.199
	%	13.08%	26.17%	28.97%	21.50%	10.28%				
Generally satisfied with my job.	n	3	4	21	43	36	73.83%	3.98	0.97	0.351
	%	2.80%	3.74%	19.63%	40.19%	33.64%				
Works hard to develop knowledge, skills and abilities.	n	2	2	6	45	52	90.65%	4.34	0.82	0.675
	%	1.87%	1.87%	5.61%	42.06%	48.60%				
Believes positive affirmation from previous experiences results from attitude.	n	4	6	35	40	22	57.94%	3.65	0.99	0.270
	%	3.74%	5.61%	32.71%	37.38%	20.56%				
Have lower levels of job stress if performance is better.	n	4	14	21	39	28	63.21%	3.69	1.12	0.188
	%	3.77%	13.21%	19.81%	36.79%	26.42%				
Emphasizes striving for achievement.	n	1	3	10	51	42	86.92%	4.21	0.80	0.408
	%	0.93%	2.80%	9.35%	47.66%	39.25%				

External locus of control

Table 5 illustrates that a majority (68.22%) of the engineering work force agree that the general work climate (e.g. work rules, procedures) tends to control their actions at work. A total of 40.19% of the engineering work force agree that they see the external environment influencing and controlling their actions at work, while 27.1% of them agree that their attitude towards work is shaped more by financial incentives. About 13.21% of the engineering work force depend on their peers to get the job done more than they do it themselves and 13.08% depend on their supervisor for direction and guidance than they depend on themselves. While these issues demonstrate the operation of external LOC, they also signify a moderately high expression of worker dependence on external LOC.

Table 5: External locus of control

External locus of control		Frequency distribution						Descriptive		Latent factor
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Agree/Strongly agree	Mean	Standard deviation	Factor loading
External environment influences my actions at work.	n	7	24	33	27	16	40.19%	3.20	1.14	0.512
	%	6.54%	22.43%	30.84%	25.23%	14.95%				
Depends on peers to get job done more.	n	52	25	15	6	8	13.21%	1.99	1.25	0.475
	%	49.06%	23.58%	14.15%	5.66%	7.55%				
Work climate tends to control my actions at work.	n	3	9	22	43	30	68.22%	3.82	1.03	0.131
	%	2.80%	8.41%	20.56%	40.19%	28.04%				
Depends on supervisor for direction and guidance.	n	43	36	14	7	7	13.08%	2.06	1.18	0.646
	%	40.19%	33.64%	13.08%	6.54%	6.54%				
Attitude towards work is shaped by financial incentives.	n	17	28	33	20	9	27.10%	2.78	1.18	0.445
	%	15.89%	26.17%	30.84%	18.69%	8.41%				
Struggles to work independently without peers.	n	57	36	11	1	1	1.89%	1.74	1.44	0.441
	%	53.27%	33.96%	10.38%	0.94%	0.94%				

Attributes success at work to external forces.	n	35	41	22	7	2	8.41%	2.07	0.98	0.614
	%	32.71%	38.32%	20.56%	6.54%	1.87%				

Influence of locus of control on job performance

This section assesses the influence of LOC of Eskom engineering workforce on job performance in their working environment. The relationship was determined through a consideration of question items' mean and standard deviations followed by the conduct of correlations analysis. Table 6 presents the influence of locus of control on job performance. A total of 96.23% agree that having self-confidence when performing tasks has assisted them accomplish tasks on their own, while 96.26% agree that cooperating with others in the organisation help to get tasks accomplished successfully. About 95.33% of the respondents agree that having self-confidence has helped them accomplish tasks with less supervision. Furthermore, 95.28% agree that making the effort improves the capabilities of employees on the job while 94.39% agree that they take note of information that can be used to create positive outcomes in the future. A total of 91.59% agree that being inquisitive and trying to figure out why things turned out the way they did helps them accomplish tasks successfully while 90.65% agree that engaging in activities that will improve their work situation has made job completion more rewarding.

Table 6: Influence of locus of control on job performance

Influence of locus of control on job performance		**Frequency distribution**						**Descriptive**		**Latent factor**
		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Agree/Strongly agree**	**Mean**	**Standard deviation**	**Factor loading**
Takes note of information that can be used to create positive outcome.	n	0	1	5	58	43	94.39%	4.34	0.61	0.656
	%	0.00%	0.93%	4.67%	54.21%	40.19%				
Self-confidence	n	0	1	3	52	50	96.23%	4.42	0.60	0.727

assists me to accomplish tasks on my own.	%	0.00%	0.94%	2.83%	49.06%	47.17%				
Self-confidence assists me to accomplish tasks with less supervision.	n	0	0	5	53	49	95.33%	4.41	0.58	0.755
	%	0.00%	0.00%	4.67%	49.53%	45.79%				
Making effort improves capabilities of employees.	n	0	1	4	57	44	95.28%	4.36	0.60	0.602
	%	0.00%	0.94%	3.77%	53.77%	41.51%				
Being inquisitive helps to accomplish tasks successfully.	n	1	1	7	51	47	91.59%	4.33	0.72	0.674
	%	0.93%	0.93%	6.54%	47.66%	43.93%				
Engaging in activities that help my work situation has made job completion rewarding.	n	2	0	8	59	38	90.65%	4.22	0.74	0.648
	%	1.87%	0.00%	7.48%	55.14%	35.51%				
Performing well at work leads to positive outcomes.	n	13	16	27	20	31	47.66%	3.37	1.36	0.226
	%	12.15%	14.95%	25.23%	18.69%	28.97%				
Have a great deal of influence on the achievements of my department.	n	0	1	19	50	37	81.31%	4.15	0.74	0.429
	%	0.00%	0.93%	17.76%	46.73%	34.58%				
I volunteer to carry out task activities that are not part of my job.	n	2	3	14	53	35	82.24%	4.08	0.86	0.330
	%	1.87%	2.80%	13.08%	49.53%	32.71%				
Cooperating with others in the	n	0	0	4	37	66	96.26%	4.58	0.57	0.596

organisation helps to get tasks done successfully.	%	0.00%	0.00%	3.74%	34.58%	61.68%				

The second level of analysis involved performing a correlation test to determine the influence of LOC on job performance. Since the LOC variables are not normally distributed, the Spearman's rho correlation coefficient was used. This correlation test determine whether or not there is a relationship between LOC and each of the performance statements. On one hand, if there is a positive relationship between the 2 variables, the correlation coefficient will be positive and it will range between 0 and 1. The closer the value is to 1, the stronger the relationship between the 2 values. On the other hand, if there is a negative relationship, the correlation coefficient will be negative and it will range between -1 and 0. The closer the value is to -1 the stronger the negative relationship between the 2 values. For interpretations and conclusions on whether the two variables are correlated, the p-value is used. The p-value is compared to a significance level of 0.1. If the p-value is less than 0.1 we conclude that a significant relationship exists between the variables, whereas if it is greater than 0.1, then there is no significant relationship between the variables. A discussion of each of the relationships between locus of control and job performance (visualising performance) statements in Table 7.

The results show that internal LOC is positively related with the visualising performance statements and the correlation coefficients range from 0.363 to 0.474. All 5 correlations coefficients are statistically significant, thus indicating that there are significant relationships between LOC and each of the visualising job performance statements. Previous studies investigating the relationship between LOC and job performance showed a modest but significant relationship between locus of control and job performance (Asgari & Vakiri, 2012:2556; Muhonen & Torkelson, 2004:21; Thomas et al., 2006:107). These results also cohere with those of Ekman and Hoff (2011:28) in which they found support for an association between imagination to picture oneself performing well on important tasks and LOC. The findings on positive significant correlation between LOC and visualising successful performance is rejected by Ziemkiewicz et al., (2012) in their study of how visualisation layout relates to locus of control and other personality factors. They demonstrate that there is indeed a correlation between the two, arguing

that participants with an internal LOC perform more poorly with visualisations that employ a containment metaphor, while those with an external locus of control perform well with such visualisations. These results provide evidence for the externalisation theory of visualisation. The results in Table 8 highlight that LOC has a positive impact on job performance. The coefficient, 0.157, means that an improvement on locus of control by 1% leads to a 15.7% increase in job performance. R squared is 0.162, which means that about 16.2% of the variation in job performance is explained by LOC. This is supported by Asiedu-Appiah and Addai's study (2014:53) whose regression analysis examined the existence of a link between employees' LOC and contextual performance measures.

Table 7: Correlation coefficients between performance and locus of control

Variables		I use my imagination to picture myself performing well on important tasks.	I visualise myself successfully performing a task before I do it.	Sometimes I picture in my mind a successful performance before I actually do a task.	I purposefully visualise myself overcoming the challenges I face.	I often mentally rehearse the way I plan to deal with a challenge before I actually face the challenge.
Locus of control						
Internal locus of control	Coefficient	0.423	0.474	0.473	0.363	0.369
	P-value	0.000	0.000	0.000	0.000	0.000
Locus of control	Coefficient	0.298	0.397	0.363	0.278	0.288
	P-value	0.002	0.000	0.000	0.004	0.003

Table 8: Regression results

Dependent variable: Performance	**Unstandardized**		**t-statistic**	**p-value**
	Coefficients	**Std. Error**		
Intercept	8.683	2.675	3.246	0.002
Locus of control	0.157	0.035	4.499	0.000
R Square	0.162			

The analysis revealed a very significant relationship between employees' LOC and contextual performance. A regression coefficient of 0.407 was obtained at a significance level of 0.000. This implies that the relationship between LOC and contextual performance, is very significant even though it is not very strong. The same study also concluded that employees with higher internal LOC have higher contextual performance ratings than employees with external LOC.

In terms of sample demographics, four main findings were apparent, namely, the moderate dominance of male engineering workforce at the expense of females, the prevalence of an economically active population, the dominance of the black racial group and variations in the academic attainments of the engineering workforce. The dominance of males in the engineering profession at the expense of females seems to mirror the lower success rate of females' tertiary students enrolled for Science, Technology, Engineering and Mathematics. This under-representation of women in the engineering profession further buttress Women in Construction's (2017) concern about the lower graduation rates of women in engineering, which remain below 20% in many African countries leading to fewer women being employed in engineering, construction and technical professions (Women in Construction, 2017). This female under-representation is further supported by Construction Industry Development Board (CIDB) (2016) statistics, which highlights that South African women constitute only 6% of the workforce of the engineering sector.

The dominance of the economically active population in the study sample seems to buttress the view that the engineering sector requires young and active employ due to its highly technical, manual and energy exhaustive character (Modise, 2015). More importantly, the prevalence of the economically active population in the engineering profession reflects the expansive population structure of South Africa, which is dominated by moderately youthful groups. This scenario is buttressed by the 2014 Ministerial Conference on Youth Employment's South Africa Country Report, which highlights the youthful nature of this nation and that almost 67% of the population comprises young people and a third of the working age population is composed of the youth.

The dominance of the black racial group in the Eskom engineering workforce seems to mirror the national reality that the black population constitutes the majority (black Africans constitute 80.5%) of the national population. This finding resonates with earlier studies that highlight that

the South African labour market normally employs economically active groups (Malo, 2015; Mosweunyane, 2016). That said, the sample demographics of the Eskom engineering workforce is somewhat inconsistent with the national demographic profile, which locates the coloured population at 8.8% and whites at 8.3% (South African National Census 2011). The study also reported some sharp variations in the academic attainments of the engineering workforce at Eskom. This finding coheres with the recruitment and appointment regulations for lower jobs at Eskom, where although having a higher qualification is considered desirable for appointments, the successful performance of many lower technical occupations may not necessarily require postgraduate qualifications. The statistics reveal that the majority (79%) of employees in the engineering divisions at Eskom, Bloemfontein, do not have postgraduate and Master's degrees.

Consistent with the focus of the study, the components of locus of control that affected engineering workforce at Eskom namely, internal locus of control and external locus of control, were examined. The mean percentage for internal locus of control was 77.88%, demonstrating that the engineering personnel at Eskom in Bloemfontein generally exhibited a high level of internal locus of control, judging from their positive work-oriented experiences and their capacity to control situations relating to the job itself and the general work environment. Such a strong positive orientation towards work and the general work environment resonates with Asiedu-Appiah and Addai's (2014:53) findings on Kumasi Centre for Collaborative Research (KCCR) employees in which 85.72% of respondents were reported to possess internal locus of control. All the averages for the internal locus of control tested were above 50%, which indicates a positive correlation with locus of control. The positive identification with locus of control seem to cohere with Mali's (2013:149) findings on the positive impact of locus of control on the job performance in an organisation. The positive orientation towards work life of engineering workforce at Eskom concurs with Thomas et al.'s (2006) study on locus of control, which reports that individuals who have the internal locus of control, think that they have a big role in affecting the events which influence their work lives.

Table 5 shows the 40.19% of engineering workforce considered the external environment as influencing and controlling their actions at work. This sizable amount of external locus of control suggests that some engineering workforce at Eskom Bloemfontein lacked the capacity and

capability to determine their work-related and work environment-related outcomes. These findings mirror Rana et al. (2011) findings on the effects of locus of control on learning performance, which highlighted that individuals who have high external locus of control display unsteady performance. However, the reality that these employees were in the minority is consistent with findings on the high internal locus of control reported in the previous section. The results in Table 6 demonstrate that locus of control of Eskom engineers positively influences their job performance. This finding on the positive impact of internal locus of control on engineers' job performance mirror Keller's (2012) claim that scientists and engineers' internal locus of control predicted their production of patents and publications five years later, and self-esteem predicted performance ratings for patents. Several studies affirm that individuals with internal locus of control exert greater effort on the job and are subsequently better performers than individuals with external locus of control (Asgari & Vakiri, 2012:2556; Muhonen & Torkelson, 2004:21; Thomas *et al*., 2006:107). For instance, it has been established that internal locus of control is related to various important work outcomes including job satisfaction and job performance (Thomas *et al*., 2006:107). The exercise of external of locus of control could be a consequence of the leadership dynamics and the amount of free reign Eskom engineers are rendered during the performance of their work. On the contrary, an authoritarian leadership style impedes middle and operational level managers' capacity to take charge of their work environment, complicating the connection of the effort spent on tasks to job performance. This would lead them to attribute performance to external circumstances.

However, if engineers enjoy a great deal of autonomy on their job, they will be more inclined to conceive the direct consonance of their individual effort and job performance (Rambe & Modise, 2016). Researchers have also found that individuals with an internal work locus of control, generally have greater control of the work environment, perform better due to their control of outcomes and have lower levels of job stress (Chen & Silverthorne, 2008:572). Furthermore, other authors have reported a strong relationship between perceived work control and certain job-related factors such as job satisfaction and emotional distress (Wang et al., 2010:761). Our intuition, therefore, is that the more locus of control Eskom engineers have on their work, the higher the chances of

their satisfaction on the job and the more they would attribute their success to individual and collective effort.

Conclusions and Implications

The first study conducted by Rambe and Modise (2016) noted that overall, South African [electricity] business climate reels under a chronic ill of lack of strong leadership and internal locus of control among employers and employees and Eskom was presented as an incarnation of an organisation under siege. The study appreciated the many strong points' in Eskom such as its sophisticated electricity supply infrastructure, strong market presence, firm and surging customer base and strong extractive capacity. However, the study was quick to caution that these leverage points were juxtaposed by impediments such as ageing infrastructure that needs replacements, refurbishments or repairs, monopolistic tendencies of Eskom, limited internationalisation of electricity generation business operations (apart from electricity "exports") and failure to externalise risk by diversifying energy supplies. While some of these challenges were of a mechanical, strategic and marketing, their resolution demanded strong electricity supply leadership and strong locus of control within Eskom, which the public utility, do not seem to exhibit or sustain persistently. As such, the theoretical investigation examined literature on self-leadership and locus of control as they relate to job performance and postulated that an integration of these concepts would leverage the job performance. It was proposed that the possession of a strong psychological orientation, behaviour focused strategy and constructive thought patterns including internal locus of control would interact to positively affect job performance.

The current study sought to investigate the relationship between internal and external locus of control on the job performance of engineers at Eskom Bloemfontein. The stress-related situations and the high problem-solving environments, including the risks that engineers are exposed to in their engineering work on a continual basis implies that engineers are increasing required to have internal locus of control over and above the possession of skills relevant to their profession. For this reason, the extent to which they demonstrate internal locus of control over and above their responses to external locus of control, and their implications for job performance cannot be take for granted. The study established that even though engineers displayed considerable internal

locus of control, a sizable number (around 40%) demonstrated the possession of external locus of control. The prevalence of external locus of control meant that many engineers (i.e. almost half of them) struggled to work independently and to carve work-related destinies insulated from external environmental circumstances and supervisory influence. This finding is critical to Eskom Bloemfontein's establishment of interventions within the work environment that would be conducive to the deepening of internal locus of control and the elimination of frustrations emerging from the work environment and leadership. These interventions would be critical to improved work performance of engineers.

The results of the study suggest that respondents understood the concept of locus of control. The fact that slightly over 40% of respondents of engineers were reported to have external locus of control, implies that future studies may need to examine the effectiveness of interventions that Eskom institute to instil internal locus of control among these employees. More so, the fact that a sizable number of the engineering workforce (40.19%) see the external environment as influencing and controlling their actions at work implies that this workforce lacks the capacity and capability to determine their work-related and work environment-related outcomes. The moderate dominance of external locus of control can be detrimental to job performance as employees would attribute their successful work performance to chance and external circumstances and not their personal effort and task efficacy. Such variations in locus of control among the engineers seems to suggest that developing a work culture that attracts employees with a high locus of control can result in the organisational wide assimilation of locus of control. Human resource recruitment policies at Eskom should, therefore, focus on locus of control considerations to inculcate internal locus of control among employees. High performers with internal locus of control can also be used as role models across departments to ensure a wider rollout of a high locus of control culture. Future research can examine the effect of role models' task behaviours on the assimilation of internal locus of control among these employees without such qualities.

Successful performance of engineering programmes and projects requires change not only in the way in which engineering education prepares students for professional practice, but rather change in the work philosophy and culture of leadership at all levels to ensure all employees'

socialisation into leadership repertoires, internalisation of a strong internal locus of control, a strong work ethic and their practical manifestations at all organisational levels. Future research could examine the effectiveness of mechanisms Eskom has put in place promote a deep work ethic and a sense of personal ownership among its engineering employees. Although the findings of this study are generalisable to the entire Eskom Bloemfontein engineering workforce as a representative sample (comprising a total sample of 107 respondents out of a total of 134 respondents) was drawn upon, these findings may not represent the (i.e. LC, and job performance) of Eskom employees nationwide. In the absence of studies that examined the influence of locus of control on job performance, the generalisation of this study to the Eskom workforce across South Africa, therefore, is limited. However, since a response rate of 50% is a minimum threshold for making generalisations about the population examined, the response rate of 79.8% generated in this study was conceived as sufficient for detailed statistical analysis. The study employed a quantitative research approach to explore the influence locus of control on job performance. While robust correlation and regression analyses have goodness of fit with regard to unravelling of the links between relationships and the predictive effect of independent variables (i.e. internal and external locus of control) on dependent (i.e. job performance) variables, they have limited explanatory power. For instance, they do not inform the researcher why the influence between variables are the way they are, hence there is a need to complement such analysis with qualitative research and analyses approaches.

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