

# The use of engineering ethics for the betterment of service delivery: The case of Ingquza hill and Elundini local municipalities

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## ABSTRACT

Service delivery is the core function of municipalities and the forefront of this function, are municipal engineers. Municipal engineers are not only tasked with providing services according to set standards but have to also balance this with public perception since this sector is highly publicized due to previous corrupt practices which have compromised the integrity of municipal engineering. It seeks to determine the linkage between engineering ethics and the quality of service delivery provided, thus determining whether the use of engineering ethics can be a driver for better service delivery. The research aims to establish how the application of the principles of ethics can impact services provided by the two municipalities that the study will be focusing on. The study was conducted in Ingquza Hill and Elundini Municipality as the case study environments. During the pilot study, personnel in the civil engineering discipline, identified in the organogram were interviewed. Findings established that honesty and integrity were the leading concerns for municipal engineers and political influence was a key concern that impacted decision making. The main study will be conducted using professional service providers working for the case study municipalities. The tool is aimed at easing decision making thus yielding better engineering judgment and improving service delivery.

**Keywords:** engineering ethics, code of conduct, service delivery, municipal engineering

## 1. INTRODUCTION

Communities perceive the quality of service delivery by municipalities to be poor, which leads to unrest and service delivery protests, however this can be improved through the proper application of engineering ethics. There has been public dissatisfaction over the quality of

infrastructure services provided by municipalities [1]. The technical factors contributing to quality such as design, poor application of standards, procurement and construction factors have been explored without necessarily providing a solution to the quality issue, as evidenced by the CIDB (2009) study on

**Table 1.** Study participants

Site reference	Number of eligible participants	Number of participants who partook in study
Ingquza Hill LM	11	11
Elundini LM	10	9
Average Participants per site		10

**Table 2.** Age frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30-39 years	13	65.0	65.0	65.0
	40 - 49 years	1	5.0	5.0	70.0
	50-59 years	3	15.0	15.0	85.0
	60 and older	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

**Table 3.** Gender frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	17	85.0	85.0	85.0
	Female	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

**Table 4.** Gender cross tabulation

		Name of municipality		Total
		Ingquza Hill	Elundini	
Gender	Male	9	8	17
	Female	2	1	3
Total		11	9	20

quality titled "Construction Quality in South Africa : A client perspective"[2].

The research seeks to determine whether there is a linkage between engineering ethics and the quality of service delivery provided, thus determining whether the use of engineering ethics can be a driver for better quality in service delivery. It also sought to distinguish between engineering judgment and moral judgment. The ECSA (2006) code of conduct for registered persons was used as a key document in defining key terms particularly in the South African Context [3].

Once the conceptual framework was established, the researcher then looked at various research conducted in the area of service delivery and the impact of corrupt practices in the South African public service [4]. The researcher then explored the legislative framework governing decision making in the local sphere of governance.

A review of ethical decision making models was undertaken. This was followed by a deeper look at ethical considerations as identified in the Guidelines for Professional Conduct for Civil Engineers issued by ASCE (2008) [5].

## 2. METHOD AND MATERIAL

The research is experimental in nature. The study made use of the pragmatic approach to research.

### 2.1. Research Environment

The setting of the research is within the local governance sphere, particularly focused on two

local municipalities within the Eastern Cape which have been identified for the case study. It draws attention on experiences within the Ingquza Hill Local Municipality and Elundini Municipality as application environments for engineering ethics within public service.

### 2.2. Research Design

**Table 5.** Population frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	African Black	19	95.0	95.0	95.0
	White	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

**Table 6.** Religion frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Catholic	6	30.0	30.0	30.0
	Protestant	5	25.0	25.0	55.0
	Evangelical	1	5.0	5.0	60.0
	Other	7	35.0	35.0	95.0
	Non Adherent to any religion	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

**Table 7.** Importance of religion frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very High importance	5	25.0	25.0	25.0
	High importance	5	25.0	25.0	50.0
	Moderate importance	9	45.0	45.0	95.0
	No importance	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

**Table 8.** Years of experience frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	5	25.0	25.0	25.0
	Between 1 and 5 years	5	25.0	25.0	50.0
	Between 6 and 10 years	6	30.0	30.0	80.0
	More than 10 years	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

**Table 9.** Qualification frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Lower than matric	1	5	5	5
Certificate	5	25	25	30
Diploma / Degree	13	65	65	95
Post graduate Diploma	1	5	5	100
Total	20	100	100	

**Table 10.** Professional affiliation frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ECSCA	4	20.0	44.4	44.4
	SAICE	1	5.0	11.1	55.6
	Both of ECSCA and SAICE	3	15.0	33.3	88.9
	Other	1	5.0	11.1	100.0
	Total	9	45.0	100.0	
Missing	System	11	55.0		
Total		20	100.0		

**Table 11.** ECSCA Category of registration cross tabulation

		Name of municipality		Total
		Ingquza Hill	Elundini	
ECSCA category of registration	None	8	6	14
	Candidate technician	2	2	4
	Professional Engineering Technologist	1	1	2
Total		11	9	20

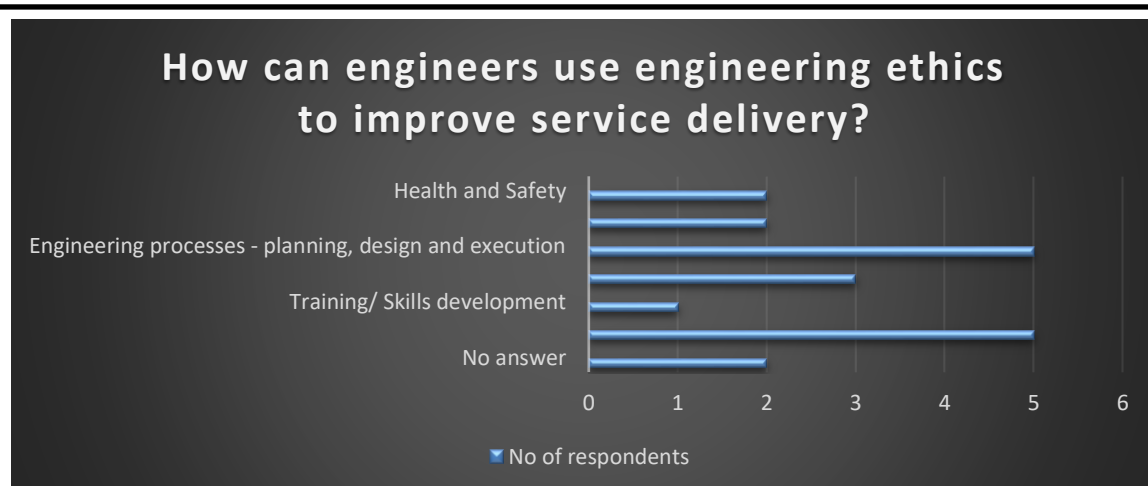
The research methodology incorporated a desktop review on literature as well as made use of structured interviews in the form questionnaires to provide an analytical experience of the concept under investigation so as to provide a more practical outcome to the research question. A pilot study was conducted to determine the feasibility of the study protocol and also to conclude on preliminary findings relevant to the desired study outcomes.

### 2.3. Data Collection

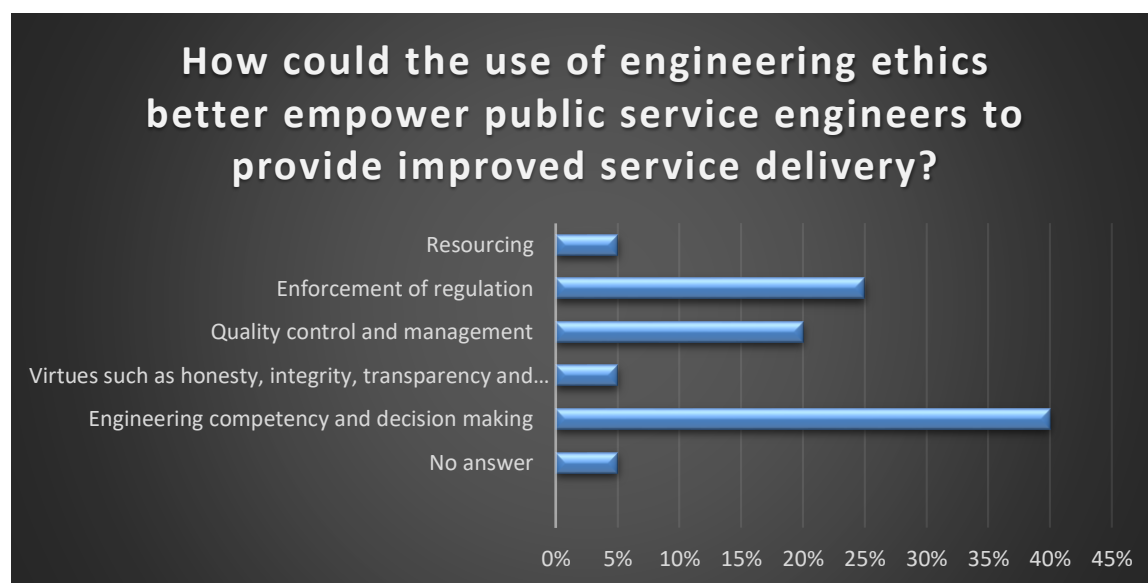
The sample for the pilot study was structured. The participants were taken from the municipal organogram of the case study municipalities and

was only limited to senior and middle management as defined in the institutional organisational structure. The entire population available from the filled positions of all senior and middle managers was interviewed, totalling to 21 participants being identified as detailed in the table below.

Questionnaires were distributed in face to face structured interviews were used as the primary method for data collection for the pilot study. The questionnaires comprised of three sections. This first section related to demographic data, the second consisted of study variables regarding the ethical decision making ranked on a Likert scale



**Figure 1.** Response for improving service delivery using engineering ethics



**Figure 2.** Response for empowering public service engineers using engineering ethics

whilst the last section incorporated open ended questions. The pilot questionnaire was administered through face to face interviews with participants and the researcher asked structured questions to the participants. The researcher was able to offer clarity in the event that some questions where clarity was sought by the participants.

#### 2.4. Data analysis

Use of BMI SPSS Statistics was made for statistical analysis of the questionnaire data and responses received. Recoding and categorising of variables was undertaken prior to processing. Data processing comprised of editing and coding. Examination and correction of the data gathered was done in a systematic way to ensure accuracy and completeness. The coding process included classifying each response in a data processing format with convenient title or symbol.

Analysis was done making use of percentages, mean scores, standard deviation, Cronbach's alpha coefficient and factor loading. Descriptive and inferential statistics were used for further analysis of patterns in the data. Open-ended questions were qualitatively analysed.

Descriptive frequency statistics were used for examining the range of responses and their repeated occurrence. The inferential analysis was employed to analyse the summarised scores of responses from the interview responses.

The questionnaire from the pilot study was validated and the resulting revised questionnaire which will be used to conduct the main study.

The final research output will incorporate information drawn from case studies within the targeted municipalities as examples of how ethics can be used to better improve service delivery.

### 3. RESULTS AND DISCUSSION

The study has a high response rate since one on one interviews for the questionnaire completion were conducted, giving the researcher adequate opportunity to collect the completed questionnaires. This also minimised the waiting time required for the return of questionnaires. A total of 20 participants ended up partaking in the study. The questionnaires were validated and screened for missing answers prior to undertaking statistical analysis.

General demographic information inclusive of age, gender, employment or educational status, religious and professional affiliations was recorded on a specifically designed and standardised questionnaire to reflect a basic profile of the pilot study population.

The following information reflects the demographic frequencies for the pilot study.

Competency to do engineering work is regarded as a crucial element in the ECSA code of conduct (2006) and undertaking work that one is not

**Table 12.** Areas of ethical compromise are people within your designation most exposed as they carry out their duties

Categories	Percentage	No of respondents
Political	15%	3
Bribery and corruption	15%	3
Quality control and management	20%	4
Engineering competency and decision making	10%	2
Tender and procurement	15%	3
Conflict of interest	5%	1
Administrative or contractual	20%	4

**Table 13.** Ethical values stated in your organisation's code of conduct

Categories	Percentage	No of respondents
Honesty, Integrity, confidentiality, trustworthiness	35%	7
Fairness, justice, courtesy	20%	4
Value for money	10%	2
Administrative conduct	20%	4
Accountability	15%	3

**Table 14.** Ethical values stated in your organisation’s code of conduct that are relevant to the ethics as contained in the ECSA Code of Conduct for Registered persons.

Categories	Percentage	No of respondents
Honesty, Integrity, confidentiality, trustworthiness	20%	4
Fairness, justice, courtesy	30%	6
Public health and safety	15%	3
Transparency, openness	10%	2
Corruption and bribery	5%	1
Accountability	10%	2
Competence	10%	2

**Table 15.** The difficult ethical issues faced

Categories	Percentage	No of respondents
Political	20%	4
Quality control and management	25%	5
Engineering processes and decision making	25%	5
Corruption and bribery	10%	2
Administrative conduct	15%	3
Conflict of interest	5%	1

qualified or trained for is regarded a violation. It is with regards to the conduct of engineering personnel, but the code of conduct is however only enforced to registered persons. From the findings, it can thus be deduced that 30% of the respondents may not directly hold a relevant qualification making them eligible for registration with the regulatory body, but would need to venture into the route for recognition of prior learning so as to be able to register in any of the recognised categories of registration.

Only 35% of the population for the study population were registered with a professional body whilst 55% of the respondents did not indicate any affiliation and these can easily be categorised under “No affiliation”. 20% of the respondents indicated that they were registered with ECSA only whilst another 15% indicated they registered with both ECSA as well as with the voluntary association SAICE [6]. The remaining 10% of the respondents reflected that

they were registered with SAICE only (5%) and another professional body (reflected as SACPCMP- 5%). No other affiliations were recorded even though the questionnaire made allowance for such.

The values identified seemed consistent with those highlighted in the code of conduct, though some respondents seemed to be entirely unaware of the composition of the code of conduct for registered persons and relied on their own knowledge of other codes of conduct which may bear similarity [6].

The answers received from respondents on question 1 of the questionnaire “How can engineers use engineering ethics to improve service delivery?” were categorised into seven categories. The responses indicated the need to improve engineering processes and values such as honesty, integrity, transparency and accountability.

Engineering competency and decision making was cited as a leading (40%) area which could be used to better empower public service engineers. This was consistent with data established earlier wherein it was identified that a majority of current personnel within the case study environment did not possess the required minimum competency for practicing in engineering work, which inherently lead to a majority of them not being registered with the regulatory body. Improvement in the enforcement of regulation particularly in line with the requirements set out by ECSA was identified as the second leading (25%) solution for how engineering ethics could be used to improve service delivery in public service, but enforcement becomes a challenge when the responsible personnel are not affiliated to the regulatory body. Improvement on quality control was cited as a third area of improvement, with 20% of responses indicating such.

In the answers received from respondents on question 3 of the questionnaire "Which areas of ethical compromise are people within your designation most exposed as they carry out their duties??" a majority of the respondents indicated that administrative causes (20%) as well as quality constraints (20%). Though political interference is usually perceived as a leading cause of ethical compromise, it was recorded at 15%. This was tied with bribery and corruption and tender and procurement which also recorded responses of 15% each.

Respondents on question 3 of the questionnaire "List 3 ethical values stated in your organisation's code of conduct" identified

Honesty, integrity, confidentiality and trustworthiness as the leading (35%) ethics identified in the organisation codes of conduct for the case study municipalities with administrative conduct and fairness and justice being highlighted as number 2 with a response average of 20%.

The answers received from respondents on question 5 of the questionnaire "List 3 ethical values stated in your organisation's code of conduct that are relevant to the ethics as contained in the ECSA Code of Conduct for Registered persons." indicated that 30% identified fairness and justice as the leading common ethical value in their organisation's code of conduct which was similar to the ECSA code of conduct [7]. Honesty, integrity, confidentiality and trustworthiness was identified as the second common (20%) ethics identified in their organisational codes of conducts that was similar to the ethics as provided for in the ECSA Code of Conduct [8].

The values identified seemed consistent with those highlighted in the code of conduct, though some respondents seemed to be entirely unaware of the composition of the code of conduct for registered persons and relied on their own knowledge of other codes of conduct which may bear similarity [9].

Engineering decision making came was tied at number 1 with quality control wherein each of these categories recorded 25%. This accounted for 50% of the responses, indicating that some of the respondents did not feel that they were able to exercise ethical engineering decision making in their environments.



In the last question, participants were asked to provide general inputs regarding the use of engineering ethics and how it can be utilised for the betterment of service delivery. The following inputs were received:

- The employment of young engineers and their salaries by contractors must be regulated by the government.
- There must be strict criteria in employment of the contractors that are doing engineering works, for example the owner of the company must have a relevant qualification which would improve the quality of service delivery.
- Major special trainings must be conducted for the company who deals with the engineering project to enforce the ethics so that it does not become a burden to one individual.
- If all young growing engineers can first prioritise the engineering ethics to their field of practice, lawfully compliance to statutory bodies for all engineering practices like any other field of study e.g. doctors and lawyers.
- Presentation of short courses on engineering ethics must be made as the understanding may differ
- Engineers using engineering ethics can sometimes be seen as a setback to service delivery so this understanding would need to be shared with managers and political leadership.
- A simplified version of ethics taking into consideration even societal norms would assist because those are not always aligned.

The greediness of politicians is affecting how engineers are getting hired so the municipality needs to have its own qualified engineers.

#### **4. CONCLUSION**

By conducting the pilot study, the researcher has been able to meet key objectives that will go a long way in assisting the main study. The pilot sought to obtain preliminary data for the primary outcome measure which would inform the main study. The data collection tool has been refined for the main study and preliminary findings have been made based on the information obtained. Lack of training on engineering ethics as well as the competency of engineering personnel has been highlighted as key factors in the pilot study. In addition to this, there is also rising concern regarding political influences which may affect ethical decision making amongst personnel practising in the case study municipalities and the development of a mechanism to enable ethical decision making could provide much needed relief to the personnel within these municipalities. A tool to address the identified concerns will be formulated and tested as part of the main study to assess whether this can ease decision making thus resulting in more ethical decision making that can yield better engineering judgement, consequently improving service delivery.

#### **5. ACKNOWLEDGEMENT**

NA

#### **6. CONFLICT OF INTEREST**

The authors have declared that there is no conflict of interest.

## **7. SOURCE/S OF FUNDING**

NA

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