UNIVERSITY OF KWAZULU-NATAL

THE APPLICATION OF LEAN MANAGEMENT PRACTICES IN THE SUPPLY CHAIN UNIT OF ETHEKWINI MUNICIPALITY

By

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ABSTRACT

With a rise in irregular and wasteful expenditure, supply chain processes have been the obvious target. Delays within supply chains account for misuse of resources and poor service delivery. The eThekwini Municipality although making clear strides in addressing socioeconomic inclusion and transparency, has shown little evidence to support its contribution to a more efficient supply chain process. This is due to operational deficiencies within the supply chain management process. The purpose of this study is therefore to investigate areas of 'waste' within Ethekwini's supply chain acquisition stage where 'Lean' can be applied. This study investigates and quantifies these wasteful activities. A quantitative research methodology was used with the aid of a survey questionnaire that was targeted at project managers within the municipality using simple random sampling. The results were analysed using frequency tables from Statistical Package for Social Sciences (SPSS). Project managers, appointed by municipalities, are responsible for administration of the bid process through to award of contracts. Therefore, in order to understand the nature of operational delays, the Supply Chain Management (SCM) process is analysed using the perceptions of a sample size of 144 project managers that are key personnel in delivering these projects within time and budget. A survey was sent electronically to 160 candidates from the Human Settlements, Engineering and Transport cluster, of which 144 responded to gauge the project managers' perceptions of SCM operations within the eThekwini Municipality. The questionnaire probed the project managers' perceptions on their level of confidence in the understanding of the SCM process; communication from the SCM department; current bid documentation process; possible delays in the process and finally possible gaps in the process that are causing these delays. The results showed an obvious consensus of wastage incurred by procedural delays, resources and skills along the eThekwini Municipality's supply chain management process. Recommendations to the arising issues included employing lean tools such as Value Stream Mapping; Kaizen and KPI's along with a more efficient (electronic) system to circulate and approve documents interdepartmentally pre-bid meetings.

Table of Contents

List of Figures

Number **Description** **Page**

List of Equations

Number	Description	Page

List of Tables

Number **Description** **Page**

1. CHAPTER ONE

Introduction

1.1 Introduction

This chapter will provide an understanding of why the study was chosen and where the gap for this research was identified. It will also describe how and why the study was focused. The research questions and objectives are then detailed along with a summary of the methodology used to address the same before pointing out the limitation of the study.

1.2 Background of Study

Municipal government is the closest sphere of government to the community (ETU, n.d). A key performance indicator of a municipality is its rate of service delivery through the infrastructure projects. With a rise in irregular and wasteful expenditure, supply chain processes have been the obvious target, especially in South Africa in the recent decade. Ambe (2016) highlights the misuse of supply chain processes within South African municipalities and further illuminates the potential it has in socioeconomic development and transformation. The eThekwini Municipality has made clear strides in addressing socioeconomic inclusion and transparency however, there is little evidence to support its contribution to a more efficient supply chain process. Manda (2015) wrote of major eThekwini city projects being stalled for reasons that included delays in awarding contracts to tenderers. There is significant literature surrounding the subject of supply chain management however there is limited literature surrounding the implementation of supply chain management from the perspective of the user i.e. project managers in the case of public entities. Project managers appointed by municipalities are responsible for administration of the bid process through to award of contract. Therefore, in order to understand the nature of operational delays, the SCM process is analysed using the perceptions of the project managers that are responsible for such projects.

Vignesh et al. (2016) articulate how lean, if applied correctly, can improve quality of work and behaviour of the workforce. This study will investigate how lean management can be used through the acquisition stage of the supply chain process to improve efficiency within eThekwini Municipality in an effort towards improved service delivery by reducing time

and cost to commence service delivery. The results of this study may be used to apply similar lean supply chain methods to other municipal entities within South Africa.

1.3 Focus of the Study

This study is conducted within the eThekwini Municipality's Human Settlements, Engineering and Transport cluster. The population chosen to conduct the study on are from the non-revenue units that deal with major (>R200 000.00) infrastructure projects. To understand the delays in awarding contracts, the study focuses on the perceptions of project managers carrying municipal infrastructure projects through the competitive bidding process.

1.4 Problem Statement

The 2015 Public Sector Supply Chain Management Review (South African Government, 2016) identifies insufficient supply chain infrastructure management capacity, a result of service delivery delays that could possibly lead to deaths. Leading from this the purpose of this study is to evaluate the acquisition stage of the current supply chain management process for major projects from the perspective of Ethekwini project managers for the application of lean principles so to identify wasteful activities that can be eliminated.

1.5 Objectives

i) To quantify the percentage of participants that are dissatisfied with the current supply chain process.

ii) To identify possible wasteful activities within the acquisition stage.

iii) To quantify the possible cost of wasteful activities.

iv) To identify possible lean practices to eliminate wasteful activities.

1.6 Research Questions

i. How do participants perceive the current supply chain process within eThekwini Municipality and what percentage of them are dissatisfied with it?

ii. Where do wasteful activities occur in the acquisition stage of major projects?

iii. What is the cost related to these wasteful practices?

iv. What are the lean practices that can be applied to reduce/eliminate wasteful activities?

1.7 Methodology

This is a quantitative study. An online survey was used as a data collection tool. The survey population included the project managers of eThekwini Municipality's, Human Settlements, Engineering and Transport (HSET) cluster that manage major city infrastructure projects through the competitive bidding process. The Simple Random Sampling method was implemented in choosing participants. Respondents were recruited through an online invitation leading into a survey link which was completed anonymously. The data was then analysed using frequency tables from Statistical Package for Social Sciences (SPSS) and cross-tabulating variables of the same was used to assist in quantifying objectives II and III. SPSS was used to analyse data using descriptive statistics and address objective I. Object IV was achieved with reference to reviewed literature.

1.8 Study Contribution

The results of this study will inform changes to the current supply chain practices that will improve or shorten the procurement process thereby improving service delivery as a whole. This will guide other such government organisations in the cause and effect of each stage of their own supply chain process.

1.9 Limitations of the Study

Revenue generating units such as Electricity, Water and Sanitation and Solid Waste were excluded from this study due to access and considering the contracts put in place for these units are long term and high value which follow the bid process less frequently than smaller lower value projects.

- Procurement process for emergency contracts were not covered in this study.
- Additional delays may have not been accounted for due to the use of multiple choice set questionnaire.

1.10 Chapter Organisation

Chapter one provides a helicopter view of the study background, objectives, how the study was focused, brief methodology, the studies intended contribution to industry and the limitations that were encountered. Chapter two sets the scene for the study considering current literature surrounding how supply chain management is defined globally before addressing what public sector supply chain management entails specific to South Africa and finally links public sector supply chains to lean principles. Chapter three provides a detailed account of the research methodology used during the study. Chapter four presents the study results before analysing and discussing the results in chapter five. Conclusions and recommendations are then made in the final chapter.

1.11 Summary

The eThekwini Municipality has made clear strides in addressing socioeconomic inclusion and transparency however, there is little evidence to support its contribution to a more efficient supply chain process. Project managers appointed by municipalities are responsible for administration of the bid process through to award of contract. Therefore, in order to understand the nature of operational delays, the SCM process is analysed using the perceptions of the project managers that are responsible for such projects. This study will investigate how lean management can be used through the acquisition stage of the supply chain process to improve efficiency within eThekwini Municipality in an effort towards improved service delivery by reducing time and cost to commence service delivery. The results of this study may be used to apply similar lean supply chain methods to other municipal entities within South Africa. The study is conducted within the HSET cluster for non-revenue major projects. The objectives of this study are to identify the percentage of respondents (project managers) dissatisfied with the current supply chain process, to identify and quantify the possible wasteful activities within the supply chain and to advise on possible lean practices that can improve the current supply chain. This is a quantitative study using an electronic survey questionnaire. The results will be analysed using SPSS. This study was limited to non-revenue departments due to access to all departments and considering the contracts put out by revenue departments are longer term and follow the process less frequently. The study also excluded emergency procurement.

2. CHAPTER TWO

Theory and Practice

2.1 Introduction

Supply chain processes are a crucial part of business and government. In recent times, focus on supply chain practices have become more and more widespread as stakeholders see the benefit it has on economic conditions (South African Government, 2016). Governments have particular interest in its effect on socio-economic and environmental benefits. The research topic i.e. "The application of lean management practices in the supply chain unit of eThekwini Municipality" aims to understand how efficient current supply chain practices within eThekwini Municipality are through the perceptions of employees involved in initiating municipal projects. It also aims to quantify any wasteful activities that are identified along the process and understand the effects to service delivery standards. eThekwini Municipality is one of eight metropolitan municipalities in South Africa with a population of 3,7 million (South African Government, 2017). With feedback from employees within eThekwini Municipality and relevant literature, the study outcomes will recommend lean practices that may be used to improve service delivery whilst maintaining the required level of compliance. The literature reviewed to follow will be presented in three sections. Section 2.2 will provide an overview on *Supply Chain Management (SCM),* Section 2.3 will narrow the focus to *Public Sector Supply Chain Management* that will lead the literature into the supply chain structure specific to Ethekwini Municipality and section 2.4 will lead into *The Application of Lean in Public Sector Supply Chains*. The first section will articulate what supply chain management means in a public arena and in doing so will expand on global concepts of supply chain management. This will set a background to current public supply chain conditions in South Africa and the evolution of the democracy on SCM practices. The literature will then outline the service delivery standards within eThekwini Municipality and means of measuring these standards at a department, unit, municipal and national level. A step further into current supply chain practices at eThekwini Municipality in particular, will introduce the challenges the municipality faces from a legislative point of view and how these affect service delivery expectations.

2.2 Supply Chain Management (SCM)

The relevance of supply chain management over the decades has become increasingly significant as organizations see the direct relationship to performance. To understand the management of supply chains, a general understanding of a supply chain needs to be outlined. With time, the definition of 'supply chain' has varied slightly among academics, some more specific than others. Mentzer et al. (2001) defines supply chain as "*a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer*". Afolayan et al. (2016) adopts 'supply chain' "*as a chain of networks linking different 'actors' (companies) for smooth flow of material from one point to another*". Over the fifteen years between these academics and many others, 'supply chain' is understood to be the flow or movement of some kind of service/commodity from its creation to the end user and the interactions between each member (designer/manufacturer/supplier/end users/etc) in advancing through the chain. The management of this 'supply chain' concept then introduces the definition to Supply Chain Management. Supply Chain Management (SCM) involves the management and planning of all activities necessary in sourcing, procuring and converting and logistical management activities (Ambe and Maleka, 2016).

2.3 Public Sector Supply Chain Management

The largest buyer of goods, services and infrastructure in a country is its government (South African Government, 2016). 10 to 25 percent of a country's gross domestic product can be attributed to its' public procurement according to the European Commission as cited by (Lynch et al., 2016). Insuring government funds are budgeted efficiently and spent within time and with quality returns, translates as a maximum benefit to all stakeholders. Stakeholders which include tax payers who receive the public service. This is the objective of the supply chain management processes carrying government projects. Ambe (2016), elaborates that SCM in the public sector concerns the "co-ordination of all parties involved in delivering the combination of inputs, outputs or outcomes that will meet a specified public sector requirement". Ambe (2016), also describes the three main members of the public supply chain being private companies that are awarded work by the public sector; accounting officers and policymakers.

2.3.1 Review of Current Public Supply Chain Conditions in South Africa

During the pre-democratic South African regime, the privileges among racial groups were acutely imbalanced. Upon the birth of South Africa's democratic government, these imbalances in financial, service, employment and other privileges were high up on the priority list to transform. Government procurement was biased towards larger more established contractors which made it difficult for smaller contractors to enter into the industry (Ambe and Badenhorst-Weiss, 2012). Government procurement lead by the post 1994 democracy, introduced transformation reforms that supported principles of good governance and included preference systems to advocate for certain socioeconomic objectives (Ambe and Maleka, 2016). Section 217 of the Constitution of the Republic of South Africa, 1996 sets out the principles for public procurement which dictates that procurement of public goods and services should be done in a way that is 'fair, equitable, transparent, competitive and cost-effective'(NT, 2016). The Public Finance Management Act (PFMA), 1999 regulates the processes to be followed when managing funds at a national and provincial level while the Municipal Finance Management Act (MFMA), 2003 regulates similar processes but on a municipal level (Bezuidenhoudt and Pilane, 2018).

The hierarchy of authority or role players within the supply chain management system in South Africa are outlined in the MFMA of 2003 from national treasury down to the supply chain management officials at municipal level. Ambe (2016) describes the functions of each in Table 2-1 below:

Table 2-1:Role Players within the Supply Chain Management System

Role Player	Function
National Treasury	Develops policy and overseas the implementation of the policy in all municipalities
Provincial Treasury	Supports the municipalities in implementing the SCM policy and further provides assistance to the municipalities in terms of capacity building
Municipal Council	Approves the SCM structure of the municipality and ensures that the accounting officer executes the council's SCM policy

Accounting Officer	Establishes the SCM unit, which will be under the supervision of the CFO. Each municipality in terms of section 165 of the MFMA is required to establish an internal Audit unit that must examine and report on the effectiveness, efficiency and economic use of SCM to achieve the objectives of the municipality
External Auditors	Examine and report on the compliance of the municipalities with the SCM policy to the Mayor of the municipality
SCM Officials	Custodians of the SCM process implement the policy and carry out the SCM operational activities. External role players are the suppliers and the community within the municipal jurisdiction

Source : Ambe (2016)

2.3.1.1 Supply Chain Management Cycle

The public sector supply chain management cycle includes three phases i.e. pre-tender; tendering and post tender.

Pre-Tender Phase : also referred to as the demand management stage, includes the compiling of the tender document with due consideration to the project needs; development of the scope and specifications; planning of timelines and budgets and the procurement strategy to be used with preferred criteria for functionality evaluation (South African Government, 2016). The bid document outlines the legalities, risks and rights between the client and the contracted party. The contents of the document therefore has to be meticulously checked to insure risk is allocated appropriately. This document has to be approved by a bid specification committee before proceeding to the next phase.

Tendering Phase : includes the invitation to tender, the tender evaluation (bid evaluation) and tender adjudication (bid adjudication). This phase, in theory, should be fair, transparent and non-discriminatory to all tenderers. This phase of the supply chain management is most prone to violations by all members involved. Bid evaluation and bid adjudication committees are held accountable for noncompliance to Nation Treasury norms and standards during evaluation and adjudication (South African Government, 2016).

Post Tendering Phase : includes the management of the contract after the tender has been awarded. This is usually in the 'work in progress' stage. During this phase, orders are issued and payments are made to the awardee. Supplier management is a critical part of insuring that the product or service delivered is within quality standards, budget and the allocated time.

The current South African Government structure is divided into three spheres, i.e. National Government; Provincial Government and Local Government. The Constitution allows for three categories of municipalities that include eight metropolitan, 44 district municipalities and 226 local municipalities (South African Government, 2017). The eThekwini Municipality falls under one of the eight metropolitan municipalities within South Africa.

2.3.2 Review of Current Supply Chain Practices at eThekwini Municipality

In accordance with section 111 of the Municipal Finance Management Act of 2003, every municipal entity is required to implement a supply chain management policy which gives effect to provisions such as procurement of goods and services by a municipality or municipal entity; the disposal of goods no longer needed; selection of contractors and the selection of external mechanisms for the procurement of services (NT, 2005).

Before reviewing the procurement processes within the Ethekwini Municipality, it's essential to understand the municipal structure and the order of authority within the supply chain process. The City Manager of Ethekwini, leads the city structure with the assistance of seven deputy city managers that head up seven clusters as well as a chief operations officer, a chief strategy officer and a chief audit executive (EM, 2018).

Subordinate to these seven cluster deputy city managers and three chief positions are thirty seven unit heads. For the purpose of this study, the Human Settlements, Engineering and Transport (HSET) cluster was chosen as a focus since this is this cluster is responsible for a large sum of the infrastructure budget. Ethekwini contributes 57.2% of KZN's GDP and 9% of the national GDP according to Ethekwini's 2016/2017 annual report. Ethekwini recorded 600 tenders awarded in the 2016/2017 financial year that amounted to R4.73billion (EM, 2018b). Figure 2.1 below shows the reporting levels from HSET cluster to City Manager.

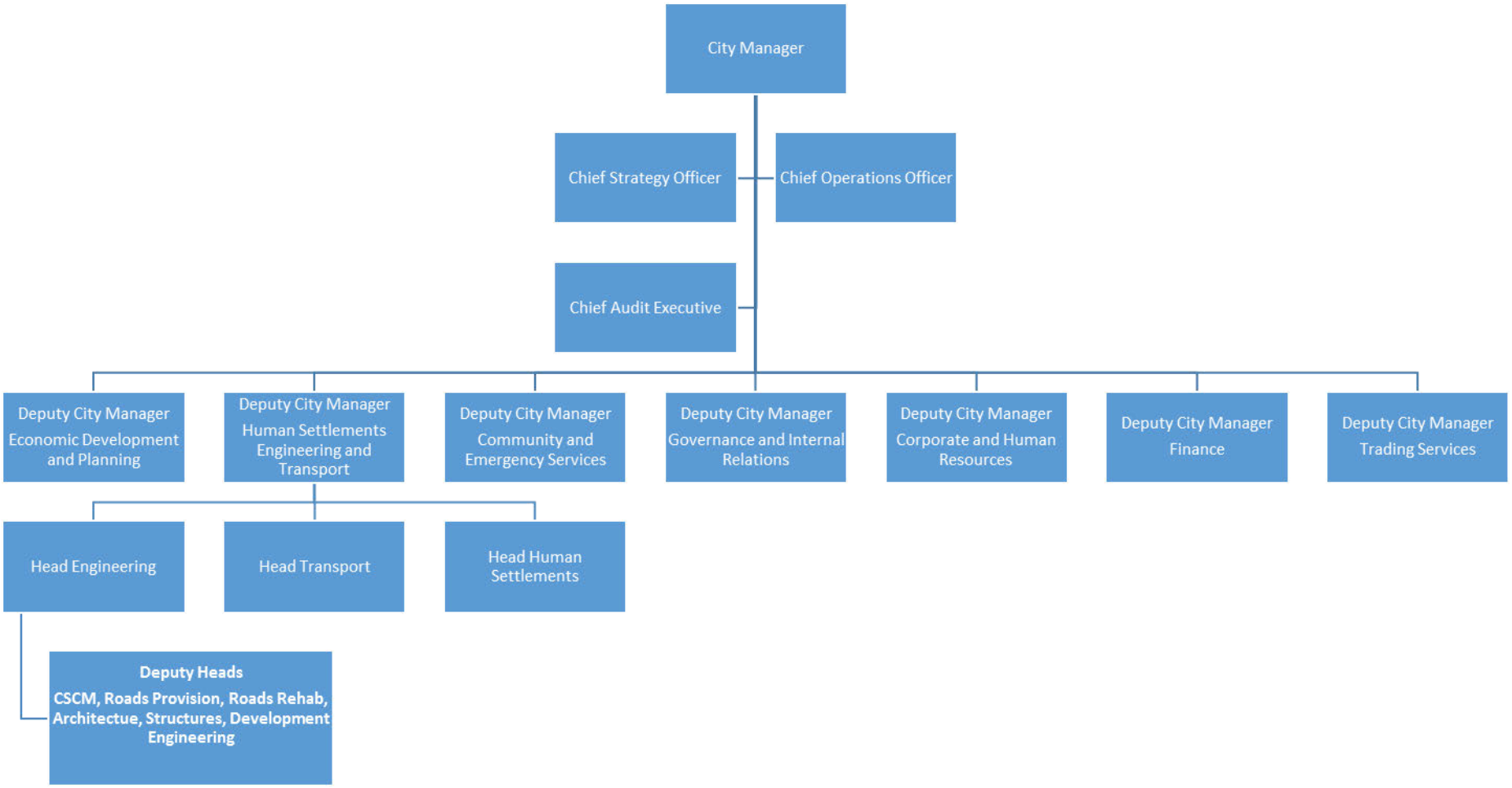

Figure 2-1:Top Management Structure of Ethekwini Municipality including HSET

Source : EM (2018)

The range of procurement processes for the procurement of goods and services include the following thresholds:

Table 2-2: Range of Procurement Processes within Municipal SCM

Value of Goods/Services (including VAT)	**Procurement Process**
< R500	Petty cash purchases
>R500 & <R5000	Written or verbal quotations where verbal quotations are to be followed up by written confirmation of quotation for the successful bidder
>R5000 & <R200 0000	Formal written priced quotations
>R200 000 & long term contracts	Application of a competitive bidding process

Source : adapted from Ethekwini Muncipality (2016)

Goods and services purchased under R200 000.00 have a relatively short procurement process with the required authorizing official escalating to the head of the line department i.e. deputy head level w.r.t Ethekwini Municipality. Service delivery to the consumers are therefore much faster as compared to that of goods and services purchased over R200 000.00 requiring a competitive bidding process. The required authorizing official in this case escalates to the City Manager through the bid committee process. This research will therefore focus on the procurement of goods and services through the competitive bidding process i.e. procurement in excess of R200 000.00 and / or long term contracts i.e. longer than 3 years, particularly through the acquisition management of the supply chain. The competitive bidding process follows a rigorous and lengthy process of supply chain management activities.

To take a step further from the previous section, NT (2005) has dictated the supply chain cycle in a flow of supply chain management activities. In accordance to section 16A3 of the SCM Regulations of 2005 these include six supply chain management systems i.e.

Demand Management; Acquisition Management; Logistics Management; Disposal Management; Risk Management and Performance Management (Bizana et al, 2015).

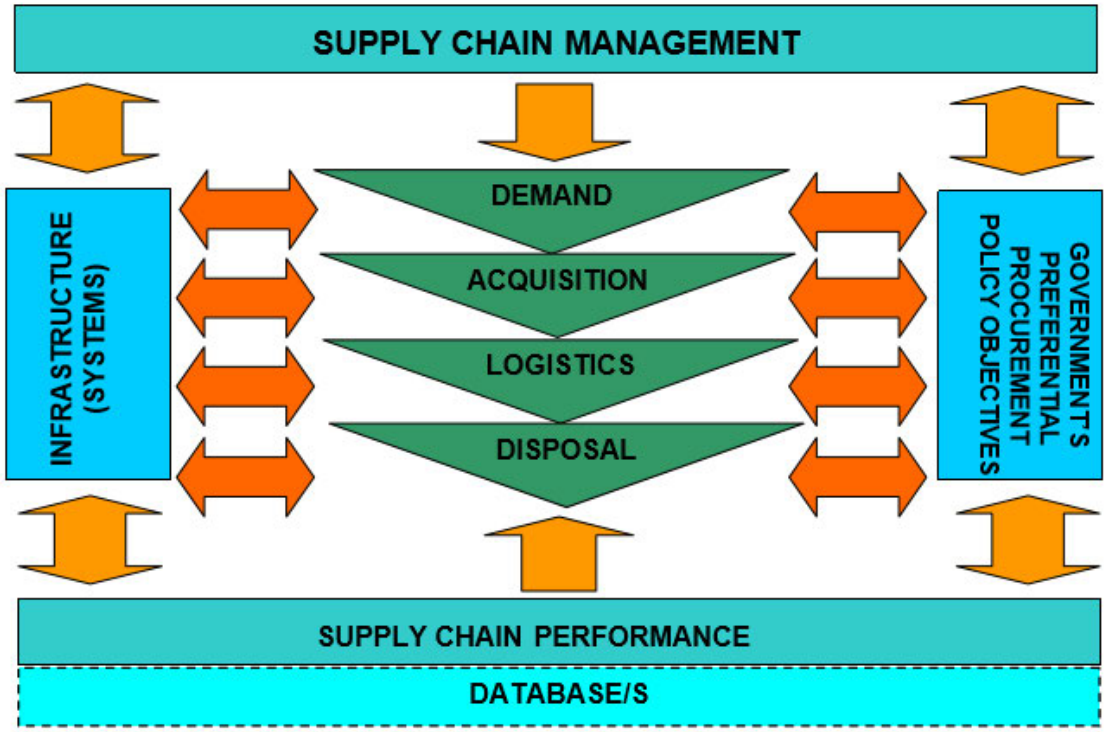

Figure 2-2:Elements of the Supply Chain Management Model

Source : NT (2005b)

The following describe each stage of the supply chain management cycle at a municipal level.

Demand Management is at the beginning of the supply chain process. It is the strategic decision making stage which is aligned with the Integrated Development Plan (IDP), looking at the operational duties and aims of the specific local municipality within the particular financial year (Bizana et al., 2015). Ambe and Maleka (2016) go on to explain that a needs analysis is to be conducted to assess resources and key elements required. This stage ensures that the required resources are delivered at the right time, price and location within quality standards of the municipality. A Bid Specification Committee approves the method of procurement for goods, services and engineering & construction works in excess of R200 000.00 (including VAT) (Ethekwini Municipality, 2016). Figure 2.3 describes the advancements within the demand management stage.

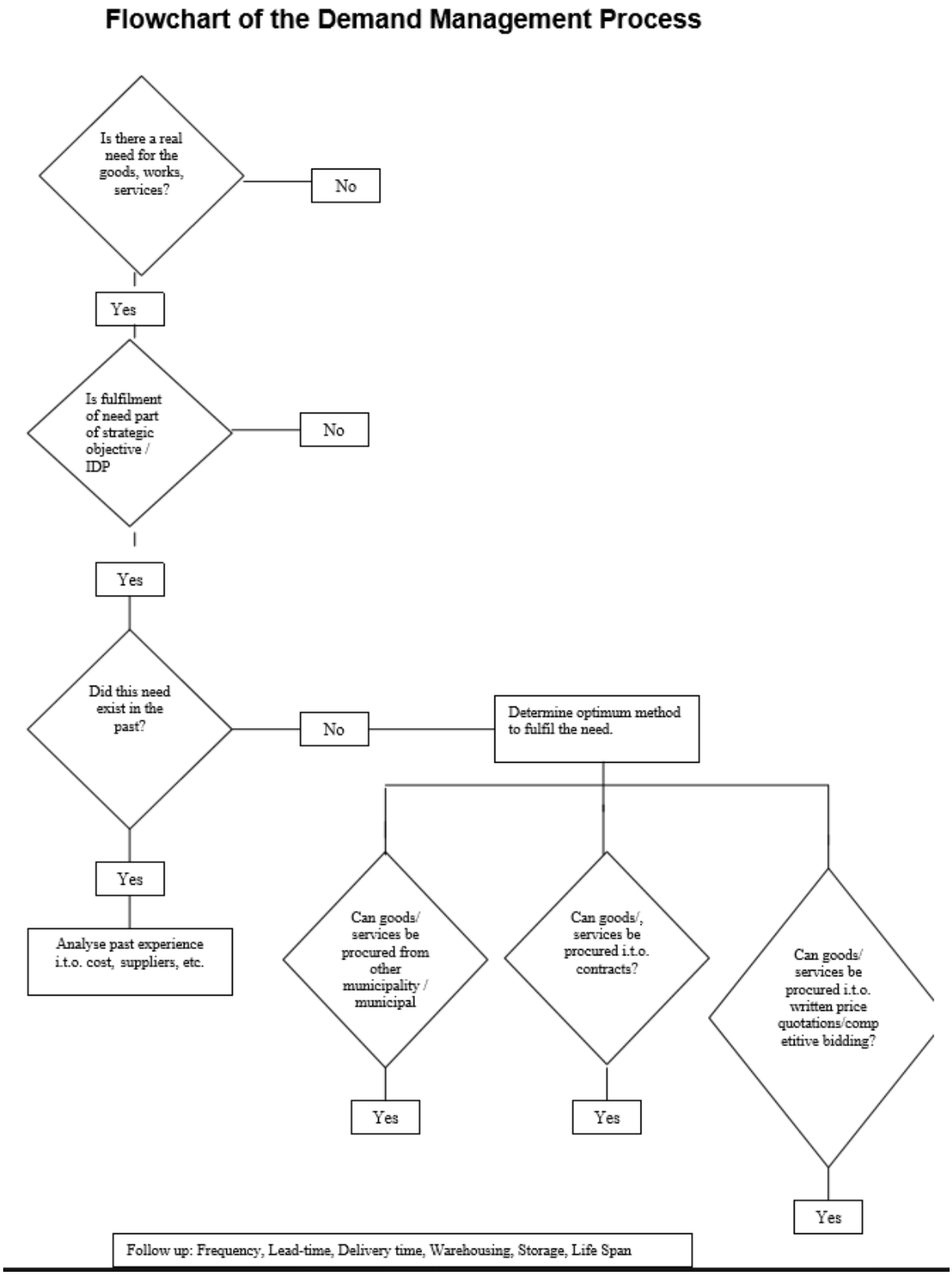

Figure 2-3:Flowchart of Demand Management Process

Source : NT, 2005b

Acquisition Management describes the purchasing or buying of goods and services for government organizations according to Bizana et al. (2015). This process ensures that the evaluation of the bids are done according to the five Pillars of Procurement outlined in the General Procurement Guidelines and adopted by the Public Sector Procurement Guidelines. These five pillars are :

- Value for Money
- Open and Effective Competition
- Ethics and Fair Dealing
- Accountability and Reporting
- Equity

All proceedings within the acquisition phase of the public sector supply chain management are to comply with more than 80 different legal instruments. Included in these are sections 217; 33 and 195 of The Constitution, the Preferential Procurement Policy Framework Act (PPPFA) of 2001; the Broad-based Black Economic Empowerment Act (B-BBEEA) 53 of 2003; Public Finance Management Act (PFMA) 1 of 1999; State Tender Board Act (STBA) 86 of 1968; Prevention and Combating of Corrupt Activities Act (Corruption Act) 12 of 2004; Construction Industry Development Board Act (CIDBA) 38 of 2000; National Land Transport Act 5 of 2009; National Supplies Procurement Act 89 of 1970; State Information Technology Agency Act 88 of 1998; Financial Management of Parliament Act 10 of 2009; Road Traffic Management Corporation Act 20 of 1999; Public Audit Act 25 of 2004; Health Professions Act 57 of 1974; Housing Act 107 of 1997; Disaster Management Act 57 of 2002; Promotion of Access to Information Act 2 of 2000; Promotion of Administrative Justice Act 3 of 2000; Local Government : Municipal Systems Act 32 of 2000 and the Municipal Finance Management Act (MFMA) 53 of 2003 which include the methods of sourcing at the municipal level i.e. in this case Ethekwini Municipality (NT, 2016). The bid adjudication committee appointed under the Guide for Accounting Officers of Municipalities and Municipal Entities (2005), insures that the bid process has followed its due course and complied with all respective budgets, acts and regulations through the acquisition of the good or services.

The range of procurement options is as per Table 2.2 : Range of Procurement Processes within Municipal SCM, that has been dictated by National Treasury. This study analyses

the process of competitive bidding within Ethekwini Municipality and thus the competitive bidding process will be reviewed further.

The acquisition management component of the competitive bidding process includes the following critical steps :

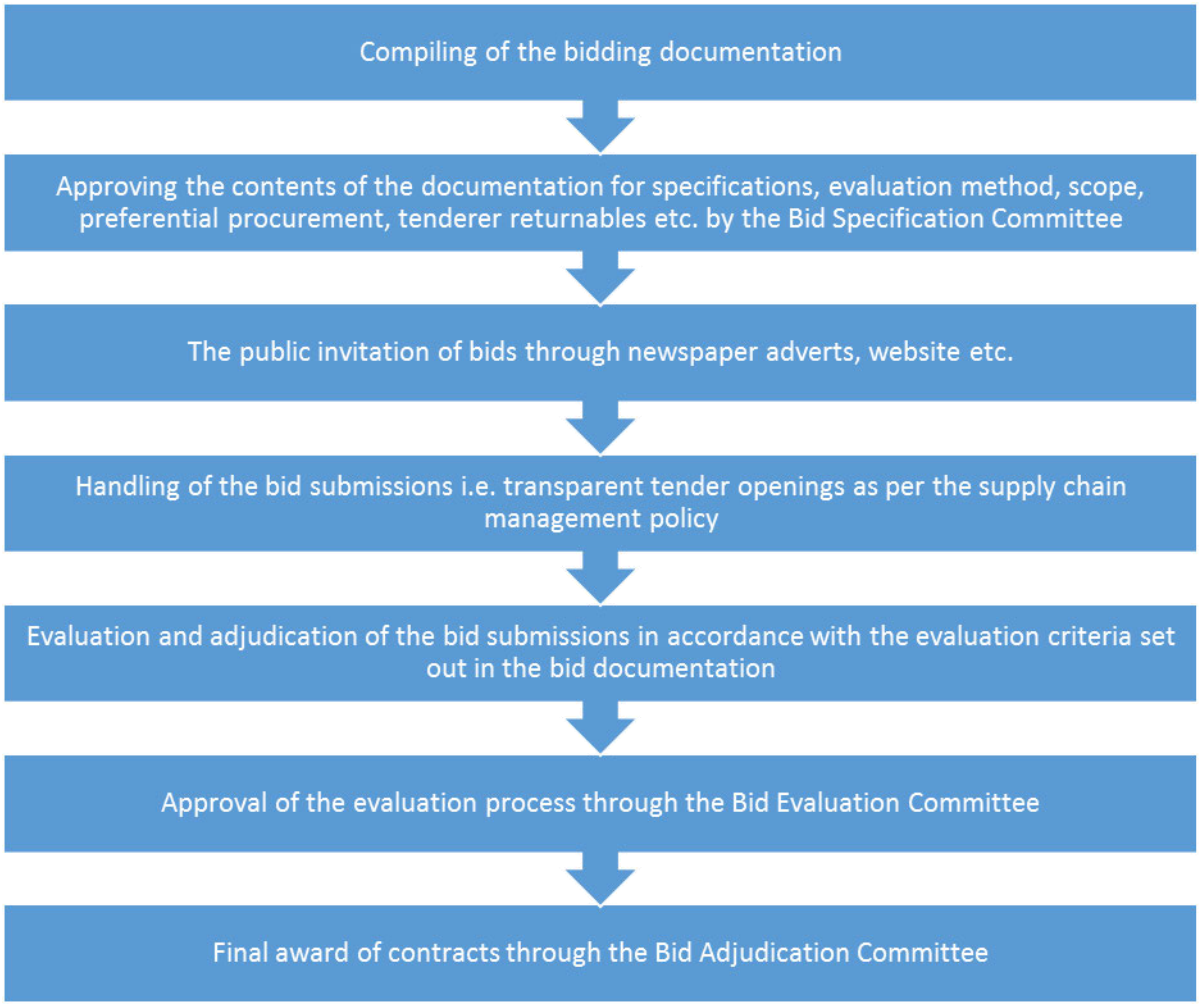

Figure 2-4:Critical stages in the competitive bidding process

Source : adapted from Ethekwini Municipality (2016)

According to NT (2005), the accounting officer is required to establish a system for competitive bidding that comprises of at least:

a) Bid Specification Committee

   A bid specification committee is expected to include at least one or more officials from the respective municipal entity and if required, external specialists may advise.

b) Bid Evaluation Committee

A bid evaluation committee is specified to include if possible at least one official from the department requiring the goods or services and at least one supply chain management practitioner of the municipal entity.

c) Bid Adjudication Committee

A bid adjudication committee may not include any members of the bid evaluation committee not any advisor the same. The bid adjudication committee must include at least four senior managers of the municipal entity of which must comprise of the chief financial officer or another manager in the financial department who reports directly to the chief financial officer; at least one supply chain management practitioner of the municipal entity and a technical expert in the relevant field of supply from the municipality.

In 2018 Ethekwini Municipality Accounting Officer i.e. the City Manager at the time, Mr Sipho Nzuza, initiated a fourth committee called the EAC (Executive Assessment Committee). This committee assesses the decisions made by the BAC for contracts over the value of R10 million and / or three years.

Logistics Management describes the strategic flow of goods, services and related information from the source to the point of consumption according to Ambe and Maleka (2016). It must provide for an effective method of managing the flow of goods and services as well as maintenance and contract administration (EM, 2016).

Disposal Management is the effective assessment of redundant materials through an asset database and the strategic execution of disposal (Ambe and Maleka, 2016). The disposal management system should provide for effective management of alienated, unserviceable, redundant or obsolete assets (EM, 2016).

Risk Management is a system for effectively identifying and quantifying of all risks associated to the supply chain process to assist in allocating the risks to the party best suited to deal with the risk as well as provide for possible residual risks (EM, 2016). Ho et al. (2015) supports the importance of effective risk management systems to avoid loss and poor performance due to supply chain disruptions. EM (2012b), identifies the value add of appropriate risk management as :

" *Highlight processes that are not clearly understood;*

Identifies processes that are inefficient;

Promotes efficiency of service delivery;

Create awareness of high risk areas and ensures uniformity in addressing exposure areas;

Create awareness of what can/cannot be controlled;

Ensures reasonable and practical time is taken to implement required responses;

Promotes pro-activeness rather than re-active response (reduce surprises);

Increases probability (likelihood/chances) of achieving goals"

The ineffective management of supply chain processes then poses significant risk in achieving the objectives set out for the organisation. The North West Provincial Department has identified the risk management related SCM under specific operational risks that result from internal as well as external failures. Table 2-3 to follow summarises the internal risks with examples:

Table 2-3:Internal Risks to Supply Chain Management Process

INTERNAL RISKS		
People	Processes	Systems
The knowledge, experience, capability and reliability of persons involved in the supply chain are critical risk factors for success	Overall execution of supply chain processes. E.g. miscommunication between user and purchasing and supply	Since databases are electronic based, system operation is critical for the SCM process to be successful in its objective
	Failures between parts of the process. E.g. changes in processes and its effect on how efficiently people adapt to the changes	System Obsolescence. Information technology is dynamic and the risk of implementing newer technology poses functional and operational risk
	Change in systems that effect processes. E.g.	Systems Security. Cyber-crime is a risk to the integrity

	change from manual to e-procurement system and how this change is implemented that effects the process in which it is carried out.	of the system. Implementing new technology without a test phase may expose the entity to hackers
		Inefficient Technology Controls. IT systems are prone to human error that include incorrect infrastructure chosen to support it, insufficient protection from external elements like weather and theft

Source : NWPG, 2017

NWPG (2017), continue to elaborate that external risks such as natural disasters, litigation, supplier risks and particular supply is difficult to be proactively manage however, should be anticipated with suitable response systems.

Performance Management is the retrospective monitoring and analysis of whether the approved supply chain process was followed with achieving the desired objectives (EM. 2016).

The application of the above defined stages in the supply chain management process within the Ethekwini Municipality is as per Figure 2.5 below.

The highlighted stages or within the Ethekwini Municipality process, from preparation of a draft specification document all the way to the issuing of a letter of award, separates the acquisition management from the process which this study investigates. This flowchart describes the procurement process for over the value of R200 000.00 or in excess of a 3 year contract with the municipality.

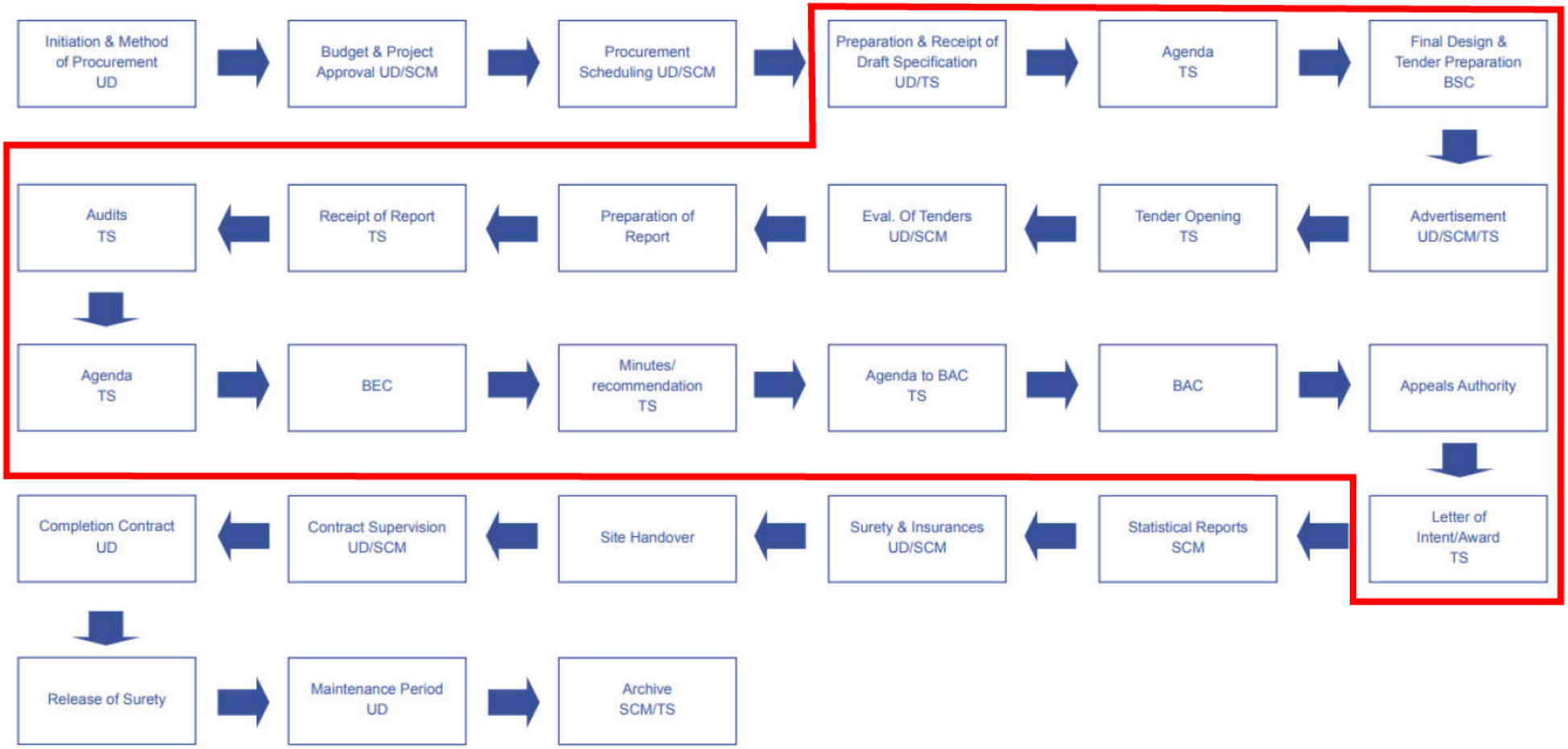

Figure 2-5: Flowchart of the Ethekwini Supply Chain Process for Competitive Bidding

Source : EM (2012)

2.3.3 Role of Project Managers within Public Sector

The difference in the role of project managers between the public and the private sector comes down to goals driven by profit verses goals driven by service delivery to the general public (Van der Waldt, 2011). Project managers within public sector are the latter. Public sector project managers are tasked to deliver the service promised to society through the demand management process. Therefore, in referring to service delivery, one cannot ignore the role of the project manager. Project managers are to carry the project identified at demand management through every stage of the supply chain cycle. Mabelebele (2006) discovered some of the challenges to project management in the public sector being 'management and coordination of inter-departmental and inter-cluster projects and programmes'; 'knowledge management'; 'deliverable sign-off and complex decision-making layers in the Public Service' and 'political interference' to name a few. Public service sector has made leaps since then, however an increasing demand for more transparency due to corruption and mal-administration, more complex systems are put in place for project managers to follow and administer. Brill et al. (2006) found that competencies related to effective project managers include problem solving expertise, leadership expertise, context knowledge, analytical expertise, communication expertise, project administration expertise and tools expertise.

2.3.4 Service Delivery Standards

As defined by Cambridge Dictionary (2018), service delivery is 'the act of providing service to customers'. Crous (2002) explains service delivery as a responsibility of an accepted governing body for a community which expects in turn, for the body to provide services that protect and provide for their needs. In South Africa, the lowest level of government is local government made up of metropolitan cities, local municipalities and district municipalities (Bizana et al., 2015). Chapter 7 of the Constitution of the Republic of South Africa details the objectives of local government being 'to ensure the provision of services to communities in a sustainable manner' and 'to promote social and economic development' whilst striving 'within its financial and administrative capacity, to achieve the objectives set out..' of the same (South African Government, 1996). Singh and Jayraman (2013) further articulate that one measure of the performance of the supply chain is lead time for delivery of goods to meet the demand of customers.

Service delivery standards in the Ethekwini Municipality are defined for each department before the beginning of each financial year through the demand management stage that reflects the respective departments/ units key performance areas.

2.3.5 Challenges in Supply Chains that Affect Efficient Service Delivery

Supply chain management or procurement practices of local government are very closely linked to the efficiency of service delivery to the community. The stages of the supply chain process are affected by various factors that challenge this efficiency.

Lack of skills and knowledge: A key success factor of supply chains is adequate structures and competent supply chain practitioners that are lacking in government entities (Ambe and Badenhorst-Weiss, 2012). The 2015 Public Sector Supply Chain Review concurs with this long standing sentiment that SCM practitioners often do not have the understanding they need to assist stakeholders in the process. This was shown by competency assessments carried out (South African Government, 2016).

Clarity of roles and responsibilities: The undefined roles and responsibilities of technical and political role-players outlined in the Supply Chain Management Policy creates room for misguided judgement and interference that leads to fraud and corruption opportunity (South African Government, 2016). This is evident in the recent probes into fraud and corruption charges against a senior level supply chain employee within Ethekwini Municipality (Mbanjwa, 2017). This also speaks to lack of guidance in the appointment of appropriate bid committees which in turn affects the quality of suppliers appointed, the misuse of bidding process etc (Ambe and Badenhorst-Weiss, 2012).

Poor supply chain integration: The tender procedures within a supply chain can be cumbersome and cause delays (NT, 2005b). As explained by Lynch (2018), one of the eight challenges contributing to procurement delays include delays during approval process which refers to committee meetings, dates these committees meet, referrals of bid applications etc. Within the Ethekwini Municipality specifically, authorising role players prior to submission of bid documents are decentralised. Decentralisation and fragmentation of the procurement processes make compliance monitoring difficult (South African Government, 2016). The use of information systems have become a matter of survival for systems integration (Rashad and Gumzej, 2014). Within the bid process there are a number of compliance checks and balances that supply chain practitioners need to do

before these bids are assessed by bid committees. These checks require a number of searches through for instance database, website, and statutory organisations etc. which require different search portals or platforms. Information systems are able to integrate this type of process.

2.4 The Application of Lean in Public Sector Supply Chains

In the business environment of today, reducing the total cost of getting goods and services to the end user is a key focus to gaining a competitive advantage (Manzouri and Rahman, 2013). In the public sector, the procurement process's objective is to receive 'value for money' through efficiency and quality of operations, making 'lean' increasingly more attractive within this sector (Weerasinghe et al, 2016). The sections that follow will introduce lean supply chain management along with lean tools used and relate how the application of lean within the public sector procurement process can be beneficial.

2.4.1 Fundamentals of Lean Supply Chain Management

The concept of 'lean' was developed by the Japanese in the 1950's (Vignesh et al, 2016) specifically for Toyota and its manufacturing process after World War II (Lean Enterprise Institute, n.d.(a)). Rymaszewka (2014) concisely describes lean as 'doing more with less'. Lean is an ideology or philosophy adopted as a management tool or system (Urban, 2015) that is used to reduce waste and cost. This is achieved by identifying all wasteful activities along the supply chain value stream and establishing effective ways to eliminate these activities (Manzouri and Rahman, 2013). The five core principles of lean as defined by Womack and Jones (2003) and articulated by Do (2017), include the following looping stages:

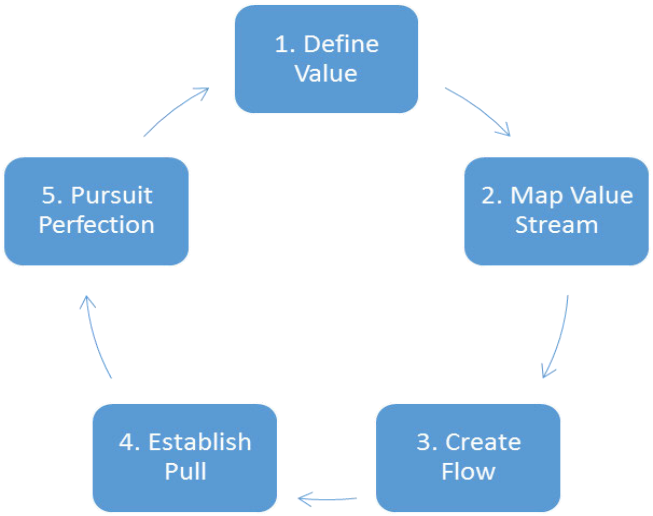

Figure 2-6:The Five Principles of Lean

Source : Adapted from Do (2017)

Stage 1 : Define Value

Defining of identifying the value of the product of service from the perspective of the consumer or end user (Lean Enterprise Institute, n.d(b)). For the purpose of this research, the consumer is the tax payer benefiting from the procurement, or the municipal department dependant on the procurement to fulfil its function that ultimately benefits the tax payer. In defining the value, things like price, time to delivery, quality or other expectations are vital information from the consumer's standpoint (Crawford, 2016). Do (2017) cautions that sometimes consumers don't understand the end product e.g. novel technologies, in which instance the use of interviews, surveys, web analytics and the like, are useful.

Stage 2 : Map Value Stream

This stage of the lean process is mapping out the 'value stream' on one page that describes every stage required to get from the needs of the consumer to the end product (Crawford, 2016). In understanding the flow of activities, non-value add activities can be identified and if possible eliminated from the value stream (Lean Enterprise Institute, n.d(b)). This achieves the shortest supply chain process i.e. Lean Supply Chain Management (LSCM), getting the consumer possibly reduced costs by eliminating wasteful activities or personnel.

Stage 3 : Create Flow

To create a flow is to sustain the process established in stage 2 in a tight sequence so that the end product gets to the consumer smoothly and efficiently (Lean Enterprise Institute, n.d(b)). Proper support structures along the value stream is needed to ensure the smooth running of the supply chain in an efficient and uninterrupted manner. Crawford (2016) advises that silo thinking needs to be broken down to make way for cross-functional systems. Do (2017) suggests breaking down steps, levelling workload, training employees to make them adaptive and multi-skilled as some of the strategies to ensuring a smooth flow.

Stage 4 : Establish Pull

In the effort to reduce inventory waste, the 'pull' system is used to understand the needs at the customer end and make only the requisite amount of materials or resources available just upstream of each value stream activity (Do, 2017). This improves the flow to the consumer in a 'just in time' operation (Crawford, 2016). Hence the pull-based system refers to working backward and 'pulling' information upstream of the supply chain.

Stage 5 : Pursue Perfection

The first four stages establishes the lean process by eliminating the wasteful activities and streamlining the value chain, however, the fifth stage is the challenge of sustaining them (Do, 2017). Urban (2015) finds that one of the failures to lean can be attributed to organizational culture, suggesting that lean processes are sustainable with a work environment that supports lean thinking. In an organisation where lean is a culture, all future endeavours stem from lean ideas and as a result encourage all that are involved to incrementally improve on processes.

2.4.2 Tools Used to Achieve Lean Management

Lean Production (2018) documents twenty five different lean tools some of which are :

Table 2-4:Lean Tools

5S	Eliminates waste by organizing the work area (Sort – what's not needed; Set In – Arrange what's left; Shine – Clean the area; Standardise – write down standards for the above 3 S's and Sustain – keep cycling through the standards.
Andon (similar to Visual Factory)	A visual communication tool that is used to display status, alerts and problems that need assistance so to address issues immediately and eliminate standing time.
Bottleneck Analysis	Is in effect, identifying the weakest link that is causing the most delay in the throughput and improving on it.
Continuous Flow	Tool used to ensure that manufacturing flows smoothly through to production.
Gemba	Encourages management to engage with the workers on the plant floor.
Heijunka	Production scheduling in smaller batches to create variances in production.
Hoshin Kanri	Aligning strategic goals with actions of middle management and plant floor staff.
Jidoka	Partially automating the process so that the human element is able to monitor and control any defects.
Just-In-Time	Also relies on other tools. Determines the upstream production based on the consumer demand to eliminate standing inventory.
Kaizen	All employees invested in lean thinking to incrementally improve the manufacturing process.
Kanban	Signal cards are used to notify when goods are needed to be replenished in order to regulate the flow of goods between customers, external and

	internal staff.
KPI's	Goal driven to encourage achievement towards the strategy of the organisation
Muda	Identifying items in the process that does not add value
OEE	Overall Equipment Effectiveness monitors the downtime, quality and performance of the production line.
PDCA	Plan – with expected results; Do- implement the plan; Check – the results are reasonable; Act – repeat after reviewing
VSM	Value Stream Mapping visually maps out the current and lean processes by process of eliminating all wasteful activities in the current process.
Poka-Yoke	Error checking or screening process before production to avoid defects

Since the concept of lean management stems from the motor manufacturing industry dating back to the 1950s, there has been significant studies and literature of lean tools being applied to manufacturing processes (Bateman et al., 2014). Limited literature is available for the application of lean tools on public procurement processes. This study will analyse and suggest which are the most effective tools for this application.

Value Stream Mapping (VSM) is another lean tool used to understand the flow of the value chain by visually mapping out the individual stages (Lean Production, 2018). In mapping the supply chain process out, wasteful and non-value adding items along the chain can be highlighted within the process to develop a roadmap for improvement in the future.

Kaizen is a method that applies lean over the long term by equipping human resources with the skills required to sustain the established lean value stream (Weerasinghe et al., 2016).

2.4.3 Lean Management Applied in Public Sector

In the application of lean in public sector procurement, the objective is to establish the tightest sequence of activities in the supply chain process at the lowest relative cost. In an era where public sectors are desperately trying to reduce costs, lean has been growing in favour (Radnor & Osborne, 2012) through pressure from a more educated consumer base.

Alford et al. (2014) applied a variation to value stream mapping which they call 'Public Value Process Mapping'. There has been speculation of transferring strategies developed for the private sector to the public sector however there has been improvements to the application of lean in the public sector (Bateman et al., 2014). Radnor & Osborne (2012) go on to discuss the failure of applying lean to public sector organisations being the focus on the technicality of the tools and not aligning the business logic of public sectors. From their discussions it is clear that although the concept of lean was developed and works well in the private sector application, it is not transferrable in its effectiveness to the public sector in the same application. It needs to be tailored to processes of the public sector.

The 2015 Pubic Sector Supply Chain Management Review highlights the many challenges that create inefficiencies within public sector supply chains such as lack of skills and knowledge; clarity of roles and responsibilities and poor supply chain integrations (South African Government, 2016). The eThekwini Municipality is a public sector entity exposed to similar threats to supply chain efficiencies. This study will explore to what extent these affect the efficiency to service delivery.

2.5 Summary

Supply Chain Management is the management of all activities related to getting goods or services from the source to the consumer. Public sector supply chain management is driven by service delivery rather than profit and as such aims to gain the maximum value out of a procurement as possible. The stages within the supply chain management process include Demand Management : stage that involves a needs analysis to ensure that the resources are sourced at the right time, place, amount and within quality standards (Ambe & Maleka, 2016); Acquisition Management : the stage that describes and dictates the procurement strategy for the required good or service; Logistics Management : managing the flow of materials related to the procured goods or service; Disposal Management : identifying unserviceable or redundant assets for disposal; Risk Management : effectively identifying the risks associated to the supply chain and who best to deal with it and lastly Performance Management : assessing the performance of the supply chain process through retrospective monitoring and analysis. Challenges to supply chain effectiveness include and are not limited to, lack of skills and knowledge of supply chain practitioners and users of the process; lack of clear roles and responsibilities and integration of systems. In order

to maximize on the value of the process and end product, the supply chain activities need to be rid of wasteful activities which is where ‘lean’ can be applied. Lean management is a management approach that assesses each activity of a process to eliminate waste using the five principles of lean developed by Womack and Jones (1996). These principles include defining the value to the consumer, mapping the value stream, creating a more efficient flow, establishing a ‘pull’ system that reduces standing inventory and finally pursuing perfection by repeating the preceding steps. The concept of lean was developed and works well in the private sector application, however, it is not transferrable in its effectiveness to the public sector in the same application. The techniques need to be tailored to processes of the public sector.

3. CHAPTER THREE

Research Methodology

3.1 Introduction

The following sections give a detailed description of the research methodology used in carrying out the study. The location of the study area, the population and sample, along with the sampling method is described. The choice of data collection instrument and the construction of the same is detailed before indicating the methods used to maintain reliability and validity of the study. The ethical considerations while conducting the study are then documented.

3.2 Aim of the Study

The aim of the study is to understand the applicability of lean principles on the supply chain management process used by the eThekwini Municipality project managers for competitive bidding. In doing so, the aim is achieved by understanding the perception of project managers and how effective or ineffective they find the current procedures put in place within the supply chain management process to award a municipal contract in the shortest possible time.

3.3 Research Design and Methods

A quantitative method was followed in carrying out this study. Quantitative research methodology deals with variables from data that are measurable and can be analysed using statistical techniques (Apuke, 2017). Bryman and Bell (2015) describe this approach as often looking for answers to ‘how many?’ or ‘how often?’. According to CIRT (n.d.) there are four types of quantitative research designs which include:

Descriptive Design : Seeks to understand the status of the variable without assuming a hypothesis upfront but rather letting the hypothesis develop as the data is analysed

Correlation Design : Seeks to understand the relationship between desired variables without the need to establish the cause and effect.

Quasi-Experimental Design : Seeks to understand the cause and effect between variables without manipulating the independent variable

Experimental Design : Seeks to understand the cause and effect by controlling the independent variable

A descriptive design was chosen for this study as it seeks to understand the current state of a process without a preceding hypothesis. Apuke (2017) refers to the descriptive design as a survey research that uses a scientific sampling technique together with a questionnaire to understand a populations characteristics. This design was selected to meet the objectives of the study i.e. understand how project managers at eThekwini Municipality perceive the current efficiency of the supply chain process and by statistical techniques, understand where the wasted resources within the supply chain are.

3.4 Research Paradigm

A positivism research paradigm was used. A positivism approach also referred to as the logical positivism applies scientific methods to gain tangible results that are concluded from verifiable measurement and observation (Kawulich, 2012). This paradigm was chosen as a result of the nature of data that was required for analysis.

3.5 Study Setting

The study was conducted at the eThekwini Municipality based in and around the central business district of Durban, Kwa-Zulu Natal, South Africa. The eThekwini Municipality as a whole comprises of 24000 employees ranging from general workers to the mayor and city manager serving approximately 3.4 million customers (eThekwini Municipality, n.d.). One of the functions of the eThekwini Municipality is to meet the shortcomings of built infrastructure for the people it serves. Since the study was conducted under the Human Settlements, Engineering and Transport (HSET) cluster, the location of respondents were spread over a number of buildings. The HSET cluster is mandated to manage the provision of non-revenue service projects that include roads, bridges, storm water, housing and transport networks.

3.6 Population and Sample

According to Stat Trek (2018), the population includes all the elements of the dataset, implying that all elements (e.g. people, objects) that qualify, according to the sampling criteria are, are part of the population. The population is often too large to assess so a representative group of the population is used which is called the sample (Statistics Solutions, n.d.). The study population includes all project managers that carry out non-revenue projects under the Human Settlements, Engineering and Transport cluster at eThekwini Municipality which includes approximately 250 people (estimated from department organograms). Project managers within this cluster include engineers, engineering technologists, engineering technicians, architects, project managers. The sample in this instance was selected through the eThekwini Municipality electronic directory of 160 who were sent an electronic questionnaire. 144 of the selected sample responded.

3.7 Sampling Method

A simple random sampling method was applied however, by requesting the selected sample to participate through an electronic questionnaire, not all had responded. A total of 144 participants met the criteria and completed the required questionnaire making up the sample size.

Sample Criteria :

- Employee of the eThekwini Municipality
- Employed under the Human Settlements, Engineering and Transport cluster
- Project managed council projects in excess of R200 000.00 that were carried through some or all steps of the acquisition stage within the supply chain management process
- Willing to participate
- Of either sex or any race

3.8 Construction of Instrument

A survey questionnaire was chosen as the data collection tool. Sansoni (2011) defines a questionnaire as 'a document designed with the purpose of f seeking specific information from the respondents'. The questionnaire included closed-ended questions for the purpose of quantitative analysis.

An electronic questionnaire was chosen for the following reasons:

- Relatively easy to administer
- An anonymous response as the email or name of the respondent is not recorded
- Data is captured automatically for the purpose of analysis
- All questions were closed making it easy and faster to answer by clicking the options provided.

The questionnaire was constructed in two parts and issued in English only. Part A aimed to extract demographic information such as age, gender, designation and career related data. This data could assist the researcher in quantifying waste in respect to human resources, generalised perceptions among age groups.

Part B aimed to collect the respondent's perceptions and experience using the current supply chain processes. This information could assist the researcher when analysing the current value stream and proposing a leaner value stream.

The questionnaire was structured using both a 5 Likert-scale response format to indicated their agreement from (Strongly disagree) to 5 (Strongly agree) as well as nominal multiple choice questions to indicate demographic information and occurrences. The questionnaire was pretested among five project managers that qualified under the required criteria and no questions were changed thereafter.

3.9 Data collection

Data was collected over a period of four months via Google Forms. The electronic link was distributed using an internal email. Random names were chosen from department organograms and using the eThekwini directory, these employees were sent the questionnaire together with all ethical clearance documentation. Two subtle follow up

emails were sent as a reminder to all copied on the initial email for those that had possibly forgotten or were too busy at the time the email was sent out initially along with the researcher's gratitude to those that had completed the questionnaire.

3.10 Data Analysis

Once the data was collected, the questionnaire link was closed to respondents so to not skew the captured data. The data was downloaded and prepared for analysis using Statistical Package for Social Sciences (SPSS). SPSS is statistical software uses ad-hoc analysis to solve research and business problems (IBM, n.d.). The data was analysed for reliability and validity as per 3.11. Frequency tables were developed from the organised data in SPSS which were then analysed using descriptive statistics. The results from the descriptive analysis were used to inform the value stream mapping of the current acquisition stage of the supply chain management process and later develop a revised value stream from lean the application of lean principles.

3.11 Reliability and Validity

Reliability:

The choice of electronic requests to participants, eliminated the data collection bias by doing the survey in person, as the information was standard for all that receive the email. The participants were not compelled nor were they pressured to complete the survey. No private emails were sent to any individual participant so to influence the quality of the data.

The reliability of the responses were tested using Cronbach's alpha. Lee Cronbach developed alpha in 1951 to measure the internal consistency i.e. the extent to which the items in an implemented test is measuring the same concept (Tavakol & Dennick, 2011), which in this case is a set of questions. Cronbach's alpha is measured between 0 and 1 with '0' having no consistency and '1' being consistent among all items. The alpha tends to 1 as the correlation between the items in the test increase therefore is more reliable (Tavakol & Dennic 2011).

Validity:

According to Polit and Hungler (1995), the validity of data is measured by how accurately or consistently the instrument used measures what it is intended to measure. The sampling criteria assisted in the validity of the data in that all participants had some degree of supply chain knowledge as they had been involved in following the bid process. Questions in Part A also informs of their knowledge and experience in the public sector and project management. Having the questionnaire pretested as detailed in 3.8 above confirmed its intended purpose. The validity of the data received was tested using the Chi-squared statistic in SPSS to determine the relative P-value. Chi-squared independence test is used to test the strength of relationships between variables within a population (SPSS Tutorials, n.d.).

3.12 Bias

Since not all 160 subjects completed the questionnaire, there is a possibility that the non-responses were a result of them having no interest in the topic however, it could also imply these subjects were unavailable to respond. There is no conclusive evidence to favour the former or latter. As mentioned above, the data collection bias was eliminated by removing the element of human interaction using an electronic request and standardising information that went to all subjects.

3.13 Ethical Considerations

During the process of collecting data, transparency, honesty and integrity is paramount. Ethical clearance was obtained from the University of KwaZulu Natal's ethics committee to insure that all the information communicated to human subjects was clearly understood so to protect the rights of all involved. Permission was granted from the eThekwini Municipality to conduct the study on municipal processes and employees perceptions.

Subjects were advised on the purpose of the study and the role of their involvement through a cover letter that had accompanied the electronic mail. The letter included assurance that all responses were anonymous and voluntary after which results of the study could be made available to them at request.

Confidentiality was maintained throughout the study as the researcher had no record of names or email addresses attached to the responses.

3.14 Summary

The aim of the study which assists in focusing the research design. The aim is to possibly improve the current supply chain practices at eThekwini Municipality using the perspective of the project managers that follow its procedures in awarding municipal contracts.

The researcher chose a quantitative descriptive survey to obtain data for analysis. An electronic questionnaire generated by Google Forms was sent out to 160 subjects selected through random sampling that represent an approximate 250 population. 144 responses were received making up the sample population.

This chapter also includes the details of the reliability, which is measured using Chronbach's alpha, validity and related bias of the study before detailing the efforts made to insure that transparency, honesty and integrity was upheld while the study was carried out. The following chapter will carry through the data representation and analysis as described in 3.10.

4. CHAPTER FOUR

Presentation of Results

4.1 Introduction

This chapter of the study presents the results of the survey conducted among project managers within the Human Settlement, Engineering and Transport cluster of the eThekwini Municipality. The respondents were questioned on their agreement of the statements put forward from 1 (Strongly disagree) to 5 (Strongly agree). The results will be presented such that they inform the research questions in the order they were stated. The data was first interrogated for its reliability and validity. The section to follow will indicate the perceptions of respondents by their level of personal confidence in SCM knowledge; their perception of interaction from the SCM department and their level of understanding during bid documentation. The penultimate section will indicate possible delays and their relative extents before displaying possible operational gaps in the SCM process.

4.2 Survey Results

The survey questionnaire was divided and structured to investigate the objectives of this study by understanding the following :

A. Demographics

B. Project managers level of confidence in the understanding of the SCM process

C. Project managers perception of communication from SCM department

D. Project managers perception of the bid documentation process

E. Possible delays in the process

F. Possible gaps causing delays

4.2.1 Reliability & Validity

Reliability

Chronbach's alpha was used to test for internal consistency for sections B, C, D and F. Section B showed a low Chronbach's alpha of 0.46 with no one question contributing a higher inconsistency than others (see Appendix 2.1). Responses to section B are therefore not considered reliable. Section C showed a relatively higher reliability with a Chronbach's alpha of 0.785 (see Appendix 2.2). Sections D and F showed a strong internal consistency with alpha's of 0.843 and 0.899 respectively (see Appendix 2.3 and 2.4 respectively).

Validity

The chi-squared equation was used to prove the null hypothesis (i.e. independence) or the alternative hypothesis (i.e. dependence) of variables in section A with all other variables. The relative p-value of 0.05 was considered statistically significantly. For a p-value of less than 0.05, the null hypothesis was disproved and the alternative hypothesis, that favoured a relationship between variables, was adopted (SPSS Tutorial, n.d.). This process was repeated to understand how the respondent's age, experience, level of responsibility and gender influenced their responses.

Age:

Appendix 3.1 shows the influence of the respondents ages to the areas of investigation covered by sections B – F. Most variables proved statistically significant showing a dependence or influence of age on the responses. Figure 4.1 below shows the distribution of ages among respondents.

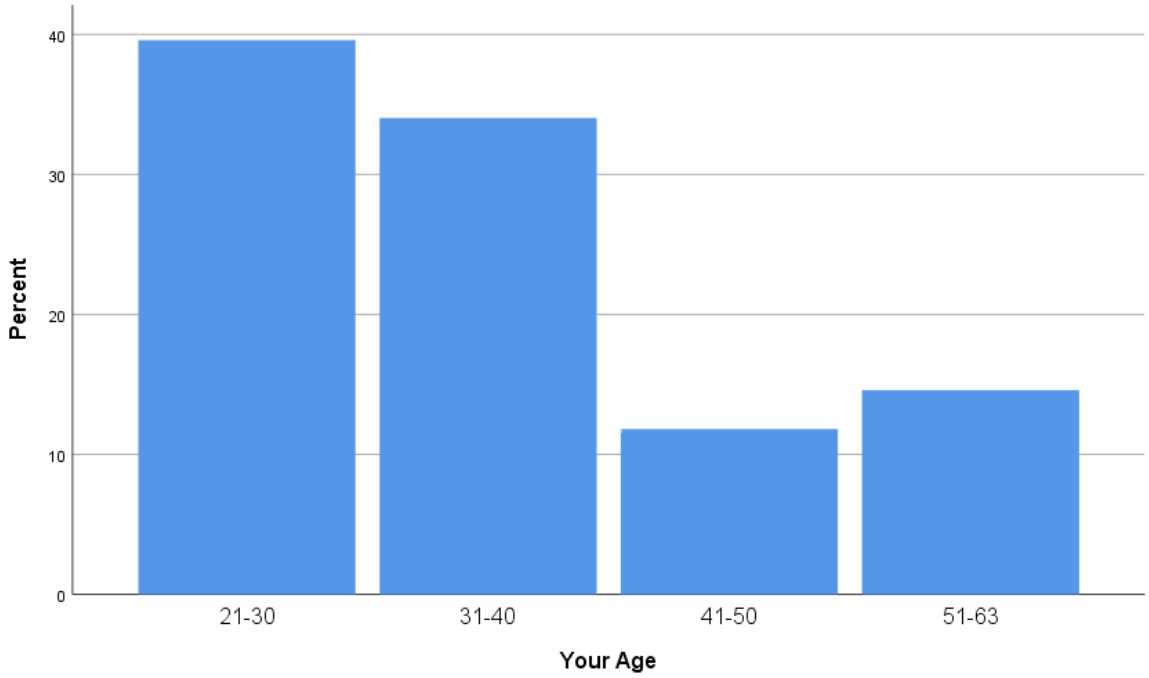

Figure 4-1: Graph of project managers' age groups

Gender:

There were 142 responses and 2 missing values. Unlike age, the respondents' gender showed minor influence on responses with only 5 questions with a p-value of < 0.05 (see Appendix 3.2. The pie chart below shows the percentage female to male respondents.

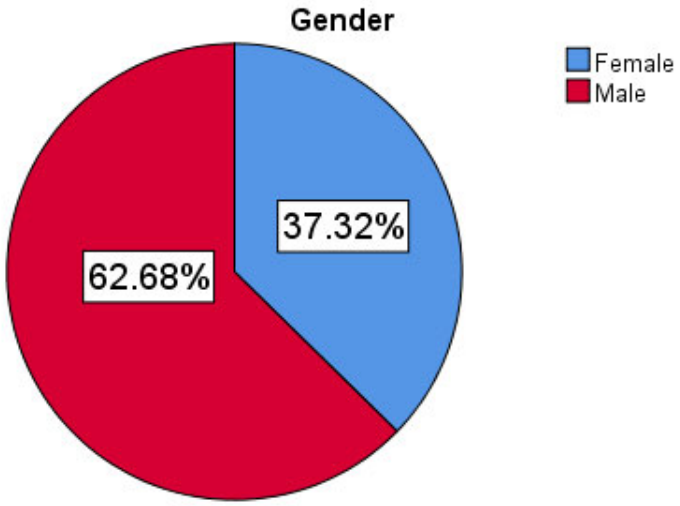

Figure 4-2: Graph of project managers' gender

Level of Responsibility:

The respondents' level of responsibility indicated by their designation is shown below in Figure 4.3. Almost 50% of responses showed statistical significance with a p-value of < 0.05 (see Appendix 3.3).

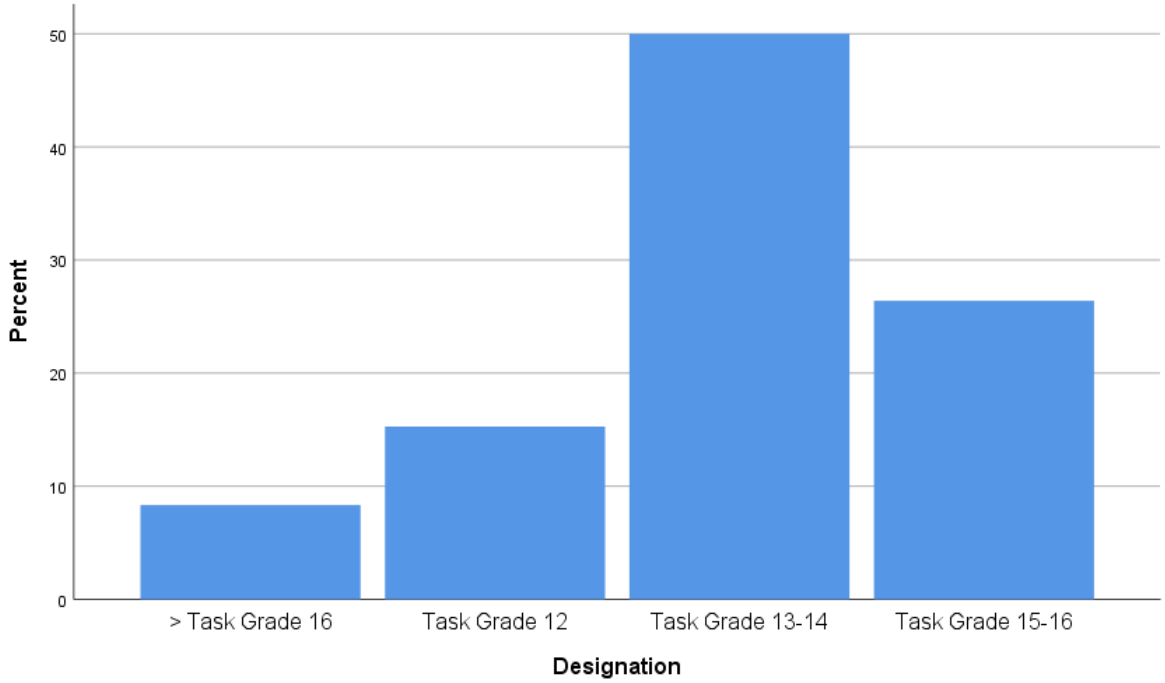

Figure 4-3: Graph of project managers' level of responsibility by designated task grades

Industry Experience:

Most project managers within the sample group have 6-10 years of experience within the industry with statistical significance varying among questions showing varying dependence of industrial experience to responses. With reference to Appendix 4.5, there is a consistent indication that project managers' perceptions of how SCM department communicates to them (section C questions as per Table 4.2) has some degree of dependence to industrial experience. Figure 4-4 below shows the distribution of industrial experience among project managers in the sample group.

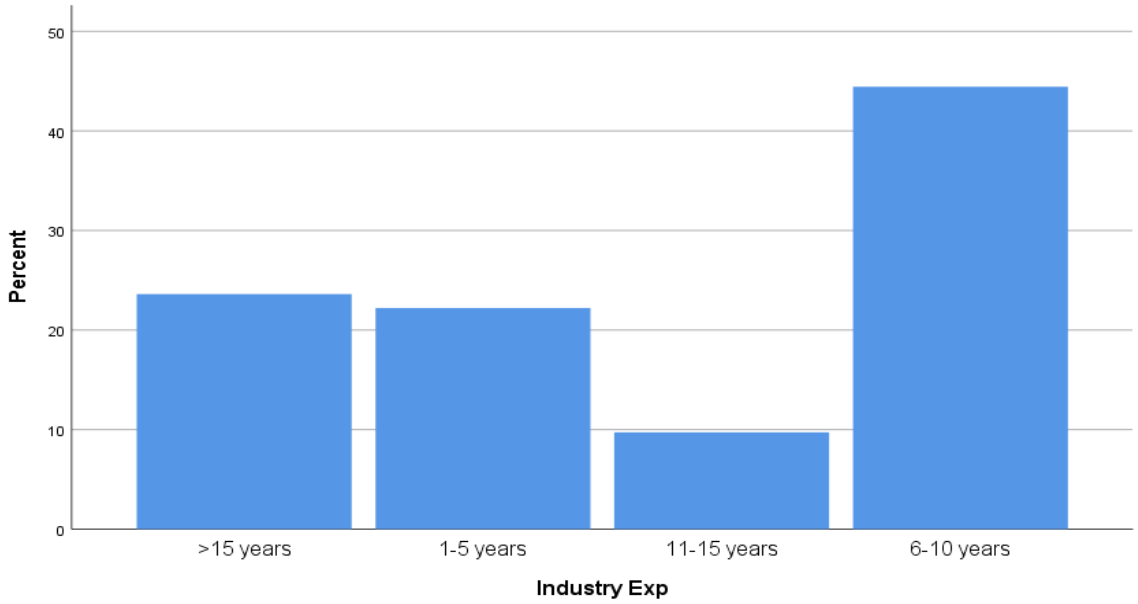

Figure 4-4: Graph of project managers' experience within the industry

Experience at eThekwini Municipality:

The majority of project managers within this sample group have 1-10 years of experience within the eThekwini Municipality. Project managers with experience between 11-15 years show a higher confidence in their personal abilities with respect to SCM knowledge (refer to Appendix 3.4). Figure 4-5 below shows the distribution of project managers' experience within the eThekwini municipality. Almost half of the questions showed p-values that were statistically significant implying possible dependencies on experience gained at the eThekwini municipality.

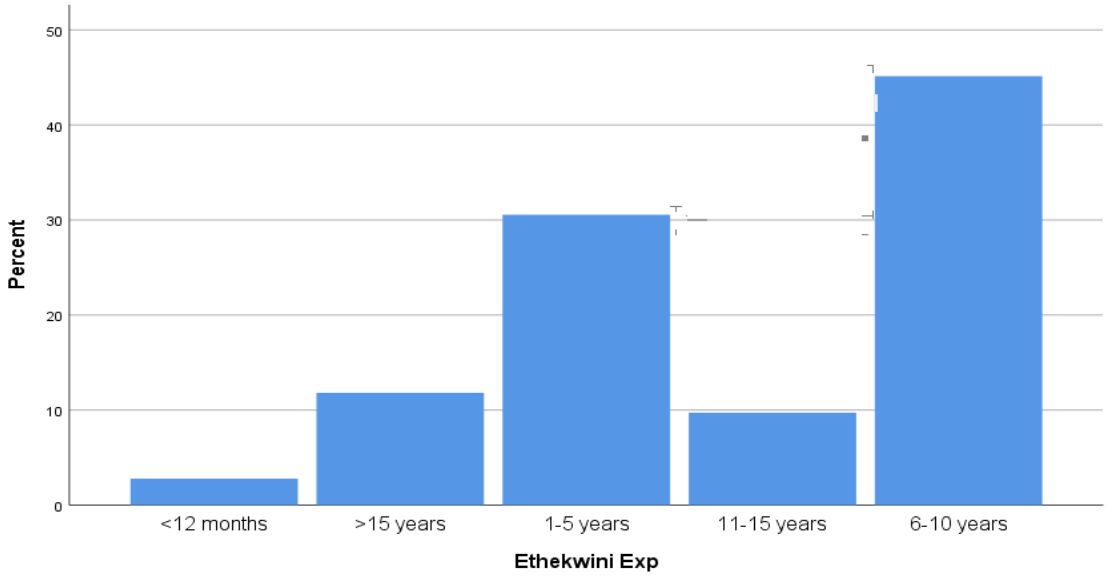

Figure 4-5:Graph of respondent's experience within eThekwini Municipality

4.2.2 Level of respondents personal confidence of SCM knowledge

Table 4-1:Perception of respondent's personal confidence in their SCM knowledge

Statements	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
B-1	4	**2.8**	21	**14.6**	38	**26.4**	81	**56.3**	4	**2.8**
B-2	2	**1.4**	30	**20.8**	34	**23.6**	72	**50**	6	**4.2**
B-3	2	**1.4**	30	**20.8**	34	**23.6**	72	**50**	6	**4.2**
B-4	6	**4.2**	6	**4.2**	24	**16.7**	90	**62.5**	18	**12.5**

B-1 I am confident with the knowledge I have of EM's supply chain processes.

B-2 I have made the time to read the City's Supply Chain Policy and follow amendments as they are published.

B-3 I understand the repercussions of non-compliance to supply chain processes.

B-4 My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.

More than 50% of respondents' agree with statements relating to their confidence in their knowledge of supply chain management. A significant percentage of responses showed that approximately 20% of project managers were not entirely confident with their knowledge of the SCM processes. A slightly higher percentage (approximately 23-26% of respondents had no opinion of statements B-1 to B-3 with a 16.7% having no opinion of statement B-4.

4.2.3 Interaction from SCM Department

Table 4-2:Project Manager's perceptions of interaction from SCM department

Statements	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
C-1	20	**13.9**	71	**49.3**	22	**15.3**	31	**21.5**	0	**0**
C-2	38	**26.4**	43	**29.9**	32	**22.2**	28	**19.4**	3	**2.1**
C-3	40	**27.8**	68	**47.2**	12	**8.3**	22	**15.3**	2	**1.4**
C-4	50	**34.7**	45	**31.3**	12	**8.3**	35	**24.3**	2	**1.4**
C-5	51	**35.4**	52	**36.1**	27	**18.8**	14	**9.7**	0	**0**
C-6	6	**4.2**	26	**18.1**	35	**24.3**	73	**50.7**	4	**2.8**

C-1 The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.

C-2 My knowledge of supply chain policy is predominantly through knowledge transfer efforts from the Supply Chain Management Unit officials.

C-3 The municipality has created time and resources for me to learn about how to manage the different types of tender processes.

C-4 I am aware of which supply chain management practitioner I should contact for specific supply chain queries.

C-5 The EM Supply Chain Unit communicates effectively to municipal line departments.

C-6 I have easily accessible information to evaluate eligibility of contractors.

Table 4.2 above reflects the respondents' perceptions of positive interactions from the Supply Chain Management department. Statements C-1 to C-5 show that more than half of the respondents disagree to strongly disagree. Responses to statement C-1 show that 63.2% of project managers do not believe that the municipality is making an effective effort to communicate updates to the SCM policy. 56.3% of responses to C-2 indicate that project managers participating in this study have not gained their primary knowledge about

the supply chain processes from the custodians of the supply chain policy. 75% of responses from participating project managers indicated that the municipality has not invested enough effort to train project managers on how to manage different types of tender processes as per responses to statement C-3. 66% of project managers are unaware of which supply chain management practitioner to contact for queries about supply chain management as per responses to statement C-4. 71.5% of project managers indicated that SCM department does not effectively communicate to line departments within eThekwini Municipality in accordance to responses from statement C5. 53.5% of project managers however, are in agreement with the availability of information required to assess the eligibility of contractors (C-6).

4.2.4 Understanding of bid documentation

Table 4-3:Project Managers' understanding of bid documentation process

Statements	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
D-1	24	**16.7**	41	**28.5**	25	**17.4**	44	**30.6**	10	**6.9**
D-2	17	**11.8**	54	**37.5**	26	**18.1**	41	**28.5**	4	**2.8**
D-3	15	**10.4**	58	**40.3**	24	**16.7**	41	**28.5**	6	**4.2**
D-4	15	**10.4**	54	**37.5**	30	**20.8**	43	**29.9**	2	**1.4**
D-5	0	**0**	21	**14.6**	17	**11.8**	88	**61.1**	18	**12.5**
D-6	4	**2.8**	34	**23.6**	27	**18.8**	65	**45.1**	14	**9.7**

D-1 Bid reports are standardised enough for the author to foresee what content is required.

D-2 I understand the requirements of the BID Specification Committee report each time I compile one.

D-3 I understand the requirements of the BID Evaluation Committee report each time I compile one.

D-4 I understand the requirements of the BID Adjudication Committee report each time I compile one.

D-5 I have a clear understanding of applying quality on a tender evaluation.

D-6 I am aware of the standard authorising signatures required within each bid report.

45.2% of participating project managers do not believe that bid documents are standardised enough to foresee the required content however, 40.6% of the project managers had also believed that the documents were standardised enough to foresee the required content. Statements D2-D4 refer to bid documentation. Less than 33% of project managers believe they understand the requirements of standard bid reports each time they compile one. A large majority of project managers (83.6%) believe they understand the application of quality to tender evaluation. 55.8% of project managers believe they understand the standard authorising signatures required for each bid report while only 26.4% believe the opposite.

4.2.5 Possible delays

Figure 4.5 below indicates a clear majority of 83.3% (as per Table 4.4) between project managers that disagree and strongly disagree with statement E-1 that supports no foreseen delays within the current supply chain processes. Only 5.56% agree with the statement. This is an indication that there are apparent delays within the processes.

Table 4-4:Frequency table of responses for Item E-1 'I have not encountered or do not foreseen delays in the supply chain in its current processes.'

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly disagree	86	59.7	**59.7**	59.7
	Disagree	34	23.6	**23.6**	83.3
	Neutral	16	11.1	**11.1**	94.4
	Agree	8	5.6	**5.6**	100.0
	Total	144	100.0	100.0	

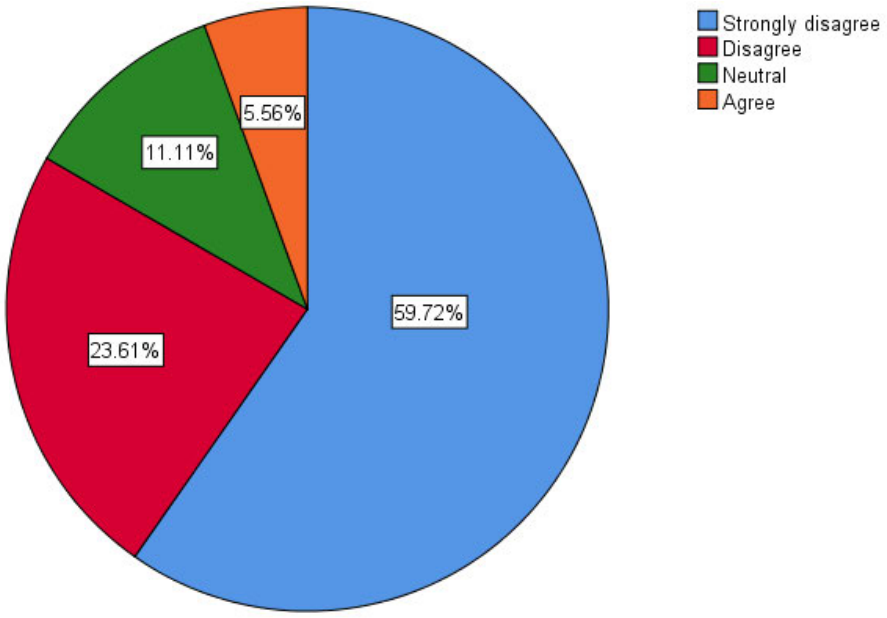

Figure 4-6: Perception of project managers with respect to delays within the current SCM process

Statement E-2 seeks to explore the possible delay with regard to a standard process (authorising signatures) that is specific to the SCM process used for competitive bidding. Table 4.5 below shows 50.7% of project managers reported more than 2 weeks required to complete authorising signatures for each bid report. 35.4% reported a 1-2 week requirement for circulation of authorising signatures. This in turn contributes a minimum of 3-6 weeks before awarding a competitive bid. Considering an average of 2 weeks per report, this implies a 6 week required circulation for reporting signatories before the contract is recommended for appointment.

Table 4-5:Frequency table of responses for Item E-2 'How many working days does it take on average to complete the required signatories on a BID Specification/ Evaluation/ Adjudication report Document?'

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	> 2 weeks	72	50.0	**50.7**	50.7
	1-2 days	2	1.4	**1.4**	52.1
	1-2 weeks	51	35.4	**35.9**	88.0

	3-4 days	4	2.8	**2.8**	90.8
	5-6 days	13	9.0	**9.2**	100.0
	Total	142	98.6	100.0	
Missing	System	2	1.4		
Total		144	100.0		

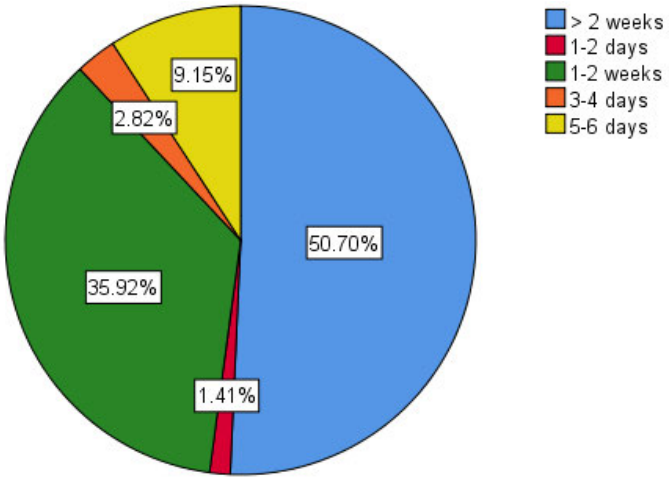

Figure 4-7: Project managers' experience on time taken for authorising bid documents

From the frequency data presented in Table 4-6 below, an average value of each group was considered as shown under 'Average Hours' to determine an average time a project manager spends attending a bid meeting. The weighted average was calculated as follows considering 2 missing responses:

Equation 1: Average hrs/ Project Manager waiting at BID meetings

$$Average\ Hrs = \frac{\sum(\text{Average hours} * \text{Frequency})}{\text{Total Respondents}}$$

$$Average\ Hrs = \frac{(1 * 10) + (7 * 18) + (1.5 * 13) + (3 * 54) + (5 * 47)}{142}$$

3.98 hours/person ≈ 4 hours/person

Table 4-6:Frequency table of responses for Item E-3 'I set aside ____hours from my work day if I need to attend a bid meeting.'

		Average Hours	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<1	1	10	6.9	**7**	7
	>6	7	18	12.5	**12.7**	19.7
	1-2	1.5	13	9	**9.2**	28.9
	2-4	3	54	37.5	**38**	66.9
	4-6	5	47	32.6	**33.1**	100
	Total		142	98.6	100	
Missing	System		2	1.4		
Total			144	100		

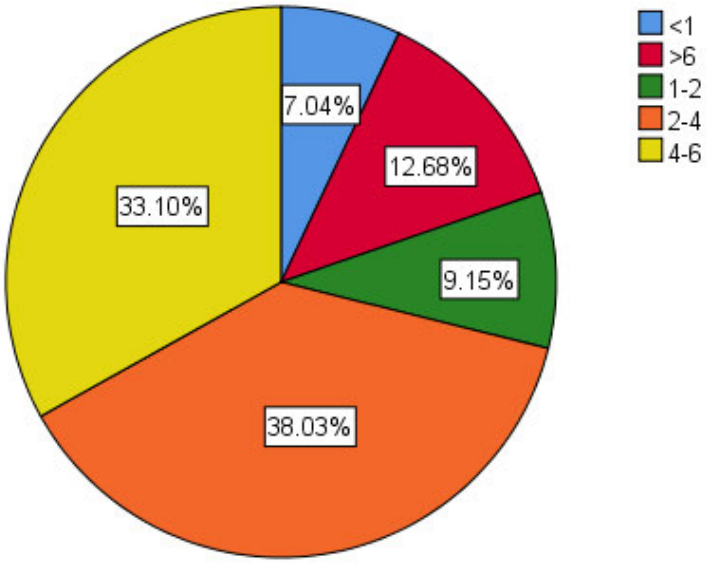

Figure 4-8:Project managers' experience of how many hours per meeting they set aside for bid meetings

The following table shows project managers responses to their experience of how long a competitive bid takes through its SCM cycle to letter of award. 76.4% of respondents experienced an SCM process of more than 4 months. This percentage was further analysed to understand the breakdown according to years of experience within the eThekwini Municipality and number of major projects managed in a year. Appendix 4.1 and 4.2 applies cross tabulation to experience within eThekwini Municipality and number of major projects per year respectively. These results are summarised in Table 4.7.

Table 4-7: Frequency table of responses to Item E-4 'From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)'

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 3 months	14	9.7	9.7	9.7
	< 4 months	16	11.1	11.1	20.8
	< month	2	1.4	1.4	22.2
	<2 months	2	1.4	1.4	23.6
	> 4 months	110	76.4	76.4	100.0
	Total	144	100.0	100.0	

Table 4-8:Summarised cross tabulation of statement E-4 against statements A-5 and A-7

		From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)					Total
		< 3 months	< 4 months	< month	<2 months	> 4 months	
	%Total	**0.097**	**0.111**	**0.014**	**0.014**	**0.764**	**100.00%**
Experience within eThekwini Municipality	<12 months	0.00%	0.00%	1.40%	0.00%	1.40%	2.80%
	1-5 years	4.20%	2.80%	0.00%	0.00%	23.60%	30.60%
	6-10 years	5.60%	6.90%	0.00%	0.00%	32.60%	45.10%
	11-15 years	0.00%	0.00%	0.00%	1.40%	8.30%	9.70%
	>15 years	0.00%	1.40%	0.00%	0.00%	10.40%	11.80%

On average, how many projects over R200 000 have you managed?	1-2	4.20%	6.90%	1.40%	0.00%	27.10%	39.60%
	3-4	4.20%	0.00%	0.00%	0.00%	27.10%	31.30%
	5-6	0.00%	1.40%	0.00%	0.00%	11.10%	12.50%
	>6	1.40%	2.80%	0.00%	1.40%	9.70%	15.30%
	none	0.00%	0.00%	0.00%	0.00%	1.40%	1.40%

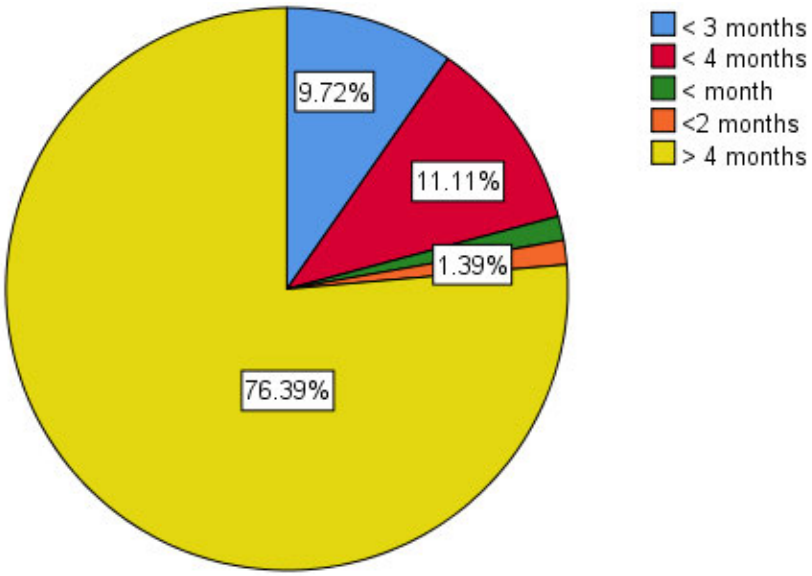

Figure 4-9:Project managers' experience of the length of SCM process from bid documentation to award

4.2.5 Project managers' opinions of operational supplements to the current SCM process

Table 4-9:Frequency table of project managers' opinions of possible improvements

Statements	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
F-1	3	**2.1**	5	**3.5**	11	**7.6**	58	**40.3**	67	**46.5**
F-2	3	**2.1**	1	**0.7**	8	**5.6**	61	**42.4**	69	**47.9**
F-3	3	**2.1**	3	**2.1**	10	**6.9**	45	**31.3**	83	**57.6**
F-4	6	**4.2**	7	**4.9**	12	**8.3**	62	**43.1**	57	**39.6**
F-5	5	**3.5**	3	**2.1**	5	**3.5**	58	**40.3**	73	**50.7**
F-6	7	**4.9**	1	**0.7**	8	**5.6**	46	**31.9**	82	**56.9**
F-7	3	**2.1**	3	**2.1**	15	**10.4**	56	**38.9**	67	**46.5**
F-8	0	**0**	17	**11.8**	40	**27.8**	30	**20.8**	57	**39.6**
F-9	4	**2.8**	0	**0**	2	**1.4**	66	**45.8**	72	**50**
F-10	3	**2.1**	7	**4.9**	16	**11.1**	54	**37.5**	64	**44.4**
F-11	4	**2.8**	5	**3.5**	44	**30.6**	35	**24.3**	56	**38.9**

F.1 I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.

F.2 I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.

F.3 I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.

F.4 I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.

F.5 Cancellations of BID meetings can be avoided with better planning.

F.6 Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.

F.7 BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.

F.8 There is a lack of technical representation on the bid committees.

F.9 Technical representation on supply chain committees will assist better judgement on engineering related matters.

F.10 The current timelines for bid approval processes affects my ability to manage project budgets.

F.11 There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.

The statements investigated in section F explored the reception of project managers to possible improvements to the existing SCM process. Between 86-90% of project managers believe that a designated compliance officer and supply chain process presentations will improve transfer of knowledge regarding contract documentation and process flows.

88.9% believe that a secure online system to circulate bid documents for authorising signatures can be used to improve the efficiency of the SCM process.

Statements F-5 to F7 refer to cancelled bid meetings and its effect on service delivery. 85-90% of respondents feel that bid meetings are not effectively planned and prioritised. Consequences of poor planning, as indicated by F-6, are delays in service delivery and negative impact on budget planning.

Although emergency projects (e.g resulting from abnormal weather) usually do not follow the complete bid process, the Bid Adjudication Committee is however required to assess emergency contracts before appointment and so delays resulting within this committee, delays appointments to address critical projects that may result in additional damages / contract costs if delayed. Responses for statement F-4 indicates that 82.6% of respondents agree to strongly agree that BAC committee members should inspect the site of an emergency contract to better understand its scope and urgency.

Statements F-8 and F-9 speak to the relevance of technical representation on bid committees. 60.4% believe that there is a lack of technical representation on the bid

committees' panel with a significant 27.8% noting a neutral response. 95.8% of responses from project managers believe that technical representation on the bid committees will improve judgement on engineering related matters.

81.9% of respondents to statement F-10 have experienced that current timelines of the SCM process affects their ability to manage project budgets with 11.1% noting a neutral response.

63.2% of responding project managers to statement F-11 believe that frivolous appeals cause delays in service delivery and a refundable cost should be charged to tenderers wishing to appeal during the appeal period. A significant 30.6% of responses noted a neutral response to this statement.

4.3 Summary

Survey results were divided into sections A to F. A – Demographics; B - Project managers level of confidence in the understanding of the SCM process; C – Project managers perception of communication from SCM department; D – Project managers perception of the bid documentation process; E – Possible delays in the process and F – Possible gaps causing delays. The respondents' demographics were largely between the ages of 21 to 40 with a 63% contribution from males and 37% from females. More than 70% of the respondents were above a task grade 13 with more than 50% having more than 6 years of experience within the industry and within the eThekwini Municipality. Section B responses showed that a little more than 50% of respondents were confident with their personal knowledge of SCM practices however a significant percentage had no opinion (could not gauge their experience) or were not confident with their experience. Section C responses showed that more than 55% of respondents felt that the SCM department was no making enough of an effort to transfer knowledge to the users (project managers) supply chain processes. Section D responses showed that half of the respondents believed that documents were not standardised enough to foresee the required content and only 33% indicate they understand the requirements of bid reports. 83% of respondents understand the application of quality criteria on bids and 55% believe they understand the required signatories for bid documents each time they compile a document. Section E presented the possible delays within the current eThekwini supply chain. With an 83% of respondents

indicating they believe there is indeed delays within the supply chain, 50% of respondents reported they experience more than 2 weeks for the circulation of authorising signatures, 76% indicated they experienced a period of more than 4 months to get a letter of award for projects. Using a weighted average method, it was calculated that on average, project managers spend 4 hours unproductively waiting at bid meetings for bid outcomes or queries. Section F displayed the responses to the possible supplements to the current supply chain process within which more than 80% agreed to most suggestions. 63% agree that frivolous appeals cause avoidable delays.

5. CHAPTER FIVE

Discussion

5.1 Introduction

The following sections will discuss the findings of the study and link them to literature. The discussion will proceed from understanding the project managers' perceptions of current supply chain practices (objective i) as well as quantify the percentage of those that are dissatisfied and to what degree (objective ii). The section to follow will identify areas that wasteful activities within the supply chain before moving to quantify the value of the wasteful activities (objective iii). The penultimate section will advise on appropriate lean tools to be used to address these wasteful activities (objective iv) before summarising the discussion.

5.2 Project Managers Perceptions of the Current SCM Process at eThekwini Municipality

To tie this discussion back to what the theory states, project managers within the public space are driven by service delivery and not profit (Van der Waldt, 2011) where Singh and Jayraman (2013) relate the good service delivery to a well performing supply chain. Hence project managers play a vital role in the implementation of the supply chain management process. Within the eThekwini municipality, these project managers are involved and sometimes entirely responsible for the demand management stage of projects before carrying the project through to the acquisition and subsequent stages. The Human Settlements, Engineering and Transport cluster is responsible for non-revenue major infrastructure projects, of which most are not extended to its disposal management stage by the same project manager that had initiated the demand and acquisition management stages. This is because of the lifespan of most infrastructure. The project managers' perceptions of how effectively he/she can proceed through the supply chain process in its current state is invaluable information to improve on its efficiency.

How project managers perceive the efficiency of the current supply chain was investigated by probing their knowledge and confidence in supply chain processes within the municipality, analysing their responses to how SCM officials communicated information

to them in a support role and their opinion of how supply chain documentation is structured and managed in its current form.

As Ambe and Bedenhorst-Weiss (2012) highlighted, a key success factor to a supply chain, is knowledgeable supply chain practitioners and proper structures. Without appropriate and skilled SCM practitioners, the potential for knowledge transfer to project managers responsible for major city projects is unlikely. The 2015 Public Sector Supply Chain Review also finds that SCM practitioners often do not have the understanding they need to guide and educate the stakeholders involved in the process (South African Government, 2016). This is closely related to the project manager's confidence in his/her own knowledge of supply chain practices within the organisation. The study shows that although just over 50% of respondents agree with statements relating to their confidence in SCM practices, there was just over 40% of respondents that disagree or have a neutral opinion of the same statements.

The internal risks that supply chain processes are exposed to as identified by the North West Provincial Government, have been asserted by the project manager's responses to questions interrogating their perception of communication from the eThekwini SCM department. The internal risks identified by the NWPG (2017), include risks related to people, processes and systems. Effectively managing these risks should address issues or gaps in the smooth flow within the value chain.

The percentage of representative population that are dissatisfied with the current supply chain process are linked to all three internal risks. Only 50% of respondents indicated that they agree with statements relating to their confidence and knowledge of the supply chain processes in place. This leaves a significant gap of project managers that are not sure (either disagree or neutral) about or invested in the processes currently employed. An efficient project manager well equipped with the knowledge and understanding of the process will be efficient in carrying out all stages of the supply chain process.

Brill et al. (2006) found that competencies related to effective project managers include problem solving expertise, leadership expertise, context knowledge, analytical expertise, communication expertise, project administration expertise and tools expertise. While most of these competencies are independent of the supply chain process being used, context knowledge and tools expertise are dependant competencies that are a result of dynamic systems.

Change of policies, procedures and systems affect the level of knowledge and expertise the project manager has at his/her disposal for efficient foresight on subsequent stages in the supply chain. How project managers view the effectiveness of documentation management within the eThekwini Municipality can be seen as the degree of context knowledge competency. Nearly half of project managers (45.2%) do not believe that bid documents are standardised enough to foresee the required content with less than 33% understanding the requirements of bid documentation each time they compile a bid document and only 55.8% of project managers understanding the list of authorising signatories for the specific document.

Having only half the population of project managers comfortably understand the supply chain management processes employed by eThekwini Municipality creates internal risks to a successful supply chain process, internal risks that can be controlled in order to avoid delays. The *Lack of Skills and Knowledge* was identified by the South African Government (2016) as one of the challenges in supply chains that affect efficient service delivery.

5.3 Wasteful Activities within the Value Chain

Section 4.2.5 details the results of the questionnaire that investigated the areas of possible delays. These were quantifiable delays under items E-1 to E4. A clear majority of 83.3% of responses indicate that there are indeed delays within the current supply chain process. The study results show the areas that were identified as open to risk in the form of delays and a waste of council resources were compiling of reports, circulation of reports and attending bid meetings. Circulation of reports and attendance of bid meetings are not included in the flowchart of the Ethekwini Supply Chain Process as indicated in Figure 2.5. The boxed out stages of the process indicate the process carried out by the project manager. The process was modified to include all tasks carried out by the project manager in Figure 5.1 below.

Compiling bid reports have been identified as a risk to delay with changing processes and policies however the extent of this study was unable to quantify the standard time a project manager should take for a document verses the time taken to compile and complete reports under the current process. The 45.2% of project managers that did not believe bid documents were standardised enough to foresee the required content indicates that there is

a significant shortfall in understanding documentation and its relevant content. This is attributed to the poor communication and transfer of knowledge by compliance officials down to project management level.

Circulating documents for the relevant authorising signatures before a bid meeting takes a significant amount of time as shown in the results from Item E-2. 50.7% of respondents said it takes on average more than two weeks to circulate a document for the required signatories. 35.9% said it takes them between one and two weeks to complete the required signatories. Two weeks can then be accepted as the average time taken to circulate a bid document for authorising signatories.

Attending bid meetings is required by the author of the document that was submitted for approval by the bid committee. Project managers are to wait outside the meeting room for the committee to deliberate and respond with an outcome or query. An agenda is sent out to all project managers / representatives a week before the meeting. This agenda is not followed in order of the items presented. Projects are sometimes grouped by department and addressed while the respective representatives are before the committee. It is for these reasons and others that project managers are expected to wait. The average time for each representative according to responses for item E-3 is four hours.

Aside from tasks that are carried out by the project manager, once the bid process is completed and moves into the appeal stage, there are risks to delays that vary with the extent of appeals. The award of the project is stalled until all appeals within the appeals period are investigated and responded to. Most times these appeals are frivolous. Appeals are submit at no cost and therefore can be submitted by any contending tenderer. *Poor Supply Chain Integration* highlighted in the theory includes delays in approval processes at committee meetings, dates that committees meet, referrals of bid applications etc (Lynch (2018). This has been demonstrated through the results gained from the eThekwini Municipality.

5.4 Quantifying the Wasteful Activities Identified

The following flowchart was generated using the existing published flowchart (EM, 2012) and study results. A competitive bid following the complete supply chain management process is estimated to take a minimum of 19 working weeks which equates to approximately 5 months that can extend to well over 7 months with appeals, differed reports and inefficient guidance, support and information.

It should be noted that this flowchart only represents the process and current associated timelines for each stage in the process. It does not represent the associated resources. The wasteful resources identified are described in Table 5.1.

Figure 5-1:Modified Flowchart of eThekwini Municipality Supply Chain Management Process

Project managers within the Human Settlements Engineering and Transport cluster include employees that are employed as technicians, technologists, engineers, senior engineers, architects, mangers, senior managers etc. Their tasks include among others project management. Being employed in the public service, other tasks may include liaising with public of infrastructure matters, attending to requests from external organisations that include state owned enterprises and private entities, development issues and the like. Having these individuals stand idle is not only a waste of council resources but also a domino effect on their other job functions. Table 5-1 quantifies the monetary value of this wasted resource for the average of four hours that are spent waiting for bid committee queries.

Table 5-1:Hourly Rates for Project Managers by Task (Salary) Grade

Task Grade	Annual Remuneration (Average)	Hourly Rate	Hourly Rate x 4hours
12	R30 000.00	R180.00	R720.00
13	R33 800.00	R201.00	R804.00
14	R38 100.00	R227.00	R907.00
15	R44 000.00	R262.00	R1048.00
16	R49 500.00	R294.00	R1179.00

Source (EM, 2018c)

It is not a wasteful resources to have the project manager present when reviewing bid reports submitted for approval however it is a wasteful resource to have these individuals waiting idle while doing so. It would be more efficient to have work stations available to them so productivity does not necessarily stop altogether. Work stations that include access to an internet connection, appropriate and adequate seating and desk space etc. At present employees up to senior management level wait for up to four hours with access limited to their mobile phones. Table 5.1 shows the wasteful resources in terms of monetary value of underused skills.

5.5 Applications of Lean Management to Improve the SCM Process

The application of 'lean' requires the individuals involved in all related activities to think lean at all times. For a sustainable lean system, the working environment needs to support lean activities and support new ideas that adapt systems to improve on lean. Since the Lean concept was born to the manufacturing industry, adapting it for the application in the public sector needs some innovative adjustments.

Value Stream Mapping is one such tricky but useful tool to apply within public sector supply chain processes. As supported by Ford & Martin (2016), value stream mapping is difficult but not impossible to apply to public sectors since there is often no clear definition of the word 'value' at the starting point. 'Value' to a public organisation is in fact how much can be done for the people it serves at the lowest cost, at the shortest time and within quality standards. This translates to increasing the level of service delivery to the general public. The study addressed, in parts, the factor of cost and time however did not address the issue of quality which is part of the performance management stage of the supply chain. Ford and Martin (2016) go on to say that value stream mapping has become an imperative in the public sector and can, if applied correctly, be used to the organisations advantage while considering that political influence on change management needs to constantly be accommodated. A simplified form of value stream mapping was used in the methodology of this study however only part of the complete supply chain was analysed.

Kaizen is a culture of lean thinking within an organisation that supports continual improvement, elimination of waste and a workforce that is constantly engaged in lean by wanting to improve (Kaizen Institute, 2013). In a public sector setting where increased pressure from politicians and public to deliver and auditors to deliver within compliance budgets and quality products and services, there is an increasing need to improve efficiency of service delivery. There is also an increasing need for the workforce to support that efficient service delivery by thinking and behaving in a lean manor. The eThekwini Municipality's first effort in Kaizen should be to educate the workforce about lean thinking and incorporate it into their vocabulary.

KPI's or Key Performance Indicators are a means of measuring lean transformation within an organisation (Lean Accountants, 2016). When instituting lean within an organisation, it requires that its progress is monitored and continuously improved on. KPI's are a tool that can be used to track and measure how well the organisation is doing against the strategy

and goals that were set for that specified time period. The eThekwini Municipality currently uses KPI's to measure the agreed KPA's (Key Performance Areas) of employees that affect the employee's performance bonus at the end of the financial year. As indicated by results, there is a clear need for a tracking system to understand where delays occur along the supply chain with the individual projects. This will hold each role-player accountable for the delay. Therefore each role-player's KPI's should be adjusted to include a Key Performance Area that dictates the time stipulation for each project that he/she encounters.

PDCA or Plan Do Check and Act also known as the Deming Cycle or Deming Wheel, introduced by W. Edwards Deming (Johnson, 2002). Plan stage recognises an opportunity, the Do stage tests the change, the Check stage reviews and analyses the results of the test for future learnings and the Act stage allows for the implementation of the learnings gained in the Check stage and if there are no outcomes gained then repeat the cycle (Johnson, 2002).

5.6 Summary

The execution of the supply chain management process is carried out by the project managers responsible for the respective projects. It was found by analysing the current supply chain process that the length of the process is approximately 5 months with possible delays extending to further weeks as a result of e.g. deferments or appeals. It is therefore essential that these individuals are well equipped with the supply chain information in order to avoid delays and wasted resources within the process. As identified by the 2015 Supply Chain Review, one of the challenges to efficient supply chains is the lack of competent supply chain practitioners. This was supported by internal risks to supply chains identified by the North West Province Government which included risks with people, processes and systems that control supply chains. Results show that approximately half of the respondents believe that there is indeed a lack of knowledge and challenges in keeping up with processes that prevents efficient managing of the supply chain process. This lends to poor transfer of knowledge and support from supply chain officials. A majority of 83% of respondents have indicated that there are indeed delays within the current setup of the supply chain. Wasteful activities identified within the eThekwini Municipality supply chain including compiling of bid documents where 45.2% of project

managers did not believe that documents were standardised enough; circulating documents where 50.7% of respondents experienced an excess of two weeks to circulate documents for authorisation and a misuse of skills resulting from project managers attending bid meetings. Bid meetings accounted for a loss of revenue from an average of 4 hours of project manager's unproductive time that ranged from R720 – R1179 /4 hours. Some applications of lean management identified for the improvement of the eThekwini Municipality supply chain process are value stream mapping, kaizen, KPI's and PDCA.

6. CHAPTER SIX

Conclusions and Recommendations

6.1 Introduction

This chapter will first summarise the contents of the study. The implications of the study to the eThekwini Municipality and the municipal/public sector as a whole will then be detailed before understanding the limitations of the study's extent and how the results were effects. The chapter will progress too provide recommendations to solving the problem statement described in chapter one and advise on possible extensions to the study for future research.

6.2 Conclusion

The research objectives were i) to quantify the percentage of participants that were dissatisfied with the current supply chain process; ii) to identify possible wasteful activities within the acquisition stage; iii) to quantify the possible cost of wasteful activities and finally iv) to identify possible lean practices to eliminate wasteful activities. All four of the research objectives identified were achieved. Objective I quantified that nearly half of the respondents were not confident with their personal knowledge of SCM practices and did not believe that supply chain practitioners were doing enough to change that. Objective II identified wasteful activities such as duration of compiling reports, attending committee meetings and circulation of reports for committee meetings. Objective III quantified these wasteful activities contributing to a supply chain process between 5 and 7 months and wasted resources up to R2 million during skilled employees waiting at committee meetings. Objective IV identified possible lean management practices to address these gaps as Value Stream Mapping, Kaizen, KPI's (Key Performance Indicators) and PDCA (Pland Do Check Act).

Municipal government is the closest sphere of government to the people and are responsible for service delivery through revenue and non-revenue generating services and infrastructure. Mande (2015) wrote of major eThekwini Municipality infrastructure projects being stalled for reasons that included delays in awarding contracts. This is the result of issues within the supply chain management processes employed by the municipality. All four research objectives were achieved with some more definitively so

than others. The Likert scale option of 'neutral' was realised to be unnecessary in hindsight for some questions and could have improved on certain outcomes if excluded.

Supply Chain Management (SCM) is the management of all activities related to getting services from the source to the consumer. In the public sector is driven by service delivery as the value and not profit. The stages within the SCM process are Demand Management; Acquisition Management; Logistics Management; Disposal Management; Risk Management and Performance Management. Since the life cycle of infrastructure projects are rather long in relation to the period of employ of the initiating project managers, only the demand and acquisition stages could be investigated within this study. Some challenges to SCM identified in literature include but are not limited to, lack of skills and knowledge of supply chain practitioners and users of the process, lack of clear roles and responsibilities and lack of integration of systems.

In order to create a more efficient supply chain that maximizes the benefit to the end users (general public), the wasteful activities including waste of time, resources and money need to be eliminated. This is where 'Lean Principles' play an important function. Lean is a concept born from the automotive industry to improve on production and has since been applied to all spheres of business. Lean management is a management approach that assesses each activity of a process to eliminate waste using the five principles of lean (defining the value to the customer, mapping the value stream, creating a more efficient flow, establishing a 'pull' system that reduces standing inventory and finally pursuing perfection) Womack & Jones (1996).

The aim of the study was to improve the current supply chain practices at the eThekwini Municipality by using the perspectives of project managers from the Human Settlements, Engineering and Transport cluster that use the process to carry major council projects through to award. The researcher chose a quantitative descriptive survey and distributed the survey using an electronic questionnaire link to Google Forms. The questionnaire included 39 questions divided into two sections that were separated by demographics and perceptions of the supply chain process structured using a Likert scale. 160 subjects were selected through random sampling representing a 250 population size with 144 responses received. The study's reliability was measured using Chronbach's alpha.

Survey results were divided into sections A to F. A – Demographics; B - Project managers level of confidence in the understanding of the SCM process; C – Project managers

perception of communication from SCM department; D – Project managers perception of the bid documentation process; E – Possible delays in the process and F – Possible gaps causing delays.

The respondents' demographics were largely between the ages of 21 to 40 with a 63% contribution from males and 37% from females. More than 70% of the respondents were above a task grade 13 with more than 50% having more than 6 years of experience within the industry and within the eThekwini Municipality.

A little more than 50% of respondents were confident with their personal knowledge of SCM practices however a significant percentage had no opinion (could not gauge their experience) or were not confident with their experience. More than 55% of respondents felt that the SCM department was not making enough of an effort to transfer knowledge to the users (project managers) supply chain processes. Half of the respondents believed that documents were not standardised enough to foresee the required content and only 33% indicated they understand the requirements of bid reports.

83% of respondents understand the application of quality criteria on bids and 55% believe they understand the required signatories for bid documents each time they compile a document. 83% of respondents indicated they believe there is indeed delays within the supply chain, 50% of respondents reported they experience more than 2 weeks for the circulation of authorising signatures, 76% indicated they experienced a period of more than 4 months to get a letter of award for projects. Using a weighted average method, it was calculated that on average, project managers spend 4 hours unproductively waiting at bid meetings for bid outcomes or queries. Possible supplements to the current supply chain process were found to be that more than 80% agreed to most suggestions. 63% agree that frivolous appeals cause avoidable delays.

The execution of the supply chain management process is carried out by the project managers responsible for the respective projects. It was found by analysing the current supply chain process that the length of the process is approximately 5 months with possible delays extending to further weeks as a result of e.g. deferments or appeals. It is therefore essential that these individuals are well equipped with the supply chain information in order to avoid delays and wasted resources within the process.

As identified by the 2015 Supply Chain Review, one of the challenges to efficient supply chains is the lack of competent supply chain practitioners. This was supported by internal

risks to supply chains identified by the North West Province Government which included risks with people, processes and systems that control supply chains. Results showed that approximately half of the respondents believe that there is indeed a lack of knowledge and challenges in keeping up with processes that prevents efficient managing of the supply chain process. This showed poor transfer of knowledge and support from supply chain officials. A majority of 83% of respondents have indicated that there are indeed delays within the current setup of the supply chain. Wasteful activities identified within the eThekwini Municipality supply chain including compiling of bid documents where 45.2% of project managers did not believe that documents were standardised enough; circulating documents where 50.7% of respondents experienced an excess of two weeks to circulate documents for authorisation and a misuse of skills resulting from project managers attending bid meetings. Bid meetings accounted for a loss of revenue from an average of 4 hours of project manager's unproductive time that ranged from R720 – R1179 /4 hours. Some applications of lean management identified for the improvement of the eThekwini Municipality supply chain process are value stream mapping, kaizen, KPI's and PDCA.

6.3 Implications of this Research

This study has investigated how lean management can be used through the acquisition stage of the supply chain process to improve efficiency within eThekwini Municipality in an effort towards improved service delivery by reducing time and cost to commence service delivery. The results of this study may be used to apply similar lean supply chain methods to other municipal entities within South Africa.

6.4 Limitations of the Study

- Revenue generating units such as Electricity, Water and Sanitation and Solid Waste were excluded from this study as the contracts put in place for these units are long term and high value which follow the bid process less frequently than smaller lower value projects.
- Procurement process for emergency contracts were not covered in this study.
- Additional delays may have not been accounted for due to the use of multiple choice set questionnaire.

6.5 Recommendations to Solve the Research Problem

- An in depth value stream mapping should be conducted by supplementing this study with interviewing all users of the procurement process so to account for all possible delays that may have been excluded by the questionnaire.

- Educate workforce about lean and incorporate it into their vocabulary. Creating awareness of lean or Kaizen, is a culture change that needs to be strategized from the top down as it needs to be part of the vision of the organisation. It should be accommodated for through an implementation plan.

- Supply chain practitioners should be required to make themselves more visible line departments and transfer knowledge of changing supply chain policies to existing users of the supply chain as well orientate new employees to the policies and procedures in place.

- KPI's should be adjusted to monitor the expected transfer of skills to supply chain users and monitor the implementation by users of the same.

- The eThekwini Municipality should invest time and resources in standardising bid documents through change management so to reduce time and effort in interpretation of the contents of the documents.

- Each department should have a standard authorising signatory list regardless of the project scope that is published on a secure online circulation platform so to eliminate authors from physically transporting the original document. This can drastically reduce time taken to circulate documents for authorising signatories before bid meetings as well as allow the author to track the documents progress in a transparent way. The element of transparency to all demands a level of urgency involved since the stages of delays are visible to all.

- The issue to delays during document circulation can be mitigated by using an online document transfer and verification system that is integrated with the existing information systems platform. This will encourage real time feedback for amendments and corrections to documents rather than manually transporting the document to each required signatory. It will also encourage transparency within the process.

- To eliminate wasted resources of skills, project managers should be provided with temporary workstations while waiting for bid meeting outcomes or queries.

6.6 Recommendations for Future Studies

- Extend the study to all clusters within the eThekwini Municipality.
- Include interviews to incorporate perceptions of managers and department heads as well as supply chain management practitioners.
- Compare efficacy of supply chains across major municipal metros within South Africa.
- Understand the influence of change management (City Management) on supply chain efficacy.

6.7 Summary

The eThekwini Municipality is responsible for infrastructure and service delivery which is largely achieved through the procurement process. The award of many major city infrastructure projects have been delayed in the past (Mande, 2015). Supply chain management issues play a role in the efficient delivery of projects so to understand the reasons for operational delays incurred in service delivery, this study focused on the users of the supply chain management (SCM) process i.e. project managers (PM's). The study was set in the Human Settlements, Engineering and Transport Cluster. PM's perceptions of the current supply chain were probed to quantify the number of dissatisfied PM's, identify wasteful activities and their relative quantifiable effect.

The study ultimately recommended lean tools to bridge the gaps within the SCM process. Some of the findings included the very pronounced 83% of PM's that were dissatisfied with the current SCM process, an alarming half of the respondents showed a working understanding of the process and belief that knowledge is being transferred to them effectively from the supply chain practitioners. PM's indicated an average of 4 hours are wasted unproductively waiting at bid meetings for outcomes and/or queries on their reports. It was also found that the supply chain process takes an average of 5 months to get through the bid process to award of a contract. The study was limited to non-revenue

standard competitive bidding process and may have overlooked additional delays such as political influences due to the nature of the type of survey tool. The findings of this study can be applied to similar municipal entities within South Africa.

The recommendations included applying lean tools such as Value Stream Mapping (VSM), Kaizen and KPI's. I was also recommended that the eThekwini Municipality invest more time and resources in standardising the documentation process or alternatively an efficient way of updating PM's on the latest developments with policies and procedures. The 4 hours of unproductive time can be curbed by providing work stations for those waiting at bid meetings. This study can be extended to all clusters of the municipality with different survey tools that may cover all possible areas of waste within the city's supply chain process. It can also then compare the efficacy of supply chains across similar municipal entities which can be used to share useful knowledge to decision makers within the municipalities.

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Appendix 1 : Survey Questionnaire

THE APPLICATION OF LEAN MANAGEMENT PRACTICES IN THE SUPPLY CHAIN UNIT OF ETHEKWINI MUNICIPALITY

This Questionnaire is divided into 2 sections.
Section A : Demographic Information
Section B : Current Supply Chain Processes

* Required

Section A: Demographic Information

This section will require information related to your age, years of experience in the industry and in the relevant segment in the supply chain.

1. **Your Age**
   Mark only one oval.
   - ◯ 21-30
   - ◯ 31-40
   - ◯ 41-50
   - ◯ 51-63

2. **Your Gender**
   Mark only one oval.
   - ◯ Female
   - ◯ Male
   - ◯ Prefer not to say

3. **Your level of responsibility**
   Mark only one oval.
   - ◯ Task Grade 12
   - ◯ Task Grade 13-14
   - ◯ Task Grade 15-16
   - ◯ > Task Grade 16

4. **How many years of experience do you have in the current industry?**
   Mark only one oval.
   - ◯ <12 months
   - ◯ 1-5 years
   - ◯ 6-10 years
   - ◯ 11-15 years
   - ◯ >15 years

5. **How many years have you been employed by the eThekwini Municipality?**
Mark only one oval.

- ◯ <12 months
- ◯ 1-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ >15 years

6. **Have you been involved in the management of projects that exceed the value of R200 000.00 for the Ethekwini Municipality.** *
Mark only one oval.

- ◯ Yes
- ◯ No *After the last question in this section, start this form over.*

Section B : Current Supply Chain Processes

N.B The Ethekwini Municipality will be abbreviated to EM for ease of reference in the following questions. Please mark one of the answers for each question.

7. **On average, how many projects over R200 000.00 have you managed per year?**
Mark only one oval.

- ◯ 1-2
- ◯ 3-4
- ◯ 5-6
- ◯ >6
- ◯ none

8. **I am confident with the knowledge I have of EM's supply chain processes.**
Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

9. **The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.**
Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

10. **I have made the time to read the City's Supply Chain Policy and follow amendments as they are published.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

11. **My knowledge of supply chain policy is predominantly through knowledge transfer efforts from the Supply Chain Management Unit officials.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

12. **The municipality has created time and resources for me to learn about how to manage the different types of tender processes.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

13. **I understand the repercussions of non-compliance to supply chain processes.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

14. **My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

15. **I am aware of which supply chain management practitioner I should contact for specific supply chain queries.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

16. **I understand the requirements of the BID Specification Committee report each time I compile one.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

17. **I understand the requirements of the BID Evaluation Committee report each time I compile one.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

18. **I understand the requirements of the BID Adjudication Committee report each time I compile one.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

19. **Bid reports are standardised enough for the author to foresee what content is required.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

20. **I am aware of the standard authorising signatures required within each bid report.**
Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

21. **I have a clear understanding of applying quality on a tender evaluation.**
Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

22. **I have easily accessible information to evaluate eligibility of contractors.**
Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

23. **The EM Supply Chain Unit communicates effectively to municipal line depatments.**
Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

24. **The EM supply chain processes make sufficient provision for emergency procurement.**
Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

25. **I have not encountered or do not foresee delays in the supply chain in its current processes.**

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

26. **I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.**

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

27. **I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.**

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

28. **I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.**

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

29. **I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.**

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

30. **Cancellations of BID meetings can be avoided with better planning.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

31. **Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

32. **BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

33. **There is a lack of technical representation on the bid committees.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

34. **Technical representation on supply chain committees will assist better judgement on engineering related matters.**
Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

35. **The current timelines for bid approval processes affects my ability to manage project budgets.**

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

36. **There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.**

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

37. **How many working days does it take on average to complete the required signatories on a BID Specification/Evaluation/Adjudication report Document?**

Mark only one oval.

- ◯ 1-2 days
- ◯ 3-4 days
- ◯ 5-6 days
- ◯ 1-2 weeks
- ◯ > 2 weeks

38. **I set aside ____hours from my work day if I need to attend a bid meeting.**

Mark only one oval.

- ◯ <1
- ◯ 1-2
- ◯ 2-4
- ◯ 4-6
- ◯ >6

39. **From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)**

Mark only one oval.

- ◯ < month
- ◯ <2 months
- ◯ < 3 months
- ◯ < 4 months
- ◯ > 4 months

Appendix 2 : Reliability : Chronbach's Alpha Tests

2.1 : Reliability of Section B Items

Reliability Statistics

Cronbach's Alpha	N of Items
,460	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I am confident with the knowledge I have of EM's supply chain processes.	9,90	4,863	,172	,463
I have made the time to read the City's Supply Chain Policy and follow amendments as they are published.	10,02	4,328	,242	,409
I understand the repercussions of non-compliance to supply chain processes.	9,62	4,028	,353	,313
My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.	10,57	2,848	,319	,345

2.2 : Reliability of Section C Items

Reliability Statistics

Cronbach's Alpha	N of Items
,785	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.	12,15	14,046	,564	,746
My knowledge of supply chain policy is predominantly through knowledge transfer efforts from the Supply Chain Management Unit officials.	12,19	14,489	,389	,790
The municipality has created time and resources for me to learn about how to manage the different types of tender processes.	12,44	12,920	,689	,714
I am aware of which supply chain management practitioner I should contact for specific supply chain queries.	12,33	13,049	,529	,756
The EM Supply Chain Unit communicates effectively to municipal line depatments.	12,57	13,296	,697	,715
I have easily accessible information to evaluate eligibility of contractors.	11,30	15,428	,385	,785

2.3 : Reliability of Section D Items

Reliability Statistics

Cronbach's Alpha	N of Items
,843	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Bid reports are standardised enough for the author to foresee what content is required.	17,58	20,528	,588	,824
I understand the requirements of the BID Specification Committee report each time I compile one.	17,67	20,961	,645	,813
I understand the requirements of the BID Evaluation Committee report each time I compile one.	17,65	20,213	,724	,800
I understand the requirements of the BID Adjudication Committee report each time I compile one.	17,67	19,812	,834	,784
I have a clear understanding of applying quality on a tender evaluation.	16,68	24,133	,434	,843
I am aware of the standard authorising signatures required within each bid report.	17,05	21,764	,595	,821
The EM supply chain processes make sufficient provision for emergency procurement.	18,06	23,585	,384	,852

2.4 : Reliability of Section F Items

Reliability Statistics

Cronbach's Alpha	N of Items
,899	11

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.	42,28	44,970	,536	,895
I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.	42,19	44,751	,644	,890
I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.	42,13	43,805	,665	,888
I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.	42,44	43,851	,546	,895
Cancellations of BID meetings can be avoided with better planning.	42,18	42,675	,771	,882
Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.	42,17	41,829	,750	,883
BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.	42,27	43,460	,698	,886
There is a lack of technical representation on the bid committees.	42,65	45,762	,372	,907
Technical representation on supply chain committees will assist better judgement on engineering related matters.	42,13	44,032	,737	,885

The current timelines for bid approval processes affects my ability to manage project budgets.	42,37	42,404	,715	,885
There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.	42,61	42,650	,623	,891

Appendix 3 : Validity : Pearson's Chi-squared Tests

3.1 : Pearson Chi-squared Test for Age:

		AGE				
		21-30	31-40	41-50	51-63	
		n (%)	n (%)	n (%)	n (%)	P-value
I am confident with the knowledge I have of EM's supply chain processes.	Strongly disagree	0 (0)	0 (0)	0 (0)	0 (0)	0,031
	Disagree	2 (3,6)	13 (26,6)	2 (11,8)	4 (19,1)	
	Neutral	18 (31,6)	13 (26,6)	4 (23,6)	3 (14,3)	
	Agree	35 (61,5)	23 (47)	11 (64,8)	12 (57,2)	
	Strongly agree	2 (3,6)	0 (0)	0 (0)	2 (9,6)	
I have made the time to read the City's Supply Chain Policy and follow amendments as they are published.	Strongly disagree	0 (0)	2 (4,1)	0 (0)	0 (0)	0,125
	Disagree	12 (21,1)	14 (28,6)	2 (11,8)	2 (9,6)	
	Neutral	19 (33,4)	9 (18,4)	4 (23,6)	2 (9,6)	
	Agree	24 (42,2)	22 (44,9)	11 (64,8)	15 (71,5)	
	Strongly agree	2 (3,6)	2 (4,1)	0 (0)	2 (9,6)	
I understand the repercussions of non-compliance to supply chain processes.	Strongly disagree	0 (0)	6 (12,3)	0 (0)	0 (0)	0,001
	Disagree	6 (10,6)	0 (0)	0 (0)	0 (0)	
	Neutral	4 (7,1)	12 (24,5)	5 (29,5)	3 (14,3)	
	Agree	43 (75,5)	25 (51,1)	8 (47,1)	14 (66,7)	
	Strongly agree	4 (7,1)	6 (12,3)	4 (23,6)	4 (19,1)	
My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.	Strongly disagree	12 (21,1)	12 (24,5)	0 (0)	2 (9,6)	0,000
	Disagree	15 (26,4)	19 (38,8)	2 (11,8)	11 (52,4)	
	Neutral	6 (10,6)	6 (12,3)	2 (11,8)	6 (28,6)	
	Agree	20 (35,1)	6 (12,3)	4 (23,6)	2 (9,6)	
	Strongly agree	4 (7,1)	6 (12,3)	9 (53)	0 (0)	
The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.	Strongly disagree	10 (17,6)	5 (10,3)	2 (11,8)	3 (14,3)	0,004
	Disagree	18 (31,6)	36 (73,5)	9 (53)	8 (38,1)	
	Neutral	12 (21,1)	4 (8,2)	4 (23,6)	2 (9,6)	
	Agree	17 (29,9)	4 (8,2)	2 (11,8)	8 (38,1)	
	Strongly agree	0 (0)	0 (0)	0 (0)	0 (0)	
My knowledge of supply chain policy is predominantly through knowledge transfer	Strongly disagree	16 (28,1)	12 (24,5)	2 (11,8)	8 (38,1)	0,037

efforts from the Supply Chain Management Unit officials.	Disagree	21 (36,9)	11 (22,5)	6 (35,3)	5 (23,9)	
	Neutral	12 (21,1)	16 (32,7)	2 (11,8)	2 (9,6)	
	Agree	8 (14,1)	7 (14,3)	7 (41,2)	6 (28,6)	
	Strongly agree	0 (0)	3 (6,2)	0 (0)	0 (0)	
The municipality has created time and resources for me to learn about how to manage the different types of tender processes.	Strongly disagree	11 (19,3)	13 (26,6)	11 (64,8)	5 (23,9)	0,000
	Disagree	24 (42,2)	32 (65,4)	2 (11,8)	10 (47,7)	
	Neutral	4 (7,1)	2 (4,1)	4 (23,6)	2 (9,6)	
	Agree	16 (28,1)	2 (4,1)	0 (0)	4 (19,1)	
	Strongly agree	2 (3,6)	0 (0)	0 (0)	0 (0)	
I am aware of which supply chain management practitioner I should contact for specific supply chain queries.	Strongly disagree	13 (22,9)	24 (49)	6 (35,3)	7 (33,4)	0,298
	Disagree	20 (35,1)	11 (22,5)	8 (47,1)	6 (28,6)	
	Neutral	6 (10,6)	4 (8,2)	0 (0)	2 (9,6)	
	Agree	16 (28,1)	10 (20,5)	3 (17,7)	6 (28,6)	
	Strongly agree	2 (3,6)	0 (0)	0 (0)	0 (0)	
The EM Supply Chain Unit communicates effectively to municipal line depatments.	Strongly disagree	18 (31,6)	20 (40,9)	6 (35,3)	7 (33,4)	0,045
	Disagree	17 (29,9)	19 (38,8)	8 (47,1)	8 (38,1)	
	Neutral	16 (28,1)	2 (4,1)	3 (17,7)	6 (28,6)	
	Agree	6 (10,6)	8 (16,4)	0 (0)	0 (0)	
	Strongly agree	0 (0)	0 (0)	0 (0)	0 (0)	
I have easily accessible information to evaluate eligibility of contractors.	Strongly disagree	0 (0)	4 (8,2)	2 (11,8)	0 (0)	0,035
	Disagree	7 (12,3)	10 (20,5)	5 (29,5)	4 (19,1)	
	Neutral	14 (24,6)	8 (16,4)	4 (23,6)	9 (42,9)	
	Agree	32 (56,2)	27 (55,2)	6 (35,3)	8 (38,1)	
	Strongly agree	4 (7,1)	0 (0)	0 (0)	0 (0)	
Bid reports are standardised enough for the author to foresee what content is required.	Strongly disagree	11 (19,3)	10 (20,5)	0 (0)	3 (14,3)	0,000
	Disagree	12 (21,1)	19 (38,8)	4 (23,6)	6 (28,6)	
	Neutral	4 (7,1)	4 (8,2)	9 (53)	8 (38,1)	
	Agree	24 (42,2)	14 (28,6)	2 (11,8)	4 (19,1)	
	Strongly agree	6 (10,6)	2 (4,1)	2 (11,8)	0 (0)	
I understand the requirements of the BID Specification Committee report each time I compile one.	Strongly disagree	4 (7,3)	8 (16,4)	2 (11,8)	3 (14,3)	0,345
	Disagree	21 (38,2)	19 (38,8)	4 (23,6)	10 (47,7)	
	Neutral	10 (18,2)	8 (16,4)	6 (35,3)	2 (9,6)	
	Agree	16 (29,1)	14 (28,6)	5 (29,5)	6 (28,6)	

	Strongly agree	4 (7,3)	0 (0)	0 (0)	0 (0)	
I understand the requirements of the BID Evaluation Committee report each time I compile one.	Strongly disagree	0 (0)	8 (16,4)	4 (23,6)	3 (14,3)	0,023
	Disagree	25 (43,9)	19 (38,8)	4 (23,6)	10 (47,7)	
	Neutral	10 (17,6)	6 (12,3)	4 (23,6)	4 (19,1)	
	Agree	16 (28,1)	16 (32,7)	5 (29,5)	4 (19,1)	
	Strongly agree	6 (10,6)	0 (0)	0 (0)	0 (0)	
I understand the requirements of the BID Adjudication Committee report each time I compile one.	Strongly disagree	4 (7,1)	8 (16,4)	0 (0)	3 (14,3)	0,364
	Disagree	19 (33,4)	19 (38,8)	6 (35,3)	10 (47,7)	
	Neutral	10 (17,6)	10 (20,5)	6 (35,3)	4 (19,1)	
	Agree	22 (38,6)	12 (24,5)	5 (29,5)	4 (19,1)	
	Strongly agree	2 (3,6)	0 (0)	0 (0)	0 (0)	
I have a clear understanding of applying quality on a tender evaluation.	Strongly disagree	0 (0)	0 (0)	0 (0)	0 (0)	0,012
	Disagree	7 (12,3)	10 (20,5)	2 (11,8)	2 (9,6)	
	Neutral	8 (14,1)	7 (14,3)	2 (11,8)	0 (0)	
	Agree	28 (49,2)	30 (61,3)	11 (64,8)	19 (90,5)	
	Strongly agree	14 (24,6)	2 (4,1)	2 (11,8)	0 (0)	
I am aware of the standard authorising signatures required within each bid report.	Strongly disagree	0 (0)	4 (8,2)	0 (0)	0 (0)	0,000
	Disagree	9 (15,8)	23 (47)	0 (0)	2 (9,6)	
	Neutral	10 (17,6)	4 (8,2)	6 (35,3)	7 (33,4)	
	Agree	32 (56,2)	14 (28,6)	7 (41,2)	12 (57,2)	
	Strongly agree	6 (10,6)	4 (8,2)	4 (23,6)	0 (0)	
The EM supply chain processes make sufficient provision for emergency procurement.	Strongly disagree	9 (15,8)	16 (32,7)	4 (23,6)	7 (33,4)	0,197
	Disagree	22 (38,6)	10 (20,5)	6 (35,3)	8 (38,1)	
	Neutral	14 (24,6)	13 (26,6)	7 (41,2)	4 (19,1)	
	Agree	10 (17,6)	10 (20,5)	0 (0)	2 (9,6)	
	Strongly agree	2 (3,6)	0 (0)	0 (0)	0 (0)	
I have not encountered or do not foresee delays in the supply chain in its current processes.	Strongly disagree	28 (49,2)	32 (65,4)	13 (76,5)	13 (62)	0,107
	Disagree	19 (33,4)	5 (10,3)	4 (23,6)	6 (28,6)	
	Neutral	6 (10,6)	8 (16,4)	0 (0)	2 (9,6)	
	Agree	4 (7,1)	4 (8,2)	0 (0)	0 (0)	
	Strongly agree	0 (0)	0 (0)	0 (0)	0 (0)	
How many working days does it take on average to complete the required signatories on a BID Specification/Evaluation/Adjudication	> 2 weeks	22 (40)	31 (63,3)	8 (47,1)	11 (52,4)	0,066
	1-2 days	2 (3,7)	0 (0)	0 (0)	0 (0)	

report Document?	1-2 weeks	18 (32,8)	16 (32,7)	9 (53)	8 (38,1)	
	3-4 days	4 (7,3)	0 (0)	0 (0)	0 (0)	
	5-6 days	9 (16,4)	2 (4,1)	0 (0)	2 (9,6)	
I set aside ____hours from my work day if I need to attend a bid meeting.	<1	2 (3,7)	4 (8,2)	0 (0)	4 (19,1)	0,044
	>6	4 (7,3)	12 (24,5)	2 (11,8)	0 (0)	
	1-2	5 (9,1)	4 (8,2)	2 (11,8)	2 (9,6)	
	2-4	26 (47,3)	15 (30,7)	4 (23,6)	9 (42,9)	
	4-6	18 (32,8)	14 (28,6)	9 (53)	6 (28,6)	
From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	< 3 months	8 (14,1)	6 (12,3)	0 (0)	0 (0)	0,043
	< 4 months	4 (7,1)	10 (20,5)	0 (0)	2 (9,6)	
	< month	2 (3,6)	0 (0)	0 (0)	0 (0)	
	<2 months	0 (0)	2 (4,1)	0 (0)	0 (0)	
	> 4 months	43 (75,5)	31 (63,3)	17 (100)	19 (90,5)	
I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.	Strongly disagree	3 (5,3)	0 (0)	0 (0)	0 (0)	0,000
	Disagree	3 (5,3)	0 (0)	2 (11,8)	0 (0)	
	Neutral	5 (8,8)	0 (0)	0 (0)	6 (28,6)	
	Agree	33 (57,9)	14 (28,6)	5 (29,5)	6 (28,6)	
	Strongly agree	13 (22,9)	35 (71,5)	10 (58,9)	9 (42,9)	
I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.	Strongly disagree	3 (5,3)	0 (0)	0 (0)	0 (0)	0,000
	Disagree	1 (1,8)	0 (0)	0 (0)	0 (0)	
	Neutral	0 (0)	2 (4,3)	4 (23,6)	2 (9,6)	
	Agree	35 (61,5)	9 (19,2)	9 (53)	8 (38,1)	
	Strongly agree	18 (31,6)	36 (76,6)	4 (23,6)	11 (52,4)	
I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.	Strongly disagree	3 (5,3)	0 (0)	0 (0)	0 (0)	0,001
	Disagree	3 (5,3)	0 (0)	0 (0)	0 (0)	
	Neutral	10 (17,6)	0 (0)	0 (0)	0 (0)	
	Agree	20 (35,1)	12 (24,5)	5 (29,5)	8 (38,1)	
	Strongly agree	21 (36,9)	37 (75,6)	12 (70,6)	13 (62)	
I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.	Strongly disagree	4 (7,1)	0 (0)	0 (0)	2 (9,6)	0,001
	Disagree	0 (0)	7 (14,3)	0 (0)	0 (0)	
	Neutral	2 (3,6)	8 (16,4)	2 (11,8)	0 (0)	
	Agree	22 (38,6)	24 (49)	6 (35,3)	10 (47,7)	
	Strongly agree	29 (50,9)	10 (20,5)	9 (53)	9 (42,9)	
Cancellations of BID meetings can be avoided with better planning.	Strongly disagree	3 (5,3)	0 (0)	2 (11,8)	0 (0)	0,203
	Disagree	1 (1,8)	2 (4,1)	0 (0)	0 (0)	
	Neutral	3 (5,3)	0 (0)	0 (0)	2 (9,6)	

	Agree	23 (40,4)	21 (42,9)	4 (23,6)	10 (47,7)	
	Strongly agree	27 (47,4)	26 (53,1)	11 (64,8)	9 (42,9)	
Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.	Strongly disagree	3 (5,3)	4 (8,2)	0 (0)	0 (0)	0,154
	Disagree	1 (1,8)	0 (0)	0 (0)	0 (0)	
	Neutral	2 (3,6)	4 (8,2)	2 (11,8)	0 (0)	
	Agree	25 (43,9)	11 (22,5)	2 (11,8)	8 (38,1)	
	Strongly agree	26 (45,7)	30 (61,3)	13 (76,5)	13 (62)	
BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.	Strongly disagree	3 (5,3)	0 (0)	0 (0)	0 (0)	0,036
	Disagree	1 (1,8)	0 (0)	2 (11,8)	0 (0)	
	Neutral	9 (15,8)	4 (8,2)	0 (0)	2 (9,6)	
	Agree	25 (43,9)	19 (38,8)	6 (35,3)	6 (28,6)	
	Strongly agree	19 (33,4)	26 (53,1)	9 (53)	13 (62)	
There is a lack of technical representation on the bid committees.	Strongly disagree	0 (0)	0 (0)	0 (0)	0 (0)	0,002
	Disagree	6 (10,6)	7 (14,3)	0 (0)	4 (19,1)	
	Neutral	8 (14,1)	20 (40,9)	8 (47,1)	4 (19,1)	
	Agree	15 (26,4)	10 (20,5)	5 (29,5)	0 (0)	
	Strongly agree	28 (49,2)	12 (24,5)	4 (23,6)	13 (62)	
Technical representation on supply chain committees will assist better judgement on engineering related matters.	Strongly disagree	4 (7,1)	0 (0)	0 (0)	0 (0)	0,145
	Disagree	0 (0)	0 (0)	0 (0)	0 (0)	
	Neutral	2 (3,6)	0 (0)	0 (0)	0 (0)	
	Agree	26 (45,7)	25 (51,1)	9 (53)	6 (28,6)	
	Strongly agree	25 (43,9)	24 (49)	8 (47,1)	15 (71,5)	
The current timelines for bid approval processes affects my ability to manage project budgets.	Strongly disagree	3 (5,3)	0 (0)	0 (0)	0 (0)	0,154
	Disagree	1 (1,8)	6 (12,3)	0 (0)	0 (0)	
	Neutral	8 (14,1)	4 (8,2)	2 (11,8)	2 (9,6)	
	Agree	17 (29,9)	21 (42,9)	8 (47,1)	8 (38,1)	
	Strongly agree	28 (49,2)	18 (36,8)	7 (41,2)	11 (52,4)	
There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.	Strongly disagree	4 (7,1)	0 (0)	0 (0)	0 (0)	0,010
	Disagree	3 (5,3)	0 (0)	0 (0)	2 (9,6)	
	Neutral	23 (40,4)	17 (34,7)	2 (11,8)	2 (9,6)	
	Agree	13 (22,9)	12 (24,5)	6 (35,3)	4 (19,1)	
	Strongly agree	14 (24,6)	20 (40,9)	9 (53)	13 (62)	

3.2 : Pearson Chi-squared Test for Gender :

		Gender				
		Female		Male		
		Count	Layer Column N %	Count	Layer Column N %	p-value
I am confident with the knowledge I have of EM's supply chain processes.	Strongly disagree	0	0.0%	0	0.0%	
	Disagree	9	17.0%	12	13.5%	
	Neutral	14	26.4%	24	27.0%	
	Agree	30	56.6%	49	55.1%	
	Strongly agree	0	0.0%	4	4.5%	0.445
I have made the time to read the City's Supply Chain Policy and follow amendments as they are published.	Strongly disagree	2	3.8%	0	0.0%	
	Disagree	14	26.4%	16	18.0%	
	Neutral	12	22.6%	22	24.7%	
	Agree	25	47.2%	45	50.6%	
	Strongly agree	0	0.0%	6	6.7%	0.085
I understand the repercussions of non-compliance to supply chain processes.	Strongly disagree	2	3.8%	4	4.5%	
	Disagree	2	3.8%	4	4.5%	
	Neutral	8	15.1%	16	18.0%	
	Agree	37	69.8%	51	57.3%	
	Strongly agree	4	7.5%	14	15.7%	0.585
My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.	Strongly disagree	10	18.9%	16	18.0%	
	Disagree	21	39.6%	26	29.2%	
	Neutral	4	7.5%	14	15.7%	
	Agree	14	26.4%	18	20.2%	
	Strongly agree	4	7.5%	15	16.9%	0.233
The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.	Strongly disagree	2	3.8%	18	20.2%	
	Disagree	37	69.8%	32	36.0%	
	Neutral	4	7.5%	18	20.2%	
	Agree	10	18.9%	21	23.6%	
	Strongly agree	0	0.0%	0	0.0%	0
My knowledge of supply chain policy is predominantly through knowledge transfer efforts from the Supply Chain Management Unit officials.	Strongly disagree	16	30.2%	22	24.7%	
	Disagree	18	34.0%	23	25.8%	
	Neutral	12	22.6%	20	22.5%	
	Agree	5	9.4%	23	25.8%	
	Strongly agree	2	3.8%	1	1.1%	0.149
The municipality has created time and resources for me to learn about	Strongly disagree	12	22.6%	28	31.5%	0.188

how to manage the different types of tender processes.	Disagree	29	54.7%	37	41.6%	
	Neutral	2	3.8%	10	11.2%	
	Agree	10	18.9%	12	13.5%	
	Strongly agree	0	0.0%	2	2.2%	
I am aware of which supply chain management practitioner I should contact for specific supply chain queries.	Strongly disagree	20	37.7%	30	33.7%	
	Disagree	23	43.4%	20	22.5%	
	Neutral	4	7.5%	8	9.0%	
	Agree	6	11.3%	29	32.6%	
	Strongly agree	0	0.0%	2	2.2%	0.015
The EM Supply Chain Unit communicates effectively to municipal line depatments.	Strongly disagree	18	34.0%	33	37.1%	
	Disagree	23	43.4%	27	30.3%	
	Neutral	6	11.3%	21	23.6%	
	Agree	6	11.3%	8	9.0%	
	Strongly agree	0	0.0%	0	0.0%	0.211
I have easily accessible information to evaluate eligibility of contractors.	Strongly disagree	0	0.0%	6	6.7%	
	Disagree	12	22.6%	14	15.7%	
	Neutral	10	18.9%	23	25.8%	
	Agree	27	50.9%	46	51.7%	
	Strongly agree	4	7.5%	0	0.0%	0.018
Bid reports are standardised enough for the author to foresee what content is required.	Strongly disagree	4	7.5%	20	22.5%	
	Disagree	27	50.9%	14	15.7%	
	Neutral	6	11.3%	17	19.1%	
	Agree	12	22.6%	32	36.0%	
	Strongly agree	4	7.5%	6	6.7%	0
I understand the requirements of the BID Specification Committee report each time I compile one.	Strongly disagree	4	7.5%	13	14.9%	
	Disagree	27	50.9%	27	31.0%	
	Neutral	6	11.3%	18	20.7%	
	Agree	14	26.4%	27	31.0%	
	Strongly agree	2	3.8%	2	2.3%	0.134
I understand the requirements of the BID Evaluation Committee report each time I compile one.	Strongly disagree	6	11.3%	9	10.1%	
	Disagree	25	47.2%	33	37.1%	
	Neutral	6	11.3%	18	20.2%	
	Agree	14	26.4%	25	28.1%	
	Strongly agree	2	3.8%	4	4.5%	0.643
I understand the requirements of the BID Adjudication Committee report each time I compile one.	Strongly disagree	4	7.5%	11	12.4%	
	Disagree	27	50.9%	27	30.3%	0.07

	Neutral	6	11.3%	22	24.7%	
	Agree	16	30.2%	27	30.3%	
	Strongly agree	0	0.0%	2	2.2%	
I have a clear understanding of applying quality on a tender evaluation.	Strongly disagree	0	0.0%	0	0.0%	
	Disagree	12	22.6%	9	10.1%	
	Neutral	8	15.1%	9	10.1%	
	Agree	27	50.9%	59	66.3%	
	Strongly agree	6	11.3%	12	13.5%	0.131
I am aware of the standard authorising signatures required within each bid report.	Strongly disagree	0	0.0%	4	4.5%	
	Disagree	19	35.8%	15	16.9%	
	Neutral	10	18.9%	17	19.1%	
	Agree	20	37.7%	43	48.3%	
	Strongly agree	4	7.5%	10	11.2%	0.069
The EM supply chain processes make sufficient provision for emergency procurement.	Strongly disagree	12	22.6%	24	27.0%	
	Disagree	14	26.4%	32	36.0%	
	Neutral	17	32.1%	19	21.3%	
	Agree	8	15.1%	14	15.7%	
	Strongly agree	2	3.8%	0	0.0%	0.195
I have not encountered or do not foresee delays in the supply chain in its current processes.	Strongly disagree	30	56.6%	56	62.9%	
	Disagree	15	28.3%	19	21.3%	
	Neutral	4	7.5%	10	11.2%	
	Agree	4	7.5%	4	4.5%	
	Strongly agree	0	0.0%	0	0.0%	0.594
How many working days does it take on average to complete the required signatories on a BID Specification/Evaluation/Adjudication report Document?	> 2 weeks	23	45.1%	47	52.8%	
	1-2 days	0	0.0%	2	2.2%	
	1-2 weeks	20	39.2%	31	34.8%	
	3-4 days	2	3.9%	2	2.2%	
	5-6 days	6	11.8%	7	7.9%	0.635
I set aside ____hours from my work day if I need to attend a bid meeting.	<1	4	7.8%	6	6.7%	
	>6	8	15.7%	8	9.0%	
	1-2	2	3.9%	11	12.4%	
	2-4	19	37.3%	35	39.3%	
	4-6	18	35.3%	29	32.6%	0.417
From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	< 3 months	8	15.1%	6	6.7%	
	< 4 months	6	11.3%	10	11.2%	
	< month	2	3.8%	0	0.0%	
	<2 months	0	0.0%	2	2.2%	0.119

	> 4 months	37	69.8%	71	79.8%	
I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.	Strongly disagree	2	3.8%	1	1.1%	
	Disagree	2	3.8%	3	3.4%	
	Neutral	4	7.5%	7	7.9%	
	Agree	17	32.1%	39	43.8%	
	Strongly agree	28	52.8%	39	43.8%	0.582
I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.	Strongly disagree	2	3.8%	1	1.1%	
	Disagree	0	0.0%	1	1.1%	
	Neutral	0	0.0%	8	9.2%	
	Agree	22	41.5%	37	42.5%	
	Strongly agree	29	54.7%	40	46.0%	0.133
I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.	Strongly disagree	2	3.8%	1	1.1%	
	Disagree	2	3.8%	1	1.1%	
	Neutral	6	11.3%	4	4.5%	
	Agree	11	20.8%	32	36.0%	
	Strongly agree	32	60.4%	51	57.3%	0.136
I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.	Strongly disagree	2	3.8%	4	4.5%	
	Disagree	5	9.4%	2	2.2%	
	Neutral	4	7.5%	8	9.0%	
	Agree	27	50.9%	33	37.1%	
	Strongly agree	15	28.3%	42	47.2%	0.089
Cancellations of BID meetings can be avoided with better planning.	Strongly disagree	1	1.9%	4	4.5%	
	Disagree	1	1.9%	2	2.2%	
	Neutral	2	3.8%	3	3.4%	
	Agree	23	43.4%	33	37.1%	
	Strongly agree	26	49.1%	47	52.8%	0.894
Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.	Strongly disagree	3	5.7%	4	4.5%	
	Disagree	1	1.9%	0	0.0%	
	Neutral	0	0.0%	8	9.0%	
	Agree	20	37.7%	24	27.0%	
	Strongly agree	29	54.7%	53	0.595506	0.095
BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.	Strongly disagree	1	0.018868	2	0.022472	
	Disagree	1	0.018868	2	0.022472	
	Neutral	6	0.113208	9	0.101124	
	Agree	25	0.471698	29	0.325843	
	Strongly agree	20	0.377358	47	0.52809	0.471

There is a lack of technical representation on the bid committees.	Strongly disagree	0	0	0	0	
	Disagree	9	0.169811	8	0.089888	
	Neutral	9	0.169811	31	0.348315	
	Agree	16	0.301887	14	0.157303	
	Strongly agree	19	0.358491	36	0.404494	0.029
Technical representation on supply chain committees will assist better judgement on engineering related matters.	Strongly disagree	2	0.037736	2	0.022472	
	Disagree	0	0	0	0	
	Neutral	0	0	2	0.022472	
	Agree	25	0.471698	39	0.438202	
	Strongly agree	26	0.490566	46	0.516854	0.661
The current timelines for bid approval processes affects my ability to manage project budgets.	Strongly disagree	1	0.018868	2	0.022472	
	Disagree	3	0.056604	4	0.044944	
	Neutral	8	0.150943	8	0.089888	
	Agree	15	0.283019	37	0.41573	
	Strongly agree	26	0.490566	38	0.426966	0.54
There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.	Strongly disagree	2	0.037736	2	0.022472	
	Disagree	2	0.037736	3	0.033708	
	Neutral	20	0.377358	24	0.269663	
	Agree	13	0.245283	22	0.247191	
	Strongly agree	16	30.2%	38	42.7%	0.575

3.3 : Pearson’s Chi-squared Test for Independence from Designation :

		Designation							
		> Task Grade 16		Task Grade 12		Task Grade 13-14		Task Grade 15-16	
		Count	Layer Column N %	Count	Layer Column N %	Count	Layer Column N %	Count	Layer Column N %
I am confident with the knowledge I have of EM’s supply chain processes.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%
	Disagree	2	16,7%	0	0,0%	5	6,9%	14	36,8%
	Neutral	0	0,0%	10	45,5%	24	33,3%	4	10,5%
	Agree	10	83,3%	12	54,5%	39	54,2%	20	52,6%
	Strongly agree	0	0,0%	0	0,0%	4	5,6%	0	0,0%
I have made the time to read the City’s Supply Chain Policy and follow amendments as they are published.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	2	5,3%
	Disagree	0	0,0%	4	18,2%	18	25,0%	8	21,1%
	Neutral	4	33,3%	7	31,8%	14	19,4%	9	23,7%
	Agree	6	50,0%	11	50,0%	38	52,8%	17	44,7%
	Strongly agree	2	16,7%	0	0,0%	2	2,8%	2	5,3%
I understand the repercussions of non-compliance to supply chain processes.	Strongly disagree	0	0,0%	0	0,0%	6	8,3%	0	0,0%
	Disagree	0	0,0%	0	0,0%	6	8,3%	0	0,0%
	Neutral	0	0,0%	4	18,2%	14	19,4%	6	15,8%
	Agree	8	66,7%	18	81,8%	40	55,6%	24	63,2%

	Strongly agree	4	33,3%	0	0,0%	6	8,3%	8	21,1%	
My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.	Strongly disagree	2	16,7%	2	9,1%	14	19,4%	8	21,1%	
	Disagree	2	16,7%	4	18,2%	25	34,7%	16	42,1%	
	Neutral	2	16,7%	2	9,1%	10	13,9%	6	15,8%	
	Agree	4	33,3%	10	45,5%	14	19,4%	4	10,5%	
	Strongly agree	2	16,7%	4	18,2%	9	12,5%	4	10,5%	
The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.	Strongly disagree	0	0,0%	2	9,1%	18	25,0%	0	0,0%	
	Disagree	6	50,0%	6	27,3%	29	40,3%	30	78,9%	
	Neutral	2	16,7%	2	9,1%	12	16,7%	6	15,8%	
	Agree	4	33,3%	12	54,5%	13	18,1%	2	5,3%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
My knowledge of supply chain policy is predominantly through knowledge transfer efforts from the Supply Chain Management Unit officials.	Strongly disagree	4	33,3%	2	9,1%	22	30,6%	10	26,3%	
	Disagree	4	33,3%	6	27,3%	22	30,6%	11	28,9%	
	Neutral	2	16,7%	6	27,3%	16	22,2%	8	21,1%	
	Agree	2	16,7%	8	36,4%	12	16,7%	6	15,8%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	3	7,9%	

The municipality has created time and resources for me to learn about how to manage the different types of tender processes.	Strongly disagree	2	16,7%	6	27,3%	24	33,3%	8	21,1%	
	Disagree	6	50,0%	6	27,3%	32	44,4%	24	63,2%	
	Neutral	2	16,7%	0	0,0%	6	8,3%	4	10,5%	
	Agree	2	16,7%	10	45,5%	10	13,9%	0	0,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	2	5,3%	
I am aware of which supply chain management practitioner I should contact for specific supply chain queries.	Strongly disagree	2	16,7%	6	27,3%	24	33,3%	18	47,4%	
	Disagree	4	33,3%	4	18,2%	27	37,5%	10	26,3%	
	Neutral	4	33,3%	4	18,2%	2	2,8%	2	5,3%	
	Agree	2	16,7%	8	36,4%	19	26,4%	6	15,8%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	2	5,3%	
The EM Supply Chain Unit communicates effectively to municipal line depatments.	Strongly disagree	2	16,7%	6	27,3%	25	34,7%	18	47,4%	
	Disagree	8	66,7%	4	18,2%	24	33,3%	16	42,1%	
	Neutral	2	16,7%	6	27,3%	17	23,6%	2	5,3%	
	Agree	0	0,0%	6	27,3%	6	8,3%	2	5,3%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
I have easily accessible information to evaluate eligibility of contractors.	Strongly disagree	0	0,0%	0	0,0%	6	8,3%	0	0,0%	
	Disagree	0	0,0%	2	9,1%	20	27,8%	4	10,5%	

	Neutral	4	33,3%	8	36,4%	13	18,1%	10	26,3%	
	Agree	8	66,7%	10	45,5%	31	43,1%	24	63,2%	
	Strongly agree	0	0,0%	2	9,1%	2	2,8%	0	0,0%	
Bid reports are standardised enough for the author to foresee what content is required.	Strongly disagree	0	0,0%	4	18,2%	14	19,4%	6	15,8%	
	Disagree	4	33,3%	6	27,3%	19	26,4%	12	31,6%	
	Neutral	6	50,0%	4	18,2%	5	6,9%	10	26,3%	
	Agree	2	16,7%	6	27,3%	28	38,9%	8	21,1%	
	Strongly agree	0	0,0%	2	9,1%	6	8,3%	2	5,3%	
I understand the requirements of the BID Specification Committee report each time I compile one.	Strongly disagree	0	0,0%	2	9,1%	11	15,7%	4	10,5%	
	Disagree	6	50,0%	4	18,2%	28	40,0%	16	42,1%	
	Neutral	0	0,0%	8	36,4%	12	17,1%	6	15,8%	
	Agree	6	50,0%	6	27,3%	17	24,3%	12	31,6%	
	Strongly agree	0	0,0%	2	9,1%	2	2,9%	0	0,0%	
I understand the requirements of the BID Evaluation Committee report each time I compile one.	Strongly disagree	0	0,0%	0	0,0%	9	12,5%	6	15,8%	
	Disagree	6	50,0%	8	36,4%	34	47,2%	10	26,3%	
	Neutral	0	0,0%	6	27,3%	10	13,9%	8	21,1%	
	Agree	6	50,0%	6	27,3%	15	20,8%	14	36,8%	
	Strongly agree	0	0,0%	2	9,1%	4	5,6%	0	0,0%	

I understand the requirements of the BID Adjudication Committee report each time I compile one.	Strongly disagree	0	0,0%	2	9,1%	9	12,5%	4	10,5%	
	Disagree	6	50,0%	6	27,3%	28	38,9%	14	36,8%	
	Neutral	0	0,0%	6	27,3%	14	19,4%	10	26,3%	
	Agree	6	50,0%	8	36,4%	19	26,4%	10	26,3%	
	Strongly agree	0	0,0%	0	0,0%	2	2,8%	0	0,0%	
I have a clear understanding of applying quality on a tender evaluation.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	2	16,7%	2	9,1%	13	18,1%	4	10,5%	
	Neutral	0	0,0%	2	9,1%	11	15,3%	4	10,5%	
	Agree	10	83,3%	14	63,6%	36	50,0%	28	73,7%	
	Strongly agree	0	0,0%	4	18,2%	12	16,7%	2	5,3%	
I am aware of the standard authorising signatures required within each bid report.	Strongly disagree	0	0,0%	0	0,0%	4	5,6%	0	0,0%	
	Disagree	2	16,7%	2	9,1%	14	19,4%	16	42,1%	
	Neutral	4	33,3%	6	27,3%	9	12,5%	8	21,1%	
	Agree	6	50,0%	12	54,5%	35	48,6%	12	31,6%	
	Strongly agree	0	0,0%	2	9,1%	10	13,9%	2	5,3%	
The EM supply chain processes make sufficient provision for emergency procurement.	Strongly disagree	4	33,3%	4	18,2%	17	23,6%	11	28,9%	
	Disagree	2	16,7%	6	27,3%	23	31,9%	15	39,5%	
	Neutral	2	16,7%	6	27,3%	22	30,6%	8	21,1%	
	Agree	4	33,3%	4	18,2%	10	13,9%	4	10,5%	

	Strongly agree	0	0,0%	2	9,1%	0	0,0%	0	0,0%	
I have not encountered or do not foresee delays in the supply chain in its current processes.	Strongly disagree	10	83,3%	6	27,3%	42	58,3%	28	73,7%	
	Disagree	2	16,7%	8	36,4%	20	27,8%	4	10,5%	
	Neutral	0	0,0%	4	18,2%	6	8,3%	6	15,8%	
	Agree	0	0,0%	4	18,2%	4	5,6%	0	0,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
How many working days does it take on average to complete the required signatories on a BID Specification/Evaluation/Adjudication report Document?	> 2 weeks	4	33,3%	8	40,0%	38	52,8%	22	57,9%	
	1-2 days	0	0,0%	2	10,0%	0	0,0%	0	0,0%	
	1-2 weeks	8	66,7%	4	20,0%	29	40,3%	10	26,3%	
	3-4 days	0	0,0%	2	10,0%	2	2,8%	0	0,0%	
	5-6 days	0	0,0%	4	20,0%	3	4,2%	6	15,8%	
I set aside ____hours from my work day if I need to attend a bid meeting.	<1	0	0,0%	2	10,0%	4	5,6%	4	10,5%	
	>6	0	0,0%	0	0,0%	8	11,1%	10	26,3%	
	02-Jan	2	16,7%	6	30,0%	5	6,9%	0	0,0%	
	04-Feb	6	50,0%	6	30,0%	34	47,2%	8	21,1%	
	06-Apr	4	33,3%	6	30,0%	21	29,2%	16	42,1%	
From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC	< 3 months	0	0,0%	6	27,3%	4	5,6%	4	10,5%	

Committee – BAC Committee – Appeal period - letter of award)										
	< 4 months	2	16,7%	0	0,0%	8	11,1%	6	15,8%	
	< month	0	0,0%	2	9,1%	0	0,0%	0	0,0%	
	<2 months	0	0,0%	0	0,0%	2	2,8%	0	0,0%	
	> 4 months	10	83,3%	14	63,6%	58	80,6%	28	73,7%	
I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.	Strongly disagree	0	0,0%	0	0,0%	3	4,2%	0	0,0%	
	Disagree	2	16,7%	0	0,0%	3	4,2%	0	0,0%	
	Neutral	4	33,3%	1	4,5%	2	2,8%	4	10,5%	
	Agree	0	0,0%	19	86,4%	28	38,9%	11	28,9%	
	Strongly agree	6	50,0%	2	9,1%	36	50,0%	23	60,5%	
I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.	Strongly disagree	0	0,0%	0	0,0%	3	4,3%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	1	1,4%	0	0,0%	
	Neutral	2	16,7%	0	0,0%	4	5,7%	2	5,3%	
	Agree	4	33,3%	17	77,3%	28	40,0%	12	31,6%	
	Strongly agree	6	50,0%	5	22,7%	34	48,6%	24	63,2%	
I believe the process of circulating bid committee reports for authorizing signatures can be done more	Strongly disagree	0	0,0%	0	0,0%	3	4,2%	0	0,0%	

efficiently through a secure online system.										
	Disagree	0	0,0%	0	0,0%	3	4,2%	0	0,0%	
	Neutral	0	0,0%	6	27,3%	4	5,6%	0	0,0%	
	Agree	2	16,7%	7	31,8%	19	26,4%	17	44,7%	
	Strongly agree	10	83,3%	9	40,9%	43	59,7%	21	55,3%	
I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.	Strongly disagree	0	0,0%	0	0,0%	6	8,3%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	3	4,2%	4	10,5%	
	Neutral	2	16,7%	2	9,1%	4	5,6%	4	10,5%	
	Agree	6	50,0%	9	40,9%	29	40,3%	18	47,4%	
	Strongly agree	4	33,3%	11	50,0%	30	41,7%	12	31,6%	
Cancellations of BID meetings can be avoided with better planning.	Strongly disagree	2	16,7%	0	0,0%	3	4,2%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	3	4,2%	0	0,0%	
	Neutral	2	16,7%	0	0,0%	3	4,2%	0	0,0%	
	Agree	2	16,7%	14	63,6%	20	27,8%	22	57,9%	
	Strongly agree	6	50,0%	8	36,4%	43	59,7%	16	42,1%	
Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.	Strongly disagree	0	0,0%	2	9,1%	5	6,9%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	1	1,4%	0	0,0%	
	Neutral	2	16,7%	0	0,0%	2	2,8%	4	10,5%	

	Agree	2	16,7%	12	54,5%	16	22,2%	16	42,1%	
	Strongly agree	8	66,7%	8	36,4%	48	66,7%	18	47,4%	
BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.	Strongly disagree	0	0,0%	0	0,0%	3	4,2%	0	0,0%	
	Disagree	2	16,7%	0	0,0%	1	1,4%	0	0,0%	
	Neutral	2	16,7%	2	9,1%	7	9,7%	4	10,5%	
	Agree	0	0,0%	14	63,6%	24	33,3%	18	47,4%	
	Strongly agree	8	66,7%	6	27,3%	37	51,4%	16	42,1%	
There is a lack of technical representation on the bid committees.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	2	9,1%	9	12,5%	6	15,8%	
	Neutral	4	33,3%	8	36,4%	19	26,4%	9	23,7%	
	Agree	0	0,0%	5	22,7%	16	22,2%	9	23,7%	
	Strongly agree	8	66,7%	7	31,8%	28	38,9%	14	36,8%	
Technical representation on supply chain committees will assist better judgement on engineering related matters.	Strongly disagree	0	0,0%	0	0,0%	4	5,6%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	2	9,1%	0	0,0%	0	0,0%	
	Agree	2	16,7%	14	63,6%	32	44,4%	18	47,4%	
	Strongly agree	10	83,3%	6	27,3%	36	50,0%	20	52,6%	

The current timelines for bid approval processes affects my ability to manage project budgets.	Strongly disagree	0	0,0%	0	0,0%	3	4,2%	0	0,0%	
	Disagree	0	0,0%	2	9,1%	3	4,2%	2	5,3%	
	Neutral	0	0,0%	6	27,3%	4	5,6%	6	15,8%	
	Agree	6	50,0%	7	31,8%	29	40,3%	12	31,6%	
	Strongly agree	6	50,0%	7	31,8%	33	45,8%	18	47,4%	
There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.	Strongly disagree	0	0,0%	0	0,0%	4	5,6%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	3	4,2%	2	5,3%	
	Neutral	0	0,0%	15	68,2%	17	23,6%	12	31,6%	
	Agree	4	33,3%	3	13,6%	16	22,2%	12	31,6%	
	Strongly agree	8	66,7%	4	18,2%	32	44,4%	12	31,6%	

3.4 : Pearsons Chi-squared Test for independence from Ethekwini Experience:

		Ethekwini Exp										
		<12 months		>15 years		1-5 years		11-15 years		6-10 years		
		N	N %	N	N %	N	N %	N	N %	N	N %	p-value
I am confident with the knowledge I have of EM's supply chain processes.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	2	11,8%	9	20,5%	2	14,3%	8	12,3%	0.258

	Neutral	2	50,0%	5	29,4%	14	31,8%	3	21,4%	14	21,5%	
	Agree	2	50,0%	8	47,1%	19	43,2%	9	64,3%	43	66,2%	
	Strongly agree	0	0,0%	2	11,8%	2	4,5%	0	0,0%	0	0,0%	
I have made the time to read the City's Supply Chain Policy and follow amendments as they are published.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	2	3,1%	
	Disagree	0	0,0%	2	11,8%	8	18,2%	4	28,6%	16	24,6%	
	Neutral	2	50,0%	4	23,5%	14	31,8%	0	0,0%	14	21,5%	
	Agree	2	50,0%	9	52,9%	18	40,9%	10	71,4%	33	50,8%	
	Strongly agree	0	0,0%	2	11,8%	4	9,1%	0	0,0%	0	0,0%	0.17
I understand the repercussions of non-compliance to supply chain processes.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	2	14,3%	4	6,2%	
	Disagree	0	0,0%	0	0,0%	6	13,6%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	5	29,4%	2	4,5%	2	14,3%	15	23,1%	
	Agree	4	100,0%	12	70,6%	34	77,3%	4	28,6%	36	55,4%	
	Strongly agree	0	0,0%	0	0,0%	2	4,5%	6	42,9%	10	15,4%	0
My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.	Strongly disagree	2	50,0%	2	11,8%	6	13,6%	2	14,3%	14	21,5%	
	Disagree	0	0,0%	7	41,2%	18	40,9%	4	28,6%	18	27,7%	
	Neutral	0	0,0%	4	23,5%	8	18,2%	2	14,3%	6	9,2%	
	Agree	2	50,0%	2	11,8%	10	22,7%	0	0,0%	18	27,7%	
	Strongly agree	0	0,0%	2	11,8%	2	4,5%	6	42,9%	9	13,8%	0.026
The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so	Strongly disagree	2	50,0%	3	17,6%	2	4,5%	1	7,1%	12	18,5%	
	Disagree	0	0,0%	4	23,5%	21	47,7%	11	78,6%	35	53,8%	
	Neutral	0	0,0%	6	35,3%	6	13,6%	2	14,3%	8	12,3%	0.003

that I am always up to date.	Agree	2	50,0%	4	23,5%	15	34,1%	0	0,0%	10	15,4%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
My knowledge of supply chain policy is predominantly through knowledge transfer efforts from the Supply Chain Management Unit officials.	Strongly disagree	0	0,0%	4	23,5%	4	9,1%	0	0,0%	30	46,2%	
	Disagree	2	50,0%	5	29,4%	17	38,6%	6	42,9%	13	20,0%	
	Neutral	0	0,0%	4	23,5%	16	36,4%	6	42,9%	6	9,2%	
	Agree	2	50,0%	4	23,5%	5	11,4%	2	14,3%	15	23,1%	
	Strongly agree	0	0,0%	0	0,0%	2	4,5%	0	0,0%	1	1,5%	0
The municipality has created time and resources for me to learn about how to manage the different types of tender processes.	Strongly disagree	2	50,0%	7	41,2%	7	15,9%	5	35,7%	19	29,2%	
	Disagree	0	0,0%	6	35,3%	25	56,8%	9	64,3%	28	43,1%	
	Neutral	0	0,0%	2	11,8%	4	9,1%	0	0,0%	6	9,2%	
	Agree	2	50,0%	2	11,8%	8	18,2%	0	0,0%	10	15,4%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	2	3,1%	0.284
I am aware of which supply chain management practitioner I should contact for specific supply chain queries.	Strongly disagree	0	0,0%	7	41,2%	15	34,1%	4	28,6%	24	36,9%	
	Disagree	2	50,0%	6	35,3%	17	38,6%	2	14,3%	18	27,7%	
	Neutral	0	0,0%	0	0,0%	4	9,1%	4	28,6%	4	6,2%	
	Agree	2	50,0%	4	23,5%	8	18,2%	4	28,6%	17	26,2%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	2	3,1%	0.316
The EM Supply Chain Unit communicates effectively to municipal line depatments.	Strongly disagree	2	50,0%	7	41,2%	10	22,7%	4	28,6%	28	43,1%	
	Disagree	0	0,0%	6	35,3%	22	50,0%	6	42,9%	18	27,7%	
	Neutral	0	0,0%	4	23,5%	8	18,2%	2	14,3%	13	20,0%	
	Agree	2	50,0%	0	0,0%	4	9,1%	2	14,3%	6	9,2%	0.095

	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
I have easily accessible information to evaluate eligibility of contractors.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	6	9,2%	
	Disagree	2	50,0%	4	23,5%	5	11,4%	4	28,6%	11	16,9%	
	Neutral	2	50,0%	9	52,9%	8	18,2%	2	14,3%	14	21,5%	
	Agree	0	0,0%	4	23,5%	29	65,9%	8	57,1%	32	49,2%	
	Strongly agree	0	0,0%	0	0,0%	2	4,5%	0	0,0%	2	3,1%	0.029
Bid reports are standardised enough for the author to foresee what content is required.	Strongly disagree	0	0,0%	3	17,6%	11	25,0%	2	14,3%	8	12,3%	
	Disagree	0	0,0%	8	47,1%	11	25,0%	0	0,0%	22	33,8%	
	Neutral	0	0,0%	6	35,3%	6	13,6%	4	28,6%	9	13,8%	
	Agree	4	100,0%	0	0,0%	12	27,3%	6	42,9%	22	33,8%	
	Strongly agree	0	0,0%	0	0,0%	4	9,1%	2	14,3%	4	6,2%	0.009
I understand the requirements of the BID Specification Committee report each time I compile one.	Strongly disagree	0	0,0%	3	17,6%	2	4,8%	0	0,0%	12	18,5%	
	Disagree	2	50,0%	6	35,3%	18	42,9%	6	42,9%	22	33,8%	
	Neutral	0	0,0%	6	35,3%	8	19,0%	4	28,6%	8	12,3%	
	Agree	2	50,0%	2	11,8%	10	23,8%	4	28,6%	23	35,4%	
	Strongly agree	0	0,0%	0	0,0%	4	9,5%	0	0,0%	0	0,0%	0.051
I understand the requirements of the BID Evaluation Committee report each time I compile one.	Strongly disagree	0	0,0%	3	17,6%	2	4,5%	2	14,3%	8	12,3%	
	Disagree	2	50,0%	8	47,1%	18	40,9%	6	42,9%	24	36,9%	
	Neutral	0	0,0%	6	35,3%	10	22,7%	2	14,3%	6	9,2%	
	Agree	2	50,0%	0	0,0%	10	22,7%	4	28,6%	25	38,5%	0.101

	Strongly agree	0	0,0%	0	0,0%	4	9,1%	0	0,0%	2	3,1%	
I understand the requirements of the BID Adjudication Committee report each time I compile one.	Strongly disagree	0	0,0%	3	17,6%	2	4,5%	2	14,3%	8	12,3%	
	Disagree	2	50,0%	8	47,1%	18	40,9%	6	42,9%	20	30,8%	
	Neutral	0	0,0%	6	35,3%	10	22,7%	2	14,3%	12	18,5%	
	Agree	2	50,0%	0	0,0%	12	27,3%	4	28,6%	25	38,5%	
	Strongly agree	0	0,0%	0	0,0%	2	4,5%	0	0,0%	0	0,0%	0.233
I have a clear understanding of applying quality on a tender evaluation.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	7	15,9%	4	28,6%	10	15,4%	
	Neutral	2	50,0%	2	11,8%	4	9,1%	3	21,4%	6	9,2%	
	Agree	2	50,0%	15	88,2%	27	61,4%	7	50,0%	37	56,9%	
	Strongly agree	0	0,0%	0	0,0%	6	13,6%	0	0,0%	12	18,5%	0.057
I am aware of the standard authorising signatures required within each bid report.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	2	14,3%	2	3,1%	
	Disagree	0	0,0%	0	0,0%	16	36,4%	2	14,3%	16	24,6%	
	Neutral	2	50,0%	11	64,7%	8	18,2%	2	14,3%	4	6,2%	
	Agree	2	50,0%	6	35,3%	16	36,4%	6	42,9%	35	53,8%	
	Strongly agree	0	0,0%	0	0,0%	4	9,1%	2	14,3%	8	12,3%	0
The EM supply chain processes make sufficient provision for emergency procurement.	Strongly disagree	2	50,0%	9	52,9%	13	29,5%	3	21,4%	9	13,8%	
	Disagree	0	0,0%	6	35,3%	12	27,3%	7	50,0%	21	32,3%	
	Neutral	0	0,0%	2	11,8%	13	29,5%	0	0,0%	23	35,4%	
	Agree	2	50,0%	0	0,0%	4	9,1%	4	28,6%	12	18,5%	0.004

	Strongly agree	0	0,0%	0	0,0%	2	4,5%	0	0,0%	0	0,0%	
I have not encountered or do not foresee delays in the supply chain in its current processes.	Strongly disagree	2	50,0%	9	52,9%	18	40,9%	12	85,7%	45	69,2%	
	Disagree	0	0,0%	6	35,3%	22	50,0%	0	0,0%	6	9,2%	
	Neutral	0	0,0%	2	11,8%	2	4,5%	2	14,3%	10	15,4%	
	Agree	2	50,0%	0	0,0%	2	4,5%	0	0,0%	4	6,2%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0
How many working days does it take on average to complete the required signatories on a BID Specification/Evaluation/Adjudication report Document?	> 2 weeks	0	0,0%	13	76,5%	13	31,0%	8	57,1%	38	58,5%	
	1-2 days	0	0,0%	0	0,0%	0	0,0%	0	0,0%	2	3,1%	
	1-2 weeks	2	50,0%	4	23,5%	18	42,9%	6	42,9%	21	32,3%	
	3-4 days	2	50,0%	0	0,0%	2	4,8%	0	0,0%	0	0,0%	
	5-6 days	0	0,0%	0	0,0%	9	21,4%	0	0,0%	4	6,2%	0
I set aside ____hours from my work day if I need to attend a bid meeting.	<1	2	50,0%	2	11,8%	4	9,5%	0	0,0%	2	3,1%	
	>6	0	0,0%	2	11,8%	4	9,5%	2	14,3%	10	15,4%	
	02-Jan	0	0,0%	2	11,8%	2	4,8%	0	0,0%	9	13,8%	
	04-Feb	0	0,0%	9	52,9%	20	47,6%	4	28,6%	21	32,3%	
	06-Apr	2	50,0%	2	11,8%	12	28,6%	8	57,1%	23	35,4%	0.023
From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	< 3 months	0	0,0%	0	0,0%	6	13,6%	0	0,0%	8	12,3%	
	< 4 months	0	0,0%	2	11,8%	4	9,1%	0	0,0%	10	15,4%	
	< month	2	50,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	<2 months	0	0,0%	0	0,0%	0	0,0%	2	14,3%	0	0,0%	0

	> 4 months	2	50,0%	15	88,2%	34	77,3%	12	85,7%	47	72,3%	
I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	3	4,6%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	5	7,7%	
	Neutral	0	0,0%	2	11,8%	2	4,5%	2	14,3%	5	7,7%	
	Agree	2	50,0%	6	35,3%	26	59,1%	5	35,7%	19	29,2%	
	Strongly agree	2	50,0%	9	52,9%	16	36,4%	7	50,0%	33	50,8%	0.253
I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	3	4,6%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	1	1,5%	
	Neutral	0	0,0%	2	11,8%	0	0,0%	2	16,7%	4	6,2%	
	Agree	2	50,0%	10	58,8%	24	54,5%	3	25,0%	22	33,8%	
	Strongly agree	2	50,0%	5	29,4%	20	45,5%	7	58,3%	35	53,8%	0.338
I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	3	4,6%	
	Disagree	0	0,0%	0	0,0%	3	6,8%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	0	0,0%	9	20,5%	0	0,0%	1	1,5%	
	Agree	2	50,0%	6	35,3%	13	29,5%	5	35,7%	19	29,2%	
	Strongly agree	2	50,0%	11	64,7%	19	43,2%	9	64,3%	42	64,6%	0.016
I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.	Strongly disagree	0	0,0%	2	11,8%	0	0,0%	0	0,0%	4	6,2%	
	Disagree	0	0,0%	0	0,0%	5	11,4%	0	0,0%	2	3,1%	
	Neutral	0	0,0%	0	0,0%	2	4,5%	2	14,3%	8	12,3%	
	Agree	2	50,0%	10	58,8%	21	47,7%	2	14,3%	27	41,5%	0.085

	Strongly agree	2	50,0%	5	29,4%	16	36,4%	10	71,4%	24	36,9%	
Cancellations of BID meetings can be avoided with better planning.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	5	7,7%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	2	14,3%	1	1,5%	
	Neutral	0	0,0%	0	0,0%	3	6,8%	2	14,3%	0	0,0%	
	Agree	2	50,0%	10	58,8%	25	56,8%	2	14,3%	19	29,2%	
	Strongly agree	2	50,0%	7	41,2%	16	36,4%	8	57,1%	40	61,5%	0.001
Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	7	10,8%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	1	1,5%	
	Neutral	0	0,0%	0	0,0%	0	0,0%	2	14,3%	6	9,2%	
	Agree	2	50,0%	4	23,5%	22	50,0%	4	28,6%	14	21,5%	
	Strongly agree	2	50,0%	13	76,5%	22	50,0%	8	57,1%	37	56,9%	0.055
BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	3	4,6%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	3	4,6%	
	Neutral	2	50,0%	0	0,0%	7	15,9%	4	28,6%	2	3,1%	
	Agree	2	50,0%	8	47,1%	18	40,9%	2	14,3%	26	40,0%	
	Strongly agree	0	0,0%	9	52,9%	19	43,2%	8	57,1%	31	47,7%	0.022
There is a lack of technical representation on the bid committees.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	2	50,0%	2	11,8%	3	6,8%	2	14,3%	8	12,3%	
	Neutral	0	0,0%	2	11,8%	12	27,3%	7	50,0%	19	29,2%	
	Agree	0	0,0%	2	11,8%	13	29,5%	3	21,4%	12	18,5%	0.074

	Strongly agree	2	50,0%	11	64,7%	16	36,4%	2	14,3%	26	40,0%	
Technical representation on supply chain committees will assist better judgement on engineering related matters.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	4	6,2%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	0	0,0%	2	4,5%	0	0,0%	0	0,0%	
	Agree	2	50,0%	6	35,3%	25	56,8%	10	71,4%	23	35,4%	
	Strongly agree	2	50,0%	11	64,7%	17	38,6%	4	28,6%	38	58,5%	0.098
The current timelines for bid approval processes affects my ability to manage project budgets.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	3	4,6%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	7	10,8%	
	Neutral	0	0,0%	2	11,8%	10	22,7%	0	0,0%	4	6,2%	
	Agree	2	50,0%	10	58,8%	17	38,6%	4	28,6%	21	32,3%	
	Strongly agree	2	50,0%	5	29,4%	17	38,6%	10	71,4%	30	46,2%	0.036
There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	4	6,2%	
	Disagree	0	0,0%	0	0,0%	3	6,8%	2	14,3%	0	0,0%	
	Neutral	2	50,0%	4	23,5%	22	50,0%	0	0,0%	16	24,6%	
	Agree	2	50,0%	4	23,5%	11	25,0%	2	14,3%	16	24,6%	
	Strongly agree	0	0,0%	9	52,9%	8	18,2%	10	71,4%	29	44,6%	0.001

3.5 : Pearson's Chi-squared Test for independence from Industry Experience

		Industry Exp								
		>15 years		1-5 years		11-15 years		6-10 years		
		Count	Layer Column N %	Count	Layer Column N %	Count	Layer Column N %	Count	Layer Column N %	p-value
I am confident with the knowledge I have of EM's supply chain processes.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0.269
	Disagree	4	11,8%	4	12,5%	4	28,6%	9	14,1%	
	Neutral	8	23,5%	12	37,5%	4	28,6%	14	21,9%	
	Agree	20	58,8%	14	43,8%	6	42,9%	41	64,1%	
	Strongly agree	2	5,9%	2	6,3%	0	0,0%	0	0,0%	
I have made the time to read the City's Supply Chain Policy and follow amendments as they are published.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	2	3,1%	0.095
	Disagree	6	17,6%	10	31,3%	2	14,3%	12	18,8%	
	Neutral	6	17,6%	9	28,1%	3	21,4%	16	25,0%	
	Agree	20	58,8%	9	28,1%	9	64,3%	34	53,1%	
	Strongly agree	2	5,9%	4	12,5%	0	0,0%	0	0,0%	
I understand the repercussions of non-compliance to supply chain processes.	Strongly disagree	4	11,8%	0	0,0%	0	0,0%	2	3,1%	0.019
	Disagree	0	0,0%	4	12,5%	0	0,0%	2	3,1%	
	Neutral	8	23,5%	2	6,3%	2	14,3%	12	18,8%	
	Agree	20	58,8%	24	75,0%	8	57,1%	38	59,4%	

	Strongly agree	2	5,9%	2	6,3%	4	28,6%	10	15,6%	
My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.	Strongly disagree	6	17,6%	4	12,5%	0	0,0%	16	25,0%	
	Disagree	11	32,4%	8	25,0%	8	57,1%	20	31,3%	
	Neutral	6	17,6%	10	31,3%	0	0,0%	4	6,3%	
	Agree	6	17,6%	8	25,0%	0	0,0%	18	28,1%	
	Strongly agree	5	14,7%	2	6,3%	6	42,9%	6	9,4%	0
The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.	Strongly disagree	6	17,6%	2	6,3%	2	14,3%	10	15,6%	
	Disagree	14	41,2%	14	43,8%	10	71,4%	33	51,6%	
	Neutral	6	17,6%	4	12,5%	2	14,3%	10	15,6%	
	Agree	8	23,5%	12	37,5%	0	0,0%	11	17,2%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0.232
My knowledge of supply chain policy is predominantly through knowledge transfer efforts from the Supply Chain Management Unit officials.	Strongly disagree	8	23,5%	4	12,5%	2	14,3%	24	37,5%	
	Disagree	11	32,4%	12	37,5%	7	50,0%	13	20,3%	
	Neutral	6	17,6%	12	37,5%	2	14,3%	12	18,8%	
	Agree	9	26,5%	4	12,5%	0	0,0%	15	23,4%	
	Strongly agree	0	0,0%	0	0,0%	3	21,4%	0	0,0%	0
The municipality has created time and resources for me to learn about how to manage the different types of tender processes.	Strongly disagree	15	44,1%	4	12,5%	6	42,9%	15	23,4%	
	Disagree	11	32,4%	16	50,0%	8	57,1%	33	51,6%	
	Neutral	4	11,8%	4	12,5%	0	0,0%	4	6,3%	
	Agree	4	11,8%	8	25,0%	0	0,0%	10	15,6%	0.082

	Strongly agree	0	0,0%	0	0,0%	0	0,0%	2	3,1%	
I am aware of which supply chain management practitioner I should contact for specific supply chain queries.	Strongly disagree	11	32,4%	10	31,3%	10	71,4%	19	29,7%	
	Disagree	14	41,2%	12	37,5%	2	14,3%	17	26,6%	
	Neutral	2	5,9%	4	12,5%	0	0,0%	6	9,4%	
	Agree	7	20,6%	6	18,8%	2	14,3%	20	31,3%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	2	3,1%	0.174
The EM Supply Chain Unit communicates effectively to municipal line depatments.	Strongly disagree	13	38,2%	6	18,8%	10	71,4%	22	34,4%	
	Disagree	14	41,2%	14	43,8%	2	14,3%	22	34,4%	
	Neutral	7	20,6%	8	25,0%	0	0,0%	12	18,8%	
	Agree	0	0,0%	4	12,5%	2	14,3%	8	12,5%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0.034
I have easily accessible information to evaluate eligibility of contractors.	Strongly disagree	2	5,9%	0	0,0%	2	14,3%	2	3,1%	
	Disagree	11	32,4%	2	6,3%	2	14,3%	11	17,2%	
	Neutral	11	32,4%	10	31,3%	0	0,0%	14	21,9%	
	Agree	10	29,4%	18	56,3%	10	71,4%	35	54,7%	
	Strongly agree	0	0,0%	2	6,3%	0	0,0%	2	3,1%	0.02
Bid reports are standardised enough for the author to foresee what content is required.	Strongly disagree	7	20,6%	6	18,8%	4	28,6%	7	10,9%	
	Disagree	8	23,5%	8	25,0%	4	28,6%	21	32,8%	
	Neutral	19	55,9%	4	12,5%	0	0,0%	2	3,1%	
	Agree	0	0,0%	10	31,3%	4	28,6%	30	46,9%	0

	Strongly agree	0	0,0%	4	12,5%	2	14,3%	4	6,3%	
I understand the requirements of the BID Specification Committee report each time I compile one.	Strongly disagree	3	8,8%	0	0,0%	2	14,3%	12	19,4%	
	Disagree	12	35,3%	8	25,0%	6	42,9%	28	45,2%	
	Neutral	10	29,4%	10	31,3%	2	14,3%	4	6,5%	
	Agree	9	26,5%	10	31,3%	4	28,6%	18	29,0%	
	Strongly agree	0	0,0%	4	12,5%	0	0,0%	0	0,0%	0.001
I understand the requirements of the BID Evaluation Committee report each time I compile one.	Strongly disagree	3	8,8%	0	0,0%	4	28,6%	8	12,5%	
	Disagree	18	52,9%	10	31,3%	4	28,6%	26	40,6%	
	Neutral	4	11,8%	10	31,3%	2	14,3%	8	12,5%	
	Agree	9	26,5%	8	25,0%	4	28,6%	20	31,3%	
	Strongly agree	0	0,0%	4	12,5%	0	0,0%	2	3,1%	0.022
I understand the requirements of the BID Adjudication Committee report each time I compile one.	Strongly disagree	5	14,7%	0	0,0%	0	0,0%	10	15,6%	
	Disagree	16	47,1%	10	31,3%	6	42,9%	22	34,4%	
	Neutral	6	17,6%	10	31,3%	4	28,6%	10	15,6%	
	Agree	7	20,6%	10	31,3%	4	28,6%	22	34,4%	
	Strongly agree	0	0,0%	2	6,3%	0	0,0%	0	0,0%	0.067
I have a clear understanding of applying quality on a tender evaluation.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	4	11,8%	2	6,3%	0	0,0%	15	23,4%	
	Neutral	3	8,8%	6	18,8%	2	14,3%	6	9,4%	
	Agree	27	79,4%	18	56,3%	10	71,4%	33	51,6%	0.034

	Strongly agree	0	0,0%	6	18,8%	2	14,3%	10	15,6%	
I am aware of the standard authorising signatures required within each bid report.	Strongly disagree	4	11,8%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	2	5,9%	6	18,8%	8	57,1%	18	28,1%	
	Neutral	11	32,4%	8	25,0%	0	0,0%	8	12,5%	
	Agree	17	50,0%	14	43,8%	2	14,3%	32	50,0%	
	Strongly agree	0	0,0%	4	12,5%	4	28,6%	6	9,4%	0
The EM supply chain processes make sufficient provision for emergency procurement.	Strongly disagree	14	41,2%	6	18,8%	4	28,6%	12	18,8%	
	Disagree	7	20,6%	12	37,5%	4	28,6%	23	35,9%	
	Neutral	11	32,4%	8	25,0%	4	28,6%	15	23,4%	
	Agree	2	5,9%	4	12,5%	2	14,3%	14	21,9%	
	Strongly agree	0	0,0%	2	6,3%	0	0,0%	0	0,0%	0.092
I have not encountered or do not foresee delays in the supply chain in its current processes.	Strongly disagree	24	70,6%	12	37,5%	10	71,4%	40	62,5%	
	Disagree	6	17,6%	16	50,0%	2	14,3%	10	15,6%	
	Neutral	4	11,8%	2	6,3%	2	14,3%	8	12,5%	
	Agree	0	0,0%	2	6,3%	0	0,0%	6	9,4%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0.012
How many working days does it take on average to complete the required signatories on a BID Specification/Evaluation/Adjudication report Document?	> 2 weeks	19	55,9%	10	33,3%	8	57,1%	35	54,7%	
	1-2 days	0	0,0%	0	0,0%	0	0,0%	2	3,1%	
	1-2 weeks	13	38,2%	12	40,0%	6	42,9%	20	31,3%	0.029

	3-4 days	0	0,0%	4	13,3%	0	0,0%	0	0,0%	
	5-6 days	2	5,9%	4	13,3%	0	0,0%	7	10,9%	
I set aside ____hours from my work day if I need to attend a bid meeting.	<1	2	5,9%	4	13,3%	4	28,6%	0	0,0%	
	>6	6	17,6%	4	13,3%	0	0,0%	8	12,5%	
	1-2	4	11,8%	2	6,7%	0	0,0%	7	10,9%	
	2-4	13	38,2%	10	33,3%	6	42,9%	25	39,1%	
	4-6	9	26,5%	10	33,3%	4	28,6%	24	37,5%	0.049
From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	< 3 months	0	0,0%	4	12,5%	0	0,0%	10	15,6%	
	< 4 months	2	5,9%	0	0,0%	2	14,3%	12	18,8%	
	< month	0	0,0%	2	6,3%	0	0,0%	0	0,0%	
	<2 months	0	0,0%	0	0,0%	2	14,3%	0	0,0%	
	> 4 months	32	94,1%	26	81,3%	10	71,4%	42	65,6%	0
I believe a dedicated supply chain compliance officer will improve a line department's efficiency in successful contract documentation.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	3	4,7%	
	Disagree	2	5,9%	0	0,0%	0	0,0%	3	4,7%	
	Neutral	6	17,6%	2	6,3%	0	0,0%	3	4,7%	
	Agree	7	20,6%	22	68,8%	2	14,3%	27	42,2%	
	Strongly agree	19	55,9%	8	25,0%	12	85,7%	28	43,8%	0.001
I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	3	4,7%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	1	1,6%	
	Neutral	2	5,9%	2	6,3%	2	16,7%	2	3,1%	
	Agree	15	44,1%	18	56,3%	2	16,7%	26	40,6%	0.354

	Strongly agree	17	50,0%	12	37,5%	8	66,7%	32	50,0%	
I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	3	4,7%	
	Disagree	0	0,0%	2	6,3%	0	0,0%	1	1,6%	
	Neutral	0	0,0%	8	25,0%	0	0,0%	2	3,1%	
	Agree	11	32,4%	10	31,3%	2	14,3%	22	34,4%	
	Strongly agree	23	67,6%	12	37,5%	12	85,7%	36	56,3%	0.001
I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.	Strongly disagree	2	5,9%	0	0,0%	0	0,0%	4	6,3%	
	Disagree	0	0,0%	0	0,0%	2	14,3%	5	7,8%	
	Neutral	2	5,9%	2	6,3%	2	14,3%	6	9,4%	
	Agree	12	35,3%	19	59,4%	8	57,1%	23	35,9%	
	Strongly agree	18	52,9%	11	34,4%	2	14,3%	26	40,6%	0.096
Cancellations of BID meetings can be avoided with better planning.	Strongly disagree	2	5,9%	0	0,0%	0	0,0%	3	4,7%	
	Disagree	0	0,0%	0	0,0%	2	14,3%	1	1,6%	
	Neutral	2	5,9%	2	6,3%	0	0,0%	1	1,6%	
	Agree	12	35,3%	16	50,0%	8	57,1%	22	34,4%	
	Strongly agree	18	52,9%	14	43,8%	4	28,6%	37	57,8%	0.048
Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	7	10,9%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	1	1,6%	
	Neutral	2	5,9%	0	0,0%	2	14,3%	4	6,3%	
	Agree	8	23,5%	17	53,1%	2	14,3%	19	29,7%	0.028

	Strongly agree	24	70,6%	15	46,9%	10	71,4%	33	51,6%	
BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	3	4,7%	
	Disagree	2	5,9%	0	0,0%	0	0,0%	1	1,6%	
	Neutral	2	5,9%	5	15,6%	2	14,3%	6	9,4%	
	Agree	10	29,4%	15	46,9%	2	14,3%	29	45,3%	
	Strongly agree	20	58,8%	12	37,5%	10	71,4%	25	39,1%	0.136
There is a lack of technical representation on the bid committees.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	2	5,9%	2	6,3%	2	14,3%	11	17,2%	
	Neutral	12	35,3%	8	25,0%	8	57,1%	12	18,8%	
	Agree	1	2,9%	11	34,4%	4	28,6%	14	21,9%	
	Strongly agree	19	55,9%	11	34,4%	0	0,0%	27	42,2%	0.001
Technical representation on supply chain committees will assist better judgement on engineering related matters.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	4	6,3%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	2	6,3%	0	0,0%	0	0,0%	
	Agree	15	44,1%	22	68,8%	4	28,6%	25	39,1%	
	Strongly agree	19	55,9%	8	25,0%	10	71,4%	35	54,7%	0.006
The current timelines for bid approval processes affects my ability to manage project budgets.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	3	4,7%	
	Disagree	0	0,0%	0	0,0%	0	0,0%	7	10,9%	
	Neutral	2	5,9%	8	25,0%	4	28,6%	2	3,1%	
	Agree	18	52,9%	10	31,3%	6	42,9%	20	31,3%	0.002

	Strongly agree	14	41,2%	14	43,8%	4	28,6%	32	50,0%	
There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	4	6,3%	
	Disagree	0	0,0%	2	6,3%	0	0,0%	3	4,7%	
	Neutral	4	11,8%	9	28,1%	6	42,9%	25	39,1%	
	Agree	6	17,6%	13	40,6%	4	28,6%	12	18,8%	
	Strongly agree	24	70,6%	8	25,0%	4	28,6%	20	31,3%	0.002

3.6 : Pearson's Chi-squared Test for independence from No. of Projects

		On average, how many projects over R200 000.00 have you managed per year?										
		>6		1-2		3-4		5-6		none		
		Count	Layer Column N %	Count	Layer Column N %	Count	Layer Column N %	Count	Layer Column N %	Count	Layer Column N %	p-value
I am confident with the knowledge I have of EM's supply chain processes.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	14	24,6%	7	15,6%	0	0,0%	0	0,0%	
	Neutral	10	45,5%	4	7,0%	13	28,9%	9	50,0%	2	100,0%	
	Agree	10	45,5%	39	68,4%	23	51,1%	9	50,0%	0	0,0%	
	Strongly agree	2	9,1%	0	0,0%	2	4,4%	0	0,0%	0	0,0%	0
I have made the time to read the City's Supply Chain Policy and follow	Strongly disagree	0	0,0%	0	0,0%	2	4,4%	0	0,0%	0	0,0%	0.384

amendments as they are published.	Disagree	2	9,1%	12	21,1%	14	31,1%	2	11,1%	0	0,0%	
	Neutral	8	36,4%	11	19,3%	10	22,2%	4	22,2%	1	50,0%	
	Agree	10	45,5%	32	56,1%	17	37,8%	12	66,7%	1	50,0%	
	Strongly agree	2	9,1%	2	3,5%	2	4,4%	0	0,0%	0	0,0%	
I understand the repercussions of non-compliance to supply chain processes.	Strongly disagree	0	0,0%	0	0,0%	6	13,3%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	6	13,3%	0	0,0%	0	0,0%	
	Neutral	2	9,1%	10	17,5%	4	8,9%	8	44,4%	0	0,0%	
	Agree	20	90,9%	45	78,9%	21	46,7%	2	11,1%	2	100,0%	
	Strongly agree	0	0,0%	2	3,5%	8	17,8%	8	44,4%	0	0,0%	0
My knowledge of the city's supply chain process allows me to compile a tender document in the shortest possible time.	Strongly disagree	6	27,3%	8	14,0%	12	26,7%	0	0,0%	0	0,0%	
	Disagree	4	18,2%	25	43,9%	15	33,3%	3	16,7%	0	0,0%	
	Neutral	4	18,2%	4	7,0%	8	17,8%	4	22,2%	0	0,0%	
	Agree	6	27,3%	16	28,1%	8	17,8%	0	0,0%	2	100,0%	
	Strongly agree	2	9,1%	4	7,0%	2	4,4%	11	61,1%	0	0,0%	0
The municipality has created opportunities for me to easily understand where there has been supply chain policy amendments so that I am always up to date.	Strongly disagree	2	9,1%	6	10,5%	5	11,1%	7	38,9%	0	0,0%	
	Disagree	0	0,0%	36	63,2%	28	62,2%	7	38,9%	0	0,0%	
	Neutral	8	36,4%	6	10,5%	4	8,9%	4	22,2%	0	0,0%	
	Agree	12	54,5%	9	15,8%	8	17,8%	0	0,0%	2	100,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0
My knowledge of supply chain policy is predominantly through knowledge	Strongly disagree	2	9,1%	22	38,6%	6	13,3%	8	44,4%	0	0,0%	0

transfer efforts from the Supply Chain Management Unit officials.	Disagree	4	18,2%	22	38,6%	14	31,1%	3	16,7%	0	0,0%	
	Neutral	6	27,3%	6	10,5%	18	40,0%	0	0,0%	2	100,0%	
	Agree	10	45,5%	4	7,0%	7	15,6%	7	38,9%	0	0,0%	
	Strongly agree	0	0,0%	3	5,3%	0	0,0%	0	0,0%	0	0,0%	
The municipality has created time and resources for me to learn about how to manage the different types of tender processes.	Strongly disagree	4	18,2%	17	29,8%	7	15,6%	12	66,7%	0	0,0%	
	Disagree	6	27,3%	32	56,1%	28	62,2%	2	11,1%	0	0,0%	
	Neutral	6	27,3%	0	0,0%	4	8,9%	2	11,1%	0	0,0%	
	Agree	6	27,3%	8	14,0%	6	13,3%	0	0,0%	2	100,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	2	11,1%	0	0,0%	0
I am aware of which supply chain management practitioner I should contact for specific supply chain queries.	Strongly disagree	2	9,1%	29	50,9%	12	26,7%	7	38,9%	0	0,0%	
	Disagree	10	45,5%	8	14,0%	23	51,1%	4	22,2%	0	0,0%	
	Neutral	2	9,1%	2	3,5%	4	8,9%	2	11,1%	2	100,0%	
	Agree	8	36,4%	18	31,6%	6	13,3%	3	16,7%	0	0,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	2	11,1%	0	0,0%	0
The EM Supply Chain Unit communicates effectively to municipal line depatments.	Strongly disagree	2	9,1%	30	52,6%	8	17,8%	11	61,1%	0	0,0%	
	Disagree	4	18,2%	17	29,8%	29	64,4%	2	11,1%	0	0,0%	
	Neutral	10	45,5%	4	7,0%	8	17,8%	5	27,8%	0	0,0%	
	Agree	6	27,3%	6	10,5%	0	0,0%	0	0,0%	2	100,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0
I have easily accessible information to evaluate eligibility of contractors.	Strongly disagree	0	0,0%	0	0,0%	2	4,4%	4	22,2%	0	0,0%	0

	Disagree	6	27,3%	13	22,8%	4	8,9%	3	16,7%	0	0,0%	
	Neutral	6	27,3%	14	24,6%	8	17,8%	7	38,9%	0	0,0%	
	Agree	10	45,5%	28	49,1%	31	68,9%	4	22,2%	0	0,0%	
	Strongly agree	0	0,0%	2	3,5%	0	0,0%	0	0,0%	2	100,0%	
Bid reports are standardised enough for the author to foresee what content is required.	Strongly disagree	0	0,0%	15	26,3%	6	13,3%	3	16,7%	0	0,0%	
	Disagree	4	18,2%	18	31,6%	17	37,8%	2	11,1%	0	0,0%	
	Neutral	4	18,2%	8	14,0%	6	13,3%	5	27,8%	2	100,0%	
	Agree	14	63,6%	10	17,5%	12	26,7%	8	44,4%	0	0,0%	
	Strongly agree	0	0,0%	6	10,5%	4	8,9%	0	0,0%	0	0,0%	0.001
I understand the requirements of the BID Specification Committee report each time I compile one.	Strongly disagree	0	0,0%	6	10,5%	4	8,9%	7	38,9%	0	0,0%	
	Disagree	6	30,0%	27	47,4%	19	42,2%	2	11,1%	0	0,0%	
	Neutral	8	40,0%	6	10,5%	6	13,3%	4	22,2%	2	100,0%	
	Agree	6	30,0%	16	28,1%	14	31,1%	5	27,8%	0	0,0%	
	Strongly agree	0	0,0%	2	3,5%	2	4,4%	0	0,0%	0	0,0%	0
I understand the requirements of the BID Evaluation Committee report each time I compile one.	Strongly disagree	0	0,0%	4	7,0%	4	8,9%	7	38,9%	0	0,0%	
	Disagree	6	27,3%	25	43,9%	25	55,6%	2	11,1%	0	0,0%	
	Neutral	10	45,5%	8	14,0%	2	4,4%	2	11,1%	2	100,0%	
	Agree	6	27,3%	16	28,1%	12	26,7%	7	38,9%	0	0,0%	
	Strongly agree	0	0,0%	4	7,0%	2	4,4%	0	0,0%	0	0,0%	0.002
I understand the requirements of the BID Adjudication Committee report	Strongly disagree	0	0,0%	6	10,5%	6	13,3%	3	16,7%	0	0,0%	0

each time I compile one.	Disagree	6	27,3%	25	43,9%	21	46,7%	2	11,1%	0	0,0%	
	Neutral	10	45,5%	8	14,0%	2	4,4%	8	44,4%	2	100,0%	
	Agree	6	27,3%	18	31,6%	14	31,1%	5	27,8%	0	0,0%	
	Strongly agree	0	0,0%	0	0,0%	2	4,4%	0	0,0%	0	0,0%	
I have a clear understanding of applying quality on a tender evaluation.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	11	19,3%	10	22,2%	0	0,0%	0	0,0%	
	Neutral	6	27,3%	4	7,0%	7	15,6%	0	0,0%	0	0,0%	
	Agree	16	72,7%	32	56,1%	26	57,8%	12	66,7%	2	100,0%	
	Strongly agree	0	0,0%	10	17,5%	2	4,4%	6	33,3%	0	0,0%	0.001
I am aware of the standard authorising signatures required within each bid report.	Strongly disagree	0	0,0%	0	0,0%	4	8,9%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	21	36,8%	13	28,9%	0	0,0%	0	0,0%	
	Neutral	6	27,3%	10	17,5%	8	17,8%	3	16,7%	0	0,0%	
	Agree	16	72,7%	20	35,1%	16	35,6%	11	61,1%	2	100,0%	
	Strongly agree	0	0,0%	6	10,5%	4	8,9%	4	22,2%	0	0,0%	0.002
The EM supply chain processes make sufficient provision for emergency procurement.	Strongly disagree	4	18,2%	23	40,4%	3	6,7%	6	33,3%	0	0,0%	
	Disagree	6	27,3%	24	42,1%	15	33,3%	1	5,6%	0	0,0%	
	Neutral	6	27,3%	2	3,5%	21	46,7%	9	50,0%	0	0,0%	
	Agree	6	27,3%	8	14,0%	6	13,3%	2	11,1%	0	0,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	2	100,0%	0.001
I have not encountered or do not foresee delays in the supply chain in	Strongly disagree	6	27,3%	44	77,2%	24	53,3%	12	66,7%	0	0,0%	0

its current processes.	Disagree	6	27,3%	7	12,3%	19	42,2%	2	11,1%	0	0,0%	
	Neutral	8	36,4%	0	0,0%	2	4,4%	4	22,2%	2	100,0%	
	Agree	2	9,1%	6	10,5%	0	0,0%	0	0,0%	0	0,0%	
	Strongly agree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
How many working days does it take on average to complete the required signatories on a BID Specification/Evaluation/Adjudication report Document?	> 2 weeks	12	54,5%	26	45,6%	23	51,1%	11	61,1%	0	0,0%	
	1-2 days	2	9,1%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	1-2 weeks	8	36,4%	20	35,1%	16	35,6%	7	38,9%	0	0,0%	
	3-4 days	0	0,0%	2	3,5%	2	4,4%	0	0,0%	0	0,0%	
	5-6 days	0	0,0%	9	15,8%	4	8,9%	0	0,0%	0	0,0%	0.072
I set aside ____hours from my work day if I need to attend a bid meeting.	<1	4	18,2%	6	10,5%	0	0,0%	0	0,0%	0	0,0%	
	>6	0	0,0%	6	10,5%	10	22,2%	2	11,1%	0	0,0%	
	02-Jan	4	18,2%	5	8,8%	4	8,9%	0	0,0%	0	0,0%	
	04-Feb	8	36,4%	20	35,1%	19	42,2%	7	38,9%	0	0,0%	
	06-Apr	6	27,3%	20	35,1%	12	26,7%	9	50,0%	0	0,0%	0.038
From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	< 3 months	2	9,1%	6	10,5%	6	13,3%	0	0,0%	0	0,0%	
	< 4 months	4	18,2%	10	17,5%	0	0,0%	2	11,1%	0	0,0%	
	< month	0	0,0%	2	3,5%	0	0,0%	0	0,0%	0	0,0%	
	<2 months	2	9,1%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	> 4 months	14	63,6%	39	68,4%	39	86,7%	16	88,9%	2	100,0%	0.04
I believe a dedicated supply chain compliance officer will improve a line	Strongly disagree	0	0,0%	3	5,3%	0	0,0%	0	0,0%	0	0,0%	0.437

department's efficiency in successful contract documentation.	Disagree	0	0,0%	3	5,3%	2	4,4%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	7	12,3%	2	4,4%	2	11,1%	0	0,0%	
	Agree	12	54,5%	19	33,3%	19	42,2%	6	33,3%	2	100,0%	
	Strongly agree	10	45,5%	25	43,9%	22	48,9%	10	55,6%	0	0,0%	
I believe presentations educating EM project managers about SCM process flows and documentation should be mandatory.	Strongly disagree	0	0,0%	3	5,3%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	1	1,8%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	4	7,0%	0	0,0%	4	22,2%	0	0,0%	
	Agree	14	70,0%	26	45,6%	17	37,8%	4	22,2%	0	0,0%	
	Strongly agree	6	30,0%	23	40,4%	28	62,2%	10	55,6%	2	100,0%	0.016
I believe the process of circulating bid committee reports for authorizing signatures can be done more efficiently through a secure online system.	Strongly disagree	0	0,0%	3	5,3%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	3	6,7%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	4	7,0%	6	13,3%	0	0,0%	0	0,0%	
	Agree	14	63,6%	21	36,8%	6	13,3%	4	22,2%	0	0,0%	
	Strongly agree	8	36,4%	29	50,9%	30	66,7%	14	77,8%	2	100,0%	0.004
I believe it is necessary for BID Committee Members to inspect the site of an emergency project so to better understand its complexity and risk of delays.	Strongly disagree	2	9,1%	4	7,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	2	3,5%	5	11,1%	0	0,0%	0	0,0%	
	Neutral	4	18,2%	0	0,0%	8	17,8%	0	0,0%	0	0,0%	
	Agree	10	45,5%	30	52,6%	14	31,1%	6	33,3%	2	100,0%	
	Strongly agree	6	27,3%	21	36,8%	18	40,0%	12	66,7%	0	0,0%	0.005
Cancellations of BID meetings can be avoided with better planning.	Strongly disagree	0	0,0%	3	5,3%	2	4,4%	0	0,0%	0	0,0%	0.08

	Disagree	2	9,1%	1	1,8%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	2	3,5%	3	6,7%	0	0,0%	0	0,0%	
	Agree	10	45,5%	26	45,6%	18	40,0%	2	11,1%	2	100,0%	
	Strongly agree	10	45,5%	25	43,9%	22	48,9%	16	88,9%	0	0,0%	
Cancelled BID meetings cause delays in service delivery and negatively affect budget planning.	Strongly disagree	0	0,0%	7	12,3%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	1	1,8%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	2	9,1%	0	0,0%	2	4,4%	4	22,2%	0	0,0%	
	Agree	6	27,3%	15	26,3%	21	46,7%	2	11,1%	2	100,0%	
	Strongly agree	14	63,6%	34	59,6%	22	48,9%	12	66,7%	0	0,0%	0.003
BID committee members need to be supported by top management so to prioritize commitment to attending bid committee meetings or planning ahead for alternate members.	Strongly disagree	0	0,0%	3	5,3%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	1	1,8%	2	4,4%	0	0,0%	0	0,0%	
	Neutral	4	18,2%	4	7,0%	5	11,1%	0	0,0%	2	100,0%	
	Agree	10	45,5%	16	28,1%	22	48,9%	8	44,4%	0	0,0%	
	Strongly agree	8	36,4%	33	57,9%	16	35,6%	10	55,6%	0	0,0%	0.005
There is a lack of technical representation on the bid committees.	Strongly disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	4	18,2%	6	10,5%	7	15,6%	0	0,0%	0	0,0%	
	Neutral	10	45,5%	10	17,5%	11	24,4%	7	38,9%	2	100,0%	
	Agree	0	0,0%	15	26,3%	15	33,3%	0	0,0%	0	0,0%	
	Strongly agree	8	36,4%	26	45,6%	12	26,7%	11	61,1%	0	0,0%	0.002
Technical representation on supply chain committees will assist better	Strongly disagree	0	0,0%	4	7,0%	0	0,0%	0	0,0%	0	0,0%	0.016

judgement on engineering related matters.	Disagree	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	0	0,0%	0	0,0%	2	4,4%	0	0,0%	0	0,0%	
	Agree	10	45,5%	20	35,1%	29	64,4%	5	27,8%	2	100,0%	
	Strongly agree	12	54,5%	33	57,9%	14	31,1%	13	72,2%	0	0,0%	
The current timelines for bid approval processes affects my ability to manage project budgets.	Strongly disagree	0	0,0%	3	5,3%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	2	9,1%	5	8,8%	0	0,0%	0	0,0%	0	0,0%	
	Neutral	6	27,3%	4	7,0%	4	8,9%	0	0,0%	2	100,0%	
	Agree	10	45,5%	13	22,8%	23	51,1%	8	44,4%	0	0,0%	
	Strongly agree	4	18,2%	32	56,1%	18	40,0%	10	55,6%	0	0,0%	0
There should be a refundable cost charged to tenderer's wishing to appeal during the appeal period to mitigate frivolous appeals that cause delays in service delivery.	Strongly disagree	0	0,0%	4	7,0%	0	0,0%	0	0,0%	0	0,0%	
	Disagree	0	0,0%	0	0,0%	5	11,1%	0	0,0%	0	0,0%	
	Neutral	10	45,5%	18	31,6%	10	22,2%	4	22,2%	2	100,0%	
	Agree	6	27,3%	17	29,8%	10	22,2%	2	11,1%	0	0,0%	
	Strongly agree	6	27,3%	18	31,6%	20	44,4%	12	66,7%	0	0,0%	0.009

Appendix 4 : Cross Tabular Analysis

4.1 : Cross tabulation of project manager experience at eThekwini Municipality to experience of SCM competitive bid process length.

Ethekwini Exp * From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award) Crosstabulation

			From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)					
			< 3 months	< 4 months	< month	<2 months	> 4 months	Total
Ethekwini Exp	<12 months	Count	0	0	2	0	2	4
		Expected Count	.4	.4	.1	.1	3.1	4.0
		% within Ethekwini Exp	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	0.0%	0.0%	100.0%	0.0%	1.8%	2.8%
		% of Total	0.0%	0.0%	1.4%	0.0%	1.4%	2.8%
	>15 years	Count	0	2	0	0	15	17
		Expected Count	1.7	1.9	.2	.2	13.0	17.0
		% within Ethekwini Exp	0.0%	11.8%	0.0%	0.0%	88.2%	100.0%

		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	0.0%	12.5%	0.0%	0.0%	13.6%	11.8%
		% of Total	0.0%	1.4%	0.0%	0.0%	10.4%	11.8%
	1-5 years	Count	6	4	0	0	34	44
		Expected Count	4.3	4.9	.6	.6	33.6	44.0
		% within Ethekwini Exp	13.6%	9.1%	0.0%	0.0%	77.3%	100.0%
		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	42.9%	25.0%	0.0%	0.0%	30.9%	30.6%
		% of Total	4.2%	2.8%	0.0%	0.0%	23.6%	30.6%
	11-15 years	Count	0	0	0	2	12	14
		Expected Count	1.4	1.6	.2	.2	10.7	14.0
		% within Ethekwini Exp	0.0%	0.0%	0.0%	14.3%	85.7%	100.0%

		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	0.0%	0.0%	0.0%	100.0%	10.9%	9.7%
		% of Total	0.0%	0.0%	0.0%	1.4%	8.3%	9.7%
	6-10 years	Count	8	10	0	0	47	65
		Expected Count	6.3	7.2	.9	.9	49.7	65.0
		% within Ethekwini Exp	12.3%	15.4%	0.0%	0.0%	72.3%	100.0%
		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	57.1%	62.5%	0.0%	0.0%	42.7%	45.1%
		% of Total	5.6%	6.9%	0.0%	0.0%	32.6%	45.1%
Total		Count	14	16	2	2	110	144
		Expected Count	14.0	16.0	2.0	2.0	110.0	144.0
		% within Ethekwini Exp	9.7%	11.1%	1.4%	1.4%	76.4%	100.0%

	% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.7%	11.1%	1.4%	1.4%	76.4%	100.0%

4.2 : Cross tabulation of project manager's number of major projects managed per year to experience of SCM competitive bid process length.

On average, how many projects over R200 000.00 have you managed per year? * From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award) Crosstabulation

			From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)					
			< 3 months	< 4 months	< month	<2 months	> 4 months	Total
On average, how many projects over R200 000.00 have you managed per year?	>6	Count	2	4	0	2	14	22
		Expected Count	2.1	2.4	.3	.3	16.8	22.0
		% within On average, how many projects over R200 000.00 have you managed per year?	9.1%	18.2%	0.0%	9.1%	63.6%	100.0%

		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	14.3%	25.0%	0.0%	100.0%	12.7%	15.3%
		% of Total	1.4%	2.8%	0.0%	1.4%	9.7%	15.3%
	1-2	Count	6	10	2	0	39	57
		Expected Count	5.5	6.3	.8	.8	43.5	57.0
		% within On average, how many projects over R200 000.00 have you managed per year?	10.5%	17.5%	3.5%	0.0%	68.4%	100.0%
		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	42.9%	62.5%	100.0%	0.0%	35.5%	39.6%
		% of Total	4.2%	6.9%	1.4%	0.0%	27.1%	39.6%
	3-4	Count	6	0	0	0	39	45
		Expected Count	4.4	5.0	.6	.6	34.4	45.0
		% within On average, how many projects over R200 000.00 have you managed per year?	13.3%	0.0%	0.0%	0.0%	86.7%	100.0%

		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	42.9%	0.0%	0.0%	0.0%	35.5%	31.3%
		% of Total	4.2%	0.0%	0.0%	0.0%	27.1%	31.3%
	5-6	Count	0	2	0	0	16	18
		Expected Count	1.8	2.0	.3	.3	13.8	18.0
		% within On average, how many projects over R200 000.00 have you managed per year?	0.0%	11.1%	0.0%	0.0%	88.9%	100.0%
		% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	0.0%	12.5%	0.0%	0.0%	14.5%	12.5%
		% of Total	0.0%	1.4%	0.0%	0.0%	11.1%	12.5%
	none	Count	0	0	0	0	2	2
		Expected Count	.2	.2	.0	.0	1.5	2.0
		% within On average, how many projects over R200 000.00 have you managed per year?	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%

	% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	0.0%	0.0%	0.0%	0.0%	1.8%	1.4%
	% of Total	0.0%	0.0%	0.0%	0.0%	1.4%	1.4%
Total	Count	14	16	2	2	110	144
	Expected Count	14.0	16.0	2.0	2.0	110.0	144.0
	% within On average, how many projects over R200 000.00 have you managed per year?	9.7%	11.1%	1.4%	1.4%	76.4%	100.0%
	% within From your experience, what is the average time taken to award a contract? (from compiling a contract document – BSC Committee – BEC Committee – BAC Committee – Appeal period - letter of award)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.7%	11.1%	1.4%	1.4%	76.4%	100.0%

Appendix 5 : Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

21 August 2017

Ms Natasha Ramdass (216072454)
Graduate School of Business & Leadership
Westville Campus

Dear Ms Ramdass,

Protocol reference number: HSS/1338/017M
Project title: The application of Lean Management Practices in the Supply Chain Unit of eThekwini Municipality

Full Approval – Expedited Application

In response to your application received on 04 August 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and FULL APPROVAL for the protocol has been granted.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

[redacted]
.....
Dr Shamila Naidoo (Deputy Chair)

/ms

Cc Supervisor: Mr Christopher Chikandiwa
Cc Academic Leader Research: Dr Muhammad Hoque
Cc School Administrator: Ms Zarina Bullyraj

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