

**Factors affecting the success of inventory control  
in the Stores Division of the eThekweni  
Municipality, Durban: a case study**

**By**

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## Declaration

I, Zwelihle Wiseman Nzuzo do declare that this dissertation is a representation of my own work in both conception and execution. This dissertation represents research work carried out by myself and it has not been submitted in any form for another degree at any university or higher learning institution. All information used from published or unpublished work of others has been acknowledged.

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## Dedication

*“My dear children, I write this to you so that you will not sin. But if anybody does sin, we have an advocate with the Father - **Jesus Christ**, the Righteous One. He is the atoning sacrifice for our sins, and not only for ours but also for the sins of the whole world”*

**1 John 2 vs 1-2 (NIV) Holy Bible**

## The Great Commission

*<sup>16</sup> Then the eleven disciples went to Galilee, to the mountain where **Jesus** had told them to go. <sup>17</sup> When they saw **Him**, they worshiped **Him**; but some doubted. <sup>18</sup> Then **Jesus** came to them and said, "All authority in heaven and on earth has been given to me. <sup>19</sup> Therefore go and make disciples of all nations, baptizing them in the name of the **Father** and of the **Son** and of the **Holy Spirit**, <sup>20</sup> and teaching them to obey everything I have commanded you. And surely I am with you always, to the very end of the age."*

**Matthew 29 vs 16-20 (NIV) Holy Bible**

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## **Abstract**

The Stores Division reportedly found it very difficult to control inventories as well as executing roles and responsibilities allocated in the section. The aims of this study were to identify factors affecting the success of inventory control and to assess strategies used by the Stores Division of the eThekweni Municipality in Durban to control inventory stocks. In order to arrive at the deep structure underpinning inventory control, three theoretical frameworks were used, i.e., stock diffusion theory, application control theory and inventory control in theory and practice.

This case study was census, descriptive, cross-sectional and predominantly quantitative in nature with only two open-ended questions. The 57 questionnaires were administered by members of staff at the Stores and Procurement Divisions of the eThekweni Municipality in Durban. Data were analysed using descriptive and inferential statistics and categorised according to themes. The IBM Statistical Package for Social Sciences (SPSS) version 21.0 was used to determine statistical results.

The findings of the study revealed that employees lack proper training and education and that there is poor inventory control planning, lack of staff communication and lack of procurement time management when processing inventory orders. Respondents also indicated that there are no common strategies in place to control inventories.

The study recommends that the Stores Division should consider the levels of staff qualifications, provide more staff training, and improve inventory control planning; communication; time management, and instigate innovative strategies in order to eradicate growing costs of inventory stocks. Moreover, the internal control processes need to be mapped according to the various roles identified.

**Contents****Page**

<b>Declaration</b>	<b>i</b>
<b>Dedication</b>	<b>ii</b>
<b>Acknowledgements</b>	<b>iii</b>
<b>Abstract</b>	<b>iv</b>
<b>Contents</b>	<b>v</b>
<b>Appendixes</b>	<b>x</b>
<b>List of tables</b>	<b>xi</b>
<b>List of figures</b>	<b>xii</b>
<b>List of acronyms</b>	<b>xiii</b>

**CHAPTER ONE – INTRODUCTION****Page**

<b>1.0</b>	<b>Introduction</b>	<b>1</b>
<b>1.1</b>	<b>Background of the study</b>	<b>1</b>
<b>1.2</b>	<b>The statement of problem</b>	<b>4</b>
<b>1.3</b>	<b>Aim and objectives</b>	<b>4</b>
1.3.1	Research questions	5
<b>1.4</b>	<b>Rationale for the study</b>	<b>5</b>
<b>1.5</b>	<b>Scope of the study</b>	<b>5</b>
<b>1.6</b>	<b>Research methodology</b>	<b>6</b>
1.6.1	Research type	6
1.6.2	Target population	6
<b>1.7</b>	<b>Pilot study</b>	<b>7</b>
<b>1.8</b>	<b>Construction or reliability and validity</b>	<b>7</b>
<b>1.9</b>	<b>Data collection</b>	<b>7</b>
<b>1.10</b>	<b>Ethical considerations</b>	<b>8</b>
<b>1.11</b>	<b>Overview of chapters</b>	<b>8</b>
<b>1.12</b>	<b>Conclusion</b>	<b>9</b>

**CHAPTER TWO - LITERATURE REVIEW****Page**

<b>2.0</b>	<b>Introduction</b>	<b>10</b>
<b>2.1</b>	<b>Theoretical framework</b>	<b>10</b>
2.1.1	Stock diffusion theory	11
2.1.2	Application control theory	11
2.1.3	Inventory control in theory and practice	12
<b>2.2</b>	<b>Defining inventory of the municipality</b>	<b>13</b>
<b>2.3</b>	<b>Motivation for holding inventory by municipality</b>	<b>14</b>
<b>2.4</b>	<b>Costs of municipal inventory</b>	<b>14</b>
<b>2.5</b>	<b>Defining inventory control of the municipality</b>	<b>15</b>
<b>2.6</b>	<b>An overview of the municipal inventory control in the world context</b>	<b>15</b>
<b>2.7</b>	<b>An overview of the municipal inventory control in the South African context</b>	<b>16</b>
<b>2.8</b>	<b>Inventory control process of the eThekweni Municipality at Stores Division</b>	<b>17</b>
2.8.1	Legal framework	17
2.8.1.1	Ordering of inventory	17
2.8.1.2	Receipt of inventory	18
2.8.1.3	Issue of inventory	19
<b>2.9</b>	<b>Factors influencing inventory control</b>	<b>20</b>
2.9.1	Inventory control planning	20
2.9.2	Keeping inventory track	28
2.9.3	Procurement	33
<b>2.10</b>	<b>Common strategies for inventory control</b>	<b>35</b>
<b>2.11</b>	<b>Conclusion</b>	<b>39</b>

**CHAPTER THREE - RESEARCH DESIGN AND METHODOLOGY****Page**

<b>3.0</b>	<b>Introduction</b>	<b>40</b>
<b>3.1</b>	<b>Research design</b>	<b>40</b>
3.1.1	Quantitative research	41
3.1.2	Qualitative research	42
<b>3.2</b>	<b>Target population</b>	<b>43</b>

<b>3.3</b>	<b>Case study</b>	<b>43</b>
3.3.1	Census size	44
<b>3.4</b>	<b>The research instrument</b>	<b>45</b>
3.4.1	Questionnaire content	46
3.4.2	Self-administered questionnaires	47
<b>3.5</b>	<b>Data collection</b>	<b>48</b>
<b>3.6</b>	<b>Pilot study</b>	<b>48</b>
<b>3.7</b>	<b>Reliability and validity</b>	<b>49</b>
3.7.1	Reliability	49
3.7.2	Validity	50
<b>3.8</b>	<b>Data analysis and processing</b>	<b>51</b>
<b>3.9</b>	<b>Statistical approach</b>	<b>51</b>
3.9.1	Descriptive statistics	51
3.9.2	Inferential statistics	52
3.9.2.1	Chi-square test analysis	53
3.9.2.2	Bivariate correlation analysis	53
3.9.2.3	Cross-tabulation	54
3.9.2.4	Hypotheses tests: P-Values and statistical significance	55
3.9.2.5	Factor analysis	55
<b>3.10</b>	<b>Ethical concerns</b>	<b>56</b>
3.10.1	Ethical clearance	56
3.10.2	Letters of information and consent	56
3.10.3	Anonymity	57
3.10.4	Confidentiality	57
3.10.5	Guidelines for data storage	58
<b>3.11</b>	<b>Conclusion</b>	<b>58</b>

#### **CHAPTER FOUR – DATA ANALYSIS AND DISCUSSION OF RESULTS**

**Page**

<b>4.0</b>	<b>Introduction</b>	<b>59</b>
<b>4.1</b>	<b>Response rate</b>	<b>59</b>
<b>4.2</b>	<b>Reliability test</b>	<b>60</b>
<b>4.3</b>	<b>Biographic information</b>	<b>61</b>



4.3.1	Departments in which the respondents were employed (Q1)	61
4.3.2	Level of experience of the respondents (Q2)	61
4.3.3	Level of qualification of the respondents (Q3)	62
4.3.4	Experience and qualification indices of the respondents by departments	63
<b>4.4</b>	<b>Analysis of the results per research objectives</b>	<b>65</b>
4.4.1	Objective 1: To determine the inventory control process of Stores Division at the eThekwini Municipality, Durban	65
4.4.2	To examine factors affecting the success of inventory control in the Stores Division of the eThekwini Municipality, Durban	65
4.4.2.1	Inventory planning (Q1.1-Q1.5)	66
4.4.2.2	Inventory keeping track system (Q2.1-Q2.5)	67
4.4.2.3	Procurement (Q3.1-Q3.5)	69
4.4.2.4	Other factors affecting the success of inventory control (Q4)	71
4.4.3	Objective 3: To assess strategies used to improve successful inventory control in the Stores Division of the eThekwini Municipality, Durban	72
4.4.3.1	Strategies for inventory control (Q1)	72
4.4.3.2	Recommended strategies to improve inventory control (Q2)	73
<b>4.5</b>	<b>Hypothesis tests: P-Values and statistical significance</b>	<b>74</b>
4.5.1	Chi square Test - single variable	76
<b>4.6</b>	<b>Bivariate correlations</b>	<b>77</b>
<b>4.7</b>	<b>Factor analysis</b>	<b>81</b>
<b>4.8</b>	<b>Conclusion</b>	<b>83</b>

## CHAPTER FIVE – CONCLUSIONS AND RECOMMENDATIONS

Page

<b>5.0</b>	<b>Introduction</b>	<b>84</b>
<b>5.1</b>	<b>Conclusions on the research objectives</b>	<b>84</b>
5.1.1	Findings from the literature	84
5.1.1.1	Objective one: To determine the inventory control process of the Stores Division at the eThekwini Municipality, Durban.	84
5.1.1.2	Objective two: To examine factors affecting the success of inventory control in the Stores Division of the eThekwini Municipality, Durban.	85
5.1.1.3	Objective three: To assess strategies used to improve successful inventory control in the Stores Division of the eThekwini	86

	Municipality, Durban.	
5.1.2	Findings from the empirical study	86
5.1.2.1	The second objective of this study related to factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban	86
5.1.2.2	The third objective related to strategies to improve inventory control in the Stores Division of the eThekweni Municipality, Durban.	88
<b>5.2</b>	<b>Recommendations for practice</b>	<b>88</b>
5.2.1	Advanced planning, communication and strategies are needed	88
5.2.2	Practices must be made clear	89
5.2.3	Additional staff training and motivation is needed	90
<b>5.3</b>	<b>Recommendations for future research</b>	<b>90</b>
<b>5.4</b>	<b>Limitations of the study</b>	<b>91</b>
<b>5.5</b>	<b>Conclusion</b>	<b>91</b>
	<b>List of references</b>	<b>92</b>

**APPENDIXES****Page**

<b>Appendix A: Consent letter</b>	<b>110</b>
<b>Appendix B: IREC Letter of information and consent</b>	<b>111</b>
<b>Appendix C: The research instrument - Questionnaire</b>	<b>113</b>
<b>Appendix D: Gatekeepers permission letter</b>	<b>116</b>

**LIST OF TABLES****Page**

<b>Table 2.1</b>	<b>Comparisons of manual and online inventory control systems</b>	<b>32</b>
<b>Table 3.1</b>	<b>Target population</b>	<b>43</b>
<b>Table 3.2</b>	<b>Census population</b>	<b>45</b>
<b>Table 4.1</b>	<b>Response rate</b>	<b>60</b>
<b>Table 4.2</b>	<b>Reliability test</b>	<b>60</b>
<b>Table 4.3</b>	<b>Departments to which the respondents were employed</b>	<b>61</b>
<b>Table 4.4</b>	<b>Experience and qualification indices of respondents by departments</b>	<b>64</b>
<b>Table 4.5</b>	<b>Responses on planning for inventory control</b>	<b>66</b>
<b>Table 4.6</b>	<b>Responses on inventory keeping track system</b>	<b>68</b>
<b>Table 4.7</b>	<b>Responses on procurement</b>	<b>69</b>
<b>Table 4.8</b>	<b>Factors affecting the success of inventory control</b>	<b>71</b>
<b>Table 4.9</b>	<b>Recommended strategies to improve inventory control</b>	<b>73</b>
<b>Table 4.10</b>	<b>Chi square tests</b>	<b>75</b>
<b>Table 4.11</b>	<b>Chi square Test - single variable</b>	<b>76</b>
<b>Table 4.12</b>	<b>Correlations between procurement and online system</b>	<b>78</b>
<b>Table 4.13</b>	<b>Correlations between online system and inventory control plan</b>	<b>79</b>
<b>Table 4.14</b>	<b>Correlations between procurement and inventory control plan</b>	<b>80</b>
<b>Table 4.15</b>	<b>Component Matrixa: for inventory control planning</b>	<b>81</b>
<b>Table 4.16</b>	<b>Component Matrixa: for inventory keeping track system</b>	<b>82</b>
<b>Table 4.17</b>	<b>Rotated Component Matrixa: for procurement</b>	<b>82</b>
<b>Table 4.18</b>	<b>Identified sub-themes</b>	<b>83</b>

**LIST OF FIGURES****Page**

<b>Figure 1.1</b>	<b>The map of South Africa</b>	<b>3</b>
<b>Figure 2.1</b>	<b>Model of synthesis of supply chain inventory planning</b>	<b>21</b>
<b>Figure 4.1</b>	<b>Level of experience of respondents</b>	<b>62</b>
<b>Figure 4.2</b>	<b>Level of qualification of the respondents</b>	<b>63</b>
<b>Figure 4.3</b>	<b>Strategies for inventory control</b>	<b>72</b>

## LIST OF ABBREVIATIONS

Abbreviation	Description
APS	Automated Plate Scanner
CFO	Chief Financial Officer
DUT	Durban University of Technology
EOQ	Economic Order Quantity
ERP	Enterprise Resource Planning
FIFO	First In First Out
IBM SPP	International Business Machines Statistical Package for Social Sciences version 21.0
IRBA	Independent Regulatory Board for Auditors
IT	Information Technology
JIT	Just In Time
KPMG	Klynveld Peat Marwick Goerdeler
KZN	KwaZulu-Natal
LIFO	Last In First Out
MFMA	Municipal Financial Management Act No. 56 of 2003
POS	Point-Of-Sale
PPPFA	Preferential Procurement Policy Framework Act No. 5 of 2000
RFID	Radio-Frequency Identification
SCM	Supply Chain Management
TQ	Total Quality
UNISA	University of South Africa

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.0 Introduction**

This chapter provides the background to the study, the statement of the problem, aim and objectives of the study and justifies the necessity for the investigation. The scope, the key methodology upon which the study will be based, and the study area are also presented. Finally, the chapter presents an overview of the chapters that follow and lays the foundation for this dissertation.

### **1.1 Background of the study**

The local government handbook (2014) reveals that there are eight (8) metropolitan municipalities, forty four (44) district municipalities and two hundred and twenty six (226) local municipalities established in South Africa by the democratic local government in a new era with the adoption of the Constitution. The Constitution introduced, for the first time in history, a wall-to-wall local government system by providing that municipalities be established for the whole of the territory of the republic. The South African municipalities are engulfed by various challenges. These challenges spread across from quality of supply chain management (SCM) policies including that of inventory control, to improving performance to strengthening audit reports (Audit to build public confidence, 2011: 19). Inventory is controlled by the Stores Divisions for each municipality but some of the municipalities do not have this section to deal with inventory control issues. This gave rise to a number of recommendations by the auditors (Schatteman, 2010: 538; Huefner, 2011: 30) in order to improve the success of inventory control. These recommendations include sound management and corporate governance.

Since 2005, municipalities introduced a number of staff training programmes that aimed to equip individuals with certain skills in dealing with the municipal issues and to

improve performance. In this respect, government spent a lot of resources to support and achieve this vision. In 2000, government spent a huge amount of time on evolving the Preferential Procurement Policy Framework Act (PPPFA), Act No. 5 of 2000 to improve acquisition, regulating and storage of inventories, but there has been no evidence of research undertaken to evaluate the success of these arrangements (eThekweni municipality inventory management policy, 2005: 7). Similarly, Nombembe (2012: 1) supports the premise that inventory control continues to be a problem in South African municipalities. It is clear that the essential need of the South African municipalities is the ability to control inventories (Greenley, 2011: 108).

eThekweni Municipality is one of the eight classified Category A Metropolitan Municipalities found in the South African Province of KwaZulu-Natal. To control inventory stocks, the eThekweni Municipality needs to comply with its core values which are sustainability, economically, caring, poverty reduction, democratic, and equality. The procedure at eThekweni Municipality in respect of inventory control is similar to that of other South African municipalities. Members of council from the eThekweni Municipality put forward various reports on deficiencies within the Municipal Supply Chain Management, which includes stores control of inventories, noting that the matter was open to public comments, since the causes of poor inventory control were unknown. Members of council further expressed unhappiness and frustration that the municipality was spending too much on buying inventories (Council minutes, 2012: 711). Therefore, problems experienced under inventory control have led to the assumption that the current approach adopted by the South African municipalities for inventory control needs to be reviewed.

Due to time constraint and insufficient funding, this study was a case study based on the eThekweni Municipality, Durban and was part of an organizational development approach in improving its ability to grow and acquire knowledge to overcome problems of inventory control.

The area of eThekweni Municipality in Durban is topographically hilly, with many gorges and ravines, and almost no true coastal plain. Durban has a turbulent history



dating from ivory hunters in the 1820s. In figure 1.1, the location of the eThekweni Municipality, Durban is shown in the map of South Africa.

**Figure 1.1: The map of South Africa**



Source: Searchable map and satellite view of the city of Durban, South Africa (2013)

The research study used a questionnaire and it was intended to shed light on the current factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. This research intended to determine if there was a need to adopt more efficient and effective measures of inventory control at the eThekweni Municipality. Lack of uniformity and latitude in respect of acceptable inventory control practices in the local government sectors has long been recognised (Audit to build public confidence, 2011: 20). The Chartered Institute of Management Accounting (CIMA) (2012: 2-6) has recognised that inventory control is an area in which there is little guidance and researches have paid less interest. Most preceding researchers (Mishra and Tripathy, 2012: 125; Alles, Amershi, Datar and Sarkar, 2000: 1528; Wadhwa and Chan, 2009: 3331) in the field of inventory control have paid a considerable role on the theoretical issues of EOQ, JIT, TQ and fixed ordering. Therefore, this research seeks examine factors affecting the success of inventory control in the

Stores Division of the eThekweni Municipality in Durban using theory in practice, stock diffusion theory and application theory. Use of these theories to understand such factors will shed light in order to provide recommendations to improve the control of inventory stocks by the eThekweni Municipality in Durban.

## **1.2 The statement of problem**

At the eThekweni Municipality, the Stores Section reportedly found it very difficult to control inventories and performing roles and responsibilities allocated in the section were also difficult. In this respect, the auditor general indicated in the financial statements that the Stores section had accumulated significant losses of R2.1 million and R70.376 million for 2011 and 2012, respectively (EThekweni Municipality annual financial statements, 2012: 4). The breakdown of the figures indicate R2.05 million losses on materials, e.g., stationery, consumables and construction stock for 2011, and R 60.101 million loss of the same types of stock in 2012 and a further R50 000 loss of other materials for 2011 and R10.275 million loss of the same types of stock in 2012.

## **1.3 Aim and objectives**

The aims of this study were to identify factors affecting the success of inventory control and to assess strategies used for inventory control in the Stores Division of the eThekweni Municipality, Durban.

The objectives of this study were:

- To determine the inventory control process of the Stores Division at eThekweni Municipality;
- To examine factors impeding the success of inventory control; and
- To assess strategies used to improve successful inventory control in the Stores Division of the eThekweni Municipality.

### 1.3.1 Research questions:

- What inventory control procedures are used by Stores Division of the eThekweni Municipality?
- What factors affect the success of inventory control?
- Which strategies can be used to improve inventory control in the Stores Division of the eThekweni Municipality?

## **1.4 Rationale for the study**

The largest risk facing municipalities is the delay in taking the necessary steps to control the events that cripple their operations. The reason for this delay is due to the lack of the necessary capacity and resources required to correctly identify and overcome any crisis areas (Abadzic, Umihanic and Cebic, 2012: 43). By investigating the factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality in Durban, the study will significantly have an impact on the Preferential Procurement Policy Framework Act (PPPFA), Act No. 5 of 2000, which is a document that governs the control of the municipal inventory stocks. This will be achieved by identifying the factors affecting the success of inventory control and the findings from this research study will be made accessible to Stores Division of the eThekweni Municipality, Durban at no cost. This study helped to provide the Stores Division with an opportunity to personally evaluate their inventory stock control and to take corrective actions where required, thus increasing their chances of survival. The study offered more meaningful and acceptable outcomes to help the eThekweni Municipality in considering real factors affecting the success of inventory control and implementing strategies to enhance inventory control.

## **1.5 Scope of the study**

The findings of this study described the success/failure rate of the inventory control in the Stores Division of the eThekweni Municipality and can also be applied to success/failure rate of other inventory control systems outside the Stores Division of

the eThekweni Municipality. This study was valid from the period in which the investigation was conducted and can be useful in the future.

## **1.6 Research methodology**

The research methodology of this study was based on the research type, target population, the data collection methods, questionnaire and the techniques used to analyse the data.

### **1.6.1 Research type**

This study was quantitative, descriptive and cross-sectional in nature and aimed at identifying factors affecting the success of inventory control and to assess strategies used to enhance inventory control in the Stores Division of the eThekweni Municipality, Durban.

### **1.6.2 Target population**

The target population of this study comprised of 62 members of staff from the two departments, namely; Stores (49) Division and Procurement (13) Division in the eThekweni Municipality, Durban. The Stores Division Unit, located within the supply chain management (SCM), comprises a team of one Manager and one Chief Storekeeper, seven Senior Storekeepers, five Stores Assistants, fourteen Storekeepers, three Stores Clerks, seven Fuel Attendants, and thirteen Stores General Assistants. These employees are responsible for making sure that all inventories delivered during and after normal working hours, on weekends, or on holidays are receipted, identified, inspected, and placed in the designated receiving section or turned over to the requesting department. The Stores Division then processes inventory orders to Procurement which has one Manager and a team of three members tasked with the responsibility of purchasing, five members tasked to buy, one Stores Investigator, one Verifier, one Systems Controller, one Contract Administrator, one Clerk, and one Store-man. Procurement is required to advertise tenders and select the approved supplier to provide a particular inventory which is on demand. To do this effectively, people involved require accurate skills. Due

to the small target population, it was decided to employ a census technique to gain insight into the factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban.

### **1.7 Pilot study**

The data gathering phase of the research process began with pilot testing. The pilot study was conducted in the form of questionnaires which were distributed to five section managers from Stores and Procurement Divisions. The detailed results of the pilot study are presented in chapter three of the dissertation. According to Dawson (2009: 98), cited by Gabula (2012: 62), a pilot study is a small scale preliminary study conducted to evaluate feasibility, time, cost, adverse events, and predict an appropriate sample size and improve the study design prior to performance of a full research scale research study.

### **1.8 Constructs of reliability and validity**

In a research study, reliability and validity are two important judgement criteria of the correctness of a measure for specific inferences, decisions and consequences (Muijs, 2011: 56). The author describes reliability as a measure to see if the study repeats the same results if the same experiment is performed again and validity is an instrument to see if the study measures what it intended to measure. Validity of this study was ensured by conducting a pilot study with a selected group of five people from Stores and Procurement Divisions. The results showed that the respondents have a good understanding of the questions and concepts of the study posed to them. Cronbach's Alpha was used to test reliability of the study. The reliability score of 0.819 exceeds the recommended value of 0.7 (Muijs, 2011: 221). This indicates a high degree of acceptable, consistent scoring for this research.

### **1.9 Data collection**

This study used predominantly closed-ended and two open-ended questions. The researcher self-administered the questionnaires. In asking questions, (Bell, 2005 as

quoted by Gabula, 2012: 8) researchers have two options. They may ask open-ended questions or close-ended questions. Analysing open-ended questions is more valuable because respondents are given a chance to explore their knowledge. On the other hand, Welman, Kruger and Mitchell (2011: 85) advocate that closed-ended questions are very popular because responses provide a greater uniformity and are more easily processed. For the purpose of this study, a questionnaire was used to reveal information to be disclosed. Besides the two open-ended questions, the questionnaire consisted of five point Likert-scale questions with listed statements for the respondents to select, where applicable.

### **1.10 Ethical considerations**

The relevant ethical issues have been considered in this study. Likewise, Cohen, Manion and Marrison (2007: 55) support that formal procedures of obtaining permission to conduct a research study should be carried out in all research fields. In this regard, the researcher submitted a research proposal to four institutional research structures, namely; Departmental Research Committee (DRC), Faculty Research Committee (FRC), Institutional Research Ethics Committee (IREC), and Higher Degrees Committee (HDC) of the Durban University of Technology. The researcher also respected respondents' rights by obtaining a permission letter from the eThekweni Municipality, Durban to conduct a study at the Stores Division. The respondents were asked to sign a written consent before participating in the study. Their names, phone numbers, addresses and other details were not included in the questionnaire to ensure confidentiality.

### **1.11 Overview of chapters**

This dissertation consisted of five chapters. Besides chapter one, the rest of this dissertation was structured as follows:

- Chapter two focused on the extensive review of the existing literature, regarding factors affecting the success of inventory control and strategies for inventory control;

- Chapter three incorporated the research design and methodology of the study, as well as the process that was followed in conducting the research. This chapter had also focused on the measuring instruments, data collection procedure and data analysis;
- Chapter four have presented and discussed the results of the study; and
- Lastly, chapter five drew conclusions and provided recommendations emanated from the study.

## **1.12 Conclusion**

This introductory chapter provided a background to the study; a statement of the research problem; aims and objectives of the study; and justified the necessity for the investigation. The scope and the methodology used were presented. Finally, the chapter presented an overview of the chapters that follow and laid the foundation for this dissertation.

The next chapter provides comprehensive literature on the factors of inventory control and assesses strategies for inventory control.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

Chapter one outlined the background for this study as well as the research problem, objectives, rationale, scope, methodology and a brief overview of subsequent chapters. This chapter intends to review the available literature in order to gain an understanding of the inventory control processes followed by the Stores Division of the eThekweni Municipality as well as the strategies and factors affecting the success of inventory control. The study was guided by three theoretical frameworks: stock diffusion theory, application control theory, and inventory control in theory and practice. In the discussion, factors affecting the success of inventory control are grouped together into three categories: inventory control planning, keeping inventory track and procurement.

The aim of the literature review is to provide a context for the entire research study. Reviewing existing literature, on the aspect in question, allows the researcher to identify the “gap” that exists. The researcher achieves this by performing an in-depth critique of the existing study. An in-depth critique entails identifying shortcomings on the existing literature and methodology which has to be used in the study, according to Dawson (2009: 98), cited by (Gabula, 2012: 62). The chapter begins by presenting a theoretical framework of the study, followed by the municipal definitions of inventory and inventory control, an overview of the municipal inventory control in the world and South African contexts, factors influencing inventory control, and common strategies for inventory control.

#### **2.1 Theoretical framework**

This study is located within the content of inventory control theories. It also takes cognizance of the fact that a municipality is an organization that is widely open to environmental influences. This section explores the theories that have been identified



as modeling behaviour for the problem being tackled by the study and indicating where the study originates. Such theories are the stock diffusion theory, application control theory and inventory control in theory and practice. The theories were selected because they provide a powerful inventory control framework for the municipality in terms of reordering, receiving, storing and dispatching.

### 2.1.1 Stock diffusion theory

A stock diffusion theory was pioneered by Braglia, Gabbrielli and Zammori (2013: 3018) with an intention to derive the probability distribution of the stock consumption and that of the reorder time. These authors further explained that the importance of stock diffusion theory is to assess and evaluate the required inventory levels in theory and practice. There are three considerations of the stock diffusion theory: (1) storage space required; (2) how quickly inventory is sold or used; and (3) how to avoid inventory from becoming outdated before it is used. These considerations can prevent shortages and wasteful spending. In addition, the stock diffusion theory has been confirmed to lower inventory level and has a direct impact on cost savings emanating from storage costs including stock insurance premiums (Unegbu and Mohammed, 2011: 304).

### 2.1.2 Application control theory

A theory called the application control theory was pioneered by Ortega and Lin in 2004 to reduce inventory variation, reduce demand amplification and optimize ordering rules (Sourirajan, Ramachandran and An, 2008: 6166). In a flexible demand environment, other organizations have doubts on inventory control, but Bijulal, Venkateswaran and Hemachandra (2011: 7088) point out that application control theory plays a vast role to deal with uncertainties of demand. For example, to answer the question when and how much to reorder in the situation of uncertainty demand, the theory can suggest guidelines on reordering processes. It is clear that uncertainty of demand is subjected into intervals and can result in great effort placed upon procurement because there is no specific lead time in between of the demand and the extent to reorder. Satisfying customers in this situation may also require strong management support and advanced

procurement strategies that derive theory into practice (Minner and Transchel, 2010: 979).

### 2.1.3 Inventory control in theory and practice

Theorizing inventory control can be a first attempt when dealing with its technical problems (Wei, 2012: 245). Balancing inventory stock on records with physical stock plays an integral part in stock counting and evaluation (Jonsson and Mattsson, 2008: 1788). Inventory control in theory and practice was developed by Whitin around 1952. The theory contributed in the field of inventory control by emphasizing that there should be a balance between theory and practice when dealing with issues of inventory stock control (Vassian, 1955: 272). The experts in the field of inventory control like, Dr. C. B. Tompkins at George Washington University and Dr. Jacob Wolfowitz at Cornell, have made considerable contributions in the development of inventory control in theory and practice. Econometricians, also, have shown much interest in the topic (Whitin, 1952: 502). Dr. C. B. Tompkins and Dr. Jacob Wolfowitz found that inventory control in theory and practice can be used to simplify and evaluate past and future inventory reorders, identify areas in need of further inventory control development, clarify and evaluate existing and future operational tools, identify areas like; inventory planning; procurement; and keep track in which further tool development is needed, develop integrated operating systems and communicate between practitioners and academicians (Tompkins and Wolfowitz, 1962).

According to Umakanta and Chaitanya (2012: 124) and Wesley (2013: 1), inventory control in theory and practice can help to reconcile between the physical inventory stock and that on records of the business, and it can be achieved using three tools: stock keeping unit (SKU), bar-code, and manual. Stock keeping unit (SKU) is a tool that allows an item to be traced through its unique number, bar-code is an electronic device that allows tracking inventory received, stored and issued, and manual allows for physical counting, sorting, identifying and locating materials on the shelf. The audit of inventories (2013: 1) and Johnson (2013) believed that balancing inventory control in theory and practice can reduce inventory misstatement by ensuring appropriate records of actual inventory position.

Basically, the application control theory and the stock diffusion theory help to balance between the control of inventory in theory and practice and it can be achieved through practical exercises when storing, placing reorders and distributing the inventory stocks as guided by the inventory control policy of the organization.

## **2.2 Defining inventory of the municipality**

The municipal inventory can be described as a form of materials, stocks or supplies to be consumed in the production process or held for sale or distribution in the ordinary course of operations (Bijulal, Venkateswaran and Hemachandra, 2011: 7085). Stock and Lambert (2001: 232-235), cited by Mpwanya (2005: 14), described that both the municipal and other entities inventory can be categorized in the same way as follows:

- Cycle inventory stock. Cycle inventory stock is the portion of inventory that the municipality cycles to satisfy regular sales orders;
- In-transit inventories. In-transit inventory generally refers to the goods that have not yet delivered from the municipality to the buyer, e.g., inventories still in the ship to be delivered;
- Buffer inventory stock. Buffer stock is the stock held in excess of its requirement to guard against stock-out;
- Speculation stock. Speculation stock is inventory held for reasons other than satisfying current demand. For example, stock may be purchased in excess necessary to receive quantity discount, because of a forecasted price increase or stock shortage in the future;
- Seasonal stock. Seasonal stock involves stock which is mostly demanded in a particular season, e.g., during the winter, departments may demand coffee rather than juice; and
- Dead stock. Dead stock is stock that was never sold or used by consumers.

### **2.3 Motivation for holding inventory by municipality**

Holding inventory has its own pros and cons. Mpwanya (2005: 11) identified and explained the following reasons that inspire municipalities to hold large inventories for a short and long period of time:

- Economies of scale. A municipality can realize economies of scale by increasing the amount of inventory purchases to get quantity discounts;
- Balancing supply and demand. A municipality can hold large inventories to meet demand in a particular period, e.g., a seasonal demand;
- Specialisation. This can be achieved by ordering or producing extra inventory to be stored in the warehousing place;
- Protection from uncertainties. Normally, the basic reasons of holding inventory are to meet the uncertainties in demand; and
- Buffer interface. Buffer interface ensures that inventory demand is met accordingly. This motive can cover six stages such as: (1) supplier and purchasing, (2) purchasing and production, (3) production and marketing, (4) marketing and distribution, (5) distribution and intermediary, and (6) intermediary and customer.

Holding the inventory stocks of different nature in a short and long period of time can generate a number of costs for the municipality. The following focuses on inventory costs.

### **2.4 Costs of municipal inventory**

According to Akcali and Bayindir (2008: 272) and Singh, Sahu and Nayak (2012: 297), municipal inventory costs are the costs incurred while ordering, holding and distributing inventory. These include the following:

- Ordering costs. Ordering costs are incurred when placing inventory orders and include procurement and inbound logistics, e. g., transportation cost, custom duties, communication and paper work;

- Stock-out costs. These costs incur when current inventory is exhausted and the stores division is unable to meet the demand. This includes sales that are lost, both in short-and long-term;
- Warehousing and logistic costs. These costs are incurred to pay rent, labour, and utilities;
- Insurance costs. These are costs incurred to insure the inventory stocks against theft, losses, and destruction;
- Spoilage/breakage losses. These are the retail costs of having to write off inventory due to it being spoiled or broken and unable to be sold;
- Materials handling costs. These costs refer to the costs of moving materials and products from one place to another; and
- Depreciation costs. This is a non-cash cost and it refers to the depreciation cost of machinery and plant used in managing the inventory in the stores.

It is very important for the municipality to make sure that inventory costs are reduced to a minimum all the time. Wei *et al.* (2013: 155) exposed that the inventory costs serve as indicators of how the municipality controls its inventory stocks.

## **2.5 Defining inventory control of the municipality**

The concept “inventory control” was described by Hailing and Guochao (2011: 1-2) as a process in which the materials and parts carried in stock are regulated within pre-determined limits or set in accordance with the policy and procedures implemented or adopted by the municipality whereas Keith and Rene (2008: 310) defined the concept “control” as a transposition of theory into practical exercise, e.g., keeping track, and processing acquisitions or ordering, receiving and issuing stocks.

## **2.6 An overview of the municipal inventory control in the world context**

Literature reveals that municipalities play an increasingly important role to deliver basic governmental services to the community. To achieve this, governments around the world, on all levels, have invested significant resources in municipalities with very mixed results, according to Schatteman (2010: 531). As one of these municipal

resources, inventory has become more complex and fragmented, and the question how it should be controlled has become more critical (Wei, Wang, and Qi, 2013: 155). Likewise, a study conducted by Schatteman (2010: 531) in Canada reported municipalities to have abused government resources including inventory stocks. The author concludes that country municipalities need to be audited before any realistic measurement is made. Another study by Huefner (2011: 26) found that inventory control was weak and caused losses in the twenty four municipalities of New York State. In the same manner, an article of Internal Audit Report (2005: 4) found that poor inventory control has resulted in a loss of \$ 118.25 in the Anchorage Municipality of the United State. In addition, the Audit report from the City of San Diego, in America, found that the authorization process for ordering goods or materials lacks strong controls, resulting in improper processing of unauthorized requisitions. Moreover, these results also indicated the lack of division of duties in the process of authorizing the purchase and issue of stocks (Audit of the central stores inventory, 2009: 8).

## **2.7 An overview of the municipal inventory control in the South African context**

In South Africa, the existence of the inventory control problem was evident in 2011/2012 when the majority of South Africa's Metro Municipalities did not receive a clean audit report on inventory control. Only five percent of the municipalities in the country performed well. This report includes the Eastern Cape Province on the Chris Hani District Municipality which did not have accurate documentation of inventory control (Audit to build public confidence, 2011: 20). A similar problem was evident when evaluating inventory in the balance sheet of Cacadu District Municipality and it was recommended that senior management needs to pay more attention on inventory control (Nombembe, 2012: 1). The auditor general once said "I did not obtain sufficient appropriate audit evidence to satisfy myself on the control of raw material inventory (Audit to build public confidence, 2011: 19). This statement indicates that South African municipalities need to implement their inventory control in an efficient and effective manner. Nevertheless, the focus of this study is on the Stores Division of the eThekweni Municipality, Durban which is one of the South African municipalities. Its inventory control is described below.

## **2.8 Inventory control process of the eThekwini Municipality at Stores Division**

### 2.8.1 Legal framework

According to eThekwini Municipality inventory management policy (2005: 7), in terms of the Municipal Financial Management Act (MFMA), Act No. 56 of 2003, which is an official framework for controlling the finances of a municipality, unauthorized, irregular, and fruitless spending on inventories must be prevented and this may also include safeguarding the local government resources.

The MFMA framework reveals that a task to control inventories in the municipality is carried out by the Stores Division in conjunction with the requirements of the Preferential Procurement Policy Framework Act (PPPFA), Act No. 5 of 2000, which governs the control of the municipal inventory stock. According to Audit of the central stores inventory (2009: 4), the preferential procurement policy framework illustrates the responsibility of the Chief Finance Officer to appoint, in writing, the officials to perform the duties of inventory control. Inventories held by the Stores Division are sold only to city departments or other government agencies and currently charge five percent extra as markup on cost to recover the costs of administering the storerooms. The Stores Division of the eThekwini Municipality in Durban adhere to the following rules or processes for ordering, receiving, and issuing of inventory stocks.

#### 2.8.1.1 Ordering of inventory

According to Ethekwini municipality inventory management policy (2005: 7), the following rules are applicable when ordering inventories from suppliers:

- Each department sets its own inventory reorder levels for all items in consultation with the CFO. The inventory levels must indicate the minimum and maximum inventory that can be maintained;
- Due diligence and care shall be exercised in identifying low value and high value items of inventory;

- Minimum inventory level of high value items is ordered. Any maximum order is based on specific requirement/need in order to avoid large amounts of cash tied up on inventory;
- A reorder listing is printed by a store-man and reviewed weekly by the Logistics Manager;
- The store-man uses the listing as a primary source of information to complete the purchasing requisition form;
- The purchasing requisition form is completed in duplicate, with one copy kept in the requisition book and an original copy forwarded to the procurement section;
- A copy of the purchase order form is then forwarded by the procurement department of the receiving department, for the receiving store-man to match with the goods delivery note once goods are delivered;
- Orders are thereafter filed in date sequence;
- This file forms the basis for follow up of orders and for matching goods that are delivered to the inventory department; and
- The orders' file is reviewed weekly by the logistics manager and any orders, which have not been delivered as per the agreement with the buyer, must be followed up immediately.

#### 2.8.1.2 Receipt of inventory

According to Ethekwini municipality inventory management policy (2005: 8), the following procedures are applicable procedures when receiving inventories from the suppliers:

- The quantity and quality of the inventory received from suppliers is matched with the information on the order form;
- The store-man compares the delivery note to the purchase order before accepting the goods;
- The invoice or delivery note must match the supplier name and order number; and
- The store-man prepares the goods received note to record all the inventory items ordered and in good condition.



The store-man also ensures that:

- All delivery notes are signed by him/her and the driver;
- All incorrect delivery items are rejected and clearly identified on both copies of the delivery note;
- The supplier signs all amendments;
- The inventory received is being transferred to the secured store by the general worker with the signed goods received note;
- The inventories are stored in their respective sections once they have been received; and
- The inventory record/register/database or system is updated on the day the goods are received, by the stores clerk.

#### 2.8.1.3 Issue of inventory

According to EThekwini Municipality inventory management policy (2005: 10), the process to issue inventory is as follows:

- Only the store-man is authorized to issue inventory from the storeroom;
- Inventory is only issued in terms of the approved requisition form of the municipality;
- All requisition forms are ruled off immediately below the last item to prevent items being added once the requisition is authorized by the responsibility manager;
- The store-man prepares the stock issue note once stock items to be issued have been picked up from the shelves;
- The official receiving the inventory acknowledges the receipt of stock items requested, by signing the stock issue note prepared by the store-man; and
- Inventories are issued and used for official purposes only.

Literature reveals that the control of inventories varies from one organization to another (Umakanta and Chaitanya, 2012: 124). According to Hailing and Guochao (2011: 2), controlling the inventory stocks is likely to be the same in all organizations. For example, the appointed officials to control inventories can be responsible for

safeguarding inventory at all times; ensuring accurate records of quantities on hand at all times; maintain the optimum inventory levels to meet the demands; making sure that only authorized issue of inventory is made; and ensuring that all items placed in store are secured and only used for the purpose for which they were purchased.

## **2.9 Factors influencing inventory control**

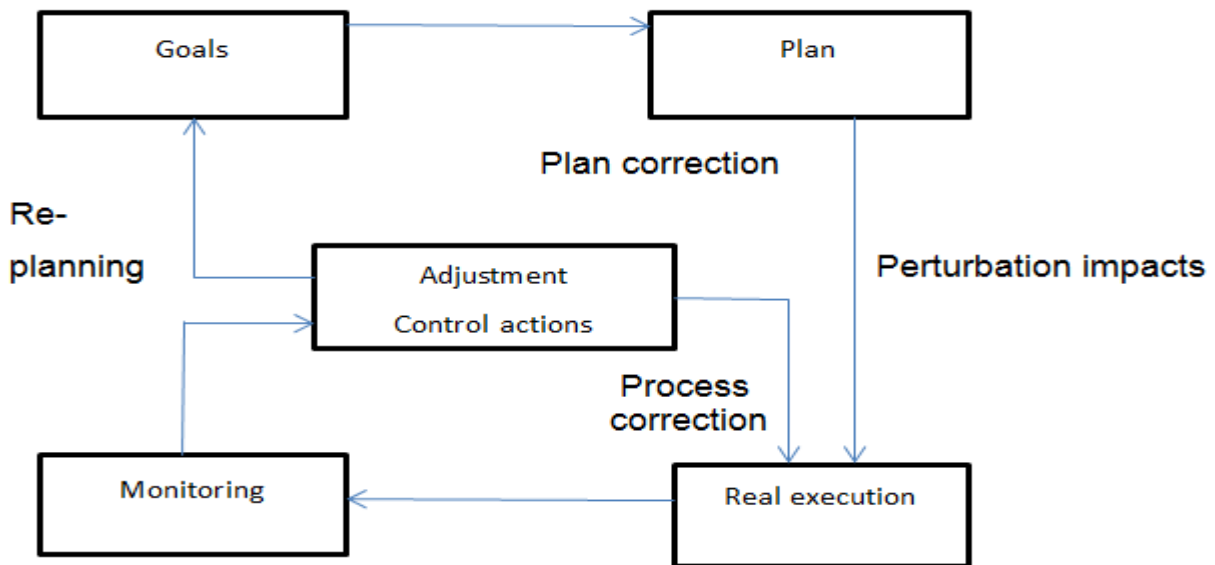
This section focuses on problems pertaining to inventory control in organizations.

### **2.9.1 Inventory control planning**

According to Jonsson and Mattsson (2008: 1788), planning is one of the critical factors in attaining good inventory control. Planning can be also described as a future approach in which the inventory is strategized to be controlled. Inventory control planning assists in arranging physical count requirements to cover preparations for spread sheets used to evaluate inventories at year end (Ivanov, 2010: 4010). Gupta, Gopalakrishnan, Chaudhari and Jalali (2011: 6301) believed that failure to involve suppliers in inventory planning can raise failure to balance current inventory requirement with future demands. Moreover, inventory control planning needs to be regarded as a solution when experiencing fruitless expenditures on inventory stocks. This exercise requires a wide understanding of the implementation of inventory control planning from the acquisition phase to storage and up to the distribution phase (Zhang, Prajapati and Peden, 2011: 1956).

Ivanov (2010: 4010) developed a conceptual framework for the municipalities to debate the issue of how inventory control and its planning can be realised. This conceptual framework, in figure 2.1, shows a comprehensive relationship between inventory control and planning. In this regard, a study conducted by Jonsson and Mattsson (2008: 1787), based on survey data from 153 manufacturing and 53 distribution companies, found that applying inventory control planning has great importance for the municipal performance. Correspondingly, literature by Feng, Zhang, Wu and Yu (2011: 4223) reveal that inventory control planning is vitally important for both the public and private sectors that handle large stocks.

**Figure 2.1: Model of synthesis of supply chain inventory planning**



Source: Ivanov (2010: 4010)

Moreover, the model in figure 2.1 aims to blend simultaneously the supply chain structure, plans, and operations of alternative supply chain structures. Contrary to Zhang et al. (2011: 1956), the model makes it clear that planning has a direct link with inventory control from the acquisition to the distribution phase. Likewise, Chris (2011 and Jonsson and Mattsson (2008: 1789) reveal that setting out the goals has a direct link with planning and monitoring real operations of the organization. It is clear that an adjustment needs to be made if the inventory control planning is not accurate or aligned with the actual practice. Most of the issues around inventory control planning were precisely tackled by Lodding and Lohmann (2012: 909), who exposed that organizations facing problems of poor planning must answer the following two questions:

1. *Do we need a strategic inventory control plan?*

A strategic inventory control plan refers to a plan that needs a strategic decision to reach a resolution. However, formulating a strategy means to theoretically develop, propose and evaluate alternatives to make a single plan. This can involve a study to design and modify the inventory control plan for the current situation to suit a future situation (Zhang *et al.*, 2011: 1961). The flexibility of the current situation to suit the

future situation can be defined as a practice and one of the advantages of using a strategic inventory control plan, whereas the disadvantages include that of being inconsistent (Gupta *et al.*, 2011: 6302). In addition, Abadzic, Umihanic and Cebic (2012: 42-43) are of the opinion that a strategic inventory control plan can provide proactive decisions to shape the inventory control process.

As a command, Abadzic *et al.* (2012: 55) stress that a strategic inventory control plan requires a high level of commitment by the organization. The authors further suggest that, due to problems of scarce skills in the South African municipalities, the majoring of staff with work experience should be allowed to have proactive opinions on the planning of inventory control. Likewise, Gupta *et al.* (2011: 6302) stress that a strategic plan cannot be carried by a single man. It was also emphasized that a strategic plan needs to be set by competent individuals (Jonsson and Mattson, 2008: 1789). To attain this plan, both managers and staff need to work together. In this regard, Abadzic *et al.* (2012: 43) state that some organizations are reluctant to build this kind of engagement. Nicole (2013) stresses the importance of staff and management engagement as a potential to impact a wide range of duties and responsibilities. Importantly, employees need to have a thorough understanding of their responsibilities during and after the process. Moreover, Evans (2012) poses the following four questions to be answered before a strategic plan is signed up on inventory control:

- What plan is working well?
- What plan is not working so well?
- What are our inventory control vulnerabilities?
- Where are the untapped opportunities?

Moreover, Slotegraaf and Atuahene-Gima (2011: 96-99) reveal that the desire to exclude staff and inventory suppliers in a strategic plan will cause difficulties in the functioning of inventory control. This was also confirmed by Iqbal, Shahi and Khan (2012: 670) who found that group discussions are more influential compared to individual judgement.

## 2. Do we need a tactical inventory control plan?

According to Zhang *et al.* (2011: 1961), a tactical planning refers to as a computerized or mathematical decision and it constitutes advanced strategies. A tactical planning has not gained momentum from the South African municipalities. This is due to a shortage of skills in the workforces, but the absence for a tactical planning has been regretted. There are advantages of using tactical planning on inventory control. One advantage relates to reducing the amount of manual interaction through electronic means in order to increase accuracy and to sustain consistency of planning. A tactical plan does not require previous experience in order to be accomplished (Gupta *et al.*, 2011: 6302).

Gupta *et al.* (2011: 6302) mentioned the following three most important factors which may affect the success of inventory control planning:

### (i) Engagement of inexperienced staff

Almost every business prefers to hire experienced labour force. Dragoni, In-sue, Vankatwyk, and Tesluk (2011: 830-831) explain that inexperienced staff can have a negative impact in the transformation of planning into exercise. Likewise, Cook, Bay, Visser, Myburgh, and Njoroge (2011: 268) state that inexperienced staff can hardly assume job responsibilities. The term “inexperienced staff” was described by Mahony, Klimchak and Morrell (2012: 173) and Jonsson and Mattson (2008: 1789) as incompetent individuals who perform certain tasks. Inexperienced staff corresponds with poor performance. These authors further describe poor work experience as irrelevant experience to a particular job. According to the Department of Labour (2013: 1), work experience is only appropriate if it is relevant to the recognised employment. Inexperienced staff may cause mistakes when developing a plan (Ramanigopal, 2012: 1920). Cook *et al.* (2011: 268) state that, due to factors like pride, healthy, and other motives, some members of staff in the municipalities may not be willing to be trained and that makes it difficult for them to grasp the future vision of the organization. Research by Lindsey (2013: 50) indicated that inexperienced staff may find it hard to transform theories into practice as well as to use a new technology to facilitate planning programmes. Subashini (2010: 36) confirms that most of the municipalities from

developing countries, like South Africa, are experiencing a problem of having less experienced staff. This includes the appointment of inexperienced individuals by the municipalities to handle the resources of the community (Challenges in smaller municipalities, 2013).

- The importance of work experience

A questionnaire-based study conducted by Naidoo and Wu (2011: 1125) using a mixed method approach among 570 mid-level international inventory control experts from the United Kingdom, United State, Australia, and New Zealand found that inventory planning and control become functionally only if experienced staff are involved. Similarly, the South African Labour Legislation Act No. 12 of 2002 encourages employers to use the workplace as an active learning environment and to provide opportunities for new entrants to the labour market to gain work experience (South African Department of Labour, 2013: 10). Likewise, the South African Treasury Act No. 1 of 1999 confirms that work experience plays a vast role in terms of professional conduct behaviour of individuals (National Treasury Republic of South Africa, 2001: 8). On the same note, Moreland and Angur (2006: 9) reveal that relevant work experience plays an integral part in developing professional conduct on inventory control. Work experience constitutes certain competencies which can never be obtained without professional training. The authors identify the following areas that enhance the importance of work experience on inventory control:

- Understanding the role of a system of quality inventory control and the Code of Professional Conduct;
- Understanding the needs of customers;
- Understanding technical proficiency of the organization, including those related to the customer;
- Understanding rules applicable to familiarity with the customer;
- Professional judgment, including the ability to exercise professional skepticism and identify areas requiring special consideration; and
- Understanding the customer organization's information technology system.

According to Dragoni *et al.* (2011: 830-831), some critical issues in businesses may require both education and relevant experience. Therefore, employees, with experience, place great importance on job satisfaction and they can get more experience from different areas including internship, in-service training and contract or permanent jobs (Sallop and Kirby, 2007: 127). Even though, most employers measure work experience based on how many times the candidate has served in the field, Moreland and Angur (2006: 9) admit that determining whether an employee has enough work experience is, therefore, a challenge, but a better work experience can be measured on the bases of the work understanding.

The importance of work experience was also elaborated by Van Zyl, Deacon and Rothmann (2010: 2) in their study. The authors state that work experience shapes the image of the organization by ensuring proper processes and achieving goals and objectives. This is characterized by employees who view work as a career rather than just monetary rewards. Dragoni *et al.* (2011: 831) illustrate that the primary objective of work experience is to acquire a deeper understanding of the work by practising it rather than theorising it. A report suggests that the importance of work experience in the South African municipalities still needs to be emphasized (Challenges facing public sector audit committees, 2013: 8). The report also recommends that staff should gain sufficient knowledge, skills and experience before they get promotions.

#### (ii) Poor staff training and development

Achua (2011: 326) conducted a study in the Nigerian municipality and found poor staff training and development to have created deficiencies, such as taking wrong directions to reach decisions, process control errors and poor performance. Another observation-based study conducted by Ruankaew and Williams (2013: 27) from the United States found that poor staff training and development is significantly associated with inventory inaccuracy. Gill, Sharma, Mathur, and Bhutani (2012: 190-191) state that the effort to empower employees from the municipalities through training and development can fail due to employees' reluctance to be empowered as well as the management reluctance to empower employees. In the exploratory study by Korkmaz

(2012: 43) from Nigeria, the author found that staff training and development requires strong commitment from the municipal council and other executive structures.

- The need for staff training and development

Staff training can be defined as a probation preparing individuals for a job whereas development means organizational-related learning experience preparing individuals for new future jobs and performance design based on possible future direction (Huque and Vyas, 2008: 188).

The need for training and development includes that of developing employees' thoughts and reduce inferiority. Normally, the task to determine how frequently employees' training and development needs to occur remains a difficult subject. In this regard, several authors (Karim, Huda, and Khan, 2012: 43; Fernandez and Moldogaziev, 2013: 155-160) who have expertise on inventory control, postulate that it could be useful to provide staff training and development only if the organisation experiences a change in the inventory control, inventory policy, inventory control planning, and workforce. Likewise, the South African Department of Labour policy (2013: 10) supports the premise that staff training should occur once there is a change in the working system. The policy also explains that, without proper training, a candidate is not fit enough for that particular job.

According to Aroge and Hassan (2011: 229), handling resources of the organization require comprehensive knowledge, and most workforce shortcomings like waste, damages, and other unnatural causes on goods and services of the public are especially the results of employees lacking adequate skills. Rehman, Khan and Khan (2011: 40) report that, since 1970s, the importance of staff training and development in all municipalities has grown drastically. This devotion was aimed to help employees to grow and became more responsible.

On the contrary, Huque and Vyas (2008: 188) and Yaghi, Goodman, Holton and Bates (2008: 241) are in agreement that the impact of staff training and development remains



weak unless trainees apply what they have learned. The authors identify the following conditions as indications that employee require training:

- Lack of interest in the work place;
- Negative attitude to work;
- Low productivity;
- Tardiness;
- Excessive complaints;
- High rejects or low quality;
- High incidence of accidents; and
- Insubordination.

Singh and Kumar (2010: 771) state that even the South African Perishable Products Export Control Board stresses the need to hire skilled labour force in order to achieve good inventory control results.

### (iii) Poor communication and information flow

Poor communication may result in wrong decisions and ultimately produce wrong information. It is the obligation of the organisation to improve communication in a way that is conducive for all employees. This devotion may call for managers and staff to ensure proper standards and structures of communication within the organization (Georgiou, Westbrook and Braithwaite, 2012: 2; Afullo, 2000: 206; and Hynes, 2012: 466). Jayaram, Tan and Nachiappan (2010: 6840) note that poor information sharing can affect the series of inventory supply, objective links, design links, and logistics links along the organization leading to a disapproved overall control.

- The importance of communication

An experimental study to improve inventory control, which was conducted by Mathaba, Dlodlo, Smith, and Adigun (2013: 228) from the South African enterprises, found that communication plays an integral role to share the necessary information regarding how plans and controls of inventories should be assumed in an effective manner. It has been

also proved that communication is the only way to convey messages and information to other people either internally or outside the organization (Braaf, Manias, Finch, Riley, and Munro 2012: 3). Communication is only enough if it is affected throughout the organisation (Groddeck, 2011: 69). In this regard, Jayaram *et al.* (2010: 6840) mention the following lines of communication as a form of pooled dependency in the municipality:

- Communication and information sharing with staff members;
- Use of formal information sharing agreements;
- Condemning the use of informal information sharing;
- Communicating the municipal future strategic needs to staff;
- Establishing more frequent contact between managers and staff; and
- Determining future needs of the municipality.

Moreover, Angell (2007: 15) states that an interactive process of communication is divided into eight dimensions, namely; sender, encoding, message, medium, decoding, recipient, feedback and noise. A clear communication process can be divided into four 'W' questions, namely; who says? What in? Which with and what effect? (4ws). Both the instruction and feedback are the critical components in the communication process. Therefore, feedback from stores personnel is an opportunity that the other personnel from the same or other department can find out and correct ineffectual and misdirected inventory stock orders (Buvee, Thill and Schatzman, 2004: 9). On the same note, Mathaba *et al.* (2013: 228) found that communication among inventory personnel involves many other individuals from different departments.

### 2.9.2 Keeping inventory track

Keeping inventory track means to control the flow of stocks, e.g., sales, purchasing, shipping and other related functions (Stimson, 2012: 13). This function can be performed manually using books or electronically using software solutions often work with barcode, Radio-Frequency Identification (RFID) and wireless tracking technology to support inventory tracking and control. Such softwares may include megaventory, desktop inventory management, eTurns, windward system five, enterprise retail suite,

ezofficeInventory, mapYourTag, retail anywhere Point-Of-Sale (POS), visual inventory control software, 3ex.net, accolent Enterprise Resource Planning (ERP), ACCTivate, aestiva inventory, Automated Plate Scanner (APS) stock control, aseat control system and many others (News beat, 2012: 10-12; Brandon, 2012: 54; Watson, 2014: 40-43). Many studies (i.e., Bouzida, Logrippo and Mankovski, 2011: 224; Mohammaditabar, Hassan and O'Brien, 2012: 655) stress the importance of keeping the inventory track as a most critical factor in achieving a better inventory control in theory and practice. This is because keeping inventory track can allow the inventory controller to be aware of every movement in the stock, either theoretical or physical. Jackson (2011) is of the opinion that failure to keep inventory track can increase chances of unauthorized individuals in having access to inventories, resulting in disturbance of moving the inventories in an orderly manner. This was confirmed by Atyam (2010: 343) who is in common view with Chou *et al.* (2012: 4686) that failure to keep and utilize the inventory tracking systems is a cause of failure to control inventories by many public sectors. Therefore, implementing a keep track system that is accurate in reducing human errors can benefit big organizations like the municipalities (Birkinshaw and Heywood, 2010: 228 and Nassar and Hegab, 2006: 555).

Bouzida *et al.* (2011: 224) are in agreement with Kuang, Ibrahim, Udzir and Sidi (2011: 111) that the usefulness of keeping an inventory track can be revoked and subjected to different types of constraints, among which are cardinality constraints and separation of duties. Conversely, Atyam (2010: 343) states that to keep a track system is not efficient alone therefore limitations such as permission and bind rules must be emphasised to prevent unauthorised individuals from having access to inventories. Nevertheless, the importance of keeping a track system was stressed by Bouzida *et al.* (2011: 223) and Kuang *et al.* (2011: 101). The authors mentioned that failure to keep inventory track can result in the organization losing millions of rands. Likewise, a report by Nombembe (2012: 1) reveals that improper technical control systems by the South African municipalities resulted in inventory losses that could not be quantified. Section 175 of the Municipal Financial Management Act (MFMA), Act No. 56 of 2003, which is a framework regulating the control of finances and inventory stock for the South African municipalities, condemn the use of improper internal control systems to safeguard public resources (Draft municipal financial misconduct regulations, 2012: 30).

According to Jackson (2011), inventory is one of the most significant items of any organization and, therefore, a loss encountered on inventories must be investigated and reasons of such a loss are to be noted.

According to Umakanta and Chaitanya (2012: 124), keeping the levels of inventory can be attributable to the following:

- Minimum stock level. Minimum stock is that level of stock which should not be allowed to decrease (Joannes, 2012). This can be calculated as follows:

Minimum level = Re-order level – Average usage x Normal re-order period.

- Re-order level. Re-order is the amount of stock that a company holds so that when the stock falls, the stock must be reordered (Singh *et al.*, 2012: 297). Re-order level can be calculated as follows:

Reorder point =  $S \times L + J (S \times R \times L)$  where S = Usage in units per day, L = Lead time in days, R = Average number of units per order, and J = Stock out acceptance factor.

- Lead time. Lead time is the time elapse between the date of placing the inventory order and the date of delivery. The need for knowing the exact lead time helps the seller to keep certain inventories to serve clients while waiting for the supplier's delivery (Liberatore, 1979: 2).
- Maximum stock level. Maximum stock is the amount of inventory which should not be exceeded (Singh *et al.*, 2012: 296). This can be calculated as follows:  
Reorder level + Economic order quantity-(Minimum rate of usage x Minimum lead time).

According to Mohammaditabar et al. (2012: 655), failure to keep inventory track can be attributable to the following two causes:

## (1) The use of complex track system

A complex track system can be described as a difficult system to be acquainted with and it can result in a responsible person not understanding his/her duties. Subsequently, he or she may require assistance from other colleagues (Castejon-Limas, Ordieres-Mere, Gonzalez-Marcos and Gonzalez-Castro, 2011: 47). There are many factors which may cause the system to be complex and this was confirmed by Birkinshaw and Heywood (2010: 228), who identify the following reasons:

- Imposed complexity – includes laws;
- Inherent complexity – includes business policies;
- Designed complexity; results from choices; and
- Unnecessary complexity; arises from growing misalignment between the needs of the organization and the processes supporting it.

A complex track system may consist of mathematical theory or certain principles (Nelson, 2010: 71-72). Therefore, it is imperative to assess individual skills and ability to perform work before any realistic judgement is made on staff performance. On the same note of a complex track system, Intaher and Johanna (2012: 250-255) reveal that the most common problems among officials from the South African municipalities include: tracking inventory information and status; maintain schedules and work orders; procurement; compliance to municipal and legislative policies; and disposal. On the other hand, Jackson (2011) reveals that the number of people involved with inventory control can cause a complexity in the system. For example, if more than one person is involved in one task, one may take advantage to manipulate the system.

## (2) Failure to use best system between manual and online systems

As shown in table 2.1, inventory control can be exercised manually or electronically, but organizations need to choose the best method that will provide support for both customers and the organization. Chris (2013: 1) demonstrates comparisons between manual and online inventory control systems as follows:

**Table 2.1: Comparisons of manual and online inventory control systems**

<b>Condition</b>	<b>Manual inventory control systems</b>	<b>Online inventory control systems</b>
Organization	<ul style="list-style-type: none"><li>• Best for small businesses</li></ul>	<ul style="list-style-type: none"><li>• Best for large businesses</li></ul>
Sense of Control	<ul style="list-style-type: none"><li>• Easy to assess the condition of inventories</li><li>• Allow for manual counting</li><li>• Easy to access</li></ul>	<ul style="list-style-type: none"><li>• Rely on the system</li><li>• Require access code</li></ul>
Cost	<ul style="list-style-type: none"><li>• Cheaper</li></ul>	<ul style="list-style-type: none"><li>• Expensive</li></ul>
Complexity	<ul style="list-style-type: none"><li>• Require proper paper work</li></ul>	<ul style="list-style-type: none"><li>• Systematic</li></ul>
Labour intensive	<ul style="list-style-type: none"><li>• There is highly labour intensive to operate</li><li>• Can involve many individuals</li></ul>	<ul style="list-style-type: none"><li>• Systematic</li><li>• Can involve one person</li></ul>
Monitoring	<ul style="list-style-type: none"><li>• Regular monitoring</li></ul>	<ul style="list-style-type: none"><li>• Can rely on the systematic counting</li></ul>
Human error	<ul style="list-style-type: none"><li>• High risks of fraud, miscounting, inventory obsolescence etc.</li></ul>	<ul style="list-style-type: none"><li>• Reduced risks</li></ul>

Source: adapted from Chris (2013: 1)

Table 2.1 shows that the online inventory control system is most preferable to organizations that handle large inventories and its requirement includes that of meeting the needs of customers faster. Normally, the faster the service, the more the number of customers will increase. In addition, a study conducted by Nassar and Hegab (2006: 555) found that most of the South African municipalities are very reluctant in using online systems. One of the reasons for such reluctance is that they are lacking skills and competency.

According to Nassar and Hegab (2006: 556), the need for manual systems includes that of having inventory records such as: out-of-stock sheets; open-to-buy records; purchase order files; supplier files; returned goods files; and price books. The author further states that designing inventory control records does not have to be heavy or a complex proposition.

### 2.9.3 Procurement

According to Intaher and Johanna (2012: 244), a procurement process can be defined as a process to acquire and receive goods and services in the municipality. Procurement processes prepare and process demand as well as the end receipt and approval of payment. Erdis (2013: 121-124) reveals that procurement has a link with inventory control. The author mentions that procurement is meant to ensure that inventory orders are made on time so that inventory control satisfies all the demands as they became due. Correspondingly, Watermeyer (2011: 2-3) states that, in response to procurement processes and regulations of inventory stocks by the South African municipalities, PPPFA Act No. 5 of 2000 was promulgated to achieve best results. With reference to section 217 (1) of the PPPFA, the primary objectives towards its promulgation was to ensure fairness, equity, transparency, competitiveness and cost effectiveness in the control of inventory in theory and practice by the municipality.

However, an exploratory based study conducted by Intaher and Johanna (2012: 243) from South Africa, found that there are challenges restraining the effectiveness and efficiency of the municipal procurement. The authors mention that incompetency, unfairness, inequality, poor strategies, and failure to be transparent by officials are the reasons of intricate procurement. Another study conducted by Allal-Cherif and Babai (2012: 40) from the South African municipality found remarkable results that the use of technology systems by incompetent practitioners is what makes intricate procurement. Intaher and Johanna (2012: 244) defined intricate procurement as a tricky process to acquire and receive goods and services in the organization.

Though there is a strong relationship between procurement and inventory control, Jovanovic and Benkovic (2012: 26) report that municipal procurement is a factor which is causing problems on inventory control. One such problem includes errors and fraudulence by responsible practitioners. This was confirmed by Larson (2009: 222) who conducted a study in Canadian municipalities on how procurement functions. It was found that some practitioners are not reliable and do not have a good understanding of procurement processes. Likewise, Allal-Cherif and Maira (2011: 709) report that experience of the South African municipalities' administration during the

past years revealed the existence of disorder by responsible parties involved with procurement processes.

Since there are many issues arising from procurement, the South African government has acknowledged a need for improvement in the procurement process. As a result, the four principles of the municipal procurement defined in the Public Procurement Law had to be complied. Such principles include: (1) cost effectiveness and efficiency; (2) principles of competition; (3) principle of transparency; and (4) principle of equality of bidders (Jovanovic and Benkovic, 2012: 26). Achua (2011: 323) reveals that the four principles have failed to settle the issues of intricate procurement processes in the South African municipalities. The author recommends that commitment, supporting regulations, and reviewing of performance regularly can help resolving the matter in question.

According to Bolton (2010: 76-80), South African municipalities have very little, if any, difference between the performance of procurement and exploitation. The author further identifies the tender process as an important section to be considered when viewing the inventory control.

- Tender process

According to Atkinson and Sapat (2012: 360-363), a tender is a process where the owner invites a quote for the inventory to be delivered, based on complete plans and specifications. Tenders are given out via procurement, but omissions like failure to identify accurate inventory to be supplied are the symptoms of tenders not being accurate when capturing requests for quotations or evaluating approved proposals of suppliers. Moreover, selecting a supplier that has not been approved can be a cause of conflict of interest between the partners involved, leading to serious corruption.

In order to deal with problems of intricate procurement processes, Intaher and Johanna (2012: 244) suggest that tender practitioners need to be trained thoroughly. This intention has increased the interest of colleges and universities to offer training to assist educating tender or procurement practitioners. UNISA short learning programmes



(2013) state that the following six types of programmes are available: (1) Procurement and supply chain perspective; (2) Public procurement and Supply Chain Management; (3) Purchasing and Supply Management; (4) Purchasing and Supply Tools; (5) Legal aspects of purchasing; and (6) Storage and inventory management. Furthermore, Jovanovic and Benkovic (2012: 26) state that the purpose of these programmes includes that of introducing and preparing individuals to an integrated approach of procurement in the municipality.

Moreover, literature reveals that providing relevant training to procurement practitioners is very important. On the same note, an empirical study conducted by Fattah Al Weshah (2013: 12-13) from a South African municipality found that incompetency of tender and procurement practitioners dealing with inventory stock orders resulted in a rise of 5% in operating costs. Even though there is no clause found in the South African PPPFA Act No. 5 of 2000 that emphasizes the need for staff training in the procurement, a study conducted by Intaher and Johanna (2012: 242) on the South African municipalities found that poor staff training was a core issue affecting successful procurement. Basically, the above statements revealed that intricate procurement has a link with failure to control inventory. Consequently, the next section highlights the strategies for inventory control.

## **2.10 Common strategies for inventory control**

Pier and Nicola (2010: 94-95) and Keith and Rene (2008: 310) define the concept “strategies” as approaches that offer a vast body of analyses, plans and prescriptions which constitute a primary reference of certain practices. On the other hand, the strategies of inventory control can be defined as approaches employed in the administration of inventory stocks and they may include the internal checks or any other type of control established by the business to carry out activities aimed at ensuring effective and efficient cost reduction (Minner and Transchel, 2010: 979).

Other forms of strategies to inventory control include ensuring high security of the store house and stock yard, good custody of keys, limiting access to premises and making of coded materials to minimize theft (Brackus, 2000: 259-293). Pandey (1995: 34) pointed

out that accounting can also be regarded as an instrument to improve the manner in which inventory is controlled. According to Robert (2004: 109-115), another important instrument in controlling the inventory stocks is a stock taking. Stock taking can help to keep track of physical stock and to cross check the accuracy of stock records at any given time. This kind of cross checking can only be obtained from the main sources of information for inventory control which are requisitions, bids and quotations, purchase orders and sub-contracts, shipping and documents, and invoices (Atkinson and Sapat, 2012: 362-363).

Singh and Kumar (2010: 771) and Minner and Transchel (2010: 979) suggest a strategy to separate inventory stocks in terms of their nature, e.g., allocating perishable and imperishable stock separately. This means that all inventories with a short life period should not be stored together with those in which they will last for a longer period of time.

It is apparent that every organization that controls the inventory stocks will need to monitor its strategies. This can help the organization to check if whether the various strategies adopted are helping its internal environment to be matched with the external environment (Lodding and Lohmann, 2012: 909). The general consensus in the literature regarding strategies for inventory control also includes use of perpetual and periodic inventory reviews. A perpetual review entails evaluating inventory stock items on a daily basis whereas a periodic review promotes inventory stock reviews at regular time intervals such as weekly, monthly or yearly (Griffin, 2013: 1). Syntetos, Babai, Dalery and Teunter (2009: 611) believe that a periodic review is a preferable strategy for large organizations that specialize in long shelf-life products. For example, large organizations assume holding large stocks and it may be easy to count each stock periodically. A question how to detect inventory fraud as early as possible derives a need for perpetual review. Using a perpetual review, an organization can be able to monitor and account for various inventory situations at any time. This is because perpetual reviews make inventory control accurate, according to Nahmias (2012: 13), cited by Minner and Transchel (2010: 979). Although a perpetual review has more benefits, according to Pratap, Sam, Francois, Thierry and Raymond (2011), there are

many considerations associated with a perpetual review, e.g., great staff experience and smooth processes are necessary to achieve its goals.

According to Demers (2002: 14-15), the division of duties and Just in Time (JIT) ordering can be the best strategies for controlling inventories. Likewise, Pratap et al. (2011) are in support of JIT strategy. Alles et al. (2000: 1528) states that JIT requires a close relationship between a seller and a buyer and, therefore, condemn the use of JIT whilst recommending a fixed ordering in order to improve total quality (TQ). Fixed ordering can reduce holding unnecessary stocks until the next order arrives, and for that reason, there is a huge discrepancy between JIT and fixed ordering. For example, JIT entails ordering only if inventory is needed whereas fixed ordering entails ordering inventory at a fixed level and time. It is, therefore, apparent that JIT can only be successful if a supplier of goods is reliable and committed to deliver stock when it is needed (Sahir, 2009: 1).

Since these debates have been on the table for a long period of time, academics and practitioners have tried to reach a consensus on the best ordering strategy. In this regard, Wadhwa and Chan (2009: 3331) found that ordering fixed quantities will reduce holding unnecessary inventory. This was argued by Sahir (2009: 1) who found that fixed ordering responds negatively to the environment where the demand is flexible.

According to Pratap *et al.* (2011), due to the growing need for proper inventory control, tracking devices have been introduced as a mechanism to provide for a need. Tracking devices can be in a form of a card or a box with a marked-off area on the floor. On the same note, Mishra and Tripathy (2012: 124-129) and Parlar, Perry and Stadje (2011: 410) explain that use of tracking devices as a strategy can be in a form of a number of tools as follows:

- Economic Order Quantity (EOQ) method;
- First in First out (FIFO) method; and
- Last in First out (LIFO) method.

Singh, Sahu and Nayak (2012: 295-297) and Drury (2011: 405) define EOQ as a strategy to determine the optimum order quantity that the organization should hold in its inventory to balance with the quantity demanded. There are many disadvantages associated with EOQ because its theories do not convince the practitioners. This was evident by Mishra and Tripathy (2012: 125) who mention that, under variable demand, EOQ does not correspond to reality and the cost resulting from its use cannot be calculated correctly.

FIFO is a strategy where the first inventory entered in the store is the first to be removed (Chou et al., 2012: 4686).

LIFO was defined by Chou *et al.* (2012: 4686) as a strategy to process materials or inventories in which the last items entered are the first to be removed. LIFO is opposite of FIFO when items are removed in the order they have been entered. Choosing the best strategy between FIFO and LIFO raised many arguments in the literature. Circo (2013: 276) explains that FIFO benefits organizations that control a single product. However, due to a growing market demand, most organizations shifted to control mixed inventories without moving from FIFO. Typically, issuing imperishable inventories using FIFO does not have a greater impact than issuing perishable inventories. Moreover, Chou *et al.* (2012: 4688) state that FIFO hardly supplies fresh-produced products. The authors further state that both FIFO and LIFO strategies fail to flow with the demand and supply.

The current and ongoing debates that exist in the literature show a lack of endorsed strategies to control inventory. In a quantitative study conducted by Aberdeen Group (2004), the group found remarkable results that re-examining strategic inventory control could assist in solving current and future inventory problems. The emphasis here is that without re-examining implemented strategies, organizations will continue making irrelevant choices and decisions on inventory control.

## **2.11 Conclusion**

This chapter used inventory control in theory and practice to review literature on factors affecting the success of inventory control. Common strategies for inventory control were also reviewed using available literature. A general overview of the municipal inventory control was also reviewed. It is clear that proper inventory planning, tracking inventory stock at all times and having proper procurement processes play an integral role in building up a strong inventory control system. It is, therefore, of utmost importance that organizations make proper arrangements to improve these areas.

The following chapter introduces the approach to the study and the overall method of research that was employed.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **3.0 Introduction**

The previous chapter described the literature on the factors affecting the success of inventory control. It also reviewed common strategies that can be used to improve inventory control. This chapter intends to discuss the research design and types of methodology undertaken by the researcher to obtain data as accurately as possible to authenticate the study. It also provides an understanding and reasoning as to the structure of the questionnaire designed to examine factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. The chapter begins by clarifying the research design specifying the aim for the research paradigm. The target population will be described in detail and the instrument used for data collection will be also explored, and followed by a method used to computerise and analyse data of the study.

#### **3.1 Research design**

The research design, according to Saunders, Lewis and Thornhill (2011: 22), is a way the researcher intends to conduct the study. During the research design, the researcher must clarify the steps in the research process, which enable the researcher to foresee and prevent eventual errors, bias or distortions. The steps involved in the research design process are described below:

- What is the research topic?
- How will the topic be addressed?
- Who are the subjects?
- Where will the subjects be found and how will the data be gathered?
- How will the data be processed?
- How will the findings be communicated?

These steps mentioned above were used to define the research process that was followed within this study. The approach of this study was cross sectional and descriptive in nature.

Leedy and Ormrod (2012: 135) state that if the respondents are considered at a fixed point in time, that research is said to have used a cross-sectional methodology. Likewise, Welman et al. (2011: 95) confirm that cross-sectional design involves the collection of information from any given sample of population elements only once. Descriptive research was defined by Leedy and Ormrod (2012: 189) as a statistical study to identify patterns or trends in a situation, but not the causal linkages among its different elements. A descriptive research is not only used for the quantitative studies, but instead it can utilize elements of both the quantitative and qualitative studies in order to measure central tendency which includes the mean, median, mode, deviance from the mean, variation, percentage, and correlation between variables (White and McBurney, 2012: 432).

The design of this study assisted with data collection, measurement and for analyses. The questions required members of staff from Stores and Procurement Divisions to use their critical thinking, problem solving and decision making skills to read and understand the questions. The study was predominantly quantitative in nature with only two open-ended questions and was analysed using the International Business Machines (IBM) Statistical Package for Social Scientists (SPSS) version 21.0.

### 3.1.1 Quantitative research

According to Welman *et al.* (2011: 87), a quantitative research method is descriptive in nature and is used to answer questions about the relationships amongst measured variables. The analysis arrays from creating simple tables that show the frequency of occurrence through establishing statistical relationships between measured variables (independent variable and dependent variable) of the study. According to White and McBurney (2012: 429), a quantitative research method has the following advantages:

Advantages of quantitative research:

- Quantitative data is statistics driven and can provide a lot of information;
- It is easy to compile the data onto a chart or graph because of the numbers that are made available;
- The research can be conducted on a large scale and gives a lot of information; and
- It saves time for the respondents.

Furthermore, White and McBurney (2012: 432) describe the following disadvantages of quantitative research:

- It is more costly than using qualitative research; and
- In a quantitative research, numbers change often.

### 3.1.2 Qualitative research

A qualitative research method explores the attitudes, behaviour and experiences through methods such as open-ended questions, interviews, and focus groups. It attempts to get a broad opinion and comprehensive understanding of the phenomenon from the views of participants. Briefly, Welman *et al.* (2011: 87) explain that a qualitative research has its own set of strength and disadvantages. Its strength includes creating a better understanding of the responses whereas its disadvantage is that its time consuming.

This study did not conduct interviews; instead, it was predominantly quantitative in nature with only two open-ended questions allowing the respondents to express their views and opinions in the questionnaire. The reasons of selecting this particular population will be discussed below.



### 3.2 Target population

Table 3.1 indicates the target population of the study.

**Table 3.1 Target population**

Department	Target population
Stores Division	49
Procurement	13
Total	62

The target population of this study comprised of 62 members of staff from the two departments, namely; Stores Division (49) and Procurement Division (13) of the eThekweni Municipality, Durban. This population excludes the 5 managers which were selected for a pilot study. The researcher targeted this population because of their direct involvement in inventory control. Leedy and Ormrod (2012: 35) state that the target population should be a set of all individuals relevant to a particular study and must be defined in terms of elements, geographical boundaries and time.

### 3.3 Case study

For the purpose of this research, a case study approach was adopted. A case study can be described as an analytical study of the development of an individual unit, as a person, family, group, event or social institution (Leedy and Ormrod, 2012: 137). Saunders, Lewis and Thornhill (2011: 23-24) found that a case study approach has extensive ability to generate answers to the questions 'why?' as well as the 'what?' and 'how?'. The authors further explained that the data collection methods for a case study may be varied, e.g., questionnaires, interviews, observation and documentary analysis. However, using a case study approach has its own advantages and disadvantages. For example, Leedy and Ormrod (2012: 140) mentioned the following advantages of a case study:

- Case studies allow a lot of detail to be collected that would not normally be easily obtained by other research designs;

- The data collected is normally a lot richer and of greater depth than can be found through other experimental designs;
- Case studies tend to be conducted on rare cases where large samples of similar participants are not available;
- Within the case study, scientific experiments can be conducted; and
- Case studies can help experimenters adapt ideas and produce novel hypotheses which can be used for later testing.

Leedy and Ormrod (2012: 149) mention the following disadvantages of a case study:

- Some case studies may not be scientific;
- The data collected from a case study cannot necessarily be generalised to the wider population. This leads to data being collected over longitudinal case studies not always being relevant or particularly useful;
- Case studies are generally conducted on one organization. This can lead to bias in data collection, which can influence the results more than in different organizations; and
- It is very difficult to draw a definite cause/effect from case studies.

Using a case study approach in this research assisted the researcher to base this study on one organization. This was to achieve the main purpose of a study, which was to identify the factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. The factors under investigation were only those affecting the Stores Division of the eThekweni Municipality in Durban and may not be generalized to other organizations.

### 3.3.1 Census size

The researcher decided to study the entire number of 62 participants or members of staff in both departments, namely, Stores Division and Procurement Division. In a census study, data is collected at a specified time from the entire population (Siniscalco and Auriat, 2011: 7). White and McBurney (2012: 429) state that a census study has the following advantages:

- Increase confidence interval;
- It gives maximum chance to identify negative feedback; and
- It studies the entire population.

White and McBurney (2012: 433) and Babbie (2011: 35) list the following disadvantages of a census study:

- Limits other possible survey opportunities; and
- There is high possibility of declined responses.

Welman *et al.* (2011: 71) advocate that a sample size larger than 25 and less than 500 is most appropriate for research studies. Therefore, a census study of 62 respondents was adopted and considered appropriate to fulfil the aim of this study. Table 3.1 shows this breakdown of the census population in more detail.

**Table 3.2: Census population**

Department	Frequency	Percentage %
Stores	49	79.03
Procurement	13	20.97
Total	62	100

As shown in table 3.1, 49 respondents (79.03 percent) of the population were targeted from the Stores Division, and 13 respondents (20.97 percent) of the population were targeted from Procurement Division of the eThekweni Municipality, Durban. This number (62) of the target population excludes those 5 managers who were selected for the pilot study.

### **3.4 The research instrument**

A questionnaire was used as a research instrument to ensure that the data is well interpreted to reflect the views of respondents regarding the factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality in Durban. There were two types of questions available for the researcher to use, namely;

closed-ended and open-ended questions: only two open-ended questions were used and the rest were closed-ended questions. Close-ended questions were designed in a way that respondents do not explain their views but rather make choices among a set of alternatives given by the researcher whereas open-ended questions allowed respondents to formulate their own views.

The use of predominantly closed-ended questions was found easier and quicker for the respondents to answer. Nevertheless, the researcher found close-ended questions to have limited creativity of respondents, but with two open-ended questions, the respondents were able to explain their opinions. When using any form of open-ended questions, Siniscalco and Auriat (2011: 4) state that there is a possibility of a low response rate. The authors further suggest that, in such cases, the researcher needs to self-administer the questionnaires. Therefore, this study was self-administered.

#### 3.4.1 Questionnaire content

The questionnaire consisted of three pages (Appendix C). The five point Likert scale (1) strongly agree; (2) agree; (3) neutral; (4) strongly disagree; and (5) disagree was used to structure the majority of the questions and the other questions were in the form of multiple choice. Likert scale and multiple choices are easy to code and easy to analyse (White and McBurney, 2012: 439). Clear and simple words were used to construct the questions for the respondents to easily understand and answer the questionnaire.

With predominantly closed-ended questions and only two open-ended questions, the questionnaire was divided into three sections and consisted of 26 questions, with the levels of measurement consisting of nominal and ordinal types of questions. The sections of the questionnaire were divided into three parts as follows:

##### SECTION A - Biographical data

The nominal levels were used to ask questions in the biological data section. The questions of this section were all closed-ended. For example, the section covered three aspects: the departments in which the respondents served; the levels of staff

experience; and the levels of staff qualifications. The analysis of results in chapter four interpreted the results of this section as nominal questions. According to Saunders *et al.* (2011: 24), a nominal level organizes data by name and by numbers assigned as arbitrary. An example of a nominal scale is race, with the choices labelled; '(1) African; (2) Coloured; (3) White; (4) Indian'. Babbie (2010: 254) explains that analysing a nominal data is easy and quicker.

#### SECTION B - Factors affecting the success of inventory control

The factors affecting the success of inventory control were themed into three main variables: inventory control planning; inventory keep track systems; and procurement. An ordinal level with a 5-point Likert scale was used to measure these variables. According to Babbie (2010: 256), the Likert scale questions are ordinal data and are easy to analyse. This section also included one open-ended question where the respondents were asked to list any other factor/s that affect the success of inventory control in their organization and its responses were analysed in themes.

#### SECTION C - Strategies for inventory control

In this section, there were eight options given to the respondents to choose, namely; LIFO, EOQ, JIT, perpetual inventory review, periodic inventory review, inventory fixed ordering, FIFO and none of the above. In measuring these variables the section is said to have used a nominal level and it was analysed in chapter four. In addition, the section also included one open-ended question where the respondents were asked to indicate strategies they prefer for their organization to improve inventory control. This one open-ended question was analysed in themes in chapter four.

#### 3.4.2 Self-administered questionnaires

The questionnaire was self-developed and based on the information gathered from the literature review. Questions related to the core issues that affect the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. For example, the factors that were relevant to the Stores Division were sifted and formed

the basis of the questionnaire. All questionnaires were distributed by the researcher to 62 members of staff in the two departments, namely, Stores and Procurement Divisions. A total of 13 questionnaires were distributed directly by the researcher to the Procurement Division and another 49 to the Stores Division. To eliminate risks, a once-off questionnaire distribution and collection method was applied. Respondents were informed timeously before the distribution and collection processes took place. The population was relatively fluent in English. Therefore, the questionnaire was presented in English.

### **3.5 Data collection**

Through data collection, the researcher has been able to measure results of secondary data and primary data. Secondary data was obtained from various sources including books, newspapers, internet, dissertations and journal articles. A self-administration method was used to collect primary data from the members of staff in the Stores and Procurement Divisions of the eThekweni Municipality, Durban. This process was performed with the help of a section manager from the Stores Division of the eThekweni Municipality, Durban. The researcher collected a total of 62 questionnaires (57 full and 5 partially completed questionnaires). The 5 partially completed questionnaires were discarded. Hence, there were 57 respondents for this study.

### **3.6 Pilot study**

The term “pilot study” was defined by Welman *et al.* (2011: 148) as a preparatory dress rehearsal for the actual study. The purpose of a pilot study is to identify possible flaws in the measurement procedures such as ambiguous instructions and inadequate time limit of the intended study. Secondly, a pilot study identifies unclear or vaguely formulated statements.

Therefore, in order to eliminate errors in the questionnaire, the researcher conducted a pilot study with 5 managers from the Stores (3) and Procurement (2) Divisions of the eThekweni Municipality, Durban. The five managers selected for a pilot study were excluded from the 62 members of the targeted population. The same questionnaires

used for main study were used for a pilot study and a hard copy was submitted to the supervisor. The five managers from the Stores and Procurement Divisions of the eThekweni Municipality in Durban, were given twenty minutes to complete the questionnaire and the researcher was available to assist. Respondents were also asked to comment on the format and wording of the questionnaire.

A few changes were made to the questionnaire after a pilot study. Some of the changes were related to questionnaire's format and spelling errors. A questionnaire needed to be tested in order to ensure that all items are clear and understandable. This happened before the main study was conducted.

### **3.7 Reliability and validity**

#### **3.7.1 Reliability**

In this study, a reliability test was performed in order to see whether the study will give similar results if the same study is repeated. Reliability refers to the degree to which the instrument will give the same results if a survey is repeated on the same sample (Parasuraman, Grewal and Krishnan, 2007: 133). To ensure reliability of this study, a Cronbach's Alpha was performed. According to Malhotra and Birks (2011: 467), there are two types of Cronbach's Alpha, namely; Cronbach's Alpha for raw variables and Cronbach's Alpha based on standardized items. The first Cronbach's Alpha employs the covariance among the items, whereas the alpha based on standardized items employs the correlations among items. The latter alpha is based on the assumption that all of the items have equal variances, which is often false in practice (Reynaldo and Santos, 2011: 297).

According to Maree (2010: 216), to determine whether the items are associated, the Alpha coefficient must be close to one and if items are badly correlated, the Alpha coefficient will be close to zero. This means that a reliability co-efficient of 0.70 or higher is acceptable (Muijs, 2011: 221).

Using IBM SPSS, version 21.0, the researcher used the following measures to ensure the reliability of the study:

- Only the close-ended questions (i.e. Planning, Inventory keep track system and Procurement) were used for reliability test;
- A pilot study of the questionnaire was undertaken to make sure that all questions and statements were both relevant and easily understood;
- The questionnaire of the study was designed to ensure the anonymity of the respondent; and
- Cronbach Alpha was calculated to measure the reliability of the measurement.

### 3.7.2 Validity

To ensure validity of a study, a pilot study was conducted and the results were scrutinised by both the researcher and statistician. To test validity of the instrument, five questionnaires were sent to five managers at Stores and Procurement Divisions of the eThekweni Municipality in Durban for comments. The pilot ensured validity as few changes had to be made in the questionnaire. Validity is a judgement of the correctness of a measure for specific inferences, decisions and consequences (Muijs, 2011: 56). The author mentioned that there are four types of validities. These are as follows:

- Face validity – It refers to whether the statements are appropriate; it relies on the subjective judgment by the researcher;
- Content validity – It is the accuracy with which an instrument measures the contents being studied;
- Criterion validity - It is determined by relating the performance of one measure against another with the second measure checking the accuracy of the first measure; and
- Construct validity – It is the degree to which the content of the study is actually measured by the questionnaire.

To see whether the instrument adequately covers the topic of this study, the following validities were ensured:



- Face validity - Face validity of the study was ensured by conducting a pilot test of the questionnaire with five managers from the Stores and Procurement Divisions in order to assess their understanding of the requirements; and
- Construct validity - an indication of whether the measures include a representative set of items that measure the concepts being addressed. This was achieved by making sure that all questions constructed in the questionnaire were derived from chapter 2 of the study's literature review.

### **3.8 Data analysis and processing**

Data was analysed using the IBM Statistical Package for Social Sciences (SPSS), version 21.0. As this study was predominantly quantitative in nature, a questionnaire had only two open-ended questions and the rest were closed-ended questions. The open-ended questions were analysed by establishing categories to assign each comment to one or several categories (this is known as "coding"). These categories ended up being in a form of descriptive text by incorporating some of the comments that demonstrated major themes. All closed-ended questions also formed part of a quantitative research and were analysed in terms of descriptive and inferential statistics.

### **3.9 Statistical approach**

#### **3.9.1 Descriptive statistics**

According to Birley and Moreland (2007: 351), descriptive statistics are used when a researcher wants to know how variables are related to one another and whether there is any difference between two or more groups. Kinnear and Taylor (2010: 671-676) and Struwig and Stead (2009: 271) are in agreement that the descriptive statistics involve the use of percentage/frequency tables, mean, standard deviation, and percentages presented in bar graphs to represent the results of this study.

The following types of descriptive statistics were used:

- Frequencies tables - Frequency tables were used to analyse the results on the biographic profiles of the respondents, the factors that affect the success of inventory control, the strategies used for inventory control, and the recommended strategies for inventory control. According to Kinnear and Taylor (2010: 674), frequency tables can be defined as a report of the number of responses in a table that a question has received and is useful to count the total number of the respondents.
- Percentages tables - To analyse the results for biographic profiles of the respondents, the factors that affect the success of inventory control, the strategies used for inventory control, and the recommended strategies for inventory control, percentage tables have been used. A percentage table is the proportion of the respondents who answer a question in a certain way, multiplied by 100%, and is presented in a form of a percentage table (Aaker *et al.*, 2012: 452).
- Percentage graphs - To analyse the results on the factors affecting the success of inventory control, an applicable graph has been used. A graph refers to a pictorial device that illustrates a quantitative relationship and its usefulness includes that of indicating a liaison between the research variables (Maree, 2010: 220).

Moreover, these statistics were done in order to obtain a count of the number of responses associated with different values and to express these counts in a percentage form (Muijs, 2011: 59).

### 3.9.2 Inferential statistics

Inferential statistics are used when a researcher wants to know how variables are related to one another and whether there is any difference between two or more groups. Inferential statistics allow one to make inferences from the sample to the population (Maree, 2010: 217). In this study, the inferential statistics used included the

Cronbach's Alpha, chi-square test analyses, bivariate correlation analysis, cross-tabulations, hypothesis tests, and factor analysis.

### 3.9.2.1 Chi-square test analysis

The chi-square test analyses were used to determine the relationship between the research variables. According to Malhotra and Birks (2011: 463-467), a chi-square test is used to test the statistical significance of the observed association between the research variables. For example, a one sample chi-square with binomial tests for dichotomous questions was used to compare the differences in proportions for the individual questions and that sample chi-square was also used for comparisons between the pairs of questions such.

### 3.9.2.2 Bivariate correlation analysis

One of the objectives of this research was to examine the factors affecting the success of inventory control. The researcher decided to test the hypotheses that one group might differ from another in terms of the factors affecting the success of inventory control. The bivariate correlations were performed in this study. This is because there was more than one group involved. Therefore, bivariate analysis should be used (Malhotra and Birks, 2011: 501). When a chi-square analysis of independence is applied, it means that there is some relationship between the row subjects and the column subjects (Sekaran, 2010: 439).

As one of the most common types of bivariate analysis, a cross-tabulation of the two variables was used in this study for the five point Likert scale questions, in section B and section C. For example, questions; 2.1, 2.2, 2.3, 2.4, and 2.5 were cross tabled against questions 3.1, 3.2, 3.3, 3.4, and 3.5, whereas questions; 1.1, 1.2, 1.3, 1.4, and 1.5 were cross tabled against questions 2.1, 2.2, 2.3, 2.4, and 2.5. The test was also applied on the questions; 1.1, 1.2, 1.3, 1.4, and 1.5 when they were cross tabled against the questions 3.1, 3.2, 3.3, 3.4, and 3.5. The test helped to indicate whether there were direct or inverse proportional relationships between the variables. All significant relationships are indicated by a \* or \*\*.

According to Malhotra and Birks (2011: 468), the Cronbach's Alpha based on the standardized items for correlation analysis is a number between -1 and +1 that measures the degree of association between two variables (call them X and Y). A positive value for the correlation implies a 69 positive association (large values of X tend to be associated with large values of Y and small values of X tend to be associated with small values of Y). A negative value for the correlation implies a negative or inverse association (large values of X tend to be associated with small values of Y and vice versa). The formula below shows the standardized Cronbach's Alpha:

$$\alpha = \frac{N \cdot \bar{r}}{1 + (N - 1) \cdot \bar{r}}$$

(Source: <http://www.ats.ucla.edu/stat/sas/notes2/>)

In the formula depicted above, N is equal to the number of research variables or items used whereas r is the average inter-item correlation among the items. This formula implies that if the number of items is increased, Cronbach's Alpha increases thereof and if the average inter-item correlation is low, Cronbach's alpha will be also low (<http://www.ats.ucla.edu/stat/sas/notes2/>).

### 3.9.2.3 Cross-tabulation

Cross tabulation is a combination of two (or more) frequency tables arranged in a manner that each cell represents a unique combination of specific values of cross tabulated variables. Thus, cross tabulation allows for the examination of observations that belong to specific categories on more than one variable (Maree, 2010: 217). By examining these frequencies, relations were identified between cross-tabulated variables such as; experience and qualification indices of respondents by departments, questions 2.1, 2.2, 2.3, 2.4 and 2.5 versus questions 3.1, 3.2, 3.3, 3.4 and 3.5 as well as questions 1.1, 1.2, 1.3, 1.4 and 1.5 versus questions 2.1, 2.2, 2.3, 2.4 and 2.5.

#### 3.9.2.4 Hypotheses tests: P-Values and statistical significance

According to Malhotra and Birks (2011: 467), the most important application in the social sciences of the statistical theory around sampling distributions is a significance testing or statistical hypothesis testing. The authors further state that the traditional approach to reporting a result requires a statement of statistical significance. A p-value is generated from a test statistic and a significant result is indicated with " $p < 0.05$ ". The choice of the value 0.05 as the level of significance is totally arbitrary, but is a standard in statistics. Hypothesis testing is normally applied to nominal, ordinal and interval questions in the form of statistical tests. The null hypothesis states that there is no association between the two. The alternate hypothesis indicates that there is an association. In chapter 4, results of the hypothesis tests are represented. For example, a chi-square test was also used to establish whether there were significant differences in the demographic aspects with the factors affecting the success of inventory control. The three demographic variables, namely; department, level of experience, and qualification were used to test significant differences with the variables.

#### 3.9.2.5 Factor analysis

Factor analysis is a statistical technique whose main goal is data reduction. A typical use of factor analysis is in survey research, where a researcher wishes to represent a number of questions with a small number of hypothetical factors. Factor analysis can be used to establish whether the measures do, in fact, measure the same thing. If so, they can then be combined to create a new variable, a factor score variable that contains a score for each respondent on the factor. Factor techniques are applicable to a variety of situations. A researcher may want to know if the skills required to be a decathlete are as varied as the ten events, or if a small number of core skills are needed to be successful in a decathlon (Willemse, 2009: 209-213).

The principle component analysis was used as the extraction method, and the rotation method was Varimax with Kaiser Normalization. This is an orthogonal rotation method that minimizes the number of variables that have high loadings on each factor. It simplifies the interpretation of the factors. For the purpose of this study, there are three

steps followed in factor analysis: (1) computing the inter-correlations between the variables, (2) extracting initial factors, and (3) rotating the factors to obtain a clearer picture of the factor content. A typical use of factor analysis is in survey research, where a researcher wishes to represent a number of questions with a small number of hypothetical factors (Lapan and Quartaroli, 2009: 127).

### **3.10 Ethical concerns**

Welman *et al.* (2011: 61) believe that a researcher should be concerned with ethical considerations in all research processes (i.e., when recruiting, measuring and publishing). Therefore, due to the sensitivity of the research topic, the use of a letter of permission assisted with the distribution of questionnaires and each member of staff was presented with a letter of information and consent. Participants were given the choice to either participate in the study or not. Participants were also assured that responses would be treated with confidentiality and their personal identification will remain anonymous throughout the research process.

#### **3.10.1 Ethical clearance**

The researcher used a letter drafted by himself (Appendix A) and the other from the Institutional Research Ethics Committee (IREC) of the Durban University of Technology (DUT) (Appendix B) to ask for permission to conduct a study on the factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. The permission was then obtained from eThekweni Municipality, Durban. (Appendix D) on ethical clearance number was also granted by the IREC Office of the DUT.

#### **1.10.2 Letters of information and consent**

Burns and Grove (2009: 704) define a letter of information as the disclosure statement that contains a clear account of all the risks and benefits involved in the participation in a particular research study. The authors also define a consent letter as a prospective

respondent's agreement to voluntarily participate in a study, which is reached after conforming essential information about the study.

A consent letter was sent before the pilot study and the main study were conducted. Letters of information and consent helped the researcher to guarantee a standard of confidentiality agreement on the information provided by the participants. Participation in the study was voluntary and refusal to participate was permitted. There was no compulsion on the respondents to answer any specific question that he/she did not want to answer.

### 1.10.3 Anonymity

Holland and Rees (2010: 98) state that "anonymity means that the respondent should not be identifiable at any time by anyone reading the research reports". Prior to the questionnaire distribution, all participants were requested not to make any reference to colleagues or to their personal identity. Participants were assured that all information gathered was treated precisely and anonymity was maintained by de-identifying themselves and no names were mentioned. Every answered questionnaire was sealed in a separate envelope. This ensured that no answered questionnaire could be seen or linked to any other questionnaire to maintain anonymity.

### 3.10.4 Confidentiality

Confidentiality relates to management of private data in a research study and is essential in order to protect people, especially if they are disclosing sensitive information as part of the research (Holland and Rees, 2010: 89). A questionnaire was distributed privately to the individual's working station. During this study, all respondents were verbally reassured about the confidentiality of the information provided. The researcher was available for assistance and requested respondents not to discuss the content of the questionnaire to each other.

### 3.10.5 Guidelines for data storage

Data will be stored according to DUT guidelines for research data storage.

### **3.11 Conclusion**

The study type and the methodology used in this research assisted in examining the factors that affect the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. This chapter presented the research design and types of methodology undertaken by the researcher to obtain data as accurately as possible to authenticate the study. The chapter also achieved to adequately clarify the research design, target population, research instrument, data collection method, pilot study, ethical concerns, and data analysis used for this study. The research design and approach of the study was predominantly quantitative, cross sectional, and descriptive in nature. This was a census study and it comprised of 57 members of staff from the two departments, namely; Stores and Procurement Divisions of the eThekweni Municipality in Durban. The research instrument used was a questionnaire. Questionnaires were distributed and collected by the researcher. A pilot study was conducted with 5 managers from the Stores and Procurement Divisions. An ethical clearance number was obtained from the IREC Office at the DUT. Gatekeeper's permission to conduct this study was obtained from the eThekweni Municipality, Durban. The data of the study was analysed by means of the descriptive and inferential statistics using a Statistical Package for the Social Sciences (SPSS), version 21.0.

In the following chapter, the findings of the research study will be presented.



## **CHAPTER FOUR**

### **PRESENTATION, INTERPRETATION AND DISCUSSION OF RESULTS**

#### **4.0 Introduction**

This chapter presents the results and discusses the findings obtained from the questionnaires in this study. The questionnaire was the primary tool that was used to collect data and was distributed to personnel in the Stores and Procurement Divisions of the eThekweni Municipality, Durban. The data collected from the responses was analysed with the aid of the IBM SPSS, version 21.0. The results presented the descriptive statistics in the form of frequencies, percentages, pie charts, tables, cross tabulations, and graphs. The inferential techniques included the use of correlations and chi-square test values; which were interpreted using the p-values. The graphs and charts presented in this section were extracted from Microsoft Excel to further clarify the findings.

The aim of this study was to examine the factors affecting the success of inventory control and to examine strategies used for inventory control. The purpose of the questionnaire was to gather the information from the respondents regarding the strategies used and factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. Use of questionnaires helped the researcher to achieve the aim of this study and to provide relevant recommendations to improve the manner in which inventories are controlled. This chapter will present the results relating to the response rate, reliability tests and biographic information.

#### **4.1 Response rate**

Table 4.1 shows the response rate for the Stores and Procurement Divisions.

**Table 4.1: Response rate**

Department	Planned sample	Achieved sample	Achieved response rate
Stores	49	45	91.83%
Procurement	13	12	92.31%
Overall response	62	57	91.94%

In table 4.1, it is clear that the achieved overall response rate for the survey was high (91.94%). A total of 62 questionnaires were despatched and 5 questionnaires were partially completed, resulting in a final sample of 57. The researcher despatched 49 questionnaires to Stores but only 45 (91.83%) were completed. A total of 13 questionnaires were despatched to Procurement, but only 12 (92.31%) were completed.

#### **4.2 Reliability test**

Table 4.2 reflects a Cronbach's Alpha score for the close-ended questions that constituted the questionnaire for section B as follows:

**Table 4.2: Reliability test**

Closed-ended questions-SECTION B	Number of Items	Cronbach's Alpha
Planning	5 of 5	.761
Inventory keep track system	5 of 5	.844
Procurement	5 of 5	.664
Overall	15 of 15	.819

The key questions analysed for a reliability test were only those which were closed-ended and included in Section B of the questionnaire. Questions from sections A and C were less critical and, therefore, did not warrant further inter - item correlation testing (Babbie, 2010: 256). The overall reliability score of 0.819 exceeds the recommended value of 0.07 (Muijs, 2011: 221). This result indicates a high (overall) degree of acceptable, consistent scoring for this research.

### 4.3 Biographic information

A brief personal profile of the respondents is provided in this section. This information was obtained from questions 1, 2, and 3 of Section A of the questionnaire. Biographic information includes the respondents' department, experience and level of qualification.

#### 4.3.1 Departments in which the respondents were employed (Q1)

Using frequencies and percentages for data presentation, this section describes the departments in which the respondents were employed. The results are shown in table 4.3.

**Table 4.3: Departments in which the respondents were employed**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stores Division	45	78.9	78.9	78.9
	Procurement Division	12	21.1	21.1	100.0
	Total	57	100.0	100.0	

Table 4.3 shows that, of the 57 respondents, 78.9% were from the Stores Division, and 21.1% were from the Procurement Division. The results indicate that inventory control is dominated by the staff of the Stores Division. This finding correlates with Bijulal *et al.* (2011: 7088) who indicate that the inventory control is usually performed by the stores or warehousing section.

#### 4.3.2 Level of experience of the respondents (Q2)

The results of the staff levels of experience are shown in figure 4.1.

**Figure 4.1: Level of experience of respondents**

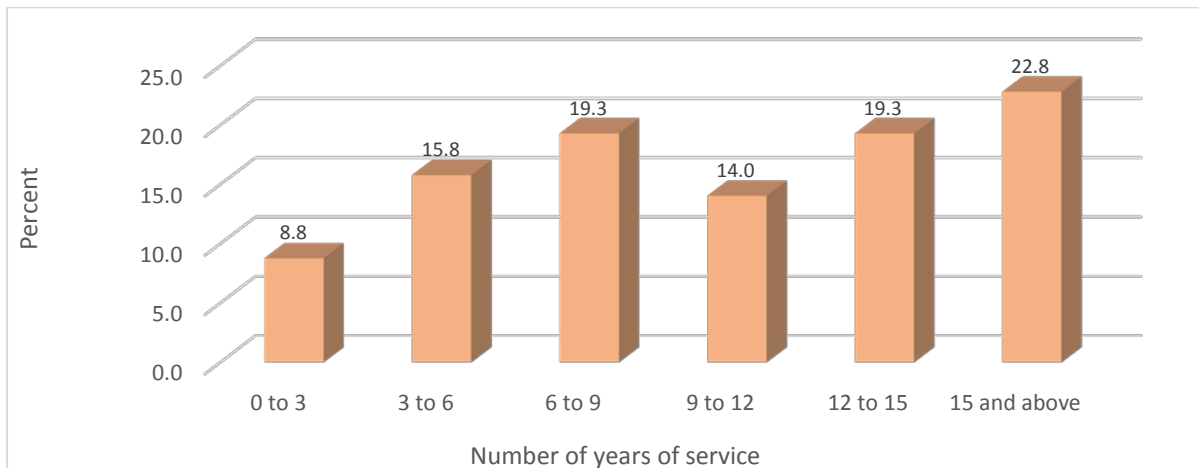


Figure 4.1 shows that, of the 57 respondents, approximately 23% had 15 and above years of experience, 19.3% had between 12 to 15 years of experience, 19.3% had between 6 to 9 years of experience, almost 16% had between 3 to 6 years of experience, 14% had between 9 to 12 years of experience, and 8.8% had between 0 to 3 years of experience. More than three-quarters of the respondents (75.4%) had more than 5 years of experience. The results indicate that over 60% of staff had more than five years of work experience. In this regard, Lindsey (2013: 50) pointed out that having more old and experienced staff members is an indication to the organization to start training the younger age groups in order to sustain consistency after retrenchment or retirement of staff. Naidoo and Wu (2011: 1125) indicate that inventory control can be successfully applied if experienced individuals are involved. Consequently, there needs to be a good balance of staff between experienced and unexperienced members to ensure continuity of good inventory control at the eThekweni Municipality.

#### 4.3.3 Level of qualification of the respondents (Q3)

In an attempt to ascertain respondents' academic qualifications and thus the skill base, respondents were requested to provide their highest qualifications obtained. The results of the staff levels of qualification are shown in figure 4.2.

**Figure 4.2: Level of qualification of the respondents**

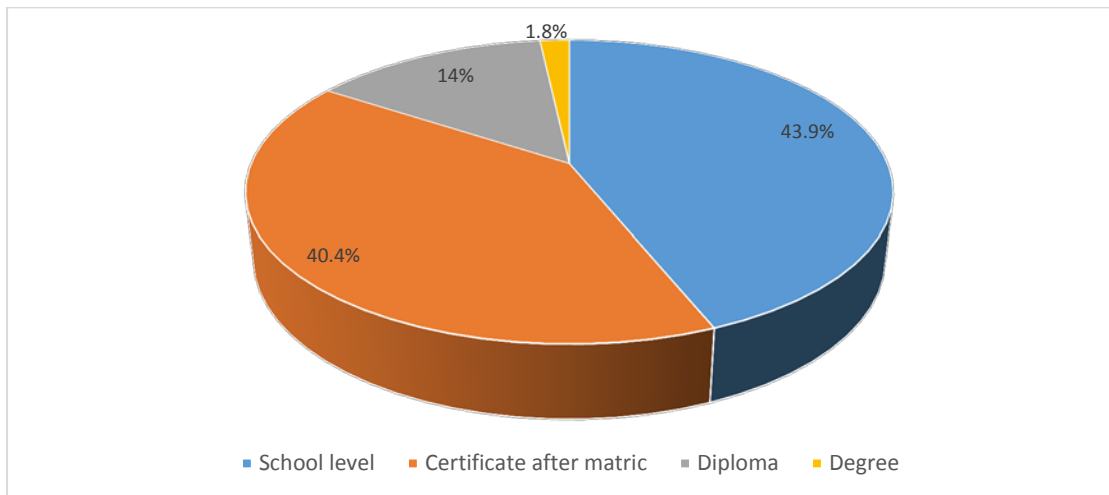


Figure 4.2 illustrates that, of the 57 respondents, approximately 44% had, at most, a school level qualification, 40.4% had a certificate after matric, 14% had a first diploma qualification, and 1.8% of the respondents had a degree qualification. The study claims that having underqualified members of staff with most school level qualifications is a source of the municipality's failure to control inventories. The results also confirm a study by Achua (2011: 326) who found that there is a lack of proper education in most public sectors, especially in the developing countries like South Africa. Allal-Cherif and Babai (2012: 40) state that, in order to achieve best performance on inventory control, an organization must spend more time in educating and training its members of staff.

#### 4.3.4 Experience and qualification indices of the respondents by departments

Table 4.4 indicates the years of experience and qualifications of the respondents by departments, namely; Stores and Procurement Divisions.

**Table 4.4: Experience and qualification indices of respondents by departments**

Department			Level of qualification				Total		
			School level	Certificate after matric	Diploma	Degree			
Stores Division	Relevant experience of service	0 to 3yrs	Count	0	2	3		5	
			% within Level of qualification	0.00%	11.80%	50.00%		11.10%	
		3 to 6yrs	Count	2	6	1		9	
			% within Level of qualification	9.10%	35.30%	16.70%		20.00%	
		6 to 9yrs	Count	2	3	1		6	
			% within Level of qualification	9.10%	17.60%	16.70%		13.30%	
		9 to 12yrs	Count	3	3	0		6	
			% within Level of qualification	13.60%	17.60%	0.00%		13.30%	
		12 to 15yrs	Count	4	3	1		8	
			% within Level of qualification	18.20%	17.60%	16.70%		17.80%	
		15 and above	Count	11	0	0		11	
			% within Level of qualification	50.00%	0.00%	0.00%		24.40%	
		Total		Count	22	17	6		45
				% within Level of qualification	100.00%	100.00%	100.00%		100.00%
Procurement Division	Relevant experience of service	6 to 9yrs	Count	1	3	1	0	5	
			% within Level of qualification	33.30%	50.00%	50.00%	0.00%	41.70%	
		9 to 12yrs	Count	0	1	1	0	2	
			% within Level of qualification	0.00%	16.70%	50.00%	0.00%	16.70%	
		12 to 15yrs	Count	1	1	0	1	3	
			% within Level of qualification	33.30%	16.70%	0.00%	100.00%	25.00%	
		15 and above	Count	1	1	0	0	2	
			% within Level of qualification	33.30%	16.70%	0.00%	0.00%	16.70%	
		Total		Count	3	6	2	1	12
				% within Level of qualification	100.00%	100.00%	100.00%	100.00%	100.00%

Table 4.4 shows that many of the respondents (48.9%) at the Stores Division were matriculants while 37.77% of the respondents had certificates after matric, 13.33% were diploma holders, and 0% degree holders. In the Procurement Division, 50% of the respondents had certificates after matric, 25% passed matric, 16.67% were diploma holders, and 8.33% were degree holders. The results reveal that the Stores Division needs greater improvement on the levels of its staff education since it had fewer diploma holders and no degree holders. According to Jovanovic and Benkovic (2012: 26), employing well educated people can improve the performance and the image of the organization.

#### **4.4 Analysis of the results per research objectives**

##### **4.4.1 Objective 1: To determine the inventory control process of Stores Division at the eThekweni Municipality, Durban**

This objective was intended to provide an understanding of the essential techniques applied on inventory control by the Stores Division of the eThekweni Municipality in Durban. This objective was achieved in chapter 2 by providing a comprehensive literature review on the methods applied to control inventory stock by the Stores Division of the eThekweni Municipality, Durban.

##### **4.4.2 Objective 2: To examine factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban**

The relevant questions of this objective were contained in section B of the questionnaire. This section intends to discuss the findings with regard to the above objective based on the following questions: 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, and 4. The statistical information presented in tables 4.5 to 4.8 was obtained from 57 questionnaires completed by the members of staff. The questions were formulated using the Likert scale of 1 up to 5 representing the following responses: 1=Strongly Agree, 2=Agree, 3=Neutral 4= Strongly Disagree, 5=Disagree.

#### 4.4.2.1 Inventory planning (Q1.1–Q1.5)

The results of inventory planning are shown in table 4.5.

**Table 4.5: Responses on planning for inventory control**

Statements	SA	A	N	SD	D
The organization makes plans for inventory control	5.3%	47.4%	36.8%	7%	3.5%
The team set to control inventory is involved in inventory planning	5.3%	24.6%	26.3%	38.6%	5.3%
Inventory suppliers are involved in inventory planning	1.8%	19.3%	38.6%	33.3%	7%
Inventory control plans are communicated throughout the organization	1.8%	24.6%	26.3%	40.4%	7%
Inventory control plans are affected by the involvement of incompetent staff	14%	29.8%	24.6%	28.1%	3.5%

As reflected in table 4.5, of the 57 respondents, more than a half (52.7%) either agreed or strongly agreed that the Stores Division does make plans for inventory control, 36.84% were neutral, and 10.5% either disagreed or strongly disagreed with the statement. It can be concluded that the Stores Division puts in place the required plans to allow for an effective control over inventories. The results opposed a study by Gupta *et al.* (2011: 6301) who indicate that most of the municipalities do not initiate control of inventory plans for their operations. Achua (2011: 327) emphasised that planning is a cornerstone for a successful control and cost reduction of inventories.

With regards to the involvement of the team set to control inventory stock, it is disconcerting that the majority (43.9%) of the respondents either disagreed or strongly disagreed that they are involved with inventory control planning, while 29.9% either agreed or strongly agreed with the statement, and 26.3% were neutral. The results claim that inventory planning by the Stores Division is not horizontally based. Correspondingly, 40.3% of the respondents either disagreed or strongly disagreed that inventory suppliers are involved with inventory planning, while 38.60% were neutral with the statement, and 21.1% either agreed or strongly agreed. From the results, it is



clear that the Stores Division fails to involve relevant people in the planning of inventory control. In this regard, Nicole (2013) and Gupta *et al.* (2011: 6301) believe that involving the members of staff and suppliers can help the organization to balance current inventory requirements with the future demands.

It is also disconcerting to note that 47.4% of the respondents either disagreed or strongly disagreed that the inventory control plans are communicated throughout the organization, while 26.4% either agreed or strongly agreed with the statement, and 26.3% of the respondents were neutral. The results reveal that there is improper communication, and is seemingly to have a negative influence on the success of inventory control at the Stores Division. In acknowledgement of the results, Georgiou *et al.* (2012: 2) mention that proper communication is characterized by reaching all relevant stakeholders, and that poor communication can result in incorrect information sharing and can disapprove performance.

It is noted that the majority of the respondents (43.8%) agreed or strongly agreed that the plans of inventory control are affected by the involvement of incompetent staff, with only 31.6% of the respondents who either disagreed or strongly disagreed with the statement, and 24.6% were neutral. The results give a clear understanding that the incompetency of staff is one of the contributing factors to poor inventory control at the Stores Division. In support of the findings, Achua (2011: 326) indicates that incompetent staff can hardly improve performance. Therefore, it is emphasised that competency of staff can help to improve the control of inventories.

#### 4.4.2.2 Inventory keeping track system (Q2.1-Q2.5)

The results of the inventory keeping track system are shown in table 4.6.

**Table 4.6: Responses on inventory keeping track system**

Statements	SA	A	N	SD	D
Online keeping track system is used to control inventory	31.6%	42.1%	14%	8.8%	3.5%
The use of online keeping track systems is easily understood	15.8%	29.8%	28.1%	21.1%	5.3%
The use of online keeping track system helps to achieve proper inventory control	12.3%	24.6%	42.1%	14%	7%
Online keeping track system is better than manual systems	14%	24.6%	43.9%	14%	3.5%
Online keeping track system is more reliable	3.5%	26.3%	38.6%	26.3%	5.3%

Table 4.6 reflects that, of the 57 respondents, 73.7% either agreed or strongly agreed that an online keeping track system is used to control inventory, while 14.04% of the respondents were neutral with the statement, and 12.3% of the respondents either disagreed or strongly disagreed. The results confirm that the Stores Division uses an online keeping system to control inventories. The results are dissimilar to that of Nassar and Hegab (2006: 555) who found that most of the South African municipalities are reluctant in using online keeping track systems for their operations.

The vast majority of the respondents (45.6%) either agreed or strongly agreed that the use of an online keeping track system by the Stores Division is easily understood, while 28.1% of the respondents were neutral with the statement, and 26.4% of the respondents either disagreed or strongly disagreed. When asked whether the use of an online keeping track system helps to achieve proper inventory control, the majority (42.1%) of the respondents was neutral, 36.9% of the respondents either agreed or strongly agreed, and 21.1% of the respondents either disagreed or strongly disagreed. On whether an online keeping track system is better than a manual system, the majority (43.9%) of the respondents was neutral, while 38.6% of the respondents either agreed or strongly agreed and 17.5% of the respondents either disagreed or strongly disagreed with the statement. The results claim that, due to a high level of staff experience, the majority claim to understand an online system, but at the same time, they were not sure whether an online system helps them to achieve proper inventory control. Therefore, a possible explanation could be that most of the respondents are not sufficiently skilled in information technology (IT). Therefore, it is not easy for them to have a clear understanding of the importance to use technology. To support this premise, Bouzida *et*

al. (2011: 224) indicate that the use of technologies has a link with the individuals' education.

A total of 38.6% of the respondents were neutral on whether an online inventory keeping track system is more reliable or not, while 31.6% either disagreed or strongly disagreed compared to 29.8% who either agreed or strongly agreed with the statement. The study claims that even though there is no trust in the workforce because of their lower education background, the results exposed that the use of online system to keep track of the inventory stocks is not reliable. A study conducted by Stimson (2012: 13) indicated that an electronic control of inventories is not adequate without the assistance of a manual system. Even though the eThekweni Municipality has adopted the use of electronic systems to control inventories, the use of manual systems seems to be still relevant for extra support.

#### 4.4.2.3 Procurement (Q3.1-Q3.5)

The results on procurement are shown in table 4.7.

**Table 4.7: Responses on procurement**

Statements	SA	A	N	SD	D
Procurement function has a link to inventory control	7%	42.1%	38.6%	8.8%	3.5%
Procurement procedures are understandable	5.3%	31.6%	45.6%	17.5%	0%
Procurement team set to order inventory keeps to time management	3.5%	29.8%	33.3%	28.1%	5.3%
Procurement team set to order inventory needs thorough training	12.3%	33.3%	35.1%	17.5%	1.8%
The entire procurement function needs thorough improvement	12.3%	33.3%	35.1%	17.5%	1.8%

Table 4.7 illustrates that, of the 57 respondents, 49.1% either agreed or strongly agreed that a procurement function has a link with inventory control, while 38.60% were neutral with the statement compared to 12.28% that neither disagreed nor strongly disagreed with the statement. In support of these findings, Erdis (2013: 121-124) indicates that there is a strong relationship between procurement and inventory

control. Therefore, when the municipality tries to improve the control of inventory at the Stores Division, the Procurement section must be also considered with a similar objective.

Other opposing views emerged on the issue that the members of staff understand procurement procedures. A total of 45.61% of the respondents were neutral with the statement, while 36.84% either agreed or strongly agreed compared to 17.54% that neither disagreed nor strongly disagreed. The findings indicate that the members of staff lack the fundamental understanding of procurement procedures. The results are in line with earlier studies by Larson (2009: 222) who found that most of the municipalities' procurement practitioners do not have a clear understanding of procurement.

However, it is disturbing to note that 33.34% of the respondents either disagreed or strongly disagreed that the procurement team set to order inventory stock keeps to time management, while 33.33% either strongly agreed or agreed as compared to 33.33% who were not sure with the statement. These results reveal that time management still needs to be emphasized at the Procurement Division. The results are in line with Ruankaew and Williams (2013: 25-27) who found that time management is a huge challenge facing most of the municipalities.

The respondents were asked to indicate their level of agreement on whether a team set to order inventory needs training. In this regard, the majority (45.61%) of the respondents either agreed or strongly agreed with the statement, while 35.09% were neutral, compared to 19.30% who either disagreed or strongly disagreed. The results indicate that the poor functioning of procurement may be the result of untrained members of staff working in this section. According to Huque and Vyas (2008: 188), staff training can have a positive impact on improving the overall performance.

It is noted that the majority (45.61%) of the respondents either agreed or strongly agreed that the Procurement Division requires improvement, 35.09% of the respondents were neutral with the statement, and 19.30% of the respondents disagreed or strongly disagreed with the statement. The study claims that improving the

Procurement Division can lead to successful inventory control. In support of the findings, a study by Intaher and Johanna (2012: 243) indicated that the existence of procurement in the most municipalities lacks effectiveness and efficiency. Therefore, regular improvements on procurement are very necessary in order to reduce problems of theft and operating costs (Fattah Al Weshah, 2013: 12).

#### 4.4.2.4 Other factors affecting the success of inventory control (Q4)

In an open-ended question, the respondents were asked to indicate other factors that they think are affecting the success of inventory control in the Stores Division of the eThekweni Municipality in Durban. As shown in table 4.8, the researcher combined all themes of a similar nature.

**Table 4.8: Factors affecting the success of inventory control**

Themes	Frequency Total=74 responses	Percent
Poor staff training	23	31.1%
Poor control	13	17.6%
Poor quality of stock used	10	13.5%
Poor management and support	8	10.8%
Poor communication	7	9.5%
Poor time management	4	5.4%
Corruption by other staff	3	4.1%
Poor planning by Stores	2	2.7%
Large quantities of stocks ordered	2	2.7%
Don't know	1	1.4%
Complex system used for inventory control	1	1.4%

In respect of table 4.8, the 31.1% of the respondents listed poor staff training as a leading factor that affected the success of inventory control, 17.6% listed poor control, 13.5% of the respondents listed poor quality of stock, 10.8% of the respondents listed poor management and support, 9.5% of the respondents listed poor communication, 5.4% of the respondents listed poor time management, 4.1% of the respondents listed corruption, 2.7% of the respondents listed poor planning, 2.7% of the respondents listed that Stores Division buys large quantities of stocks, 1.4% of the respondents

stated they don't know, and 1.4% of the respondents mentioned the use of complex systems. The results indicate that there is poor staff training, poor internal control and improper ordering of stocks at the eThekweni Municipality. According to Ruankaew and Williams (2013: 27) and Intaher and Johanna (2012: 243), aspects like staff training; communication; proper ordering; and management support are influential in the improvement of the inventory control.

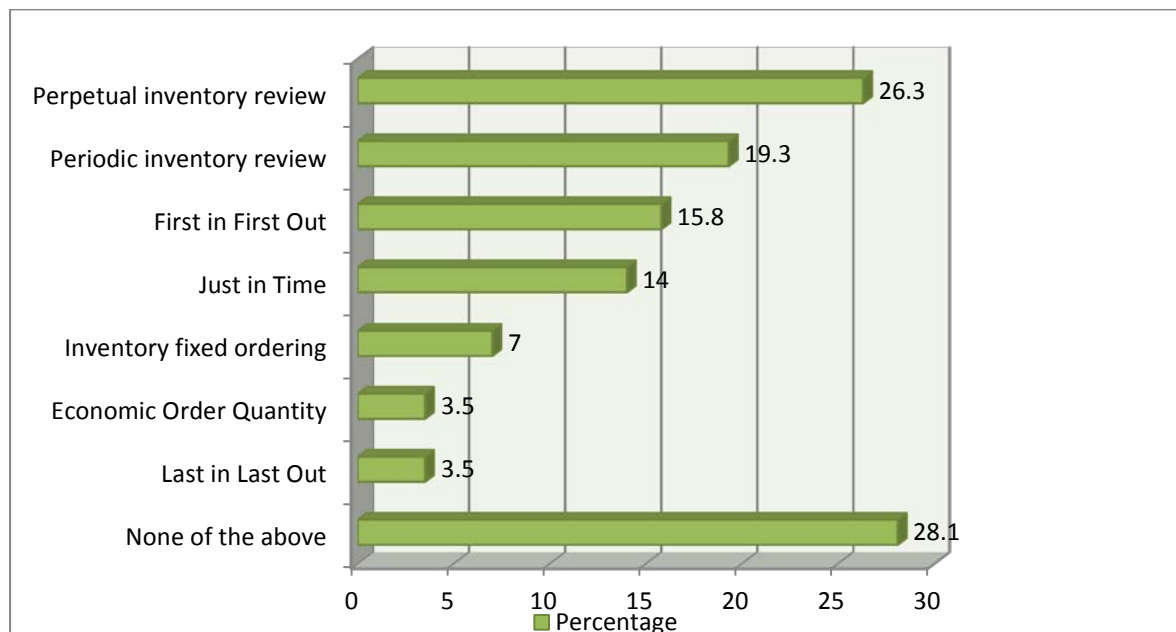
#### 4.4.3 Objective 3: To assess strategies used to improve successful inventory control in the Stores Division of the eThekweni Municipality, Durban

The relevant questions (1 and 3) of this objective were drawn in section C of the questionnaire.

##### 4.4.3.1 Strategies for inventory control (Q1)

The strategies for the inventory control are presented in figure 4.3.

**Figure 4.3: Strategies for inventory control**



Surprisingly, the results in figure 4.3 show that 28.1% of the respondents do not use any of the listed strategies, 26.3% of the respondents use perpetual inventory review,

19.3% of the respondents use periodic inventory review, 15.8% of the respondents use First in First Out (FIFO), 14% of the respondents use Just in Time (JIT), 7% of the respondents use inventory fixed ordering, 3.5% of the respondents use Economic Order Quantity (EOQ), and 3.5% of the respondents use Last in First Out (LIFO). The results indicate that the Stores Division does not use a common strategy to control the inventory stocks. Wadhwa and Chan (2009: 3331) and Lodding and Lohmann (2012: 909) are in common view that using a strategy to control inventory stocks can play a vast role to achieve better performances.

#### 4.4.3.2 Recommended strategies to improve inventory control (Q2)

As per an open ended question, the recommended strategies to improve the inventory control are shown in table 4.9.

**Table 4.9: Recommended strategies to improve inventory control**

Response	Frequency	Percent
	Total=71 responses	
Periodic inventory review	18	25.4%
Perpetual inventory review	17	23.9%
Just in Time (JIT)	12	16.9%
Inventory fixed ordering	11	16%
First in First Out (FIFO)	8	11%
Economic order Quantity (EOQ)	3	4.2%
Last in First Out (LIFO)	0	0.0%
None of the above	2	3%

Table 4.9 demonstrates that 25.4% of the respondents recommended a periodic inventory review as a strategy to control the inventory stocks; approximately 24% of the respondents recommended a perpetual inventory review, while almost 17% recommended JIT. 16% of the respondents recommended inventory fixed ordering whereas 11% of the respondents recommended FIFO, and 4% recommended EOQ. A total of 3% did not recommend any of these strategies and none (0%) of the respondents recommended LIFO. The results illustrate that most of the respondents prefer the periodic inventory review as a better strategy for them to be able to control

the inventory stocks. According to Syntetos *et al.* (2009: 611), a periodic inventory review is preferable for big organizations that are holding large quantities of stocks. This strategy entails the review of inventory stocks at regular times, according to Nahmias, as cited by Minner *et al.* (2010: 979).

#### **4.5 Hypothesis tests: P-Values and statistical significance**

Tests were performed to determine whether there was a statistically significant difference between the biographical information variables (departments, work experience and staff qualifications) and factors of inventory control variables (inventory control planning, inventory keeping track systems and procurement). The results are presented in table 4.10.



**Table 4.10: Chi square tests**

Questions	Departments	Experience of service	Level of qualification
<b>Q1.1</b> The organization makes plans for inventory control	0.203	0.262	.004*
<b>Q1.2</b> The team set to control inventory is involved in the inventory plan	0.574	0.215	.026*
<b>Q1.3</b> Inventory suppliers are involved in the inventory plan	0.501	0.519	0.110
<b>Q1.4</b> Inventory control plans are communicated throughout the organization	0.065	0.073	.019*
<b>Q1.5</b> Inventory control plans are affected by the involvement of incompetent staff	0.301	0.195	.046*
<b>Q2.1</b> Online keeping track system is used to control inventory	.021*	0.233	0.634
<b>Q2.2</b> The use of online keeping track system is easily understood	0.569	0.363	0.086
<b>Q2.3</b> The use of online keeping track system helps to achieve proper inventory control	0.212	0.859	0.277
<b>Q2.4</b> Online keeping track system is better than manual systems	0.250	0.790	0.248
<b>Q2.5</b> Online keeping track system is more reliable	0.051	0.171	0.284
<b>Q3.1</b> Procurement function has a link to inventory control	.001*	0.067	.016*
<b>Q3.2</b> Procurement procedures are understandable	.001*	0.940	0.266
<b>Q3.3</b> Procurement team set to order inventory keeps time management	.016*	0.922	0.265
<b>Q3.4</b> Procurement team set to order inventory needs thorough training	0.075	0.215	0.119
<b>Q3.5</b> The entire procurement function needs thorough improvement	0.065	.030*	0.444

The traditional approach to reporting a result requires a statement of statistical significance. A p-value is generated from a test statistic. A significant result is indicated with "p < 0.05". These values are highlighted with a \* and yellow. Table 4.10 indicates that other questions (Q) have at least one p-value that indicates a significant difference between the biographical information. For example, a chi-square (x) test result in question (Q) 1.1 indicates a p value of .004\*, which is less than 0.05. The result reflects a

significant association between Q1.1 (the plans for inventory control by an organization) with level of qualification. Q2.1 (online keeping track system is used to control inventory) with departments are significantly related at .021\* level. All other variables with a  $p < 0.05$  are inter-related.

#### 4.5.1 Chi square Test - single variable

A single variable chi-square test was performed to determine whether there was a statistically significant difference of the factors of inventory control variables (inventory control planning, inventory keeping track systems and procurement). The results are presented in table 4.11.

**Table 4.11: Chi square Test - single variable**

Questions	Chi-Square	df	Asymp. Sig.
<b>Q1.1</b> The organization makes plans for inventory control	15.474	2	.000
<b>Q1.2</b> The team set to control inventory is involved in the inventory plan	2.947	2	.229
<b>Q1.3</b> Inventory suppliers are involved in the inventory plan	3.895	2	.143
<b>Q1.4</b> Inventory control plans are communicated throughout the organization	5.053	2	.080
<b>Q1.5</b> Inventory control plans are affected by the involvement of incompetent staff	3.263	2	.196
<b>Q2.1</b> Online keep track system is used to control inventory	41.789	2	.000
<b>Q2.2</b> The use of online keep track system is easily understood	3.895	2	.143
<b>Q2.3</b> The use of online keep track system helps to achieve proper inventory control	4.105	2	.128
<b>Q2.4</b> Online keep track system is better than manual systems	6.632	2	.036
<b>Q2.5</b> Online keep track system is more reliable	0.737	2	.692
<b>Q3.1</b> Procurement function has a link to inventory control	12.316	2	.002
<b>Q3.2</b> Procurement procedures are understandable	7.053	2	.029
<b>Q3.3</b> Procurement team set to order inventory keeps time management	0	2	1.000
<b>Q3.4</b> Procurement team set to order inventory needs thorough training	6	2	.050
<b>Q3.5</b> The entire procurement function needs thorough improvement	6	2	.050

In order to select a test that will produce valid results, each question was subjected to a Shapiro-Wilks test for normality in order to ascertain whether the responses follow a normal distribution. Chi-square tests-single variable were carried out on each question to assess whether there is significant selection of specific satisfaction rates over others. This highlighted any significant satisfaction/dissatisfaction with the various aspects. The null hypothesis that is tested showed that there is no difference in the number of selections.

From the results of this analysis, summarized in table 4.11, it can be seen that the following areas yielded significant results: 'The organization makes plans for inventory control'; 'Online keeping track system is used to control inventory'; 'Online keeping track system is better than manual system'; 'Procurement function has a link to inventory control'; and 'Procurement procedures are understandable'. However, the rest of the statements yielded insignificant results.

#### **4.6 Bivariate correlations**

Using a chi square test, bivariate correlation was performed on the ordinal data. The test was performed to demonstrate whether there were direct or inverse proportional relationship between the research variables. The results are presented in tables 4.12, 4.13 and 4.14.

**Table 4.12: Correlations between procurement and online system**

Questions (Q)			Q2.1	Q2.2	Q2.3	Q2.4	Q2.5
Spearman's rho	Q3.1 Procurement function has a link to inventory control	Correlation Coefficient	.298*	.353**	.410**	.406**	.306*
		Sig. (2-tailed)	.024	.007	.002	.002	.021
		N	57	57	57	57	57
	Q3.2 Procurement procedures are understandable	Correlation Coefficient	.292*	.336*	.395**	.519**	.330*
		Sig. (2-tailed)	.028	.011	.002	.000	.012
		N	57	57	57	57	57
	Q3.3 Procurement team set to order inventory keeps time management	Correlation Coefficient	.110	.410**	.543**	.472**	.521**
		Sig. (2-tailed)	.415	.002	.000	.000	.000
		N	57	57	57	57	57
	Q3.4 Procurement team set to order inventory needs thorough training	Correlation Coefficient	.269*	.130	.102	.058	.113
		Sig. (2-tailed)	.043	.337	.452	.669	.405
		N	57	57	57	57	57
	Q3.5 The entire procurement function needs thorough improvement	Correlation Coefficient	.191	.082	.063	.150	.102
		Sig. (2-tailed)	.155	.543	.643	.265	.449
		N	57	57	57	57	57

\*\* . Correlation is significant at the 0.01 level (2-tailed). \* . Correlation is significant at the 0.05 level (2-tailed)

The results in table 4.12 reflect positive and negative values. Positive values indicate a directly proportional relationship between the variables and a negative value indicates an inverse relationship. All significant relationships are indicated by a \* or \*\*. For example, the correlation value between Q2.5 (Online keep track system is more reliable) and Q3.3 (Procurement team set to order inventory keeps time management) is .521\*\* and is extremely significant at .000. Respondents agreed that the more reliable the online keeping track system, the greater is the probability that the procurement team will order inventory on time, and vice versa.

**Table 4.13: Correlations between online system and inventory control plan**

Questions			Q1.1	Q1.2	Q1.3	Q1.4	Q1.5
Spearman's rho	Q2.1 Online keeping track system is used to control inventory	Correlation Coefficient	.224	.003	-.190	-.090	.156
		Sig. (2-tailed)	.094	.984	.158	.503	.246
		N	57	57	57	57	57
	Q2.2 The use of online keeping track system is easily understood	Correlation Coefficient	.574**	.330*	.158	.184	.294*
		Sig. (2-tailed)	.000	.012	.241	.170	.027
		N	57	57	57	57	57
	Q2.3 The use of online keeping track system helps to achieve proper inventory control	Correlation Coefficient	.526**	.478**	.221	.204	.281*
		Sig. (2-tailed)	.000	.000	.099	.128	.034
		N	57	57	57	57	57
	Q2.4 Online keeping track system is better than manual systems	Correlation Coefficient	.371**	.382**	.189	.068	.197
		Sig. (2-tailed)	.005	.003	.158	.617	.141
		N	57	57	57	57	57
	Q2.5 Online keeping track system is more reliable	Correlation Coefficient	.328*	.451**	.349**	.151	.085
		Sig. (2-tailed)	.013	.000	.008	.262	.530
		N	57	57	57	57	57

\*\* . Correlation is significant at the 0.01 level (2-tailed). \* . Correlation is significant at the 0.05 level (2-tailed)

The results in tables 4.13 indicate positive and negative patterns. Positive values indicate a directly proportional relationship between the variables and a negative value indicates an inverse relationship. All significant relationships are indicated by a \* or \*\*. For example, the correlation value between Q1.1 (The organization makes plans for inventory control) and Q2.2 (The use of online keep track systems is easily understood) is .574\*\* and is extremely significant at .000. Respondents agreed that the more the organization makes plans for inventory control, the more the use of online keeping track system will be understood, and vice versa.

Negative values imply an inverse relationship. That is, the variables have an opposite effect on each other. For example, the correlation value in table 4.13 between Q1.4 (Inventory control plans are communicated throughout the organization) and Q2.1 (Online keeping track system is used to control inventory) is -.190. This value is also an inverse relationship. Respondents indicated that the more inventory control plans are communicated throughout the organization, the less likely online keeping track system is used to control inventory, and vice versa.

**Table 4.14: Correlations between procurement and inventory control plan**

Questions			Q1.1	Q1.2	Q1.3	Q1.4	Q1.5
Spearman's rho	Q3.1 Procurement function has a link to inventory control	Correlation Coefficient	.357**	.308*	.109	.054	.178
		Sig. (2-tailed)	.006	.020	.418	.688	.185
		N	57	57	57	57	57
	Q3.2 Procurement procedures are understandable	Correlation Coefficient	.146	.256	-.065	.105	.039
		Sig. (2-tailed)	.277	.054	.632	.438	.775
		N	57	57	57	57	57
	Q3.3 Procurement team set to order inventory keeps time management	Correlation Coefficient	.299*	.252	.285*	.173	0.000
		Sig. (2-tailed)	.024	.059	.032	.197	1.000
		N	57	57	57	57	57
	Q3.4 Procurement team set to order inventory needs thorough training	Correlation Coefficient	.289*	.270*	.274*	.226	.277*
		Sig. (2-tailed)	.029	.042	.039	.092	.037
		N	57	57	57	57	57
	Q3.5 The entire procurement function needs thorough improvement	Correlation Coefficient	.219	.277*	.274*	.287*	.182
		Sig. (2-tailed)	.101	.037	.039	.031	.176
		N	57	57	57	57	57

\*\* . Correlation is significant at the 0.01 level (2-tailed). \* . Correlation is significant at the 0.05 level (2-tailed)

Positive values in table 4.14 indicate a directly proportional relationship between the variables and a negative value indicates an inverse relationship. All significant relationships are indicated by a \* or \*\*. For example, the correlation value between Q1.1

(The organization makes plans for inventory control) and Q3.1 (Procurement function has a link to inventory control) is .357\*\* and is significant at .006. This value indicates a directly related proportionality between the aforementioned variables. Respondents agreed that the more the organization makes plans for inventory control, the more the procurement function gets closer to inventory control, and vice versa.

Negative values imply an inverse relationship. That is, the variables have an opposite effect on each other. For example, the correlation value in table 4.14 between Q1.3 (Inventory suppliers are involved in the inventory planning) and Q3.2 (Procurement procedures are understandable) is -.065. Respondents indicate that the more inventory suppliers are involved in the inventory planning, the less likely the procurement procedures are understandable, and vice versa.

#### 4.7 Factor analysis

The purpose of factor analysis was to reduce the number of variables or questions into one or two variables for further analysis and examinations. One needs not believe that factors actually exist in order to perform a factor analysis, but, in practice, the factors are usually interpreted by given names, and spoken of as real things. Certain components divided into finer components. The rotated component matrix is explained below with reference to the Tables 4.15, 4.16, and 4.17. Factor analysis/loading shows inter-correlations between variables. Items of questions that loaded similarly imply measurement along a similar factor. An examination of the content of items loading at or above 0.5 (and using the higher or highest loading in instances where items cross-loaded at greater than this value) effectively measured along the various components.

**Table 4.15: Component Matrix<sup>a</sup>: for Inventory control planning**

Questions	Component
	1
Q1.1 The organization makes plans for inventory control	.609
Q1.2 The team set to control inventory is involved in the inventory plan	.836
Q1.3 Inventory suppliers are involved in the inventory plan	.798
Q1.4 Inventory control plans are communicated throughout the organization	.813
Q1.5 Inventory control plans are affected by the involvement of incompetent staff	.602

Extraction Method: Principal Component Analysis. A 1 component extracted

Table 4.15 indicates that from Q1.1 to Q1.5, the variables that constituted inventory control planning loaded perfectly along a single component. This implies a degree of consistency for these components that measured what they set out to measure.

**Table 4.16: Component Matrix<sup>a</sup>: for inventory keeping track system**

Questions	Component
	1
Q2.1 Online keeping track system is used to control inventory	.389
Q2.2 The use of online keeping track system is easily understood	.835
Q2.3 The use of online keeping track system helps to achieve proper inventory control	.896
Q2.4 Online keeping track system is better than manual systems	.877
Q2.5 Online keeping track system is more reliable	.792

Extraction Method: Principal Component Analysis. A 1 component extracted

Table 4.16 illustrates that the variables from Q2.1 to Q2.5 that constituted the use of online system, loaded perfectly along a single component. This implies a degree of consistency for these components that they measured what they set out to measure.

**Table 4.17: Rotated Component Matrix<sup>a</sup>: for procurement**

Questions	Component	
	1	2
Q3.1 Procurement function has a link to inventory control	.684	.367
Q3.2 Procurement procedures are understandable	.013	.813
Q3.3 Procurement team set to order inventory keeps time management	.083	.845
Q3.4 Procurement team set to order inventory needs thorough training	.819	.005
Q3.5 The entire procurement function needs thorough improvement	.845	-.062

Extraction Method: Principal Component Analysis. Rotation Method: Varimax Kaiser Normalization. A. Rotation converged in 3 iterations.

As indicated in table 4.17, it is clear that the variables that constituted Q3.1 – Q3.5 had variables that split along 1 and 2 components. This means that the respondents identified different sub-components within the components. One possibility is that respondents did not clearly distinguish between the questions constituting the components. This was highly likely due to the fact that the respondents were unable to



distinguish what the questions were measuring, i.e., these factor headings were not made evident in the questionnaire. Therefore, the statements Q3.1 to Q3.5 in table 4.17 can be split along two sub-themes as follows.

#### 4.7.1 Suggested sub-themes

As a result of the overlapping of the above-mentioned factors in table 4.17, the components were split into the sub-themes seen in table 4.18.

**Table 4.18: Identified sub-themes**

Component/factor	Sub-themes	
	1	2
Procurement function	Municipal procurement function	State procurement function
Procurement procedures	State procurement procedures	Municipal procurement procedures
Procurement time management	Organizational employees time management	Procurement employees time management
Procurement team training	Procurement employees training	Organizational employees training
Procurement improvement	Municipal procurement improvement	State procurement improvement

As a result of the overlapping of the above-mentioned factors in table 4.17, the components were split into the sub-themes suggested as seen in table 4.18.

## 4.8 Conclusion

This chapter presented, interpreted and discussed the analysis of the data collected in the research study. It has applied qualitative analysis and different methods of quantitative analysis to obtain both descriptive and inferential statistics. Chi-square ( $\chi^2$ ) tests were performed to identify significant relationships and differences between the research variables. In addition, the study also pointed out areas that require further attention in controlling inventory.

The following chapter focuses on the summary, conclusions and recommendations of the study.

## **CHAPTER FIVE**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **5.0 Introduction**

Chapter four presented statistical information with the aid of descriptive and inferential statistics. These findings were compared to the literature review in order to determine the strategies used and factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. This chapter will indicate how the objectives of the study have been achieved. The objectives of the study are as follows: to determine the inventory control process of the Stores Division at the eThekweni Municipality, Durban; to examine factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban; and to assess strategies used to improve successful inventory control in the Stores Division of the eThekweni Municipality, Durban. This chapter will present conclusions on the research objectives, recommendations for practice, recommendations for future research and limitations of the study.

#### **5.1 Conclusions on the research objectives**

The following section presents the conclusions in relation to the achievement of objectives.

##### **5.1.1 Findings from the literature**

The findings of the literature are based on the objectives which are outlined below.

**5.1.1.1 Objective one:** To determine the inventory control process of the Stores Division at the eThekweni Municipality, Durban.

This objective was intended to provide an understanding of the essential techniques applied on inventory control. To achieve this objective, chapter two explored the literature outlining the inventory control processes that have been followed by the Stores Division of the eThekweni Municipality. For example, the eThekweni municipality inventory management policy (2005: 7) outline the stock ordering process, receipt process, and issue process. The policy explained that each department sets its own inventory reorder levels (minimum and maximum) for all items in consultation with the CFO. The quantity and quality of the inventory received from suppliers are matched with the information on the order form. For issuing purposes, in terms of the approved requisition form of the municipality, only the store-man is authorized to issue inventory from the storeroom. Therefore, the first objective has been achieved.

5.1.1.2 Objective two: To examine factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban.

Some of the most significant findings arising from the literature highlight the significance of the stock diffusion theory, the application control theory, and inventory control in theory and practice. A stock diffusion theory provides a useful probability distribution of stock consumption and the reorder time (Braglia *et al.*, 2013: 3018) whereas the application control theory helps to reduce inventory variation, reduce demand amplification and optimize ordering rules (Sourirajan *et al.*, 2008: 6166), and the inventory control in theory and practice provides that there must be a balance between physical stocks and documented stocks (Vassian, 1955: 272). Several authors (Jonsson and Mattsson, 2008: 1788; Cook *et al.*, 2011: 268, Buvee *et al.*, 2004: 9, Bouzida, *et al.*, 2011: 224; and Fattah Al Weshah, 2013: 12-13) reveal that inventory control success is dependent on proper planning, keeping track at all times, proper procurement, communication, and staff training. In addition, Aroge and Hassan (2011: 229) purport that executive management should provide its full support and commitment towards inventory stock control. Therefore, the second objective has been achieved.

5.1.1.3 Objective three: To assess strategies used to improve successful inventory control in the Stores Division of the eThekweni Municipality, Durban.

The literature suggests four basic strategies that can be used to improve the quality of inventory control and the understanding of different crises for inventory stocks. These include ensuring high security of the store house and stock yard, good custody of keys, limiting access to premises and the importance of coding, segregation of prescribed items, stock taking, perpetual reviews, periodic reviews, fixed ordering, JIT, EOQ, FIFO, and LIFO (Brackus, 2000: 259-293; Robert, 2004: 109-115; Minner and Transchel, 2010: 979; Griffin, 2013: 1; Pratap *et al.*, 2011; Mishra and Tripathy, 2012: 124-129; Parlar, Perry and Stadje, 2011: 410). Furthermore, Singh and Kumar (2010: 771) state that a strategic internal control system should be implemented to improve quality. The stakeholders should be in attendance at relevant meetings and sufficient time must be devoted to staff training.

#### 5.1.2 Findings from the empirical study

The findings of the empirical study are based on the following objectives:

5.1.2.1 The second objective of this study related to factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban

In this study, the majority of the respondents (52.7%) revealed that the Stores Division does make plans for inventory control. It is good to make plans for inventory control because it has a direct link with reordering and stock consumption of inventory stocks.

The majority of the respondents (43.9%) strongly disagreed/disagreed that the team set to control inventory is involved in inventory planning, and 40.3 percent of the respondents strongly disagreed/disagreed that inventory suppliers are involved in inventory planning. These findings raise doubts on the competency levels of a large number of staff in the Stores Division. This is also a reflection of how often the members of staff fail to make proper estimates of inventory consumption and inventory reorders

needed at a specific period of time as they are not fully involved with inventory control planning.

About 48% of the respondents strongly disagreed/disagreed that the inventory control plans are communicated throughout the organization. Communication barriers among staff can hinder true inventory verification and can delay reordering of inventory stocks which may be resulting to poor transposition of theory into practice.

A total of 73.7% and 45.6% of the respondents agreed that the Stores Division uses an online keeping track system to control its inventory and that the use of an online keeping track system is understandable, respectively. 42.1% of the respondents were neutral that the use of an online keeping track system helps to achieve proper inventory control. Therefore, this study concludes that, even if the Stores Division is using an online keeping track system that is claimed to be understood, due to lack of staff skills, they do not know how to implement the tracking system effectively and efficiently.

About 45.6% of the respondents were neutral that procurement procedures are understandable. This finding raises a need for future research to investigate the success or failure of procurement in the eThekweni Municipality. The need for future research is supported by 45.6% of the respondents who strongly agreed/agreed that procurement needs thorough improvement. Furthermore, 33.33% of the respondents strongly disagreed/disagreed that procurement keeps to time management. In order to meet customers' demand just in time and to make stock reorders, keeping time management can play an integral part.

In an open-ended question, respondents were asked to provide factors that they consider to affect the success of inventory control at the Stores Division of the eThekweni Municipality, Durban. The majority of the respondents (31%) listed poor staff training and education. The majority of the respondents (49%) from the Stores Division had matric certificates compared to the Procurement Division in which the majority (50%) of staff had post-matric qualifications. Poor staff training and education may indicate failure to interpret and transform theory into practical inventory control.

5.1.2.2 The third objective related to strategies to improve inventory control in the Stores Division of the eThekweni Municipality, Durban.

The respondents were asked to indicate strategies used by the Stores Division to control inventories. A total of 28.1% indicated that they do not use common strategies (e.g., EOQ, FIFO, LIFO, JIT, periodic review, perpetual review, fixed ordering) for inventory control. A total of 25.4% of the respondents recommended a periodic inventory review to control inventories.

## **5.2 Recommendations for practice**

Based on the research findings, the study provides the following recommendations to the Stores Division of the eThekweni Municipality in Durban in order to improve inventory control practice:

### **5.2.1 Advanced planning, communication and strategies are needed**

The findings proved that there is poor inventory control planning. Therefore, the Stores Division needs to draft a comprehensive year plan for inventory control. Such a plan must be communicated and discussed by all key stakeholders that are involved with inventory logistics (e.g., customers, suppliers, CFO, staff and managers from procurement or logistics, internal auditors, risks management team, and members of the executive council). This exercise can assist in reducing fruitless expenditures on inventory stocks.

The study also recommends the implementation of the inventory fixed ordering strategy for the Stores Division. The necessity to involve suppliers in the year plan relies on the fact that the suppliers will be notified on time if there will be extra stock needed during the year. Therefore, an inventory fixed ordering strategy can be useful. For example, fixed ordering is a strategy that can allow the municipality to place inventory orders at a fixed level and time (i.e., 100 units of cakes every Fridays) in order to reduce excessive and unnecessary stocks. Setting requirement levels to be ordered each time can be discussed by all stakeholders during the planning stage.

The study also recommends that the Stores Division should review its stock on hand periodically. This strategy is highly recommendable strategy for controlling a large quantity of high value stocks (Syntetos *et al.*, 2009: 611). The Stores Division needs to have a properly designed tracking system that will assist in keeping accurate inventory records. Durable and non-durable inventory stocks need to be separated and controlled by different personnel from different working stations, to prevent fast deterioration of stock and save working capital. Staff must have limited entrance access to inventory storage sections. Only authorised individuals with unique access codes should be allowed to enter. Installation of cameras and other useful security systems (i.e., security guards) should be fixed with the aid of the information technology (IT), risk management and internal auditing departments.

Most importantly, these comprehensive plans need to be reviewed to see if they help in achieving the goals. Prior to performance review, it is important to choose measures that are well defined, allow for comparison, are specific and allow for monitoring of outcomes.

#### 5.2.2 Practices must be made clear

The Stores Division also need to revise its inventory control processes to make them more understandable for employees. This will lead to a better understanding of the Preferential Procurement Policy Framework Act (PPPFA), Act No. 5 of 2000 which is a document that governs the control of the municipal inventory stocks (SCM, 2005: 23). It is important to determine who should monitor the floor area; who should keep physical records of inventory; who should keep computerized records of inventory; who should perform a physical inventory count, in what time frame, and what should be done if a discrepancy exists. Procedures and methods need to be tailored to suit the circumstances of each type of customer and the changing economy.

Lastly, the Stores Division must create good communication with the Procurement Division so that inventory orders can be processed on time. Moreover, the internal control processes need to be mapped according to the various roles identified.

### 5.2.3 Additional staff training and motivation is needed

Even though the eThekweni Municipality has previously introduced a number of staff training programmes that were aimed to equip staff with certain skills, there is still a need for more training for the Stores Division staff. Such training must be aimed to help them understand the importance of inventory control and strengthen their techniques for planning the demand patterns, movement patterns and cycles to build suitable inventory norms for different categories of inventories.

From the findings, it is evident that most employees had school levels of qualification with many years of experience. This suggests that most of them are nearing their retirement age. Therefore, it is important for the Stores Division to start training and educating more young staff for the near future.

Staff also needs to be motivated either by monetary incentives, praise, appreciation, thanks, smiles, or opportunities to acknowledge their good performance. The study also recommends improvement on the levels of staff education. The team set to control inventory and all stakeholders must be encouraged to participate in meetings, discussions and workshops related to vision and objectives of the stores unit. The organization must ensure that it forms a strong guiding partnership with key stakeholders. Senior managers and executives should “walk the talk”, understand the changes with employees and support new innovation.

### **5.3 Recommendations for future research**

This study related to the Stores Division of the eThekweni Municipality in Durban. Therefore, it is recommended that future research of this nature be done with large samples and a different methodology at other municipalities, particularly in the African continent. Future research studies on the improvement of the Stores Division should be encouraged and the role of Municipal Financial Management Act (MFMA), Act No. 56 of 2003 on inventory control should be reviewed. These studies should also look at the role that the inventory control plays on the financial reporting of municipalities.



#### **5.4 Limitations of the study**

Since this study was a case study, it gathered data from only one municipality. As a result, the study contains information that is specific for the Stores Division of the eThekweni Municipality in Durban. Nevertheless, the results can be generalized to other departments or municipalities that are operating in the same way as the eThekweni Municipality, Durban.

#### **5.5 Conclusion**

This chapter provided conclusions relating to the literature review and empirical findings. It also provided recommendations emanating from the analyses of findings. The study recommends that the Stores Division should consider the levels of staff qualifications, provide more staff training, and improve planning; communication; procurement; time management; and initiate innovative strategies of inventory control. Moreover, the internal control processes need to be mapped according to the various roles identified. In conclusion, all the objectives of this study were achieved. The recommendations made in this chapter represent some of the actions that could possibly be taken to improve the success of inventory control in the Stores Division of the eThekweni Municipality in Durban.

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## APPENDIXES

### Appendix A – Consent letter

**Title: Factor affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban: a case study.**

Dear Participant,

I am currently undertaking a research project that aims to investigate factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban.

Would you agree to participate in the study? The research will be conducted via a questionnaire which you will need to complete and forward back to me. Participation is voluntary and you are free to withdraw from the study at any time. The information that you give will only be used for a research purposes, and your identity and individual answers will be kept totally confidential. Should you wish to discuss this further, please feel free to contact me or my supervisor Dr H. L. Garbharran on 031 373 5740.

Your assistance will be much appreciated.

Yours faithfully,  
Zwelihle Wiseman Nzuza  
076 444 2110

## Appendix B – IREC letter of information and consent



INSTITUTIONAL RESEARCH ETHICS COMMITTEE (IREC)

### LETTER OF INFORMATION

**Title of the Research Study:** Factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban: a case study

**Principal Investigator/s/researcher:** Mr. Zwelihle Wiseman Nzuza, M Tech Cost and Management Accounting

**Co-Investigator/s/supervisor/s:** Dr H. L. Garbharran, DPA

**Brief Introduction and Purpose of the Study:** This study seeks to investigate factors affecting the success of inventory control in the Stores Division of the eThekweni Municipality, Durban. This will strategically develop a preparedness recommendations responding to enhance the success of inventory control.

**Outline of the Procedures:** Filling in the questionnaire will take approximately 15 minutes.

**Risks or Discomforts to the Participant:** There are no risks to you. Information divulged in the questionnaire will be kept confidential. The name of your organisation will be given a code during the publication of findings of this study.

**Benefits:** There are no financial benefits for you to participate in this study. However, it may contribute to improve inventory controls.

**Reason/s why the Participant May Be Withdrawn from the Study:** Participating in this study is voluntary. You have a right to withdrawal from the study if you feel uncomfortable or for any other reason that may deem you unfit to continue with the study.

**Remuneration/ Costs of the Study:** Kindly note that there is no remuneration for participating in this study.

**Confidentiality:** Your identity will not be disclosed in this study.

**Research-related Injury:** There will be no injuries and this study does not involve any medication or body exercise.

**Persons to Contact in the Event of Any Problems or Queries:** Supervisor: Dr. H. L. Garbharran (Supervisor) at 031 373 5740, or Mr. Z. W. Nzuza (Researcher) on 076 444 2110 or the Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or [dvctip@dut.ac.za](mailto:dvctip@dut.ac.za).



**CONSENT**

***Statement of Agreement to Participate in the Research Study:***

- I hereby confirm that I have been informed by the researcher, \_\_\_\_\_ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: \_\_\_\_\_,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
<b>Full Name of Participant</b>	<b>Date</b>	<b>Time</b>	<b>Signature / Right Thumbprint</b>

I, \_\_\_\_\_ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
<b>Full Name of Researcher</b>	<b>Date</b>	<b>Signature</b>

_____	_____	_____
<b>Full Name of Witness (If applicable)</b>	<b>Date</b>	<b>Signature</b>

_____	_____	_____
<b>Full Name of Legal Guardian (If applicable)</b>	<b>Date</b>	<b>Signature</b>

## Appendix C – The research instrument - Questionnaire

### SURVEY ON THE FACTORS AFFECTING THE SUCCESS OF INVENTORY CONTROL

**SECTION A:**

**PERSONAL AND COMPANY INFORMATION**

**Mark the appropriate box with a cross (X)**

**1. Please indicate your respective department**

Stores Division	<b>1</b>
Procurement Division	<b>2</b>

**2. Please indicate your relevant experience of service**

0 to 3yrs <b>1</b>	3 to 6yrs <b>2</b>	6 to 9yrs <b>3</b>	9 to 12yrs <b>4</b>	12 to 15yrs <b>5</b>	15yrs and above <b>6</b>
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**3. State your level of qualification**

School level <b>1</b>	Certificate after matric <b>2</b>	Diploma <b>3</b>	Degree <b>4</b>	Honors <b>5</b>	Other <b>6</b>
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**SECTION B:**

**FACTORS AFFECTING THE SUCCESS OF INVENTORY CONTROL**

FOCUS AREA (A)	1. Planning	1 Strongly agree	2 Agree	3 Neutral	4 Strongly	5 Disagree
1.1 My organization makes plans for inventory control.						
1.2 The team set to control inventory is involved in the inventory plan.						
1.3 Inventory suppliers are involved in the inventory plan.						
1.4 Inventory control plans are communicated throughout the organization.						
1.5 Inventory control plans are affected by the involvement of incompetent staff.						

FOCUS AREA (B)	2. Inventory keep track systems	1 Strongly Agree	2 Agree	3 Neutral	4 Strongly Disagree	5 Disagree
2.1 In my organization, an online keep track system is used to control inventory.						
2.2 The use of online keep track system is easily understood.						
2.3 The use of online keep track system helps to achieve proper inventory control.						
2.4 Online keep track system is better than manual systems.						
2.5 Online keep track system is more reliable.						

FOCUS AREA (A)	3. Procurement	1 Strongly Agree	2 Agree	3 Neutral	4 Strongly Disagree	5 Disagree
3.1 Procurement function has a link to inventory control.						
3.2 Procurement procedures of inventory control are understandable.						
3.3 Procurement team set to order inventory keeps time management.						
3.4 Procurement team set to order inventory needs thorough training.						
3.5 The entire procurement function needs thorough improvement.						

**4. List any other factor/s that affects the success of inventory control in your organization.**

.....  
 .....



**SECTION C:**

**5. STRATEGIES FOR INVENTORY CONTROL**

5.1 Please tick **Yes/No** in any of the following strategies that work better for your organization.

	<b>STATEMENTS</b>	<b>YES 1</b>	<b>NO 2</b>
5.1.1	Fist in First Out (FIFO).		
5.1.2	Last in First Out (LIFO).		
5.1.3	Economic Order Quantity (EOQ).		
5.1.4	Just in Time (JIT).		
5.1.5	Perpetual inventory review.		
5.1.6	Periodic inventory review.		
5.1.7	Electronic inventory control system.		
5.1.8	Inventory fixed ordering.		

5.2 Other than the above listed strategies, please give any other strategies that work better for inventory control in your organization.

.....  
.....

Thank you for your kind cooperation.

Mr. Zwelihle Nzuza

## Appendix D – Gatekeeper’s permission letter



### PROCUREMENT & INFRASTRUCTURE Supply Chain Management Unit

166 K E Masinga Road, Durban 4001  
PO Box 644, Durban 4000  
Tel: 031 322 7911, Fax: 031 311 7330

[www.durban.gov.za](http://www.durban.gov.za)

Our Ref. GCA/5389

Enquiries :- G.C. Appalsamy Telephone :- (031) 311 7518 Fax :- (031) 311 7330

Date :- 26 July 2013


Durban University of  
Technology Department  
of Management  
Accounting P.O. Box 1334  
DURBAN  
4001

Dear Sir/Madam

#### INVENTORY CONTROL AT ETHEKWINI MUNICIPALITY

Permission was granted to Mr Nzuzu, (Contact Number 076 444 2110 / E-Mail Address [zwnzuz@gmail.com](mailto:zwnzuz@gmail.com)), to conduct a research about Inventory Control.

Yours Faithfully

  
**Acting Senior Manager : Corporate Procurement**  
