THE CHALLENGES OF SAP (ERP) SYSTEM ON PURCHASING PERFORMANCE AT ENVIRONMENTAL MANAGEMENT AGENCY (EMA) IN 2018.

BY

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The undersigned members do confirm that they have supervised, read and recommend to Bindura University of Science Education that the research entitled **THE CHALLENGES OF SAP (ERP) SYSTEM ON PURCHASING PERFORMANCE AT ENVIRONMENTAL MANAGEMENT AGENCY (EMA) IN 2018**, submitted by in partial fulfilment of the requirements for the **BACHELOR OF COMMERCE (HONORS) DEGREE IN PURCHASING AND SUPPLY** met the minimum required standards for acceptance.

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(Signature of the Departmental Chairperson)                          Date

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(Signature of Student)                          Date
DEDICATION

I dedicate this project to my parents; Mr and Mrs Mazhangara and siblings for their prayers and endless support on the course of undertaking this research project.
ABSTRACT

The study seeks to investigate the challenges of SAP system implementation on procurement performance at EMA in 2018. The research used secondary data which was obtained from credible sources of the organisation. The data was analysed using E-Views econometric software and Ordinary Least Squares (OLS) was employed in the estimation of the results. The results show that SAP system implementation, number of employees and number of purchase requisitions improves procurement performance. Training was seen to be insignificant in determining changes in procurement performance. The study recommends employment of procurement staff in the line with the Public Procurement and Disposal of Public Assets Act, 2018.
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Thank you all, May God Bless you.
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<th>Description</th>
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<tbody>
<tr>
<td>ADF</td>
<td>Augmented Dick-Fuller test</td>
</tr>
<tr>
<td>CCS</td>
<td>Central Computing Services</td>
</tr>
<tr>
<td>CIPS</td>
<td>Chartered Institute of Purchasing and Supply</td>
</tr>
<tr>
<td>EDI</td>
<td>Electronic Data Interchange</td>
</tr>
<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
</tr>
<tr>
<td>GoZ</td>
<td>Government of Zimbabwe</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication and Technology</td>
</tr>
<tr>
<td>IRBMS</td>
<td>Integrated Results Based Management System</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicators</td>
</tr>
<tr>
<td>MRP</td>
<td>Materials Requirement Planning</td>
</tr>
<tr>
<td>NoE</td>
<td>Number of Employees</td>
</tr>
<tr>
<td>NoR</td>
<td>Number of Requisitions</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
</tr>
<tr>
<td>PP</td>
<td>Procurement Performance</td>
</tr>
<tr>
<td>PRAZ</td>
<td>Procurement Regulatory Authority of Zimbabwe</td>
</tr>
<tr>
<td>SAP</td>
<td>Systems Applications and Products</td>
</tr>
<tr>
<td>SCAZ</td>
<td>Supply Chain Association of Zimbabwe</td>
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CHAPTER 1

INTRODUCTION TO THE STUDY

1.0 Introduction

Procurement performance has been drawing great attention from practitioners, academicians and researchers due to poor performance resulting from non-adherence to proper processes and procedures as noted by (Mose, et al., 2013). Most entities in developing countries have been known for their poor performance in the utilisation of ERP systems thus failure to utilise all the modules in the systems. The trend around the world is for companies to adopt the most recent ERP systems such as SAP system in order to be competitive.

The government of Zimbabwe mandated all public institutions to utilise SAP (ERP) system in their operations which targeted to provide the following benefits; being able to manage a group of companies using a single system, enhanced financial reporting, increased effectiveness of the company logistics process, the ability to reduce the costs of procurement and increase the effectiveness of inventory management, quick response to notifications and elimination of manual work through automated business support. This research seeks to focus on the impact of SAP system implementation on procurement performance at EMA from a stipulated time of 2012 to 2018.

1.1 Background of the study

Since 1960s and 1970s, which are the years that mark the beginning of software manufacturing, many organisations made use of open inventory systems that were known as Material Requirement Planning (MRP) (Lysons & Farrington, 2016). To handle basic functions of MRP, computers remained mandatory, and to create orders and purchases among suppliers and consumers, Electronic Data Interchange (EDI) was required to save time and the budget of printing materials. During late 1990s, the Year Two Thousand (2000) difficulty caused enterprises to transfer to Enterprise Resource Planning (ERP) methods (Tsai, Hwang and Hsu, 2010). ERP help organisations to
regulate their budget and strategize in an effective and proficient way thereby enhancing procurement function. Enterprise resource planning (ERP) system refers to a company wide information system for managing the company’s operational and support processes, its administrative processes, its human resources, its materials resources and financial resources (Weele, 2010). ERP system is the latest and possibly the most significant development of MRP and MRP II. ERP is applicable to all organisations and allow managers from all functions or departments to have consolidated view of what is or is not taking place throughout the enterprise (Lysons & Farrington, 2006). It now encompass the whole organization’s operations which includes finance, logistics, manufacturing, supplier management and human resources. (Lysons & Farrington, 2006) defines ERP as a business management system that, supported by multi-module application software integrates all the departments or functions of an enterprise.

The setting out of Information and Communication Technology (ICT) in Zimbabwe goes back to early 1970s when the Central Computing Services (CCS) provided ICT services to the public services (Hikwa & Maisiri, 2014). It followed by the adoption of the Integrated Results Based Management System (IRBMS) in 2005, which is seen by the government as an integral component (COMESA E-Government Web Portal, 2012). In 2005, the Government of Zimbabwe (GoZ) together with National Economic Consultative Forum (NECF) embarked on a survey to appropriately inform the intent to deploy ICTs in the country (Mhlanga, 2006). This survey eventually became the basis for the “national ICT policy and to provide a roadmap towards a knowledge society” (Mhlanga, 2006). In 2009 upon the formation of the inclusive government, the government of Zimbabwe established the Ministry of information and Communication Technology. The ministry of ICT aims at promoting the use of ICTs in the public sector value chains in Zimbabwe. The introduction of Ministry of ICT in 2009 motivated several public institutions to acquire ERP software in order to effectively and efficiently manage their resources.

In addressing the Charted Institute of Procurement and Supply (CIPS) conference Deputy Chief secretary to the President and Cabinet Dr Ray Ndhlukula said the reforms should bring accountability and transparency in the procurement process (Ndhuluukula, 2015). As part of the up scaling the implementation of the RBM system government undertook a bold decision to reform and modernize the procurement system in Zimbabwe. The reforms aimed at doing away with the paper-based procurement system,
increase capacity to achieve economy, efficiency and accountability in service delivery (Musawanzikwa, 2015). This also aimed at improving procurement performance in public institutions.

The Environmental Management Agency (EMA) is a statutory body established under the Environmental Management Act (CAP 20:27). The Agency is responsible for ensuring the sustainable utilisation of natural resources and the protection of the environment. It is a parastatal in the Ministry of Environment, Water and Climate. The Agency was formed through the merging of the Department of Natural Resources, the ZINWA Water Quality Section and the Hazardous Substances and Atmospheric Pollution sections of the Ministry of Health and Child Welfare. EMA became operational in 2007, from this period the Agency used Sage Pastel (MRP II) system in managing its resources. This system became functional in 2012 but it faced major challenges in procurement function, thus it resulted in increased purchase order cycle time as shown by the graph below.

**Figure 1. Procurement Performance Graph**

![Procurement Performance Graph](image)

**Source: EMA Annual report 2017**

Due to many challenges faced with using Sage Pastel system in managing resources of the organisation, EMA adopted the government insertion to implement SAP system as a way of reducing inefficiencies in the use of Pastel. The SAP system implementation project was initiated on 1st January 2015 with historical data entry. SAP system
implementation targeted to improve procurement performance, since the system comes with functional modules which were not previously enjoyed through the use of Pastel. SAP system implementation expected to reduce purchase order cycle time from an average of 18 days to 10 days or lesser. The inefficiencies experienced in the period resulted in an outcry of the whole organisation since some orders were not followed and failure to meet targets.

From the initiation period SAP system has faced several challenges in implementing and using the system, this failed to provide a gradual improvement in procurement performance. The purchase order cycle time has experiencing fluctuating times in the current situation. The purchase order cycle time has ups and down which reaching a maximum of 18 working days. Several challenges are also encountered particularly with regards to the delivery and cycle time reduction, engaging suppliers electronically and network failure in the use of the system. The company is yet to enjoy benefits of implementing SAP system since there are current challenges in the use of the system.

1.2 Problem statement

The use of SAP system has been agued to be one of the ways in which procurement performance can be improved. EMA is experiencing procurement performance challenges chief of which are long purchase order cycle time and some other procurement challenges which are high paper-based procurement, failure to provide up-to-date information and management reports, budget blowing due to unplanned purchases and backlog in the system. The financial report for year 2016 reported that inefficient use of SAP system sub-modules could be the major contributing factor towards the poor procurement performance, hence this pose a problem to the researcher to undertake a study on challenges which are faced in implementing the system.

1.3 Research objectives

The main objective of this study was to establish the relationship between procurement performance and the implementation of SAP as an ERP system in public institutions for instance EMA in Zimbabwe.
i. To find the extent sub modules of SAP system been utilised in the procurement department of EMA.

ii. To establish the influence of procurement training in enhancing procurement performance at EMA.

iii. To determine the challenges and interruptions that affect full adoption and use of SAP system at EMA.

1.4 Research Questions

i. How does the organisation enjoy the benefits of SAP through procurement?

ii. Does the number of procurement staff in Procurement Unit affects use of SAP system?

iii. What challenges are being faced in adoption and use of SAP system?

1.5 Statement of hypothesis

The statement of hypothesis for this research is stated as;

The implementation of SAP system will result in improvement of procurement performance.

1.6 Significance of the study

This research will create enough evidence on the challenges of SAP system implementation in order to draw attention of the directors and shareholders to permit approval for further funding of the SAP system on key areas currently not integrated to the current SAP system this will enable EMA to harness the full benefits of the system.

This study’s focus is to bring out the importance of integrating SAP (ERP) system into the whole business operations such that the system implementation can yield long term procurement benefits. The major reason for this research to focus on the importance of SAP system implementation is because the anticipated benefits of the application are not obtained from the initiation. SAP implementation is a large technological improvement which changes the activity of the whole organisation and proper
understanding of the system and co-operation for implementation of the system between the members of the organisation are very important because humans are prone to change but a change as big as an implementation of ERP is not very easily acceptable. This study hypothesizes benefits which can be obtained through utilisation of SAP system sub-modules. These includes integrating the whole organisation’s resources under one system, an automated system which provides reports in real time and better supply chain management through the use of Electronic Data Interchange (EDI).

This research will create new knowledge and awareness in the extent of procurement performance across all industry sectors both in private and public sectors. The research findings will assist policymakers in the procurement profession by embracing the outcomes of this research that provides objective ways of improving procurement performance through the use of SAP system.

The use of an econometric methodology of data analysis on the subject of procurement performance created a gap of analysis for future studies. This methodology provides objective results on the topic under analysis this is because the study used a testable econometric methodology which is the linear regression model. This methodology provides a new gap of knowledge, as the model provides assumptions of model that link to theoretical model. This study provides a new gap of knowledge on the current topic since previous studies on the same topic used subjective methodologies.

1.7 Research Assumptions

In conducting this research the key assumptions are that

i. Data collected is correct, unbiased and reliable.

ii. The findings of this research are indicative of the nature of SAP system adoption in procurement process at EMA.

1.8 Delimitations of the study

The research is going to analyse the effects of SAP on procurement performance at EMA from a stipulated time of 2012 to 2018. The researcher mainly focused on the head office of EMA since the organisation applies hybrid purchasing strategy. Were strategic items are procured at head office while non-critical products are being decentralized.
1.9 Limitations of the study

Confidentiality regarding data to be collected where some of the information was likely to be regarded as confidential by the officers concerned and, therefore, deny the researcher access to it. The researcher assured respondents that all information provided is strictly for academic work and therefore confidential.

1.10 Definition of key terms

**ERP** - A business management system that is supported by multi-module application software that integrates all the departments or functions of an enterprise (Lysons and Farrington, 2006).

**Procurement Performance** - is considered to be the result of two elements: purchasing effectiveness and purchasing efficiency. It is defined as the extent to which the purchasing function is able to realize its predetermined goals at the sacrifice of a minimum of the company’s resources (Carter & Mosconi, 2005).

**Procurement Efficiency** - is defined as the relationship between planned and actual sacrifices made in order to realize a goal previously agreed upon (Weele, 2014).

**Procurement Effectiveness** - related to the resources which are required to realize the previously established goals and objectives and their related activities. Essentially it refers to the relationship between planned and actual costs (Weele, 2014).

**Procurement** - this refers to the process for acquiring the various resource inputs at the right price, of the required quality, in the right place and at the right time to the primary activities (Rushton, Oxley and Crouchel, 2000).

**Efficiency** - is defined as the measure of how productively resources are utilised to achieve a goal. It covers the relationship between the output of goods of services and the resources used to produce them hence entails one to spend well (Lysons and Farrington, 2006).
1.11 Chapter summary

This chapter was the preliminary chapter to the research it presented a brief background of ERP system evolving from MRP to ERP system, thus the development from use of SAGE pastel to SAP system. It clearly states the research objectives, the research questions which will guide the course of the research, the significance of the study, research assumptions of the study delimitations and limitations. This chapter will assist readers to understand and realize where the research is heading.

Chapter two focuses on the review of literature of the case study as well as the empirical evidence. Chapter three will look at the methodology of the research. The fourth chapter then looks at data analysis and findings. Finally chapter five conclusions and recommendations experienced in the implementation and use of SAP.
CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter gives an overview of the literature review and past research work related to the subject area while providing a setting for and connection to this current research. This chapter begins with theoretical literature review and empirical literature review follows which gives an analysis of past research done on the area of study. The main importance of this literature review in this circumstance is to provide theoretical insights into the two main variables which are SAP system implementation and procurement performance. More so the chapter pursues to provide theories that hypothesize the relationship of ERP system or technological improvement on procurement performance.

2.1 Theoretical Literature review

Theories are formulated to explain, predict, and understand phenomena and, in many cases to challenge and extend existing knowledge within the limits of the critical bounding assumptions. The theoretical framework introduces and describes the theory which explains why the research problem under study exists

2.2 Conceptual Framework

Mugenda (2008) defines conceptual framework as a concise description of phenomenon under study accompanied by a graphical or visual depiction of the major variables of the study. According to Young (2009), conceptual framework is a diagrammatical representation that shows the relationship between dependent variable and independent variables.

The study examined how SAP relates to procurement performance of EMA in Zimbabwe. The independent variables included SAP system, Number of Employees (NoE), Training (TR) and Number of Requisitions (NoR). On the other hand, the
dependent variable was Procurement Performance (PP) of EMA. The relationship among variables was estimated using the function below.

PP=f (SAP system, NoE, TR, NR)

Figure 2.1 conceptual framework

Independent Variables

SAP SYSTEM
- Materials Management
- Supply Chain Management
- Supplier Relationship Management
- Planning and Optimisation

PROCUREMENT STRUCTURE (NoE)
- Procurement Management Unit
- Number of staff

STAFF COMPETENCY (TR)
- Employee training
- Developing skills and competencies
- Employee qualification

WORKLOAD (NoR)
- Number of Requisition held

Dependent Variable

Procurement Performance
- Efficiency
- Effectiveness
PP=f (SAP; NoE; TR; NR)

PP=Procurement Efficiency, SAP as the system utilised, NoE= Number of Employees, TR= Training
NR= Number of Requisitions

2.3 Theoretical Framework

A theoretical framework consists of concepts, together with their definitions, and existing theory/theories that are used for the particular study (Sekaran, 2005). This section explores the literature and theories which were put forward regarding the major variables under study.

2.3.1 Diffusion of Innovation Theory

The theory was advanced by Rogers in 1962. It enlightens how, over time, an idea increases momentum and diffuses through a social system or specific population. The end result of this theory is that people accept a new behavior, product or idea. This means that the staff does some tasks in a different way than what they did previously. When promoting an innovation to a target population, it is significant to understand the characteristics of the target population that will help or delay adoption of the innovation (Rogers, 1962). As SAP (ERP) system includes changes in traditional procurement approaches and new technologies, the need to train staff in the use of SAP tools and procurement practices are critical to the success of an ERP system initiative

2.3.2 Technology Acceptance Model

This model was introduced by Davis in 1993. According to this theory, evolving technologies cannot improve organisational effectiveness and performance if the change has not been acknowledged by the users. Implementation of any innovation especially information technology (IT) needs investment in computer based tools to support decision making, planning and communication. It is therefore very critical that the systems are specified on organisational preference and logic. It is also essential to appreciate that people may resist technological changes. An organization should strive to understand why people resist changes and the likely ways through which such issues can be resolved. Everyone involved must therefore be
informed on their roles and authorized to perform the respective roles (Kamel, 2014). However, this theory is a subjective measure and unreliable in measuring actual use of the system. This is because the time period between innovation and implementation could be full of uncertainties and other factors may arise during the process.

The technology acceptance model has been a theory that is most widely used to explain individuals’ acceptance of an information system or ERP system in particular. Technology acceptance model has been developed by Davis (1989) is one of the most popular research models to predict use and acceptance of information system and technology by individuals’ users. TAM has been widely studied and verified by different studies that examine the individual technology acceptance behavior in different information systems constructs. TAM has been widely used model to help understand and explain user behavior in an information system. There has been number of researches which have been used to test the model and results have been reliable. This current study has tried to explain TAM and the different crucial factors in it. In addition this current research provided an extension of the TAM and use it to understand the user acceptance of technology in procurement.

2.3.3 Learning and Knowledge Perspective

Another rational for explaining procurement collaboration is that firms establish partnerships to exploit opportunities for knowledge creation and organisational learning. Through knowledge creation and organisational learning, organisations strengthen their competitive positions (Verwaal & Hesselmans, 2004). In the face of high environment uncertainty, it is important to have access to a broad and deep knowledge base in order to respond quickly to changing circumstances (Volberda, 1998). Since great diversity of knowledge is distributed across the supply chain, collaboration provides an ideal platform for learning and facilitates partner-enabled market knowledge creation. Learning in supply chain management can be exploited in order to improve existing capabilities and also discover new opportunities. Thus being able to improve absorptive capacity and the ability to recognize the value of new, external knowledge, assimilate it and apply it to commercial ends. A firm’s ability to adopt ERP system is based on the employee quality, knowledge base, organisational culture and the quality of IT systems.
2.4 Empirical literature review

Empirical literature review is a way of gaining knowledge by means of experience or direct observation. In this section of the research study, the researcher will review the previous case studies and surveys which were conducted by other researchers concerning the impact of ERP systems on procurement performance. The review looks into pertinent studies carried out globally, regionally and in Zimbabwe respectively. The studies were reviewed in tandem with the study variable which captures the study objective.

2.4.1 ERP implementation in developed countries

A study by Fergal Carton and Frederic Adam (2003) in Ireland focused on analysis in the impact of ERP systems roll-outs in multinational companies. The study analysed the implementation of ERP on multinational companies in which they required a standard implementation, as designed by Headquarters. Standardization of the system as highlighted may lead to large scale organisational problems, which must be ironed out if the full potential of the enterprise-wide system is to be obtained. The study indicated that local managers are given too little scope and time to adequately adapt the template to their site. This study has conducted in developed countries were most of Head Quarters of multinational companies are located and also the time gap of the research.

The research done by (Kong, 2010) indicates that when an ERP system is implementation successfully, it can reduce operational costs, increase productivity and improve customer services. In contrast he then states that ERP fails to deliver the promised benefits in many companies due to poor implementation planning. The research objectives were to identify the most important critical success factors that could help to make an effective planning strategy for the issue. Their findings were indicated the need for top management support in the implementation process.

2.4.2 ERP implementation in developing countries

A study by (Jilani.A, 2014) on the effects of ERP systems on procurement efficiency. The research was a cross-sectional among manufacturing firms in Nairobi, Kenya. The study found that the ERP systems has come out to be the best tool in processing
information faster, track-orders and inventory control, automation of orders and payment process, lowering of set-up costs, reduction of order cycle, avoidance of data duplication in the procurement system module. The study recommended that organisations should embrace technological changes that are rapidly changing on the environment that the organisation exist. The study focused on manufacturing sector in which procurement is recognized as the vital aspect of the organisation.

A research conducted by (Wanyonyi & Muturi, 2015) focused on the factors affecting performance of procurement function among public technical training institutions in Kisimu County, Kenya. The study focused on the main objectives of information technology on performance of procurement function in public procurement, establishment of staff competence on procurement function and the ethical issues affecting decision making in performance of procurement functions in public technical training institutions. The study concluded that information technology, ethics and staff competency have a positive effect on performance of the procurement function.

A study by (Charuma, 2012) explored the implementation of ERP system for competitive advantage by mining companies in Zimbabwe. The study used Hwange Colliery Company as the case study. The study looked at the benefits of ERP to mining companies, challenges that companies face during the ERP implementation and it also assessed for readiness for implementing ERP and the alignment of ERP to the company strategy. The research concluded that proper ERP implementation brings tremendous benefits and competitive advantage to mining organisations.

A study by (Kambarami, 2012) evaluated the implementation of ERP system at case study company Zimbabwe. Thus the study evaluated Implementation of ERP systems comparing companies that have implemented ERP systems in Zimbabwe. This study analysed the standard implementation stages of an ERP system. It also evaluated ERP implementation success factors at country level comparing large companies that have implemented ERP in Zimbabwe. It further looked at ERP on a broader perspective which included the implementation of SAP Business Suite (R/3) to integrate all functional areas and they measured using International World Class Performance standards such as Overall Equipment Effectiveness (OEE) and Customer Case Fill on Time (CCFOT) and the use of Key Performance Indicators.
2.5.1 Benefits of SAP implementation

The major reason why public institutions implement ERP systems is to integrate the whole organisation’s system and do away with the paper-based procurement.

ERP systems can help cut costs across the value chain by re-engineering their process. For this, the ERP system should incorporate flexibility without complexity. And to improve their relationships with customer, organisations need to generate information and content that add value from their processes themselves (Joseph, 2005).

In addition ERP facilitates a company-wide integrated information systems covering functional areas such as manufacturing, sales and distribution, accounts, payables, receivables, management and talent management (Nawaz & Channakeshavalu, 2013).

More so ERP integrates and automates most business processes and shares information enterprise-side in real-time.

ERP bridges information gaps across an organisation and focuses on key issues such as productivity enhancement, customer service, cash management, inventory, quality control and prompt delivery (Nawaz & Channakeshavalu, 2013).

The ERP system can provide many benefits such as enterprise integration, business process re-engineering, standardizing systems and procedures across the enterprise, transparency, business networking, best global management practices and global information systems infrastructure.

The procurement procedure has had many ambiguities in the recent past due to the long and tedious processes and lots of paperwork (Rwoti, 2005). The implementation and application of ERP systems in the procurement process has reduced this through embracing online methods of carrying out the procurement process. In addition, the adoption of SAP (ERP) system ensures transparency, accountability as well as reduction in errors and omissions. The adoption and full utilisation of SAP system will result into reduction in cost, delivery and cycle time reduction, low inventory levels and accurate record keeping.
2.5.2 Procurement Performance

One of the most important factors that influences the way in which purchasing results are measured, is how the management looks upon the role and the importance of the purchasing function (Weele, 2014). The position of the purchasing department within organisational structure differs and the measures used for purchasing performance measurement and evaluation will differ significantly. Thus when purchasing is seen as an operational function, performance measurement are mostly quantitative and administrative in character. On the other hand when purchasing is considered as strategic business area, performance measurement are also qualitative and strategic (Weele, 2014). In this study the researcher used quantitative characters to measure purchasing performance.

2.6 Research Gap

The empirical literature demonstrate that, the implementation of ERP on procurement function is not extensive in Zimbabwe. Therefore this study merely focused on SAP (ERP) system on procurement performance. ERP should be viewed as an enabling mechanism to make the process of procurement more efficient in terms of cost, time and achieving of value for money. Thus implementation of ERP requires the reengineering of existing purchasing processes. (Birks, 2001) states that the roles on responsibilities might change substantially with the new process which requires staff to adapt.

2.7 Chapter summary

The above section came up with an argument showing the past academic research and material that was done in relation to the studied area. This recognizes what other researchers had to say through journals, text books and online libraries. The related literature which highlighted concept of factors affecting the implementation of SAP (ERP) system on the procurement performance of an organisation. The chapter looked at other researchers that where done by other researches and their findings. The literature reviewed will give a guideline on all aspects of the implementation of SAP in
organisations and its effects on procurement function, thereby enabling the researcher to know what to deliberate when examining various aspects that could affect such a change. The next chapter will focus on research methodology, data analysis and presentation procedure.
CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction
This chapter centers on the methodology of the research that is the method of analysis used to analyse the effects of SAP system implementation on procurement performance. In this chapter the research puts forward the estimation criteria, justification and selection of the variables chosen and their measurement units, sources of data and the diagnostic tests to be performed.

3.1 MODEL SPECIFICATION

3.1.1 THEORATICAL MODEL

This study seeks to establish, the impact of SAP system on procurement performance at EMA Zimbabwe. The research adopts Technology Acceptance Model for its theoretical model, this theoretical model explains the behaviors of the user’s acceptance in using computer model and new developments. Therefore Technology Acceptance Model postulates that SAP utilisation is a function of user training and change fatigue and work overload.

\[ P = f (\text{Technological level, Acceptance}) \] \hspace{1cm} (1)

Where; \( P \) is Performance

\( \text{TL} \) is Technological Level and \( A \) is Acceptance

The equation above states that to achieve full utilisation of a technological advancement there is need to train users to accept the system and to manage work-load fatigue in order to achieve maximum performance. This can be translated to the equation below for procurement performance.

\[ PP = f (\text{TL, A}) \] \hspace{1cm} (2)

Where \( \text{TL} \) is SAP system and \( A \) is technological utilisation
Thus Acceptance is measured by how the implemented technology is utilised.

This equation can be translated to into a mathematical model;

$$PP = f (SAP, TU)$$

(3)

### 3.1.2 EMPIRICAL MODEL

The model of this research is borrowed from Eva Ngina Kariuki (2010). The researcher used this model in analyzing procurement performance measurement in commercial banks in Kenya. Eva Ngina Kariuki’s primary model was specified as;

$$Y = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + U$$

Where; $Y$ = Procurement performance measurement

$X_1$ = Information Technology

$X_2$ = Ethics and Culture

$X_3$ = Staff Training

$X_4$ = Internal Process

In the model, $B_0$ = the constant term while the coefficient $B_i = 1, ..4$ is used to measure the sensitivity of the dependent variable ($Y$) to unit changes in the predictor variables $U$ represents the error term which captures the unexplained variation in the model.

It is from this premise that the model of this research is specified. The research modified this model to suit the case study under research EMA. Ethics and culture were removed from the model.

$$PP = f (IT, Staff Training, Internal Processes, Number of Employees & Number of Requisitions)$$

The mathematical model is transformed to equation 1

$$PP = \alpha + B_1 SAP + B_2 STR + B_3 IP + B_4 NoE + B_5 NoR$$

(1)

Where

$PP$ = Procurement Performance

$SAP$ = Systems Applications and Products
\[ \alpha B_1, B_2, B_3, B_4, B_5 \text{ are regression coefficients or parameters that are to be estimated.} \]

Equation 1 presented the mathematical model. Introducing an error term to the equation will make it an econometric model. The error term (u) captures all other variables which affect procurement performance which are not included in the model and also cater for chance events which are once off events which do not need analysis. The econometric model will be:

\[ PP = \alpha B_1 \text{SAP} + B_2 \text{STR} + B_3 \text{IP} + B_4 \text{NoE} + B_5 \text{NoR} + u \]  
……………………………….. (2)

### 3.2 DESCRIPTION AND JUSTIFICATION OF VARIABLES

#### 3.2.1 Procurement performance (PP)

Procurement performance is measured using Purchase Order Cycle Time in days. Procurement performance is an indicator which measures the extent to which the previously stated goals and objectives are being met. The level of procurement performance at organisational level shows how well the procurement department is responding to purchase requisitions held and time taken to process the purchase requisition until a purchase order is placed. Purchase order cycle time was taken as a measurement unit for procurement performance because at EMA we have two subsections in the procurement department which are buying and stores and these sections provide different activities which are measured differently. So to cut across these measurement problems and difference in measurement units we adopted purchase order cycle time as it uses percentage increase in performance.

Van Weele (2014) noted that there are two main aspects of the procurement performance: effectiveness and efficiency. Procurement effectiveness as defined by Van Weele (2010) is the extent to which the previously stated goals and objectives are being met. It refers to the relationship between actual and planned performance of any
human activity. Additionally, he explains that procurement efficiency is the relationship between planned and actual resources required to realize the established goals and objectives and their related activities, referring to the planned and actual costs.

If an organisation’s business performance is improving it is evident that the procurement performance has improved as well. This means that procurement function is responding quickly to purchase requisitions held, thus processing the documents in minimum days. This variable was chosen to be the dependent variable because the procurement performance of EMA has been falling and a probe needs to be taken to find out the causes.

3.2.2 System Applications and Products (SAP)

In measuring SAP system which is a dummy variable we assume that the value of 1 if SAP system is present and 0 for the period when EMA used Pastel system. Thus we are going to consider how Pastel system differ from the period SAP system was implemented. The implementation of SAP system will increase procurement performance by reducing purchase order cycle time.

3.2.3 Training (TR)

It is defined as the time taken in acquiring skills and knowledge about procurement procedures and processes. It is measured in hour’s procurement staff trained per quarter. It is also seen as major variable that affect procurement performance in public institutions particularly EMA. An increase in training hours will lead to an improvement in procurement performance ceteris paribus. Procurement performance will improve as training increases holding other things constant because there will be increase skills and knowledge on conducting procurement processes effectively, this will increase performance per worker. It is measured as the total trainings conducted by the organisation towards procurement function, it is also measured as total hours per quarter.

For the sake of this research we took all trainings conducted in the procurement department regardless of ERP systems or any procurement related because it results into improvement in procurement performance so we all trainings towards procurement as ERP system training. Also it can be expressed as a percentage of procurement
performance and is calculated by dividing total trainings per quarter. Many of the purchasing theories and empirics have indicated and proved that training affects procurement performance hence training is a significant variable in this study.

Implementation of SAP (ERP) systems in public procurement needs resources and specialised skills, thus the process requires a well-coordinated change management systems and training program that is also important to put into place practices, processes and systems for the implementation of ERP system (Vaidya, et al., 2009). In public procurement, much effort has been made to define the competencies required of those in the profession through professional bodies such as the Chartered Institute of Purchasing and Supply, 2004; Supply Chain Association Zimbabwe (SCAZ), 2017 and the Procurement Regulatory Authority of Zimbabwe PRAZ (2018). These professional bodies are responsible for among others, development and dissemination of codes of ethics and conduct for its professionals.

3.2.4 Number of Employees (NoE)

Number of employees is defined in this research as the total number of workers in the procurement department per quarter. This number can increase or decrease due to the following factors; number of employees may increase when the organisation decides to employ a new worker, when an existing worker is transferred from other department or province to join the procurement department and internship of students. Therefore number of employees is defined as current procurement staff plus additional staff [NoE=current staff + additional workers]. In measuring total number of employees as a variable we are going to add all staff who were involved in the procurement department per quarter. A ratio can be calculated from these figures of current employees in the department and those extra labour employed per quarter. If the organisation employees more workers, it will results into reduction in purchase order cycle time.

An additional employee in the procurement department will increase procurement performance by reducing purchase order cycle time in days.
3.2.5 Number of Requisitions (NR)

This variable is defined as the amount of workload given to the procurement function. It is measured by finding the average number of requisitions held per quarter. It is the relationship between the organisation’s performance and procurement function. Thus purchase requisitions are held to fulfill the needs of certain stakeholders. Therefore the ability of procurement to process those requisitions quickly improves organisational performance in its mandate to fill the needs. This shows how the organisation’s procurement function is performing and its ability to process the purchase requisitions in predetermined time.

Estimation Procedure

In this paper we determine the level procurement performance as a function of SAP system, TR, NoE, NoR and the estimation of the model was made using data for EMA for the period 2012 to 2018. The research was conducted using the (OLS) Ordinary Least Squares econometrics model and the choice of OLS econometrics methodology is based on the Gauss–Markov Theorem (GMT) of a Classical Linear Regression Model (CLRM) which states that in a linear regression model, errors have expectation zero and are uncorrelated and have equal variances, coefficients given by the OLS estimator. OLS econometrics methodology produces consistent, efficient and unbiased estimates of the parameters since the model will be using linear regression model. There are assumptions associated with the OLS estimated model and OLS has to satisfy these assumptions. The assumptions of the OLS estimation are that the model is correctly specified and there is absence of multi–collinearity, auto correlation and heteroscedasticity. The assumption of OLS regression analysis requires that there is no covariance between the error term and explanatory variable. For the context of the study the (OLS) method will be used through the E-views 8 computer package in the estimation of the regression model. The estimated co-efficients are subject to some test in order to prove their statistical relevance to the model. R2 determines the statistical reliability of the whole model, that is, the goodness of fit of the line of regression for the data sampled. It actually shows the predictive power of the model and in other words tells us to what extent do the explanatory variables explain the dependant variable.
3.3 Diagnostic Tests

Before the model can be estimated and used for policy recommendation some diagnostic tests have to be performed so as to see if the variables are meeting the necessary properties in elucidating the variations in the model. These tests are completed so as to eliminate prejudice from the achieved results after approximation and this increases confidence in the model to be approved for policy recommendation when it meets the mandatory properties required by the estimation procedure. The tests to be performed consist of Stationarity test, Autocorrelation test, multicollinearity, heteroscedasticity and normality test. These tests must be fulfilled before a model can be estimated using the Ordinary least squares (OLS)

3.3.1 Stationarity Test

According to Gujarati (2004) a stochastic procedure is assumed to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is calculated. The data to be used for approximation in this research is time series data from 2012 to 2018 and in regressing a time series variable on another time series variable(s), one often obtains a very high $R^2$ (in excess of 0.9) even though there is no significant relationship between the two variables. Sometimes we expect no relationship between two variables, yet a regression of one variable on the other variable often shows a significant relationship. This situation exemplifies the problem of false regression. A test of Stationarity (or non-stationarity) that has become widely popular is the unit root test. The Unit root test will be conducted using the Augmented Dick-Fuller test (ADF). If a variable is not stationary at its initial level then first order differencing will be performed to make the variable stationary. And if the variable is not stationary at first order differencing then second order differencing would be conducted. Time series data (from 2012 to 2018) is used for this research and the obtained results can be used for forecasting so this test is necessary so that the estimation can be made precisely.

3.3.2 Autocorrelation

This is a situation where there is covariance between the error term and the explanatory variables. Autocorrelation also refers to the correlation of a series with its own past and
future values. There should be no systematic pattern of the error term \( \mu \). If there is systematic pattern or covariance between the error term and the \( X \) values there is the presence of autocorrelation or serial correlation. The problem can result from systematic errors in measurement and omission of variables from the model. The test is to be done to ascertain if all the variables (PP, SAP, NoE and all other variables) are independent of their past or lagged values and their future values. The Durbin Watson Statistic is used to test for the presence of autocorrelation. The test is going to be used in this research to test for autocorrelation.

3.3.3 Multicollinearity test

Gujarati (2004) describes multicollinearity to mean the presence of an exact relationship among some or all explanatory variables in a regression model. When Multicollinearity is high, OLS is likely to have large variances and covariance’s therefore making precise estimation very difficult. There should be no relationship between \( X \) values that is we have to ascertain whether there is a relationship between PP, SAP, NoE, NR and TR. In this research we are going to use the covariance matrix to test for Multicollinearity, a correlation greater than 0.8 shows that there is co-linearity. Multicollinearity is a day to day phenomenon and what matters is the degree of Multicollinearity.

3.3.4 Heteroscedasticity test

Heteroscedasticity means the absence of Homoscedasticity. This classical linear regression model assumption entails that the variance of the error term has to be constant and the same should happen for all other variables. The violation of the Heteroscedasticity makes the standard errors of the OLS estimators and the covariance among them biased and inconsistent and this makes hypothesis testing wrong and invalid due to the fact that standard errors are wrong. Heteroscedasticity is to be tested using the White Heteroscedasticity test in E-views.

3.3.5 F test

To test the significance of the whole model the researcher is going to use the F statistic and its Probability value. The F value is the ratio of the mean regression sum of squares divided by the mean error sum of squares. Its value will range from zero to a randomly large number. The P-value of the F statistic gives the range of significance where we
can accept the null hypothesis that the model is correctly specified and is a good of fit model to suit the situation under study. A P-value of less than 0.1 and greater than 0.05 and mean that we are accepting the null hypothesis at 10 % level of significance and of greater than 0.01 but less than 0.05 means we are accepting the null hypothesis at 5% and that of less than 0.01 means accepting at 1% level of significance.

3.4 Data Sources

Due to the nature of the research, the researcher used secondary data. The researcher used quantitative data analysis because of accurate results and limited personal bias involved in the analysis (Gay, 2009). The data was sourced from company records. The researcher didn’t encountered major challenges in data collection since the company allowed the researcher to acquire the data however the minor challenge is data was collected for other different purposes.

3.5 Summary

The chapter focused on the methodology to be adopted for estimation and justification of the variables to be included in the model. Also diagnostic tests to be carried out before estimation and also data sources were put forward in this chapter. The next chapter focuses on interpretation and discussion of results.
CHAPTER 4

PRESENTATION AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter will focus on the presentation and interpretation of results. The researcher will benchmark with research questions and objectives which were laid down in chapter one in mind, this chapter aims to give solutions to the questions relating the answers to the obtained results after data estimation. The researcher used regression analysis and ordinary least squares (OLS) method using econometric software E-Views (Version 8) to establish the impact of SAP (ERP) system implementation on procurement performance. The results are presented as follows.

4.1 Descriptive statistics

Table 4.1 below shows the descriptive statistics of all the variables used in the research
As shown by the table 4.1 above procurement performance measured by purchase order cycle time in days has an average of 13.75 and this means that they have been an average increase of 5 days in procurement performance points from 2012 base figure. Its maximum was 18 and the minimum was 8. Number of employees (NOE) recorded an average of 3 and it was between a range of 5 and 2. Number of requisitions had a mean of 300 per quarter and a minimum of 161 per quarter and a maximum of 448 per quarter and finally average training period was 10.28571 hours per quarter and the maximum hours trained per quarter was 24 hours and other quarters employees were not trained at all.

**Table 4.1 Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>PP</th>
<th>NOE</th>
<th>NOR</th>
<th>SAP</th>
<th>TR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>13.75</td>
<td>3.357143</td>
<td>301.1786</td>
<td>0.5</td>
<td>10.28571</td>
</tr>
<tr>
<td>Median</td>
<td>14</td>
<td>3</td>
<td>316</td>
<td>0.5</td>
<td>8</td>
</tr>
<tr>
<td>Maximum</td>
<td>18</td>
<td>5</td>
<td>448</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>Minimum</td>
<td>8</td>
<td>2</td>
<td>161</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>3.306839</td>
<td>1.026114</td>
<td>64.21783</td>
<td>0.509175</td>
<td>8.939538</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.15137</td>
<td>0.28854</td>
<td>-0.18154</td>
<td>0</td>
<td>0.228382</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.678295</td>
<td>2.008762</td>
<td>2.92503</td>
<td>1</td>
<td>1.715599</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>2.144979</td>
<td>1.534834</td>
<td>0.160355</td>
<td>4.666667</td>
<td>2.16804</td>
</tr>
<tr>
<td>Probability</td>
<td>0.342156</td>
<td>0.46421</td>
<td>0.922952</td>
<td>0.096972</td>
<td>0.338233</td>
</tr>
<tr>
<td>Sum</td>
<td>385</td>
<td>94</td>
<td>8433</td>
<td>14</td>
<td>288</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>295.25</td>
<td>28.42857</td>
<td>111346.1</td>
<td>7</td>
<td>2157.714</td>
</tr>
<tr>
<td>Observations</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>
4.2 Results of the model’s diagnostic tests

4.2.1 Multicollinearity

In order to establish that the correlation between the explanatory variable is within the acceptable limits, a Multicollinearity test was done using the correlation matrix and the outcomes are shown below in table 4.2

4.2.2 Correlation matrix

Table 4.2 Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>NOE</th>
<th>NOR</th>
<th>PP</th>
<th>SAP</th>
<th>TR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOE</td>
<td>1.000000</td>
<td>0.099044</td>
<td>-0.71494</td>
<td>0.708881</td>
<td>0.230721</td>
</tr>
<tr>
<td>NOR</td>
<td>0.099044</td>
<td>1.000000</td>
<td>0.154046</td>
<td>-0.04021</td>
<td>0.007521</td>
</tr>
<tr>
<td>PP</td>
<td>-0.71494</td>
<td>0.154046</td>
<td>1.000000</td>
<td>-0.78088</td>
<td>-0.01002</td>
</tr>
<tr>
<td>SAP</td>
<td>0.708881</td>
<td>-0.04021</td>
<td>-0.78088</td>
<td>1.000000</td>
<td>0.065094</td>
</tr>
<tr>
<td>TR</td>
<td>0.230721</td>
<td>0.007521</td>
<td>-0.01002</td>
<td>0.065094</td>
<td>1.000000</td>
</tr>
</tbody>
</table>

Multicollinearity is always present in time series data and researchers are worried about its degree not its presence and the rule of thumb is that the correlations of explanatory variables should be less than 0.8. From the outcomes in table 4.2 above all the variables have correlations which are below 0.8 and this demonstrates the non-existence of a high degree or perfect correlation between the explanatory variables.

4.2.3 Heteroscedasticity

This means the absence of homoscedasticity which means the variances of the variables are not equal. If data estimation proceeds with heteroscedastic data the confidence interval will be too wide and this reduces the evidence of rejecting the null hypotheses (significance level). Heteroscedasticity was tested using Heteroscedasticity White Test without cross terms and its summarized outcomes are presented in table 4.3
Table 4. 3White Heteroscedasticity Test

<table>
<thead>
<tr>
<th>White Heteroscedasticity Test</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>2.137761</td>
<td>Probability</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>4.736386</td>
<td>Probability</td>
</tr>
</tbody>
</table>

From the results in the above table, the probability value is 0.1429 which is greater than that of the observed R squared which is 0.0936 hence we agree that data is homoscedastic. The Probability value of the F statistic is greater than 0.1 therefore we accept the null hypothesis that data is homoscedastic at 10% significance.

4.2.4 Autocorrelation Test

Autocorrelation is a condition where there is covariance between the error term and the explanatory (independent) variables. It is called serial correlation. The Durbin Watson test was used to test for autocorrelation. From the regression results (refer to Appendix) the Durbin Watson statistic was 1.40506

Due to the inconclusiveness of the Durbin Watson test, the ARCH LM test was done and its summarized results are presented in table 4.4 below.

4.2.5 Stationarity Test

In most cases time series data is not stationery and to avoid the problem of spurious regression where we have a very high R-squared and most of our variables not exhibiting any meaningful relationship with the dependent variable. To avoid this Unit root tests are done to establish the time series properties of variables and to make sure that they are integrated at the same wave length. The Augmented Dickey-Fuller test was used to test the Stationary of all the five variables. The outcomes at level are summarized below in Table 4.5
Table 4. 4 ADF at Level

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF Statistic</th>
<th>Critical values</th>
<th>decision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>PP</td>
<td>-2.09344</td>
<td>-3.69987</td>
<td>-2.97626</td>
</tr>
<tr>
<td>SAP</td>
<td>-0.96225</td>
<td>-3.69987</td>
<td>-2.97626</td>
</tr>
<tr>
<td>NoE</td>
<td>-2.39754</td>
<td>-3.69987</td>
<td>-2.97626</td>
</tr>
<tr>
<td>TR</td>
<td>-5.96846</td>
<td>-3.69987</td>
<td>-2.97626</td>
</tr>
<tr>
<td>NoR</td>
<td>-2.29965</td>
<td>-3.69987</td>
<td>-2.97626</td>
</tr>
</tbody>
</table>

From the table it is seen that all other variables are non-stationary at level as the absolute ADF Statistic are less than the critical values at 1%, 5% and 10%, except for training which is stationery at level. So if we estimate the results at difference level it will provide illogical results. Hence the Augmented Dickey-Fuller is to be performed at first difference so as to determine the stationarity. The figures of the ADF at first difference are shown in the table 4.6 below

Table 4. 5 ADF at first difference

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF Statistic</th>
<th>Critical values</th>
<th>decision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>PP</td>
<td>-6.15494</td>
<td>-3.72407</td>
<td>-2.98623</td>
</tr>
<tr>
<td>SAP</td>
<td>-5.09902</td>
<td>-3.71146</td>
<td>-2.98104</td>
</tr>
<tr>
<td>NoE</td>
<td>-7.47668</td>
<td>-3.71146</td>
<td>-2.98104</td>
</tr>
<tr>
<td>NoR</td>
<td>-6.28942</td>
<td>-3.71146</td>
<td>-2.98104</td>
</tr>
<tr>
<td>TR</td>
<td>-5.96846</td>
<td>-3.69987</td>
<td>-2.97626</td>
</tr>
</tbody>
</table>

From the results shown in the table above, four variables became stationary after first differencing at 1% and first difference. Hence the null hypothesis that the data is
stationary can be accepted at 1% for PP, SAP, NoE and NoR at first difference for TR. In this scenario the researcher is going to use obtained outcomes of the ADF test since to correct TR variable is beyond level of my research.

4.3 Regression Model Results

After the data was estimated in E-views regression results were obtained and a summary of the obtained results is presented in Table 4.7 (For full results refer to Appendix)
Table 4. 6 Regression Model Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>16.65322</td>
<td>1.782932</td>
<td>9.340353</td>
<td>0</td>
</tr>
<tr>
<td>NOE</td>
<td>-1.32766</td>
<td>0.448068</td>
<td>-2.96307</td>
<td>0.007</td>
</tr>
<tr>
<td>NOR</td>
<td>0.008976</td>
<td>0.005126</td>
<td>1.751004</td>
<td>0.0933</td>
</tr>
<tr>
<td>SAP</td>
<td>-3.17812</td>
<td>0.974256</td>
<td>-3.26209</td>
<td>0.0034</td>
</tr>
<tr>
<td>TR</td>
<td>0.042751</td>
<td>0.047108</td>
<td>0.907511</td>
<td>0.3735</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.702355</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.650591</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>13.56831</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.000008</td>
<td>Durbin-Watson stat</td>
<td>1.40506</td>
<td></td>
</tr>
</tbody>
</table>

The linear regression model after estimation will be;

PP=16.65322-1.32766NOE+.008976NOR-3.17812SAP+0.042751TR

PP=Procurement Performance    SAP=Systems Application and Product
NoE=Number of Employees       TR=Training
NoR=Number of Purchase Requisitions

4.3 Model significance

The model is significant in explaining the variations in dependent variable. This is evident using our R-squared which is 0.702355 which means that 70.2% of variations in procurement performance are explained by the independent variables which are
namely NoE, NOR, SAP and TR and about only 30% of the variations are explained by the error term and some other variables not included in the model.

The model is properly quantified and it’s significant in explaining the variations in procurement performance as the probability value of the F statistic is 0.000008 which is less than 0.01 and this means that the model is significant at 1% level of significance and we have 99% confidence that the model is correctly specified.

4.4 Results and interpretation

This section focuses on the interpretation of results obtained after regression was done.

4.4.1 Number of employees (NoE)

Number of employees has a probability value (P-Value) of 0.007 and this means that it is statistically significant at 1% significance level. The coefficient of NoE -1.33 shows that the number of employees improves procurement performance. An employment of one more employee in procurement staff will reduce purchase order cycle time by 1 day.

According to the results above number of employees has found to have a negative relationship with the purchase order cycle time. This negative relationship on purchase order cycle time is good because on the essence of procurement performance is a positive relationship. Thus reduction in purchase order cycle time is an improvement in procurement performance by the figure. This is in line with philosophies from the procurement perspective which states that employment of has a positive relationship to procurement performance by reducing the purchase order cycle time (days).

4.4.2 Number of Purchase requisitions (NOR)

The results from regression show that NOR is significant in explaining the variations in procurement performance. This is shown by the P value of 0.0933 which shows that NOR is statistically significant in explaining changes in procurement performance at 10% level of significance. The coefficient of NOR +0.008976 which shows a positive relationship to procurement performance. This translates to a negative relationship to
purchase order cycle time, thus an increase in number of purchase requisition increases purchase order cycle time.

An increase in number of requisitions is higher workload to the existing staff which increases the purchase order cycle time, thus days taken to process purchase order to suppliers.

4.4.3 Systems Applications and Products (SAP)

Systems Applications and Products (SAP) has a P-Value of 0.0034 and this means that it is statistically significant at 1% significance level. Procurement performance is lower for by about 3 days for the period where SAP is being used compared to a period where it is not in place.

4.4.4 Training (TR)

This variable has proved to be insignificant in explaining changes in procurement performance as it have a P-value of 0.3735 which is way greater than 0.1. Therefore we accept the Null hypothesis that the coefficient of TR is statistically not significant from zero.

The organisation undergoes training to the employees in procurement department

Training has a P-value of 0.3537 this shows that training is statistically insignificant in explaining changes in procurement performance.

4.5 Summary

The regression results showed that SAP system and employment of extra person will reduce purchase order cycle time, which resulted into better procurement performance. While number of requisitions (NOR) and training (TR) increases purchase order cycle time in days, which result into low procurement performance. Number of requisitions (NOR) is an increase in workload on the current work-force which reduce procurement performance. Training on the other hand turns to reduce procurement performance since employees resist change and failure to adapt new technology improvements from 2012 to 2018. The next chapter will focus on conclusions and policy recommendations and also opportunities for further study and research.
CHAPTER 5

POLICY RECOMMENDATIONS AND CONCLUSIONS

5.0 Introduction

This chapter is synthesis of the entire study and comprehends summary of research findings, exposition of the findings, matching in objectives, conclusions and recommendations based there on. Conclusions are drawn from results and suitable recommendations are made for improvement of the procurement performance. The recommendation will also assist EMA management to draw action plans for improvement in SAP module integration.

5.1 Key findings and conclusions

The main objective of this research was to find out the major challenges EMA has faced during the course of implementing SAP system. Main challenges faced in implementing SAP system has a negative effect to procurement performance and this was analysed through Econometric methodology using E-Views (Version).

The results of the study also indicate that SAP system had a positive impact on procurement performance with a coefficient of 3.17812. This states that implementation of SAP reduces purchase order cycle time by 3 days.

Results also indicate that the model was robust for the study, which means that the independent variables that is number of employees, number of purchase requisitions and SAP system variables explain 70% of the variations in the dependent variable which is procurement performance measurement.

Results further indicate that a unit change in staff training and number of employees’ variables will lead to a positive change in procurement performance measurement of EMA while a unit change in number of purchase requisitions will cause a negative change in measurement of procurement performance
The study found out that SAP (ERP) system implementation increases procurement performance of an organisation. Thus the implementation of SAP resulted in reduction in purchase order cycle time. The outcomes also highlighted that training has no effect on procurement performance thus from the results it showed that as employees trained procurement performance reduced. This outcome was supported with technology acceptance model which states that employees are resistance to change, they fail to adapt early to technological advancement. This results in employees continuing to use old system.

This study suggests that effective execution of organization procurement performance greatly depends on the level of employees’ training since lack of professional trained staff on procurement functions limits the ability of the organizations to embrace procurement performance. Lack of professional training is a key impediment to maintenance of high level of professionalism in the execution of procurement procedures in many public sector organizations. This research argues that the efficiency and the effectiveness of procurement performance are hindered by absence of effective continuous employees training programmes that help in equipping the employees with competitive procurement management skills and knowledge on the use of ERP systems.

In the examination of number of employees in the department of procurement, the study concluded that number of employees in the department have a significant influence on procurement performance at EMA. The study concludes that the procurement staff attained professional qualification should undertake regular training for procurement for staff to enable them update their skills and knowledge and that organization undertake regular training for procurement department staff to enable the update their skills and knowledge and that procurement staffs are conversant with Public Procurement directive.

Workload refers to the intensity of job assignments or tasks given to an employee. It is a source of mental stress for employees. In organizations, reaction of people toward workload is different. Some tackle much better while others suffer in destructive consequences. Just as workload differs as a function of the individual, it also differs as a function of one’s type of occupation. Some occupations are, inherently more work loaded than others.
5.2 Policy recommendations

- As seen by the study, the sub modules of SAP system has failed to be fully utilised in the procurement department due to problems of technological advancement without providing proper training to employees in the procurement department of EMA. EMA has initiated SAP system from the time it was implemented, the organisation only used functional modules and fails to utilise sub-modules of the system. Therefore top management has to consider providing effective training to the employees and hiring new employees with required qualifications for new technology.
- Top management at EMA should channel resources towards use training on SAP system.
- This research recommends EMA top management to stand by with new developments by PRAZ in establishing procurement structure and employment of qualified procurement staff.

5.4 Summary of findings

The study’s objective was to determine the effect of SAP system implementation on procurement performance of EMA from 2012 to 2018. The study targeted number of employees in the procurement department at Head Office, trainings conducted per quarter and workload per quarter as the main variables that affect utilisation of SAP system to achieve better procurement performance. The researcher used secondary data and the output was reported using figures and tables. The researcher also used regression analysis and OLS to establish the effect of SAP System, number of employees, training and number of purchase requisitions held per quarter to try and measure procurement performance at EMA.

5.3 Suggestion for future studies

There is room for future research and study; researchers can expand the topic by researching on the threshold at which SAP (ERP) implementation has resulted in reduction of purchase order cycle time. This will help to establish whether the same
effects will be found when the research is done in different sectors. This will assist in providing concrete facts upon which reliable conclusions can be made.
References


APPENDIX

Appendix 1.1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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R-squared  0.702355  Mean dependent var  13.75000
Adjusted R-squared  0.650591  S.D. dependent var  3.306839
S.E. of regression  1.954701

Appendix 1.2 : LM TEST

Breusch-Godfrey Serial Correlation LM Test:

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<tbody>
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<td>Method: Least Squares</td>
</tr>
<tr>
<td>Date: 04/03/19  Time: 19:33</td>
</tr>
<tr>
<td>Sample: 1 28</td>
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<tr>
<td>Included observations: 28</td>
</tr>
</tbody>
</table>

Presample missing value lagged residuals set to zero.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</table>

R-squared  0.169157  Mean dependent var  -1.59E-16
Adjusted R-squared  -0.068227  S.D. dependent var  1.804108
S.E. of regression  1.864637  Akaike info criterion  4.296327
Sum squared resid | 73.01427 | Schwarz criterion | 4.629379  
Log likelihood  | -53.14858 | Hannan-Quinn criter. | 4.398145  
F-statistic | 0.712587 | Durbin-Watson stat | 1.983944  
Prob(F-statistic) | 0.643460  

Appendix 1. 3 Correlation matrix

<table>
<thead>
<tr>
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<th>NOE</th>
<th>NOR</th>
<th>SAP</th>
<th>TR</th>
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<td>24</td>
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<tr>
<td>Minimum</td>
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<td>Observations</td>
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Appendix 1. 4 Procurement performance

Dependent Variable: PP  
Method: Least Squares  
Date: 04/04/19  Time: 10:41  
Sample: 28  
Included observations: 28
White heteroskedasticity-consistent standard errors & covariance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<td>SAP</td>
<td>-3.178115</td>
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<td>TR</td>
<td>0.042751</td>
<td>0.047108</td>
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</tr>
<tr>
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<td>Prob(Wald F-statistic)</td>
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Appendix 1. 5 White Heteroscedasticity

Dependent Variable: PP  
Method: Least Squares  
Date: 04/04/19   Time: 10:41  
Sample: 1 28  
Included observations: 28  
White heteroskedasticity-consistent standard errors & covariance  

<table>
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<th>Std. Error</th>
<th>t-Statistic</th>
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R-squared  0.702355  Mean dependent var  13.75000  
Adjusted R-squared  0.650591  S.D. dependent var  3.306839  
S.E. of regression  1.954701  Akaike info criterion  4.338784  
Sum squared resid  87.87971  Schwarz criterion  4.576678  
Log likelihood  -55.74298  Hannan-Quinn criter.  4.411511  
F-statistic  13.56831  Durbin-Watson stat  1.405060  
Prob(F-statistic)  0.000008  Wald F-statistic  18.73015  
Prob(Wald F-statistic)  0.000001

Appendix 1. 6 Correlation matrix

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<th>SAP</th>
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