

**EFFECT OF E-PROCUREMENT PRACTICES ON THE
OPERATIONAL PERFORMANCE OF MANUFACTURING FIRMS
IN MOMBASA COUNTY, KENYA**

BY

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DECLARATION

This research project report is my original work and has not been presented for examinations either in the University of Nairobi or any other university.

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This research project report has been presented with my approval as the University supervisor.

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DEDICATION

I dedicate this project to God and my family. Thanking God for being my source of strength, wisdom and inspiration but also for being the source of great health and life. I wish to acknowledge the support of my wonderful wife Nancy Musyoki and the support of Mr. William Malombe my great dad. I also wish to acknowledge the support of Mrs. Sabina Kiusya my supportive mam and the encouragement of my wonderful brothers Kim and Mash. To my great friends Ronnie and Mulumba who have supported this academic journey in different ways, I remain indebted and may our good God reward you immensely.

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ABBREVIATIONS AND ACRONYMS

DOI	-	Diffusion of Innovation
E-invoicing	-	Electronic Invoicing
E-tendering	-	Electronic Tendering
E- Ordering	-	Electronic Ordering
E-payment	-	Electronic Payment
E- procurement	-	Electronic Procurement
E-sourcing	-	Electronic Sourcing
GDP	-	Gross Domestic Product
ICT	-	Information, Communication and Technologies
IT	-	Information Technology
KAM	-	Kenya Association of Manufacturers
KNBS	-	Kenya National Bureau of Statistics
RBV	-	Resource Based View
SCM	-	Supply Chain Management
TAM	-	Technology Adoption Model

ABSTRACT

The adoption of e-procurement platforms enables the organization to reduce business cost, access wider market and streamline purchasing processes. However, the advantages of e-procurement have varied depending on the implementation context; but the overall impact when applied appropriately has been indisputable. The title of this study was to explore the influence of e-procurement practices on operational performance of manufacturing firms in Mombasa County. The objectives of the study were to determine the e-procurement practices employed by manufacturing firms in Mombasa County and to examine the effect of e-procurement practices on the operational performance of manufacturing firms in Mombasa County. Operational performance which was the dependent variable and e-procurement practices that consist of e-ordering, e-tendering, e-invoicing, e-sourcing and e-payment formed the independent variable. This study adopted a cross sectional descriptive survey research design and the population was 41 manufacturing firms in Mombasa County. The study used original data which was obtained through the use of a standardized questionnaire. The questionnaire was administered to the e-procurement managers of manufacturing firms in Mombasa and one respondent per firm was surveyed. Regression analysis was employed to determine the association between dependent and independent variables. The results of e-procurement practices and operational performance established that e-procurement practices accounted for 79.8% of the variation in overall operational performance of manufacturing firms in Mombasa. More importantly, the results established that the effect of e-tendering and e-payment on operational performance was positive and significant. Based on these findings therefore, proper installation of e-procurement practices has an overall positive and significant effect on the operational performance of manufacturing firms. In conclusion, the study mainly found that the effect of e-tendering and e-payment on the operational performance of manufacturing firms was positive and significant. It is therefore the recommendation of this study that manufacturing firms should embrace e-tendering and e-payment more and more because of the strong and positive effect that the two have on operational performance of manufacturing firms.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

In order to advance business performance, e-procurement is a vital tool although it has not been incorporated adequately in many businesses, especially small and medium enterprises. According to Gunasekaran and Ngai (2008), insufficient and unsustainable e-procurement practices have led to low performance in terms of business growth and profit making for many firms in the world. E-procurement arrangements involve essential improvements of the procuring process providing advantages to the company such as procure procedure competence, price reductions and improved mutual links (Croom & Brandon-Jones, 2005).

Over the decades, e-procurement has created considerable industrial benefits and it is anticipated to continue enhancing effectiveness as well as future production (Corina, 2011). For sustainable growth, directors have started to reorganize their competitive priorities. More and more companies have realized that through e-procurement there is a great possibility of improving their competitiveness and curving out a niche (Vaidyanathan & Devaraj, 2008). E-procurement enables businesses, as well as state and non-state companies, to leverage their procuring capacity in an extremely simplified way right from the comfort of their working desks (Candra & Gunawan, 2017).

From a theoretical perspective, a number of models can be used to explain and discuss the link between e-procurement and operational performance. In this study, the technology adoption model, the resource-based view and the diffusion of innovation theory are used to support the link between e-procurement practices and operational performance of

manufacturing firms. The technology adoption model postulates that perceptions about an innovation are important in the development of attitudes that eventually lead to utilization behavior (Audu, 2018). Therefore, e-procurement adoption is influenced by the user's attitude towards its usefulness as they perceive it, and the actual usefulness of e-procurement practices. The resource-based view articulates that online information as well as online practices are resources that affect the potential of logistical performance and consequently lead to improved performance (Vaidyanathan & Devaraj, 2008). The diffusion of innovation theory on the other hand explains that the innovation and adoption of e-procurement happens in several stages including understanding, persuasion, decision, implementation and confirmation (Lai, 2017).

In Kenya, the manufacturing industry is the third largest sector after agriculture and transport and it is also the third largest GDP contributor. The manufacturing sector in Kenya is quite diversified and comprises of all products, which in other terms are referred to as non-agricultural products as well as products from the agro-processing industries (Akoth, 2015). Some of the key challenges facing manufacturing firms in Kenya include cost reduction, spending controls and compliance, increased productivity, standardized buying, process efficiencies, increased transaction speeds and reduced errors. Likewise, in Mombasa manufacturing firms are under lots of pressure to cope with changing modern trends and innovations.

The manual procurement process in many Mombasa based manufacturing firms has faced many challenges. Key ones include red taped paper-based processes, lack of capacity to track costs, lack of capacity to justify costs and inability to manage purchasing history (Kariith & Kihara, 2017). The adoption of E-procurement practices in manufacturing firms

is going to address most of these challenges in ways that lead to improved performance and consequently increased profits.

1.1.1 E-Procurement

E-procurement relates to the utilization of the integrated communication structures (normally based on the internet) in the performance of a part or the entire procuring practice; the practice could involve phases such as need identification, searching, exploring, ordering, concession, delivery and post procurement appraisal (Sitar, 2011). It is also defined as the application of electronic systems via internet to carry out purchasing duties: need identification, tendering procedure, compensation as well as contract management (Barngetuny & Kimutai, 2015). It involves technology supported procuring solutions intended to simplify business transactions within and between firms as well as information technology solutions supporting logistics, handling and payment platforms (Corina, 2011).

E-procurement seeks to make strategic benefits by enhancing customer links resulting from higher organizational efficiency and improved information access and versatility (Corina, 2011). It is supported by technology-driven purchase practice, integrating functional procedures and purchase management (Shukla, Khan & Shah, 2016). It represents a considerable and significant part of electronic business in the SCM (Croom & Brandon-Jones, 2005). It solves the problems associated with traditional procurement by streamlining procedures, offering well-timed information and improving harmonization and coordination, all of which result to cost reductions and time savings (Sitar, 2011). It is basically more than merely a platform for acquiring goods online.

It has been promoted as a key performance indicator that can advance performance and competence of companies (Rotich & Okello, 2015). E-procurement helps firms to regionalize their operational procurement processes and consolidate their strategic procurement processes in ways that provide superior supply chain precision (Singh & Punia, 2011). Buying of commodities by electronic means increases transparency as well as accountability, increases market access as well as healthy competition and advances the effectiveness of e-procurement system (Candra & Gunawan, 2017). The utilization of these e-procurement platforms helps cut down cost of purchasing and offers room for enhanced coordination among different suppliers, faster time of transaction and increased overall efficiency (Ruzindana & Kalaskar, 2016).

1.1.2 Operational Performance

The concept looks at performance of an organization against set standards including aspects like waste reduction, productivity, cycle time, environmental responsibility and regulatory compliance (Vencataya, 2011). It focuses on the firm's internal operating capacity in relation to reducing waste and cutting costs, enhancing product quality, development of new products, improved delivery capacity, as well as growing productivity (Riyadi & Munizu, 2013). Operational performance also represents the measurable elements of an organizational system including production cycle time, reliability and stock turns. It further reflects business performance attributes such as market share and consumer satisfaction (Voss, Åhlström & Blackmon, 1997).

Operational performance is important to organizations because it enhances production effectiveness, builds high quality products, consumers are more satisfied, and consequently the organization enjoys higher revenue and profits (Kaynak & Hartley, 2008).

The firm's operational performance determines the extent to which it is producing products as well as services both efficiently and effectively and the degree to which the products as well as the services satisfy the customer requirements and expectations (Vencataya, 2011). Operational performance is very important in the management of the organizational processes and it is key in paving appropriate pathways for sustainable company competitiveness (Hwang, Han, Jun & Park, 2014). It further fosters the company's performance to reach its basic objectives including productivity, quality and service (Bayo-Moriones, &De Cerio, 2002).

Evaluation of the operational performance of a firm is a fundamental exercise and a key function in the maintenance of competitive advantage for that particular firm (Hwang et al, 2014). Operational performance is measured using various approaches and dimensions including issues of performance to schedule, preventive maintenance, productivity measures, lead-time measures, quality measures, inventory measures, utilization, time, speed, cost, efficiency and effectiveness (Birech, 2011). Considering the overall scope of this study, the focus of operational performance has been placed on the following three dimensions; efficiency, quality and speed. To achieve high operational performance, firms must consider the efficient and effective use of all the resources in their disposal; for example, organizations must consider employees to be assets and they must be deployed in the most effective and efficient ways to achieve maximum productivity and maximum employee motivation. Efficiency describes the best possible use of the organization's resources to achieve maximum benefit. This results to low-cost commodities due to minimizing waste and generally the firm can provide value to clients (Vencataya, 2011).

Quality has been defined in relation to conformance to specification and therefore quality aspects of performance seek to address matters like the number of defects produced and the cost of quality. Time and speed encompass on-time deliveries and has capacity to significantly determine consumer satisfaction -this makes it an important component of operational performance. It also looks at things like the time elapsing between materials reception and product delivery to the consumers (Bayo-Moriones, & de Cerio, 2002).

1.1.3 E-procurement and Operational Performance

E-procurement has a strategic significance especially because its implementation overcomes many institutional hurdles. It involves new and dynamic trends that bring about efficient practice in procurement management and by extension improves interaction between suppliers and the organization. It provides an opportunity to generate competitive advantage through ways that advance the operational performance of an organization (Adero, 2014).

Operational performance attributes like cost reduction, spending controls and compliance, increased productivity, standardized buying, process efficiencies, process effectiveness, increased transaction speeds and reduced errors can be pursued through proper application of e-procurement systems and methods. E-procurement offers considerable cost savings and ensures operational efficiency in many organizations. Accountability and transparency are also a primary benefit of the e-procurement systems (Boudijilda & Pannetto, 2013). E-procurement benefits are primarily rooted in; reduction of spending outside the contract by use of technology to raise awareness of the available and accessible products and services and making it easy and seamless to place an order. It reduces transaction costs by automating procedures presently based on paper and simplifies the regulation processes

and records management. Application of e- procurement processes significantly enhances achievement of profits for the organization (Plant & Valle, 2008).

1.1.4 Manufacturing Firms in Mombasa County

Manufacturing firms play an increasingly significant role in the Kenyan economy (Avedi, 2016). Most manufacturing firms in Kenya concentrate around the three biggest towns - Nairobi, Kisumu and Mombasa and many of the companies are either micro or small (Kariithi & Kihara, 2017). The Kenyan manufacturing industry encompasses all aspects of human activities playing a key role in the transformation of raw materials into finished products (Chege, Ngui & Kimuyu, 2015).

The Kenyan manufacturing sector happens to be the third largest in terms of contribution to GDP (10.3 %) behind transport and communication (11.3 %) and agriculture and forestry (23.4%) (KNBS, 2017). The 2017 Economic Survey showed that manufacturers in Kenya contributed 11% value to GDP and hence the favourable policies in place to encourage the growing sectorial performance (Kariithi & Kihara, 2017). The industry is a key employment source in the urban areas and has both backward and forward links which are very key to the rest of the economy. It is essential in achieving the nation's vision of being prosperous as well as globally competitive by 2030 (Chege, Ngui & Kimuyu, 2015).

According to the Kenya Association of Manufacturers (KAM) and the Mombasa County department of Trade and investment, Mombasa County has got 41 registered manufacturing firms. All of which face challenges related to operations and management but also infrastructural issues. Statistics indicate that many manufactured goods have a

shorter life cycle due to the changing market needs. Mombasa-based manufacturing firms are under pressure to cope with the evolving market needs.

This requires them to constantly improve technology and innovation leading to introduction of new products while keeping the costs of manufacturing low. This endeavor requires a versatile e-procurement platform (Kariith & Kihara, 2017). In terms of the prevalence of modern technology including E-procurement platforms, Mombasa-based manufacturing firms are missing the opportunity as they are not effectively leveraging technology, usually because of the related costs of doing so. Therefore, while larger manufacturing firms use technology efficiently including adoption of e-procurement procedures, smaller manufacturing firms do not. As a result, many of these firms are using outdated technology as well as obsolete systems and machines (Were, 2016). Proper installation of e-procurement platforms by the Mombasa based firms will lead to three key strategic benefits: they will begin to respond to market needs seamlessly and much faster, they will improve product delivery time and they will lower overall costs of production significantly. E-procurement therefore presents solutions to these challenges and is a worthwhile investment.

1.2 Research Problem

The rise of information technology has a big impact on all business- oriented activities and recently, it has involved the implementation of e-procurement systems and e-marketplace platforms in many organizations (Sitar, 2011). Adoption of e-procurement platforms enables the organization to reduce business cost, access wider markets and streamline purchasing processes (Shukla, Khan & Shah, 2016). However, the advantages of e-

procurement have varied depending on the implementation context; but the overall impact when applied appropriately has been indisputable (Barasa, Namusonge & Okwaro, 2017).

A good number of organizations perceive e-procurement platforms to be too costly to set up and operate, the resulting organizational change and the need for staff training or increased resources has been a cause for alarm (Ruzindana & Kalaskar, 2016). E-procurement function in Kenya has continued to be associated with scandals and lack of transparency mainly achieved through mishandling of e-procurement information, dishonesty, lack of standard checks and controls and the deliberate inflation of figures to benefit a few managers. All these concerns have led to excessive corruption (Barngetuny & Kimutai, 2015). E-procurement departments of many manufacturing firms in Kenya have no suitable procedures or standards for issuing supplier contracts (Masheti, 2016). They either use outdated procedures or systems that have weaknesses leading to the massive corruption witnessed around e-procurement function. The adoption of e-procurement platforms by manufacturing firms in Mombasa will directly address these challenges and in many ways, it is expected to sanitize the e-procurement function of many organizations.

Ruzindana and Kalaskar (2016) studied the impact of e-procurement in e-procurement performance of selected telecommunication companies in Rwanda. They found a positive correlation between the adoption of e-procurement and the overall procurement performance, but this study focused on telecommunication firms only. Similarly, Quesada (2010) examined the effect of e-procurement on some e-procurement procedures and procurement performance. He found that the use of e-procurement platforms positively affects procurement practices and procurement performance, but the study did not focus

on operational performance. In Kenya, a study by Barngetuny and Kimutai (2015) examined impact of e-procurement on the supply chain performance in the Counties. They found that e-tendering and e-invoicing positively affects supply chain performance, but operational performance was not factored in the study. Nganga (2017) also examined the effect of e-procurement on operational performance of parastatals locally and found a link between e-procurement and operational performance, but the context of the study was parastatals in Kenya. Matunga, Nyanamba and Okibo (2013), Avedi (2016) and Masheti (2016) have also looked at e-procurement practices in their different studies and their findings are captured in the subsequent sections.

All in all, there is little focus on the existing correlation between e-procurement and operational performance of manufacturing firms. A focus on manufacturing firms is important because e-procurement in many manufacturing firms presents unique and untapped potential. Operational performance is also essential because manufacturing firms are mainly driven by operations and in Mombasa County for example, one of the key challenges facing the firms involves weak operational set up and weak operational performance. This study therefore aims at answering the following research problem: What is the effect of e-procurement practices on operational performance of manufacturing firms in Mombasa County?

1.3 Research Objectives

To assess the link between e-procurement practices and operational performance of manufacturing firms in Mombasa County.

1.3.1 Specific Objectives

- (i) To determine the e-procurement practices employed by manufacturing firms in Mombasa County.
- (ii) To examine the effect of e-procurement practices on operational performance of manufacturing firms in Mombasa County.

1.4 Significance of the Study

Findings of this study shall enable policy-makers, government, regulatory bodies and other users to model policies and programs that significantly enhance sustainability and growth of manufacturing firms. It will boost, promote and enhance the introduction of sound policies, procedures and standards to guide the management of e-procurement. It will also steer managers towards understanding and adopting e-procurement best-practice and by extension minimizing corruption and maximizing value for money.

The outcome of this research and the recommendations will assist manufacturing firms to understand how they can effectively manage their procurement function as a source of competitive advantage. The results will also highlight the general cost implications for establishing and running e-procurement platforms especially among small and medium sized manufacturing firms in Mombasa County. Additionally, the study will highlight the operational challenges faced by manufacturing firms in Mombasa County and how those challenges have been addressed through effective application of e-procurement platforms. To a great extent, the study will provide background information, useful ideas and gaps that other researchers and scholars can take up and investigate. It also forms a basis for a good case to future employers and investors joining the manufacturing sector.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The section discusses theoretical review, various e-procurement practices and the previous studies on e-procurement practice and operational performance. The chapter further looks at the various gaps in literature, summarizes the reviewed literature and finally depicts the study's conceptual framework.

2.2 Theoretical Foundation of the Study

The broad aim of this study was to evaluate the effect of e-procurement on operational performance. The theoretical foundation of this study will consist of the Technology adoption model (TAM), the resource-based view (RBV) and the diffusion of innovation theory (DOI). These will provide the theoretical anchorage for the study and will be discussed in the following subsections.

2.2.1 Technology Adoption Model

Technology adoption model (TAM) was established by Davis (1989) and it examined the different factors (components) that influence the adoption of any new technology in any working organization (Ruzindana & Kalaskar, 2016). TAM explains the general determinants of adopting technology and focuses on the behavior of the users specifically across a wide array of technologies and populations (Lai, 2017; Audu, 2018). TAM explains that the utilization of technology is mostly affected by the user's expectations towards the technology. The expectations are as a result of the attitude possessed by the user either positive or negative for this specific technology. The users attitude is dependent on his or her view about the ease of use or the perceived ease of use (Singh & Punia, 2011).

The TAM model is based on two given notions: the perceived usefulness (PU) as well as the perceived ease of use (PEU). This perceived usefulness (PU) is explained to be an individual feeling that the usefulness of the system such as an electronic payment system will improve the traditional way of doing things. On the other hand, the perceived ease of use (PEU) is the extent to which the potential customer anticipates that the new system will be efficient, effective and effortless (Lai, 2017). Perceived usefulness (PU) is further demonstrated through the extent to which the customer has faith that the use of a new system will indeed improve their level of operations in terms of effectiveness. Perceived usefulness is a key determinant influencing user's convictions and decisions to utilize an innovation (Hoong, Thi & Lin, 2017). Perceived ease of use (PEU) is demonstrated by the extent to which the given tool of use is free of effort.

In accordance to this theory, emerging technologies such as e-procurement cannot enhance the firm's operational performance unless the technology is properly adopted by the users (Rotich & Okello, 2015). In e-procurement adoption and use, the technology adoption model explains that, personal perceptions such as attitude towards ease of use, perceived usefulness, and organizational factors such as corporate culture, success of the competitors and top management support are key (Suliantoro, Ghazali & Wibowo, 2015). According to the theory, if e-procurement platforms are perceived to be easy to use, then they are more likely to be adopted by the management and staff and by extension the operational performance of the organization will improve (Alomar & Visscher, 2017). The theory also explains that if e-procurement platforms are perceived as complex to use, then they would be adopted at a slower pace which will negatively affect the company's operational performance.

2.2.2 Resource Based View

Penrose, (1959) is associated with the resource - based-view (RBV) and places emphasis on the resources of a particular company being the fundamental indicators of competitive edge and performance (Madhani, 2009). According to this theory, a firm may be classified as a collection of tangible assets, human resources as well as organizational resources. Organizational resources that are rare, valuable, unique and cannot have substitutes are the major sources of competitive advantage (Raphaeli, Berman & Fink, 2015). The resource-based view argues that resources can be grouped into organizational capital resources, physical capital resources and human capital resources. Allocating them efficiently helps an organization to achieve greater performance (Vaidyanathan & Devaraj, 2008).

The RBV presumes that companies in a given sector or group could be similar with regard to the assets they are in charge of. Secondly, it presumes that the similarities of those companies could continue over time since the utilization of resources and the application of strategies within those firms is different and not necessarily mobile across the firms (Raphaeli, Berman & Fink, 2015). The RBV evaluates and analyzes the assets used internally in a firm and insists that assets and abilities are very key in strategy formulation and that they lead to competitive advantage. The assets could be seen as the inputs which allow companies to conduct their operations. The assets and abilities found in the firm determine the choices made by the organization and how it competes with the other players in the industry (Madhani, 2009). Resource based view identifies internal operational processes as vital components of the organizational resources and this could include processes like integrating electronic platforms in executing tasks such as tender invitations (Munyao & Moronge, 2018).

The theory states that IT related resources create unique IT capabilities which improve the operational performance of organizations. This could mean improvements in time, speed, quality, reduced errors and also increased efficiency. In addition, IT investments like e-procurement enhance the operational performance of a firm after a certain period of time while in the short term they increase the operating costs, enhance quality and enhance speed in the operations of the firm (Raphaeli, Berman & Fink, 2015). In this study, the resource-based view argues that e-procurement will potentially provide extensive improvements in operational performance over the long term. This is due to the streamlining and automation of the e-procurement function leading to lower inventory costs and lower operational costs as well as a strategic network of suppliers that allows effective and efficient supply chain management.

2.2.3 Diffusion of Innovation Theory

Rogers (1995) came up with the diffusion of innovation (DOI) theory suggesting that innovations were all but perceptions, processes or a tool seen to be new by a person or by any other adoption unit (Suliantoro, Ghozali & Wibowo, 2015). DOI explains the procedure of distributing an innovative idea using the various channels of communication to members of a system. The medium of communication is preferably the channels of mass media for example radio as well as the newspaper and also the interactive and interpersonal channels (Alomar & Visscher, 2017). The theory also explains that when the adopter is an organization, the organizational structure (including centralization, complexity and formalization) and the organizational transparency (including connections to the other organizations) affects the rate of adoption. This theory classifies innovation adopters into

five groups; innovators, early adopters, early majority, late majority as well as the laggards (Alomar & Visscher, 2017).

The DOI theorem provides an analytical and conceptual framework for describing the adoption of innovation right from the idea conceptualization phase to the implementation phase. According to Rogers (1995), this rate of adoption is the pace at which these innovations are integrated into the social system. This pace is affected by the perceived characteristics of that innovation, that include the benefits derived, the suitability, flexibility, complexity and finally the testing ability (Alomar & Visscher, 2017). In this study, DOI theory argues that organizations increasingly attempt to improve their operational performance by adopting new technologies such as e-procurement systems which in turn improve sharing of information, speed of transactions, efficiency in supplier coordination and overall lowering of costs.

2.3 E-procurement Practices

E -procurement practices can be looked at as solutions that integrate and streamline many procurement processes throughout organizations (Ruzindana & Kalaskar, 2016). This practice entails the use of Information Communication Technologies (ICTs) to conduct the entire e-procurement process which includes sourcing for prospective suppliers, negotiation with the suppliers, ordering for the products or services, receipt of goods as well as post procurement reviewing. The application of ICT to these e-procurement procedures leads to a significant reduction in terms of both the cost incurred as well as the time used (Shukla, Khan& Shah, 2016). There are various types of e-procurement practices which focus on either part or the entire e-procurement cycle. Scholarly articles have distinguished several e- procurement practices in literature. The most common ones are e-

ordering, e-tendering, e-invoicing, e-sourcing and e-payment (Barasa, Namusonge & Fredrick, 2017). These are discussed in the following subsections.

2.3.1 E-ordering

E-ordering is defined as a formal electronic request for products or for services which is inclusive of all the phases from need identification, purchasing, payment for the services or goods received to after sales services including management of the contract and the suppliers (Ibem & Laryea, 2015). It is underpinned by the automation of the e-procurement cycle, integrating the functional procedures and the management of purchase (Barngetuny & Kimutai, 2015). It is mostly utilized in the final stages of procurement process and it generates savings and increased effectiveness of the e-procurement process (Singh & Punia, 2011).

E-ordering has contributed to great savings in basic procurement costs incurred by various firms worldwide and thus technology use is a key strategy for many firms (Munyao & Moronge, 2018). E-ordering focuses mostly on the procedure for creation and the approval of the requisitions used for purchasing, order placement as well as receipt of the services and goods ordered online. E-catalog is utilized by the staff of the firm to place an order for the urgently needed products.

2.3.2 E-tendering

E-tendering is the process of conducting the full procurement cycle on the internet including submission of price bids in a way that ensures effectiveness, economy and speed of internet is well harnessed. It is the procedure of electronic request transmission through the internet so as to perform operations related to procurement (Munyao & Moronge,

2018). This is where submission of quotation is done electronically by the contractor when so required for the execution of a part or the entire project or for the materials to be provided by the vendor (Singh & Punia, 2011). E-tendering entails the dissemination as well as the receiving of tender information, expressions of interest for the tender and finally the awarding of the tender digitally through technologically networked platforms (Ibem & Laryea, 2015).

It encompasses sending the requests for information (RFIs) and request for proposals (RFP) to vendors and obtaining back their responses through the internet. Mostly, e-tendering is supported by the e-tendering system which evaluates the received responses from the vendors (Corina, 2011). This leads to better tracking of the order placed, as it is easy to keep track of orders and also make corrections in case of any errors for the previous orders placed. Some of the biggest advantages include: the use of less time as well as reduced labour intensive activities (Barngetuny & Kimutai, 2015).

2.3.3 E-invoicing

E-invoicing refers to the delivery of bills and related information by an enterprise to its clients using electronic communication and more so the internet. It offers lots of advantages: great cost reductions, the process is also made simple, reduced time for making payments, greater data security, and also lots of environmental benefits (Barasa, Namusonge & Okwaro, 2017). To create a financially viable e-invoicing platform, corporates should come up with a critical mass or a network of alliance partners and technology solution providers to add the necessary desirability for electronic invoicing through a financial supply chain (Barngetuny & Kimutai, 2015).

Generally, e-invoicing provides a number of advantages to organizations and suppliers. These advantages could include things like: vendor self-service, automated matching, digital invoice capture, enhanced account reconciliation, enhanced spend management and access to early payment discounts. Evidence has shown that considerable savings will be realized if companies move their suppliers from submitting invoices manually to submitting invoices electronically. In Kenya, most private entities have moved to e-procurement and are using the e-invoicing platforms, but government entities have not changed in equal measure.

2.3.4 E-sourcing

E-sourcing refers to the internet-linked applications and their decision support systems enabling the associations between suppliers and buyers through online negotiations, online auctions, reverse auctions and other related applications (Candra & Gunawan, 2017). It entails the use of electronic purchase procedures implemented through different types of web-based tools. Its systems are used to standardize and automate purchasing procedures (Munyao & Moronge, 2018). Its tools are used to manage the flow of different types of documents for example by either automating the document creation process or electronically transmitting documents to suppliers (Singh & Punia, 2011).

E-sourcing enables the determination of prospective vendors for a specific category of purchasing requirements using internet technologies across spatial boundaries. Key advantages of e-sourcing include: improved flexibility to make decisions and also to reduce the prices (Corina, 2011). It is mostly applied during the stage of coming up with specifications and gives the firm improved competitiveness and more savings on costs incurred (Barngetuny & Kimutai, 2015). It offers many potential benefits to organizations

including lower incurred costs emanating from better efficiency experienced by the firm, reduced costs by vendors, fewer errors in orders placed and lower spontaneous purchases (Sitar, 2011).

2.3.5 E-payment

E -payment system is a form of financial commitment that involves the buyer and the sellers facilitated transactions through the use of electronic platforms. It is a monetary transaction between the buyer and seller by use of electronic systems to perform transactions including mobile payments, internet payments, e-cards, PC banking and e-cash in the supply chain (Munyao & Moronge, 2018). E-payment is rapidly growing in the global market and it continues to hold enormous growth potential. It gives the clients the advantage of conducting their transactions anytime and anywhere with reduced costs. Furthermore, it minimizes the real distance between the participants and makes the world appear as a small village with ease of access. The use of e-payment is influenced by its ability to introduce value in a quick, efficient and effective manner (Singh & Punia, 2011).

2.4 Empirical Review

Various studies undertaken by different scholars will help us form a deep understanding of the subject matter and will help us establish a point of departure for this study. In their study, Teo and Lai (2009) studied the relationship between the degree of e- procurement practices employed, and their effects measured from different dimensions such as volume, diversity, breadth, and intensity as well as the performance gains with respect to financial performance. The study reviewed firms in Singapore where a sample of 141 firms were selected and questionnaires used to collect data. The research results showed that different dimensions of e-procurement use influence the performance of firms. The study however

focused on financial performance and not operational performance. While focusing on financial performance is important, in the context of manufacturing firms in Mombasa County, a focus on operational performance prevails because of the operational nature of the key challenges that most of those firms face. It is therefore relevant for this study to proceed with an operational performance perspective.

A study by Purchase and Dooley (2010) investigated the important aspects driving organizations to adopt e-procurement platforms. The study found out that task improvements, vendor participation, and organizational support directly influences intentions, and active participation of the vendors. These findings also revealed that vendors play a strategic role in the use of e-procurement systems and highlight a range of implications for organizations.

Smart (2010) examined the use of e-procurement within four international companies, to establish the impact of these mechanisms on their approach to supply market. The findings revealed that firms developed a clear market supply strategy based on a segmentation model and e-procurement tools were used as tactical means to implement and extend that strategy towards the supply base. The study also revealed that tactics within defined segments were developing, as purchasing firms utilize e-procurement tools to minimize the suppliers involved as well as to leverage their volumes in price competitive markets.

Matunga, Nyanamba and Okibo (2013) examined impact of e-procurement on the efficiency of procurement in the county hospitals. This study assessed the degree in which e-procurement was enhancing quality of products in the hospitals, the level of price reduction through e-procurement and getting value for money thanks to e-procurement.

The findings revealed that the referral hospital in Kisii County applies e-tenders, e-quotation and e-sourcing as the major e-procurement tools while the biggest challenge during e-marketing was minimal funding, poor management of change as well as limited training of staff in the use of e-procurement platforms.

Mikalef, Pateli, Batenburg and Wetering, (2013) examined the influence of procurement practices on SCM performance. The study sampled 172 European firms and analyzed data by way of partial least squares structural equation modelling. The findings revealed that procurement alignment causes increased performance over time. The study also found that in contrast to the evidence of empirical studies that agree with the notion that decentralization of functions allows for the application of e-procurement, centralized SCM practices encourage good alignment in procurement. The study focused on e-procurement and supply chain management and not operational performance.

Oh, Yang and Kim (2014) examined the influence of e-procurement systems on the correlation of IT abilities with the performance of companies. The study collected primary data from 142 manufacturers in Korea and used the moderated regression analysis to check for any kind of association among ICT abilities, such as coordinating abilities, as well as the systems of e-procurement. The findings revealed that there was a relationship between ICT capacity and profitability of the firms. This study however focused on e-procurement practices and IT competence and not operational performance.

Avedi (2016) examined the effect of e-procurement on the organizational performance of firms using KAM registered industries' in the Kenyan capital. The study adopted a descriptive approach and collected data using questionnaires from a sample of 102

respondents. The collected data was evaluated using descriptive statistics as well as multiple regression analyses. These results established significant positive relationship between the components of e-procurement namely; data transmission, buyer/supplier organizational management and billing management with the performance of manufacturing companies in Nairobi, Kenya. The study however did not link e-procurement to operational performance of firms.

Masheti (2016) sought to establish the correlation between e-procurement practices and operational performance in pharmaceutical manufacturing companies in Nairobi. It adopted descriptive cross-sectional survey design and used questionnaires to collect data from 50 pharmaceutical firms operating in Nairobi. Using the regression model to analyze data, the findings revealed that e-planning, e-supplier selection, e-tendering and e-sourcing influences the performance of pharmaceutical manufacturing companies. However, the study focused on pharmaceutical firms and not manufacturing firms.

In another study, Odero and Ayub (2017) examined the impact of procurement plans on purchasing performance in the public sugar manufacturing firms in Western Kenya. This study used the descriptive survey design of research and questionnaires from 62 respondents were used to gather data primarily from the e-procurement section of two public sugar-processing companies. The study results established that, planning of procurement had a positive and significant effect on the performance of procurement while the competence of staff had a positive but insignificant effect on the performance of sugar processing firms. However, this study concentrated on procurement performance and not operational performance.

In Kenya, Munyao and Moronge (2018) examined the influence of the practices of e-procurement on the procurement performance of public universities in Kenya. This study targeted 31 public universities in Kenya and collected data using questionnaires from procurement officers of the universities. The study found that e-tendering, e-sourcing and e-ordering positively and significantly affect the purchasing performance while e-payment had a direct but insignificant influence on purchasing performance. The study further established that e-procurement practices were adopted to a moderate extent among the publicly owned institutions of higher learning in Kenya. However, the context of the study was public universities and not manufacturing firms.

2.5 Summary of Literature Review and Research Gaps

This paper reviewed several research studies among them Teo and Lai (2009) who examined e-procurement practices and financial performance but the study did not address operational performance, Purchase and Dooley (2010) who focused on e-procurement adoption but the study did not incorporate aspects of operational performance. Smart (2010) examined the effect of e-procurement on the supply market and (Mikalef et al., 2013) studied procurement alignment on SCM performance. Oh, Yang and Kim (2014) examined the effect of e-purchasing practices on IT capacity and company performance but the study did not concentrate on operational performance and their context was not manufacturing firms.

The study also reviewed other studies in Kenya among them Matunga, Nyanamba and Okibo (2013) who examined e-procurement practices and effective procurement in communal health centers and not manufacturing firms. Avedi (2016) who studied e-procurement on organizational performance and not operational performance. Masheti

(2016) focused on e-procurement practices and operational performance of pharmaceutical firms while Odero and Ayub (2017) concentrated on procurement performance of communal sugar firms. Munyao and Moronge (2018) focused on e-procurement practices in the procurement departments of public universities and not manufacturing firms. In the context of this study, the focus is placed on operational performance of Mombasa based manufacturing firms and assessing the existing relationship between e-procurement practices and operational performance. This is because most of the manufacturing firms in Mombasa are facing challenges that are operational in nature and there is an indication that e-procurement may have a positive and significant effect on operational performance in that context.

2.6 Conceptual Framework

The conceptual framework for this study will include operational performance which will be the dependent variable and e-procurement practices consisting of e-ordering, e-tendering, e-invoicing, e-sourcing and e-payment will form the independent variable. The conceptual framework is shown by Figure 2.1.

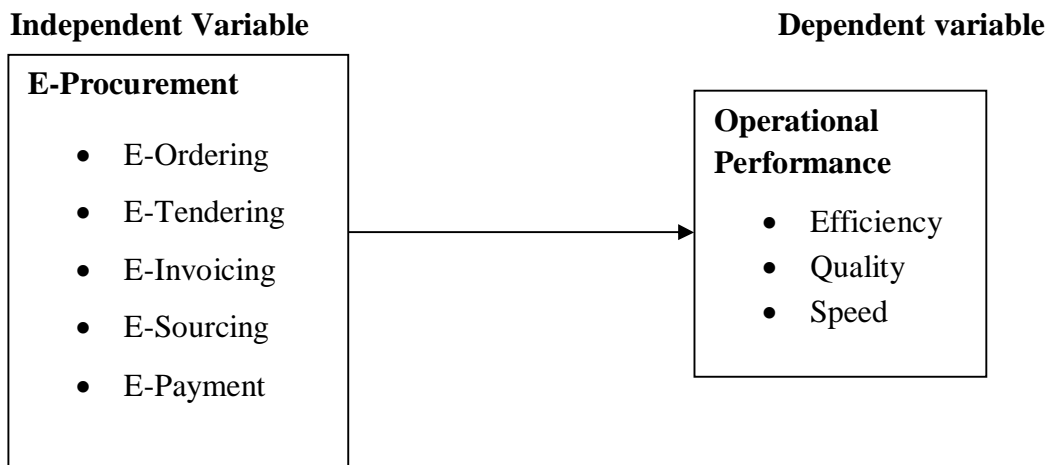


Figure 2.1: Conceptual Framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section describes the steps, procedures and the approaches that were followed in executing this study. It lays down the study plan used, the population of interest, the procedures and instruments used to collect data, analyze data and to determine reliability and validity.

3.2 Research Design

This study adopts a cross-sectional descriptive research design, which is a method entailing the evaluation of gathered information from a target population , or a representative of the subset at a specific time. Descriptive cross-sectional survey is concerned with establishing what, who, where and how much of a phenomenon is involved; it is also keen on the appearance or the relationship between variables. This research design was selected because it is affordable, it is also easy to use to prove or disprove assumptions and it is fairly time saving.

3.3 Population of Study

The population of this study comprised of all manufacturing firms operating in Mombasa County. According to KAM (2017) and Mombasa County government (2017), there are 41 manufacturing firms in Mombasa County. A census of all the manufacturing firms was done since this population is small.

3.4 Data Collection

The study used primary data which was obtained through the use of a structured questionnaire. The questionnaire was the most suitable study instrument because it allowed

the researcher to gather data from all the manufacturing firms in Mombasa. The questionnaire was made up of three parts; Part A gathered data on the firm's demographic characteristics, Part B gathered data on e-procurement practices and Part C gathered data on operational performance. The questionnaire was administered to the e-procurement managers of the manufacturing firms in Mombasa and one respondent per firm was surveyed. The questionnaires were emailed to some e-procurement managers while in some instances the questionnaires were presented to the e-procurement managers in-person. The response rate was 87%.

3.5 Operationalization of Study Variables

The study's dependent variable was operational performance while the independent variable was e-procurement practices. Table 3.1 indicates how the variables were operationalized.

Table 3.1: Operationalization of Study Variables

Variable	Sub Variable	Indicators	literature
E-procurement practices (Independent variable)	• E-ordering	<ul style="list-style-type: none"> • Use of online order management system-(OMS) • Online warehouse integration • Suppliers have real time online access to stock information. • Use of online customized order forms • Order information and history well stored 	Ibem & Laryea (2015)
	• E-tendering	<ul style="list-style-type: none"> • Online screening and selection of suppliers • Prepare and publish tenders online • Online supplier performance assessments • Historical bid submissions • Online supplier contract management • E-invoice templates in use 	Munyao & Moronge (2018) Barasa, Namusonge & Okwaro, 2017

	<ul style="list-style-type: none"> E-invoicing 	<ul style="list-style-type: none"> Automatic payment reminders Late payment online notifications Online invoice processing E-invoice software in use 	Candra & Gunawan (2017)
	<ul style="list-style-type: none"> E-sourcing 	<ul style="list-style-type: none"> Pre-qualified suppliers have online access to key information Online requests for quotations Online bidding Standardized, timely, online communication to suppliers Use of e-sourcing software 	Singh & Punia (2011)
	<ul style="list-style-type: none"> E-payment 	<ul style="list-style-type: none"> Suppliers have access to their online supply accounts 24/7 Use of credit and debit cards for payments Use of smart cards for payments Use of online bank transfers for payment Use of online payment platforms for payment 	
Operational performance (Dependent variable)	<ul style="list-style-type: none"> Efficiency 	<ul style="list-style-type: none"> Improved inventory turns Improved throughput Schedule/production attainment Improved capacity utilization Overall equipment effectiveness 	Matunga, D., Nyanamba, S., & Okibo, W. (2013).
	<ul style="list-style-type: none"> Quality 	<ul style="list-style-type: none"> Levels of customer rejects/returns Supplier defect rate Rates of corrective action requests First pass yield percentage Re-work rates 	
	<ul style="list-style-type: none"> Speed 	<ul style="list-style-type: none"> Manufacturing cycle time On-time delivery Improved time to make change overs Availability time Downtime rate 	

Source: Research Data (2018)

3.6 Data Analysis

Data for the study was analyzed using descriptive statistics like the mean, percentages, frequencies, as well as standard deviation to summarize the data into meaningful form. In

addition, regression analysis was employed to determine the association between dependent and independent variables. A summary of data collection and data analysis methods is included in table 3.2

Table 3.2: Summary of Data collection and Data analysis methods

Objectives	Questionnaire	Data Analysis Method
General information	Part A	Descriptive statistics–percentages
To determine the e-procurement practices employed by manufacturing firms in Mombasa County	Part B	Descriptive statistics - mean and standard deviation
To examine the influence of e-procurement on operational performance of manufacturing firms in Mombasa County	Part C	Descriptive statistics - mean, standard deviation and regression analysis

Source: Research Data (2018)

Regression Model:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5$$

Where: Y = dependent variable (Operational performance)

$\beta_0, \beta_1 \beta_2 \beta_3 \beta_4 \beta_5$ = constants

X_1 = independent variable (E-sourcing)

X_4 = independent variable (E-payment)

X_2 = independent variable (E-invoicing)

X_5 = independent variable (E –ordering)

X_3 = independent variable (E-tendering)

3.6.1 Diagnostic Tests

Various diagnostic tests were undertaken to assess the assumptions of the regression model.

Diagnostic tests ensure that the assumptions are not violated. The study therefore undertook

the normality test, the multicollinearity test, the autocorrelation test and the homoskedasticity test. The normality of the data was tested by the Shapiro Wilk tests.

Autocorrelation arises when random error components are not independently distributed using the Durbin Watson test. The value of 1.5 and 2.5 is considered to indicate the absence of serial correlation. Homoskedasticity assesses whether different samples have the same variance even if they came from different populations. The Variance Inflation Factor (VIF) was used to assess multicollinearity in this study.

3.6.2 Validity and Reliability

When an instrument assesses what it was meant to assess then it is said to be valid (Kothari, 2004). Experts were engaged among them the project supervisor and other departmental lecturers to assess for validity of the research instrument. Reliability means consistency in the results obtained and a test is considered reliable if the same results are recorded repeatedly (Cooper & Schindler, 2003). Reliability was measured using the Cronbach Alpha coefficient.

3.6.3 Test of Significance

The t and F tests were used as the measures of significance where t – test assessed the significance of the independent variables and the F-test was used to evaluate the importance of the regression equation.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter discusses data collection and data analysis of the study. It carefully presents the results of the response rate, reliability analysis, demographic analysis and descriptive statistics on e-procurement practices and operational performance. The chapter further gives results of the diagnostic tests, regression analysis and finally the interpretation of the study results.

4.2 Response Rate

The study targeted 41 manufacturing firms in Mombasa County. The list of firms is based on KAM and Mombasa County government 2017 records and has been included in the appendices. The study managed to have 87% response rate and this was sufficient for the study.

4.3 Reliability Analysis

The Cronbach alpha coefficient was used to evaluate the reliability of the questionnaire.

The questionnaire was the study instrument. Table 4.1 shows the reliability results;

Table 4.1: Reliability Analysis

Variable	Cronbach Alpha	No of Items
E-sourcing	.847	5
E-invoicing	.836	5
E-tendering	.801	5
E-payment	.843	5
E-ordering	.836	6

Source: Research Data (2018)

Table 4.1 indicates that Cronbach Alpha figures of 0.847, 0.836, 0.801, 0.843 and 0.836 are more than the recommended threshold of 0.7. This indicates that the questionnaire is reliable.

4.4 Demographic Characteristics

This section discusses the demographic characteristics of the respondents. This includes the gender, experience, number of employees, the number of suppliers/contractors contracted routinely, the use of e-procurement practices and the level of education of the respondents. The results are discussed in the following subsections.

4.4.1 Gender of the Respondent

Table 4.2 shows the gender results.

Table 4.2: Gender

	Frequency	Percent
Male	20	55.6
Female	16	44.4
Total	36	100.0

Source: Research data (2018)

The gender results on table 4.2 show that 55.6% of the respondents were male while 44.4% of the respondents were female. The results indicate that most of the respondents were male.

4.4.2 Experience of the Respondents

Information on the respondents' experience was sought and the findings are presented in table 4.3. Table 4.3 shows that 30.6% of the respondents had an experience of less than 5 years while 55.6% had an experience of 5 to 10 years. The study further shows that 13.9% of the respondents had an experience of more than 10 years.

Table 4.3: Respondents' Experience

	Frequency	Percent
Less than 5 years	11	30.6
5-10 years	20	55.6
Over 10 years	5	13.9
Total	36	100.0

Source: Research data (2018)

The general findings show that majority of the respondents had an experience of more than 5 years. This implies that most of the respondents in the study had existed long enough to consider implementing e-procurement practices.

4.4.3 Number of Employees

A strong indicator of the level of adoption of technology is the number of employees. To this end, the study required the respondents to indicate the number of employees that their respective firms had engaged. The results are displayed in table 4.4.

Table 4.4: Number of Employees

Employees	Frequency	Percent
Less than 200	18	50.0
200-400	17	47.2
Above 400	1	2.8
Total	36	100.0

Source: Research data (2018)

Findings in table 4.4 indicate that 50% of the firms had less than 200 employees while 47.2% had between 200-400 workers. It further shows that 2.8% of the firms had more than 400 workers. The results therefore indicate that many firms had less than 200 employees. This is in line with the observation that firms adopting various technologies and innovations are likely to hire less people.

4.4.4 Number of Suppliers Contracted Routinely

The respondents indicated the number of suppliers or contractors who they contracted routinely. Table 4.5 shows that 41.7% of the firms had 20-50 suppliers while 33.3% had 10-20 suppliers. The results further show that 16.7% of the firms had more than 50 suppliers while 8.3% had 5 to 10 suppliers respectively.

Table 4.5: Suppliers Contracted Routinely

Number of Suppliers	Frequency	Percent
5-10	3	8.3
10-20	12	33.3
20-50	15	41.7
Over 50	6	16.7
Total	36	100.0

Source: Research data (2018)

The findings indicate that majority of the firms had more than 10 suppliers. This shows that a large number of firms dealt with many suppliers. Under such circumstances adopting e- procurement practices would be better for the firms.

4.4.5 Use of E-procurement Practices

The results on the use of e-procurement practices are shown in table 4.6.

Table 4.6: Use of E-procurement Practices

Response	Frequency	Percent
Yes	35	97.2
No	1	2.8
Total	36	100.0

Source: Research data (2018)

The results on table 4.6 show that 97.2% of the respondents used e-procurement practices while 2.8% did not. This indicates that majority of the firms used e-procurement practices.

4.4.6 Level of Education

The results of the respondent's education levels are shown in Table 4.7.

Table 4.7: Education Levels

Education levels	Frequencies	Percentage
Diploma	8	22.2
Degree	20	55.6
Masters	8	22.2
Total	36	100.0

Source: Research data (2018)

The results on education levels from table 4.7 show that 22.2% of the research participants had a diploma and 22.2% had a master's degree. On the other hand, 55.6% of the participants had a bachelor's degree. This indicates that majority of the participants had good levels of education.

4.5 Extent of adoption of E-procurement Practices

One of the objectives was to determine the degree to which e-procurement practices were adopted. The respondents were required to indicate on a Likert scale the extent to which they had adopted e-procurement practices.

(1-1.5) – No Extent (2.5 -3.5) – Moderate Extent (4.5-5.0) Very Large Extent
(1.5 -2.5) -Small Extent (3.5-4.5) – Large Extent

The results are discussed in the following subsections.

4.5.1 E-Ordering

E-ordering is defined as a formal electronic request for products or for services which is inclusive of all the phases from need identification, purchasing, payment for the services or goods received to after sales services. Table 4.8 below indicates that the firms use an online order management system, they allow suppliers to have real time online access to stock information and they use an online order information history to a moderate extent as

indicated by the mean values of 3.1667, 3.0278 and 3.0833 which correspond to the scale values of (2.5 -3.5) indicating moderate extent. The results also show that the development of an online warehouse integration platform and the use of online-customized order forms was applied to a moderate extent as shown by the mean values of 3.0833 and 2.9444. The overall mean of 3.01611 indicates that e-ordering is applied to a moderate extent by the manufacturing firms in Mombasa County. The results of the extent of adoption of e-ordering practices are shown in Table 4.8.

Table 4.8: E-Ordering

Statement	Mean	Std. Deviation	Rank
The firm uses an online order management system (OMS)	3.1667	1.36277	1
The firm allows suppliers to have real time online access to stock information	3.0278	1.23024	4
The firm uses online customized order forms	2.9444	1.32976	5
The firm has developed an online warehouse integration platform	3.0833	1.50000	2
The firm has online order information history which is well managed	3.0833	1.33898	2
Overall Mean	3.01611	1.0611	

Source: Research data (2018)

4.5.2 E-Tendering

E-tendering refers to a process that facilitates the complete tendering process from the advertising to the placing of the contract through web or internet-based approaches. The results on Table 4.9 below indicate that firms prepare and publish tenders online, carry out online screening and selection of suppliers to a moderate extent as indicated by the mean values of 2.7222 and 2.8333. The results on adoption of e-tendering practices are displayed in Table 4.9 below.

Table 4.9: E-Tendering

Statement	Mean	Std. Deviation	Rank
The firm prepares and publishes tenders online	2.7222	1.25610	5
The firm does online screening and selection of suppliers	2.8333	1.10841	3
The firm does online supplier performance assessments routinely	2.9722	1.48297	2
The firm has an internet-based system that manages historical bid submissions	2.8333	1.36277	3
The firm has an online supplier contract management system	3.0278	1.18288	1
Overall mean	2.8778	0.99860	

Source: Research data (2018)

The results show that the firm carries out online supplier performance assessments routinely and has an internet-based system that manages historical bid submissions to a moderate extent as shown by the mean values of 2.9722 and 2.8333 respectively. Additionally, the results indicate that the firms use online supplier contract management systems to a moderate extent as indicated by the mean value of 3.0278. The overall mean of 2.8778 indicates that e-tendering is used to a moderate extent by the manufacturing firms in Mombasa County.

4.5.3 E-Invoicing

E-invoicing refers to bills and payment information submission by a firm to its customers via electronic communication and more so the internet. Table 4.10 indicates that the firms use e-invoicing templates, e-payment online notifications and an e-invoice software system to a moderate extent as indicated by the mean values of 3.00, 3.2500 and 3.1111. The findings on adoption of e-invoicing practices are shown in table 4.10.

Table 4.10: E-Invoicing

Statement	Mean	Std. Deviation	Rank
The firm is currently using e-invoice templates	3.0000	1.24212	5
The firm is currently using Automatic payment reminders	3.5278	1.20679	2
The firm is currently using e-payment online notifications	3.2500	1.10518	3
The firm is currently using online invoice processing	3.6111	1.39955	1
The firm is currently using an e-invoice software	3.1111	1.44969	4
Overall mean	3.3000	0.96036	

Source: Research data (2018)

The results further indicate that the firms use automatic payment reminders and online invoice processing systems to a large extent as shown by the mean values of 3.5278 and 3.6111. The overall mean value of 3.300 indicates that the firms use e-invoicing to a moderate extent.

4.5.4 E-Sourcing

E -sourcing refers to the internet-linked applications and their decision support systems enabling the associations between suppliers and buyers through online negotiations, online auctions, reverse auctions and other related applications (Candra & Gunawan, 2017). The results on the adoption of e-sourcing practices are displayed in table 4.11.

Table 4.11: E-Sourcing

Statement	Mean	Std. Deviation	Rank
The firm has a list of pre-qualified suppliers who have online access to key organizational information	2.8889	1.25988	5
The firm receives online quotations from different suppliers	3.0833	1.31747	3
The firm organizes online bidding to select the lowest but most qualified supplier	3.0833	1.13074	3
The firm uses an e-sourcing software	3.2778	1.13669	1
The firm provides standardized, routine online communication to suppliers	3.1389	1.37639	2
Overall mean	3.094	0.97803	

Source: Research data (2018)

Table 4.11 indicates that the firms receive online quotations from different suppliers, organizes online bidding to select the lowest but most qualified supplier, uses an e-sourcing software and provides standardized, routine online communication to suppliers to a moderate extent as indicated by the mean values of 3.0833, 3.0833, 3.2778 and 3.1389 respectively. The results also indicate that the firm uses a list of pre-qualified suppliers who have online access to key organizational information to a moderate extent as indicated by the mean value of 2.8889. The overall mean of 3.094 indicates that e-sourcing is used to a moderate extent by the manufacturing firms in Mombasa County.

4.5.5 E-Payments

E-payment is a way of paying for goods and services electronically instead of using checks or cash. The results on table 4.12 indicate that the firms ensure that suppliers have access to their online supply accounts and they use mobile money platforms to make payments to suppliers to a moderate extent as indicate by mean values of 3.2222 and 3.2500 respectively.

Table 4.12: E-Payments

Statement	Mean	Std. Deviation	Rank
The firm ensures that suppliers have access to their online supply accounts 24/7	3.2222	1.31173	2
The firm uses debit and credit cards to make payments	3.2222	1.37552	2
The firm uses smart cards to make payments to suppliers	3.1944	1.36945	4
The firm uses online bank transfers to make payments to suppliers	2.8056	1.34843	6
The firm uses online payment platforms to make payments to suppliers	2.9167	1.29560	5
The firm uses mobile money platforms to make E-payments to suppliers	3.2500	.99642	1
Overall mean	3.1019	0.95558	

Source: Research data (2018)

The results also indicate that the firms use debit and credit cards to make payments and use smart cards to make payments to suppliers to a moderate extent as indicated by the mean values of 3.2222 and 3.1944 respectively. The results further indicate that the firms use online bank transfers to make payments to suppliers and they use online e-payment platforms to make payments to suppliers to a moderate extent as indicated by mean values of 2.8056 and 2.9167 respectively. The overall mean value of 3.1019 indicates that e-payments are used to a moderate extent by the manufacturing firms in Mombasa County.

4.5.6 Summary of Adoption of E-procurement Practices

This study was keen to determine the e-procurement practices employed by manufacturing firms in Mombasa County. The summary results of the adoption of e-procurement practices by the manufacturing firms in Mombasa County are depicted by table 4.13.

Table 4.13: Summary of adoption of E-procurement Practices

	Mean	Standard Deviation	Rank
E-ordering	3.01611	1.0611	3
E-tendering	2.87780	0.99860	5
E-invoicing	3.0000	0.96036	4
E-sourcing	3.0940	0.97803	2
E-payment	3.1019	0.95558	1
Average	3.0870	0.87976	

Source: Research data (2018)

The results on table 4.13 indicate that manufacturing firms in Mombasa have adopted e-payment and e-sourcing to a moderate extent as shown by the mean values of 3.1019 and 3.0940 respectively. The results further show that manufacturing firms in Mombasa have adopted e-ordering and e-invoicing practices to a moderate extent as indicated by the mean values of 3.01611 and 3.0000 respectively. Lastly, the results also depict e-tendering with a mean value of 2.87780 meaning that manufacturing firms in Mombasa County have adopted e-tendering to a moderate extent. The overall mean value of 3.0870 shows that in

general, e-procurement practices are adopted to a moderate extent by the manufacturing firms in Mombasa County.

4.6 Operational Performance

This section evaluates the various attributes of operational performance among the manufacturing firms in Mombasa County. Table 4.14 shows the results;

Table 4.14: Operational Performance

	Statement	Mean	Std. Deviation
Efficiency	The firm has improved inventory turns	3.2222	1.22150
	The firm has improved throughput	3.2778	1.16155
	The firm has improved schedule/production attainment	2.9167	1.38099
	The firm has improved capacity utilization	3.0278	1.02779
	The firm has improved overall equipment effectiveness	3.0000	1.30931
	Overall mean	3.0889	0.85716
Quality	The firm has reduced the levels of customer reject/returns	2.7778	1.09834
	The firm has reduced the supplier defect rate	3.3333	1.12122
	The firm has reduced the rates of corrective action requests	3.0278	1.13354
	The firm has improved the percentage of first pass yield	3.3611	.93052
	The firm has reduced the re-work rate	2.6111	1.49815
	Overall mean	3.0222	0.78526
Speed	The firm has improved availability time	3.0556	1.24084
	The firm has improved manufacturing cycle time	3.2222	.83190
	The firm has improved on time delivery commitment	3.2500	1.05221
	The firm has improved time to make changeovers	3.2778	.97427
	The firm has greatly reduced the downtime rate	3.4444	1.15745
	Overall mean	3.2500	0.75800
Operational Performance		3.1204	0.65452

Source: Research data (2018)

Table 4.14 indicates that the firms had improved inventory turns, improved schedule/production attainment, improved capacity utilization and improved overall

equipment effectiveness to a moderate extent as indicated by the mean values of 3.2222, 3.2778, 3.0278 and 3.0000 respectively. The results also show that the firms had improved throughput to a moderate extent as indicated by the mean value of 2.9167. The overall mean of 3.0889 indicates that the firms operational performance in terms of efficiency was moderate.

The results further indicate that the firms had reduced the rates of corrective action requests, improved the percentage of first pass yield and reduced the re-work rate to a moderate extent as indicated by the mean values of 3.3333, 3.0278 and 3.3611 respectively. The results also show that the firms had reduced the levels of customer reject/returns and reduced the supplier defect rate to a moderate extent as shown by the mean values of 2.7778 and 2.6111 respectively and the overall mean of 3.0222 indicates that the firms operational performance in terms of quality was moderate.

The findings also show that the firms had improved availability time, improved manufacturing cycle time, improved on time delivery commitment and reduced the downtime rate to a moderate extent as indicated by mean values of 3.0556, 3.2222, 3.2500 and 3.2778 respectively. The overall mean of 3.2500 indicates that the firms' operational performance in terms of speed was moderate.

4.7 E-Procurement and Operational Performance

The second objective of this study was to determine the effect of adoption of e-procurement practices on operational performance of manufacturing firms in Mombasa County. The data that was used to achieve this objective is summarized in table 4.15 below.

Table 4.15: E-procurement Practices and Operational Performance

SNO	X1	X2	X3	X4	X5	Y1	Y2	Y3	Y
1	3.40	3.20	3.20	3.40	2.50	2.80	2.40	3.60	2.93
2	4.40	3.60	4.20	3.40	2.83	2.80	1.80	3.60	2.73
3	1.80	1.60	3.60	2.40	2.67	2.40	2.40	2.40	2.40
4	1.80	1.40	4.00	2.40	4.17	2.60	3.80	3.60	3.33
5	3.60	3.40	3.20	3.00	3.67	3.60	3.40	3.40	3.47
6	3.40	3.00	3.40	3.40	3.33	4.20	3.20	4.00	3.80
7	1.00	1.00	2.40	1.20	2.00	2.00	2.20	2.60	2.27
8	3.80	4.20	4.20	3.80	4.50	3.60	4.40	3.40	3.80
9	1.00	1.00	1.40	1.40	1.17	1.80	1.40	1.80	1.67
10	4.40	4.60	4.60	4.60	4.50	4.80	3.80	4.60	4.40
11	3.80	3.40	3.80	4.40	4.33	4.00	3.60	3.20	3.60
12	1.60	1.40	1.20	1.20	2.33	2.00	2.00	3.80	2.60
13	1.00	1.20	2.40	1.40	1.50	2.00	3.20	3.00	2.73
14	3.00	3.40	3.40	4.20	4.33	4.00	4.40	3.40	3.93
15	2.20	3.60	3.00	3.80	2.33	3.80	4.40	2.20	3.47
16	1.20	1.40	1.80	1.20	1.33	1.60	2.60	2.80	2.33
17	4.60	4.40	2.80	4.20	4.00	4.60	3.00	4.60	4.07
18	1.60	1.40	1.20	1.40	1.67	1.60	1.60	1.80	1.67
19	2.20	2.20	1.80	2.40	1.33	1.60	2.00	2.60	2.07
20	3.00	3.40	2.40	3.40	2.83	3.40	3.40	2.80	3.20
21	3.60	2.80	3.40	3.20	3.17	3.80	3.20	3.60	3.53
22	3.80	2.80	3.20	2.80	4.00	3.20	1.80	3.20	2.73
23	3.60	3.60	3.40	3.60	3.50	3.20	3.40	3.40	3.33
24	4.80	4.20	2.80	4.40	4.17	4.20	3.80	4.40	4.13
25	3.60	3.60	3.40	3.60	3.50	3.20	3.40	3.20	3.27
26	3.60	2.60	4.20	3.40	3.83	3.40	3.60	3.40	3.47
27	3.60	3.20	3.60	3.20	4.00	2.80	2.80	3.40	3.00
28	3.60	3.80	4.00	3.20	3.00	3.40	2.80	3.20	3.13
29	3.60	3.60	3.40	3.60	3.67	4.00	3.20	4.40	3.87
30	3.80	3.00	5.00	3.40	3.33	3.00	2.80	3.20	3.00
31	3.20	3.00	4.20	3.80	2.33	2.60	2.80	2.40	2.60
32	3.20	3.00	3.80	3.00	3.50	3.00	3.00	4.40	3.47
33	4.00	3.00	3.80	3.60	3.17	2.80	4.00	2.20	3.00
34	3.00	3.40	4.40	4.20	3.33	2.60	2.80	4.20	3.20
35	3.00	2.80	4.20	3.00	2.67	3.20	3.40	2.80	3.13
36	3.40	2.40	4.00	2.80	3.17	3.60	3.00	2.40	3.00

Source: Research data (2018)

Where;

X₁ = E-ordering

X₂ = E-tendering

X₃ = E-invoicing

X₄ =E- sourcing

X₅ = E-payment

Y₁ = Efficiency

Y₂ = Speed

Y₃ = Quality

Y = Operational Performance

4.7.1 Diagnostic Tests

Before data is subjected to regression analysis, diagnostic tests are done to ensure that the data does not violate important assumptions of regression analysis. The tests are discussed in the following subsections.

4.7.1.1 Normality Test

In statistics, normality tests are used to determine if a data set is well-modeled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. This study adopts the Shapiro-Wilk test as it is the most powerful normality test. The findings of the tests are shown in Table 4.16.

Table 4.16: Normality Test

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E-Procurement and Efficiency	.088	36	.200*	.991	36	.989
E-Procurement and Quality	.080	36	.200*	.986	36	.927
E-Procurement and Speed	.143	36	.059	.950	36	.101
E-Procurement and Overall Operational Performance	.076	36	.200*	.975	36	.562

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Research data (2018)

4.7.1.2 Multicollinearity Test

The Variance Inflation Factor (VIF) was used to test for linearity. The findings are presented in Table 4.17. The collinearity statistics results indicate that all the VIF values are less than 10 an indication that there is no multicollinearity among the study variables. This indicates that the assumption of multicollinearity has not been violated in the study.

Table 4.17: Multicollinearity Test

		tolerance	VIF
E-procurement and Efficiency	E-Ordering	0.172	5.809
	E-Tendering	0.104	9.588
	E-Invoicing	0.454	2.204
	E-Sourcing	0.116	8.633
	E-Payment	0.37	2.699
E-procurement and Quality	E-Ordering	0.172	5.809
	E-Tendering	0.104	9.588
	E-Invoicing	0.454	2.204
	E-Sourcing	0.116	8.633
	E-Payment	0.37	2.699
E-procurement and Speed	E-Ordering	0.172	5.809
	E-Tendering	0.104	9.588
	E-Invoicing	0.454	2.204
	E-Sourcing	0.116	8.633
	E-Payment	0.37	2.699
E-procurement and overall Operational Performance	E-Ordering	0.172	5.809
	E-Tendering	0.104	9.588
	E-Invoicing	0.454	2.204
	E-Sourcing	0.116	8.633
	E-Payment	0.37	2.699

Source: Research data (2018)

4.7.1.3 Autocorrelation Test

The study assessed autocorrelation - which arises when random error components are not independently distributed using the Durbin Watson test. Table 4.18 shows the results;

Table 4.18: Durbin Watson Test

Relationship	Durbin Watson Statistic	K=5 n = 36		Conclusions
		d _L	d _U	
E-procurement and Efficiency	1.742	1.071	1.833	Test is inconclusive
E-procurement and Quality	2.277	1.071	1.833	No Autocorrelation
E-procurement and Speed	2.643	1.071	1.833	No Autocorrelation
E-procurement and Operational Performance	2.273	1.071	1.833	No Autocorrelation

Source: Research data (2018)

Table 4.18 shows that the Durbin Watson result of 2.273 lies between the recommended value of 1.5 and 2.5. This is an indication that there was no autocorrelation among the study variables.

4.7.1.4 Test for Heteroskedasticity

To test for presence of Heteroskedasticity, the macro syntax by Gwilym Pryce on Breusch-Pagan and Koenker was run. Koenker test was employed due to the small number of targeted firms. The results of the tests are displayed in table 4.19.

Table 4.19: Koenker-Test statistics

Relationship	Koenker test Statistic	P-Value	Conclusion
E-procurement and Efficiency	2.593	0.7625	Data is not heteroskedastic
E-procurement and Quality	3.529	0.6190	Data is not heteroskedastic
E-procurement and Speed	1.241	0.9409	Data is not heteroskedastic
E-procurement and Overall Operational Performance	3.395	0.6393	Data is not heteroskedastic

Source: Research data (2018)

Since the p-values for all the models (0.7625, 0.6190, 0.9409 and 0.6393) are greater than the significance level of 0.05, the null hypothesis is not rejected. This means that in all the four models data is not heteroskedastic.

4.8 Regression Analysis

To determine the correlation between the dependent and independent study variables, regression analysis was carried out. The regression results were as follows;

4.8.1 E-Procurement Practices and Efficiency

E-procurement seeks to make strategic benefits by enhancing customer links resulting from higher organizational efficiency. Efficiency describes the best possible use of the organization's resources to achieve maximum benefit. To test how e-procurement practices influenced efficiency, the two were regressed and the findings are indicated in Table 4.20.

**Table 4.20: E-Procurement Practices and Efficiency
Model Summary^b**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.873 ^a	.762	.723	.45135	1.742

a. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

b. Dependent Variable: Efficiency

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.604	5	3.921	19.247	.000 ^b
	Residual	6.111	30	.204		
	Total	25.716	35			

a. Dependent Variable: Efficiency

b. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.704	.297		2.372	.024		
	E-Ordering	-.006	.172	-.007	-.033	.974	.172	5.809
	E-Tendering	.289	.237	.336	1.220	.232	.104	9.588
	E-Invoicing	-.114	.118	-.128	-.970	.340	.454	2.204
	E-Sourcing	.242	.229	.276	1.056	.299	.116	8.633
	E-Payment	.387	.131	.431	2.950	.006	.370	2.699

a. Dependent Variable: Efficiency

Source: Research data (2018)

The results on e-procurement practices and efficiency shows that the R value (correlation coefficient) was 0.873 which indicates a strong correlation between the independent variables (e-payment, e-invoicing, e-tendering, e-ordering, e-sourcing) and the dependent variable (efficiency). The R square value of 0.762 shows that the independent variables

accounted for **76.2%** of the variation in the dependent variable (efficiency). The F statistics value of 19.247 was significant as indicated by the fact that the p value (0.000) is less than 0.05 an indication that the regression model is fit and significant. The coefficient results show that the effect of e-ordering and e-invoicing on efficiency was negative and insignificant while the effect of e-tendering and e-invoicing on efficiency was positive and insignificant. The results further show that there was a significant and positive effect of e-payment on efficiency. These findings are depicted by the following equation:

$$Y_1 = 0.704 - 0.07X_1 + 0.336X_2 - 0.128X_3 + 0.276X_4 + 0.431X_5$$

Where Y_1 = Efficiency, X_1 = E-ordering, X_2 = E-tendering, X_3 = E-invoicing, X_4 = E - Sourcing and X_5 = E-payment.

Test of significance

The test of significance for the correlation coefficient of e-procurement practices and efficiency was conducted as follows;

H_0 : $r = 0$ (the correlation between e-procurement practices and efficiency is not significant)

H_1 : $r \neq 0$ (The correlation between e-procurement practices and efficiency is significant)

The level of significance $\alpha = 0.05$

$$t = r \sqrt{\frac{n-2}{1-r^2}}$$

$$t = 0.873 \sqrt{\frac{36-2}{1-0.873^2}} = 10.434$$

(Reject H_0 if computed t does not fall between -2.042 and 2.042.)

Conclusion: Since computed t (10.434) falls in the rejection region, the null hypothesis is rejected implying that the correlation between e-procurement practices and efficiency is significant.

4.8.2 E-Procurement Practices and Quality

Quality was regressed on e-procurement practices. The findings are tabulated in table 4.21.

Table 4.21: E-procurement Practices and Quality

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.764 ^a	.583	.514	.54748	2.277

a. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

b. Dependent Variable: Quality

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.590	5	2.518	8.401	.000 ^b
	Residual	8.992	30	.300		
	Total	21.582	35			

a. Dependent Variable: Quality

b. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.146	.360		3.184	.003		
	E-Ordering	-.673	.209	-.915	-3.221	.003	.172	5.809
	E-Tendering	.320	.287	.407	1.114	.274	.104	9.588
	E-Invoicing	.085	.143	.104	.596	.556	.454	2.204
	E-Sourcing	.457	.278	.569	1.642	.111	.116	8.633
	E-Payment	.426	.159	.518	2.677	.012	.370	2.699

a. Dependent Variable: Quality

Source: Research data (2018)

The results on e-procurement practices and quality show that the R-value (correlation coefficient) was 0.764 which indicates a strong correlation between the independent variables (e-payment, e-invoicing, e-tendering, e-ordering, e-sourcing) and the dependent variable (quality). The R square value of 0.583 shows that the independent variables accounted for **58.3%** of the variation in the dependent variable (quality). The F statistics

value of 8.401 was significant as indicated by the p value of 0.000 ($p \leq 0.05$) an indication that the regression model is fit and significant. The coefficient results show that there was a negative and significant effect of e-ordering on quality while the effect of e-payment on quality was positive and significant. On the other hand, the effect of e-tendering, e-invoicing and e-sourcing on quality was positive and insignificant. These relationships were depicted by the following equation:

$$Y_2 = 1.146 - 0.915X_1 + 0.407X_2 + 0.104X_3 + 0.569X_4 + 0.518X_5$$

Where Y_2 = Quality, X_1 = E-ordering, X_2 = E-tendering, X_3 = E-invoicing, X_4 = E-Sourcing and X_5 = E-payment.

Test of significance

The test of significance for the correlation coefficient of e-procurement practices and quality was conducted as follows;

H_0 : $r = 0$ (the correlation between e-procurement practices and quality is not significant)

H_1 : $r \neq 0$ (The correlation between e-procurement practices and quality is significant)

The level of significance $\alpha = 0.05$

$$t = r \sqrt{\frac{n-2}{1-r^2}}$$

$$t = 0.764 \sqrt{\frac{36-2}{1-0.764^2}} = 6.904$$

(Reject H_0 if computed t does not fall between -2.042 and 2.042.)

Conclusion: Since computed t (6.904) falls in the rejection region, the null hypothesis is rejected implying that the correlation between e-procurement practices and quality is significant.

4.8.3 E-Procurement Practices and Speed

The results on E-procurement practices and speed show that the R-value (correlation coefficient) was 0.685 which indicates a strong correlation among the independent variables (e-payment, e-invoicing, e-tendering, e-ordering, e-sourcing) and the dependent variable (speed).

**Table 4.22: E-Procurement Practices and Speed
Model Summary^b**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.685 ^a	.470	.381	.59631	2.643

a. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

b. Dependent Variable: Speed

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.443	5	1.889	5.311	.001 ^b
	Residual	10.667	30	.356		
	Total	20.110	35			

a. Dependent Variable: Speed

b. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.751	.392		4.465	.000		
	E-Ordering	.014	.228	.020	.061	.952	.172	5.809
	E-Tendering	.420	.313	.554	1.345	.189	.104	9.588
	E-Invoicing	-.077	.156	-.098	-.496	.623	.454	2.204
	E-Sourcing	-.324	.303	-.418	-1.069	.294	.116	8.633
	E-Payment	.485	.173	.611	2.798	.009	.370	2.699

a. Dependent Variable: Speed

Source: Research data (2018)

The R square value of 0.470 shows that the independent variables accounted for **47%** of the variation in the dependent variable (speed). The F statistics value of 5.311 was significant as indicated by the p value of 0.000 ($p \leq 0.05$) an indication that the regression model is fit and significant. The coefficient results show that there was a positive and insignificant effect of e-ordering and e-tendering on speed while the effect of e-invoicing and e-sourcing on speed was negative and insignificant. On the other hand, the effect of e-payment on speed was positive and significant. These findings are represented by the following equation:

$$Y_3 = 1.751 + 0.20X_1 + 0.554X_2 - 0.098X_3 - 0.418X_4 + 0.611 X_5$$

Where $Y_3 = \text{Speed}$, $X_1 = \text{E-ordering}$, $X_2 = \text{E-tendering}$, $X_3 = \text{E-invoicing}$, $X_4 = \text{E - Sourcing}$ and $X_5 = \text{E-payment}$.

Test of significance

The test of significance for the correlation coefficient of e-procurement practices and speed was conducted as follows;

$H_0: r = 0$ (the correlation between e-procurement practices and speed is not significant)

$H_1: r \neq 0$ (The correlation between e-procurement practices and speed is significant)

The level of significance $\alpha = 0.05$

$$t = r \sqrt{\frac{n-2}{1-r^2}}$$

$$t = 0.470 \sqrt{\frac{36-2}{1-0.470^2}} = 3.105$$

(Reject H_0 if computed t does not fall between -2.042 and 2.042.)

Conclusion: Since computed t (3.105) falls in the rejection region, the null hypothesis is rejected implying that the correlation between e-procurement practices and speed is significant.

4.8.4 E-Procurement Practices and Overall Operational Performance

The results on e-procurement practices and overall operational performance show that the R-value (correlation coefficient) was 0.893 which indicates a strong correlation between the independent variables (e-payment, e-invoicing, e-tendering, e-ordering, e-sourcing) and the dependent variable (operational performance).

Table 4.23: E-Procurement Practices and overall Operational Performance

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.893 ^a	.798	.765	.31763	2.273

a. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

b. Dependent Variable: Operational Performance

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.967	5	2.393	23.724	.000 ^b
	Residual	3.027	30	.101		
	Total	14.994	35			

a. Dependent Variable: Operational Performance

b. Predictors: (Constant), E-Payment, E-Invoicing, E-Tendering, E-Ordering, E-Sourcing

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.200	.209		5.746	.000		
	E-Ordering	-.222	.121	-.361	-1.828	.077	.172	5.809
	E-Tendering	.343	.166	.523	2.060	.048	.104	9.588
	E-Invoicing	-.035	.083	-.052	-.427	.672	.454	2.204
	E-Sourcing	.125	.161	.187	.775	.445	.116	8.633
	E-Payment	.433	.092	.632	4.687	.000	.370	2.699

a. Dependent Variable: Operational Performance

Source: Research data (2018)

The R square value of 0.798 shows that the independent variables accounted for **79.8%** of the variation in the dependent variable (operational performance). The F statistics value of 23.724 was significant as indicated by the p value of 0.000 ($p \leq 0.05$) an indication that the regressed model is fit and significant. The coefficient results show that there was a negative and insignificant effect of e-ordering and e-invoicing on operational performance but the effect of e-sourcing on operational performance was positive and insignificant. The results further show that the effect of e-tendering and e-payment on operational performance was positive and significant. These findings are represented in the following equation:

$$Y = 1.200 - 0.361X_1 + 0.523X_2 - 0.052X_3 + 0.187X_4 + 0.632X_5$$

Where Y = Overall Operational Performance, X_1 = E-ordering, X_2 = E-tendering, X_3 = E-invoicing, X_4 = E-Sourcing and X_5 = E-payment.

Test of significance

The test of significance for the correlation coefficient of e-procurement practices and overall operational performance was conducted as follows;

H_0 : $r = 0$ (the correlation between e-procurement practices and overall operational performance is not significant)

H_1 : $r \neq 0$ (The correlation between e-procurement practices and overall operational performance is significant)

The level of significance $\alpha = 0.05$

$$t = r \sqrt{\frac{n-2}{1-r^2}}$$

$$t = 0.893 \sqrt{\frac{36-2}{1-0.893^2}} = 11.570$$

(Reject H_0 if computed t does not fall between -2.042 and 2.042.)

Conclusion: Since computed t (11.570) falls in the rejection region, the null hypothesis is rejected implying that the correlation between e-procurement practices and overall operational performance is significant.

4.9 Discussion of the Findings

The results revealed that the effect of e-ordering and e-invoicing on efficiency was negative and insignificant while the effect of e-tendering and e-invoicing on efficiency was positive and insignificant. This means that e-ordering, e-invoicing and e-tendering do not have a significant effect on efficiency of manufacturing firms in Mombasa County. The findings equally reveal the existence of a substantial and positive effect of e-payment on efficiency. This indicates that e-payment has a significant effect on efficiency of manufacturing firms in Mombasa County. The study by Masheti (2016) revealed that e-supplier selection, e-tendering and e-sourcing influences operational performance of pharmaceutical firms and this is in line with the findings of this study although the focus for this study was on manufacturing firms in Mombasa County.

The results show a direct but insignificant effect of e-ordering and e-tendering on speed while the effect of e-invoicing and e-sourcing on speed was negative and insignificant. This finding means that e-ordering, e-tendering, e-invoicing and e-sourcing do not have a significant effect on speed among the Mombasa based manufacturing firms. The study established that the effect of e-payment on speed was positive and significant. This indicates that e-payment significantly affects speed among manufacturing firms in Mombasa County. Smart (2010) however revealed that strategies in some parts of the market were developing, such that companies utilize electronic procurement tools to minimize the suppliers involvement as well as to increase their volumes and reduce prices.

The findings show that the effect of e- procurement practices on quality were statistically significant. Overall, e- procurement practices correlate with quality up to 0.764, which is a strong positive correlation and e-procurement practices explain 58.3 percent variation in

quality. The findings further established that there was a negative and significant effect of e-ordering on quality while the effect of e-payment on quality was positive and significant. In his study, Avedi (2016) established a significant influence of the components of e-procurement on the performance of manufacturing firms. These findings are aligned to the findings of this study although the context is different.

Lastly, the findings revealed that there was a negative and insignificant effect of e-ordering and e-invoicing on operational performance and the effect of e-sourcing on operational performance was positive and insignificant. This is an indication that e-ordering, e-invoicing and e-sourcing have insignificant influence on operational performance of manufacturing firms in Mombasa County. The findings also found that the effect of e-tendering and e-payment on operational performance were positive and significant. This is an indication that e-tendering and e-payment significantly affect operational performance of manufacturing firms in Mombasa County. A study by Munyao and Moronge (2018) found that e-tendering, e-sourcing and e-ordering positively and significantly affect the purchasing performance while e-payment has a positive but not significant effect on purchasing performance. Teo and Lai (2009) revealed that various forms of electronic procurement platforms influence the performance of firms.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The section provides summarized view of this study, it presents the conclusion and proposals made based on the results obtained from the study. It looks at research limitations and also looks at suggestions for further research.

5.2 Summary of Findings

This section presents the summary results of the study. The results are tabulated on the basis of specific objectives of the study as shown in Table 5.1. it is the finding of this study that a great number of participants had worked for periods exceeding five years. This was important to the study because the years of experience were associated with the need to adopt e-procurement practices. Additionally, the study revealed that majority of the firms had fewer than two hundred employees in line with the observation that once a firm adopts a certain technology or innovation, then it was likely to hire fewer workers. It was also observed from the findings that a large number of manufacturing firms in Mombasa County had multiple suppliers.

The findings also established that a majority of the firms used e-procurement practices and a big number of participants had attained higher education levels. The results of e-procurement practices and quality revealed that e-procurement practices accounted for 58.3% of the variation in quality. The results of e-procurement practices and speed found out that e-procurement practices accounted for 47% of the variation in speed.

Table 5.1: Summary of Findings

Objective	Indicator	Result/Extent
Objective 1: To determine the e-Procurement practices employed by manufacturing firms in Mombasa County.	E-Ordering	Moderate
	E-Tendering	Moderate
	E-Invoicing	Moderate
	E-Sourcing	Moderate
	E-Payment	Moderate
Objective 2: To examine the effects of e-procurement practice on operational performance of manufacturing firms in Mombasa County	Proxy	Results
	Efficiency	Positive relationship
	Quality	Positive-relationship
	Speed	Positive relationship
	Operational Performance	Positive relationship

Source: Research data (2018)

The results of e-procurement practices and efficiency found out that e-procurement practices accounted for 76.2% of the variation in efficiency. The results of e-procurement practices and the overall operational performance established that e-procurement practices accounted for 79.8% of the variation in overall operational performance. The results also revealed that the effect of e-tendering and e-payment on operational performance was positive and significant.

5.3 Conclusions

The study results established that the effect of e-ordering and e-invoicing on efficiency was negative and insignificant while the effect of e-tendering and e-invoicing on efficiency was positive and insignificant. This finding leads to the conclusion that e-ordering, e-invoicing and e-tendering do not have a significant effect on efficiency of manufacturing firms in Mombasa County. The results established a significant and positive effect of e-payment on

efficiency. The conclusion is that e-payment has a great effect on efficiency of manufacturing firms in Mombasa County. The results are similar to the study by Masheti (2016) that revealed that e-planning, e-supplier selection, e-tendering and e-sourcing influences the performance of pharmaceutical manufacturing companies.

The results established that there was a negative and significant effect of e-ordering on quality while the effect of e-payment on quality was positive and significant. Based on these results, the study concludes that e-ordering and e-payment significantly affect quality among manufacturing firms in Mombasa County. Additionally, the study found that the effect of e-tendering, e-invoicing and e-sourcing on quality was positive and insignificant. The study therefore concludes that there is no significant effect of e-tendering, e-invoicing and e-sourcing on quality among manufacturing firms in Mombasa County. The results were consistent with a study by Matunga, Nyanamba and Okibo (2013) that indicated e-procurement practices enhanced the product/service quality in hospitals.

Further, the findings established that there was a positive and insignificant effect of e-ordering and e-tendering on speed while the effect of e-invoicing and e-sourcing on speed was negative and insignificant. Therefore, the study concludes that e-ordering, e-tendering, e-invoicing and e-sourcing do not have a significant effect on speed within manufacturing firms in Mombasa County. The finding also established that the effect of e-payment and speed was positive and significant. The study therefore concludes that e-payment significantly affects speed within manufacturing firms in Mombasa County. Smart (2010) however revealed that strategies in some parts of the market were developing, such that companies utilize electronic procurement tools to minimize the suppliers involved as well as to increase their volumes and reduce prices.

The findings revealed that there was a negative and insignificant effect of e-ordering and e-invoicing on operational performance and the effects of e-sourcing on operational performance were positive and insignificant. The study therefore concludes that e-ordering, e-invoicing and e-sourcing had insignificant effects on operational performance. In final conclusion, the study found that the effect of e-tendering and e-payment on operational performance was positive and significant. Hence, the study concludes that e-tendering and e-payment significantly and positively influence operational performance of manufacturing firms in Mombasa County. A study by Munyao and Moronge (2018) found that e-tendering, e-sourcing and e-ordering positively and significantly affect purchasing performance while e-payment has a positive but not significant effect on purchasing performance. Teo and Lai (2009) revealed that various forms of electronic procurement platforms influence the performance of firms.

5.4 Recommendations of Study

The conclusion of the study is that e-tendering has a significant influence on the operational performance of manufacturing firms in Mombasa County and therefore the study recommends that the management of manufacturing firms in Mombasa County should invest more in e-tendering resources, e-tendering practices and e-tendering platforms to enhance the firms' operational performance.

The study also concluded that e-invoicing has insignificant influence on operational performance of manufacturing firms in Mombasa County. However, the study recommends that the management of manufacturing firms should embrace e-invoicing and eliminate reliance on manual invoice systems so as to save time and increase transparency and accountability.

Finally, the study concluded that e-payment significantly and positively influences the operational performance of manufacturing firms in Mombasa County. It therefore recommends that the management of manufacturing firms should use e-payment platforms and e-payment systems to reduce delays, mitigate the risks associated with cash transactions as well as improve the operational performance of their firms.

The main conclusion of this study is that e-tendering and e-payment significantly and positively influence operational performance of manufacturing firms in Mombasa County. The study therefore makes an overall recommendation that policy makers, government agencies and industry associations should encourage manufacturing firms to install and use e-tendering and e-payment platforms in order to improve their operational performance.

5.5 Limitations of the Study

This study focused on manufacturing firms in Mombasa County, hence the findings are limited to the sampled firms and the study findings, conclusions and recommendations are confined to the targeted firms. The study also focused on e-payment, e-invoicing, e-tendering, e-sourcing and e-ordering as the key indicators of e-procurement practice hence the findings are based on those considered indicators within the context of manufacturing firms.

Additionally, other firms would also use e-procurement platforms and therefore they are not limited to manufacturing firms only. However, the findings of this study are only limited to manufacturing firms and may not be generalized to other sectors which use e-procurement platforms. The study collected data from procurement managers of firms hence the views are those presented by the sampled procurement managers. Finally,

procurement managers are busy people and it was challenging to get all the responses in good time, consequently the study cannot guarantee that the questionnaires were filled in by the respondents themselves in all the cases.

5.6 Suggestions for Further Research

The models summary of the study established that 79.8% of the variation in the dependent variable (operational performance) was explained by the independent variables (e-payment, e-invoicing, e-tendering, e-sourcing and e-ordering). This means that there are other factors which influence the operational performance of manufacturing firms in Mombasa County. The study therefore recommends an additional study on the factors that affect operational performance of manufacturing firms in Mombasa County.

The focus of this research was on operational performance of manufacturing firms and how that is linked to the use of e-procurement practices. The study therefore recommends an additional research assessing the link between e-procurement practices and profitability of manufacturing firms where accounting measures can be used to assess the performance of the firms.

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APPENDIX I: QUESTIONNAIRE

Kindly provide your responses in the spaces provided by ticking at the box that matches your answer.

Part A: Firm Characteristics

1. Please indicate the number of years the company has been in existence by ticking in the appropriate box.

	Period of existence	Please tick as appropriate
i	0 – 5 Years	
ii	Between 5 and 10 Years	
iii	More than 10 Years	

2. Please indicate the number of employees engaged by the company

	No of employees	Please tick as appropriate
i	0 – 200	
ii	200 - 400	
iii	More than 400	

3. Kindly indicate the number of suppliers/contractors your company routinely engage.

	No of suppliers	Please tick as appropriate
i	5 - 10	
ii	10 - 20	
iii	20 - 50	
iv	More than 50	

Part B: E-procurement Practices

4. Kindly identify the e-procurement practices adopted by your organization.

Scale 1: No-Extent, 2: Small-Extent, 3: Moderate-Extent, 4: Large-Extent, 5:

Very Large Extent

E-ordering	1	2	3	4	5
The firm uses an online order management system (OMS)					
The firm allows suppliers to have real time online access to stock information.					
The firm uses online customized order forms.					
The firm has developed an online warehouse integration platform.					
The firm has online order information history well managed.					
E-tendering					
The firm prepares and publishes tenders online					
The firm does online screening and selections of suppliers					
The firm does online supplier performance assessments routinely					
The firm has an internet-based system that keeps historical bid submissions					
The firm has an online supplier contract management system					
E-invoicing					
The firm is currently using invoice templates					
The firm is currently using automatic payment reminders					
The firm is currently using online payment notifications					
The firm is currently using online invoice processing.					

The firm is currently using an invoice software					
E-sourcing					
The firm has a list of pre-qualified suppliers who have online access to key information.					
The firm receives online quotations from different suppliers.					
The firm organizes online bidding to select the lowest but most qualified suppliers.					
The firm uses an E-sourcing software.					
The firm provides standardized, routine online communication to suppliers.					
E-payment					
The firm ensures that suppliers have access to their online supply accounts 24/7.					
The firm uses debit and credit cards to make payments.					
The firm uses smart cards to make payments to suppliers.					
The firm uses online bank transfers to make payments to suppliers.					
The firm uses online payment platforms to make payments to suppliers.					
The firm uses mobile money platforms to make payments to suppliers.					

Part C: Operational Performance

5. To what extent have the listed operational performance measures been directly influenced by the firms adoption of e-procurement practices.

Use the following scale to rate your answer.

No-Extent:1; Small-Extent:2, Moderate-Extent: 3, Large-Extent: 4, VeryLarge-Extent: 5

Statement	1	2	3	4	5
Efficiency					
The firm has improved inventory turns					
The firm has improved throughput					
The firm has improved schedule/production attainment					
The firm has improved capacity utilization					
The firm has improved overall equipment effectiveness					
Quality					
The firm has reduced the levels of customer reject/returns					
The firm has reduced the supplier defect rate					
The firm has reduced the rates of corrective action requests					
The firm has improved the percentage of first pass yield					
The firm has reduced the re-work rate					
Speed					
The firm has improved availability time					
The firm has improved manufacturing cycle time					
The firm has improved on time delivery commitment					
The firm has improved time to make changeovers					
The firm has greatly reduced the downtime rate					

APPENDIX II: List of Firms in Mombasa County

- 1) Wonderpac industries ltd.
- 2) Laneeb plastic industries ltd
- 3) Aryuv agencies ltd
- 4) Murtaza Enterprises
- 5) Cables and plastics
- 6) Avery (East Africa) ltd.
- 7) Seal honey ltd
- 8) Narcol Aluminium rolling mill
- 9) Segway industries
- 10) Magadi Soda Company
- 11) Binsha industries
- 12) All fruit EPZ ltd
- 13) Mas petroleum contractors
- 14) Rizwan metal craft
- 15) Landeo steel pipe manufacturer
- 16) Likoni Quality furniture
- 17) Drenal Enterprises
- 18) Monitoring and testing services
- 19) Steel engineering services
- 20) Cars and General
- 21) Royal mabati factory ltd
- 22) Summit fibres ltd

- 23) Pakhus enterprises
- 24) Civicon ltd
- 25) General Aluminium fabricators ltd
- 26) Timsale ltd.
- 27) The Mombasa Bathrooms
- 28) Welding Alloys.
- 29) Bhabra brothers.
- 30) Ma Roy consulting
- 31) Del monte (K) LTD.
- 32) Kenya cold storage (foods).
- 33) ACME Containers ltd.
- 34) Devsons industries ltd.
- 35) Tarmal steel.
- 36) Pwani oil products ltd
- 37) Pharmaken Ltd
- 38) The Rumorth Group
- 39) Aluminum Rolling Mills
- 40) Canvas Ltd
- 41) Bactlab Ltd

Source: Researcher 2018