THE RELATIONSHIP BETWEEN COMMODITY RISK, ITS MANAGEMENT AND FINANCIAL PERFORMANCE OF MANUFACTURING COMPANIES IN KENYA

NDUNG'U STEPHEN KANINI

A Thesis Submitted to the Institute of Postgraduate Studies and Research in Partial Fulfilment for the Requirements of the Doctor of Philosophy in Business Administration Degree in Finance of Kabarak University

KABARAK UNIVERSITY

NOVEMBER, 2020

DECLARATION

1. I do by declare that:
   (i) This thesis is my own work and to the best of my knowledge, it has not been presented for the award of a degree in any university or college.
   (ii) That the work has not in-cooperated material from other works or a paraphrase of such material without due and appropriate acknowledgement.
   (iii) That the work has been subjected to processes of anti-plagiarism and has met Kabarak University 15% similarity index threshold.
2. I do understand that issues of academic integrity are paramount and therefore I may be suspended or expelled from the University or my degree may be recalled for academic dishonesty or any other related academic malpractices.

Student Name Ndung'u Stephen Kanini

Student Signature _____

Admission No: GDB/M/0933/9/10

Date: _____

RECOMMENDATION

To the Institute of Postgraduate Studies:

The thesis titled "**The relationship between commodity risk, its management and financial performance of manufacturing companies in Kenya**" and written by Ndung'u Stephen Kanini is presented to the Institute of Postgraduate Studies of Kabarak University. We have reviewed the thesis and recommend it be accepted in partial fulfilment of the requirement for the degree of Doctor of Business Administration degree in finance of Kabarak University.

Dr. Patrick Kibati

Signature of Supervisor_____Date_____

Dr. Stella Muhanji

Signature of Supervisor_____Date_____

COPYRIGHT

ACKNOWLEDGEMENT

I give thanks to God for guiding me this far, for his care and protection every day of my life. Deepest appreciation to my supervisors Dr. Patrick Kibati and Dr. Stella Muhanji for their insightful guidance as I compiled the thesis. Their input is highly valued and treasured. To my family Grace and Neema, the support given during the research period has been overwhelming and humbling. Be blessed.

ABSTRACT

Commodity risk exposure and its management is critical for any business entity as the risk management tactics used impact on the financial performance of an entity. This study adopts a pragmatic approach as it sought to establish the relationship between revenue volatility and financial performance and equally the relationship between commodity risk management tactics such as pricing tactics, inventory management tactics and corporate diversification tactics as used by manufacturing entities in Kenya and the financial performance of these entities focusing on the earnings before interest and tax (EBIT) and return on assets (ROA). The objectives of this study focused on the relationship of the above revenue volatility, inventory management, commodities pricing and corporate diversification tactics and the financial performance of manufacturing entities in Kenya. The study has made contributions towards evaluating the current trends in risk management and make critical input towards policy formulation. The theories upon which the research has been grounded include prospect theory, theory of storage, theory of price determination and the modern portfolio theory. The researcher conducted a thorough literature review focusing on the key variables of the study. The literature reviewed provides different perspectives and aspects of commodity risk management tactics, impact on enterprise value and ultimately its effect on financial performance. From the literature reviewed, the researcher established a gap exists as no research has been done in Kenya specifically focusing on commodity risk management tactics and their impact on the financial performance of manufacturing companies in Kenya thereby justifying the importance of the study. The study adopted an analytical research design in order to get a better understanding of the relationship between the independent variables and the dependent variable. The target population consisted of five hundred and two manufacturing companies in Kenya from which a representative sample of two hundred and eighteen companies was selected through stratified and random sampling from the key sectors as classified by the Kenya Association of Manufacturers (KAM). The study used ten-year panel data given that this period was adequate for an objective analysis. Data was collected from archival financial statements to compute the key measures under the independent and dependent variables. Data analysis was done through a general linear model for panel data analysis and the results presented in a concise manner. From the descriptive statistics, the data is normally distributed across all variables of the study and thus it can be construed the results obtained from the data are accurate. There was significant correlation between the independent and dependent variables but no multicollinearity was observed. From the findings, the first three null hypotheses of the study were rejected implying that revenue volatility, inventory management, and commodity pricing variables have significant relationship with the financial performance of manufacturing entities in Kenya. For corporate diversification, the null hypothesis was not rejected implying that corporate diversification does not have a significant relationship with the financial performance of manufacturing companies. The researcher recommends that manufacturing entities should pay special attention to revenue volatility, inventory management and commodity pricing in order to enhance their financial performance.

Key words: *Revenue volatility, inventory management tactics, commodities pricing tactics, corporate diversification tactics*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

2SLS	Two-Stage Least Square
3SLS	Three-Stage Least square
CAPM	Capital Asset Pricing Model
CBK	Coffee Board of Kenya
CPI	Consumer Price Index
EBIT	Earnings before Interest and Tax
ECM	Error Correction Model
EOQ	Economic Order Quantity
ERC	Energy Regulatory Commission
EVA	Economic Value Added
GARCH	Generalized Autoregressive Conditional Heteroskadisticity
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
GNP	Gross National Product
ICP	Inventory Conversion Period
ICT	Information and Communications Technology
ISO	The International Organization for Standardization
JIT	Just-in-Time
KAM	Kenya Association of Manufacturers
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
KRA	Kenya Revenue Authority

KTDA	Kenya Tea Development Authority
LME	London Metals Exchange
MPT	Modern Portfolio Theory
NCPB	National Cereals and Produce Board
NSE	Nairobi Securities Exchange
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PPI	Producer Price Index
PWC	Price Waterhouse Coopers
REVA	Refined Economic Value Added
ROA	Return on Assets
ROI	Return on Investment
SIC	Standardized Industrial Classification
SMEs	Small and Medium-Sized Enterprises
SVAR	Structural Vector Autoregressive Models
TPM	Total Productive Maintenance
UNCTAD	United Nations Conference on Trade and Development
VaR	Value at Risk
VAR	Vector Autoregressive
VSM	Value Stream Mapping
WFE	World Federation of Exchanges

OPERATIONAL DEFINITIONS OF KEY TERMS

Commodity: A commodity is a consumption asset whose scarcity has a significant impact on the world, country, industry or company-specific operations (German, 2009).

Risk: The International Organization for Standardization (ISO) guide 73 (2009) defines risk as effects of uncertainties on objectives and identifies three categories of risks namely: hazard/pure risks, opportunity/speculative risks, uncertainty/control risks and Hazard risks such as fires, theft among others only results into negative outcomes while control risks such as fraud and legal action result in uncertainty about outcomes. Speculative risks are those categories of risks that a business entity deliberately and consciously undertakes in order to obtain a positive return and commodity price risk falls under this category (ISO guide 73, 2009).

Commodity Risk: commodity risk refers to uncertainty of future market value and revenue generated by business entity due to volatility in commodity prices. (Poitras, 2013).

Revenue Volatility: refers to the extent to which revenue will fluctuate from commodity sales by manufacturing companies due to commodity risk exposure (Kwak, 2011).

Commodities Pricing Tactics: these refer to the internally and externally generated tactics that a business entity maintains to ensure that its products remain competitive in the market thus translating into better financial performance (Oke, et al., 2016).

Inventory Management Tactics: these involves tactics for coordination of material sourcing, utilization and control to ensure that the business entity doesn't incur unnecessary holding, storage and stock out costs which eat into the profits of the entity (Shardeo, 2015).

Corporate Diversification Tactics: Corporate diversification tactics refers to entering into new or expanding to existing markets, which are different from the entity existing product lines. (Ravichandran & Bhaduri, 2015).

Risk Management: The International Organization for Standardization (ISO) guide 73 (2009) refers to risk management as coordinated actions to direct and control the business entity with regard to hazard, control and opportunity risks. Hazard risk management results in fewer negative outcomes: control risk management minimizes the variety of possible outcomes of a given event while opportunity risk management seeks more substantial and positive outcomes (ISO guide 73, 2009).

Hedging: This is a process by which a business entity reduces the risk resulting from changes in financial market variables such as prices of commodities, rates of exchange, rates of interest and counterparty creditworthiness. Hedging involves the application of financial instruments such as options, futures and forwards and adjustment of business practices to reduce risk (German, 2009).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

A connection between various commodity risk management tactics and financial performance has been established by different scholars. Ibraimi (2014) argues that strategy should be a conscious effort to enhance the business entity competitive advantage which should start with recognition of your capacities, competitors, customers and how these variables will eventually affect the financial performance of the entity. He concludes that financial performance will be linked to the causal variables resulting from business environment, entity tactics and organizational characteristics. Some of the commodity risk management tactics that a business entity can use include revenue volatility management, inventory management, appropriate product pricing and corporate diversification.

1.1.1 An Outlook of Commodity Risk and its Impact

Various scholars (German, 2009: Martin, et al., 2011 and Pirrong, 2014) have classified commodity risks differently but the very common categorization of commodity risks include commodity price risk, quantity risk, transportation risk, settlement risk, default risk, basis risk, geopolitical risk and speculative risk. Commodity price volatility has been found to be higher in the commodities market than in the financial markets. This is compounded by the illiquidity of the market and therefore changes in supply and demand tend to have greater far reaching effects on prices and volatility making hedging of commodity risks more difficult (Al Janabi, 2009).

Volumetric or yield risk, quantity risk results when the quantity of the commodity to be hedged is uncertain or the demand for a commodity declines in the future. Oum and Oren, (2010) in a paper on hedging quantity risk in wholesale electricity markets advanced that such risks can be hedged effectively through establishing a portfolio of put options, call options and forward contracts whereby economic agents facing such risks should use the above financial instruments to maximize expected utility. Abkowitz (2002) advocates for a more expanded approach to transportation risk management which should incorporate both natural and man-made related risks. Transportation risk can be classified into two major categories namely, partial or total deterioration of goods during transportation and cost of transport risks with deterioration of goods being further categorized into ordinary risks which results from natural causes such as age and obsolescence of goods and means of transport while extra ordinary risks which may emanate from piracy, strikes, war, riots etc.

German (2009) suggests an approach where she argues that delivery risk can be managed by crafting a very specific and customized contract or developing trust and a long term relationship with the other party in the contract given that no financial hedge may adequately cover delivery risks. According to Clarvis, et al., (2014) given the volume of goods consumed by manufacturing entities, credit risk exposure is equally a significant risk as most of these consumers purchase materials in bulk and on credit from all over the world. In developed economies, credit rating institutions such as Standard & Poor's, Fitch, Moody's, Dun and Bradstreet are able to give up to date credit rating information but in developing economies this type of information is rarely available.

Pirrong (2014) argues that as a way of managing basis risk, traders taking short hedges which have long basis positions stand to gain when the basis strengthens while traders taking long

hedges with short basis positions gain when the basis weakens. Therefore changes in the basis tend to influence the overall cost of the hedged commodities. In the commodities markets such as for fuel and metals, the price is influenced more by geopolitical risks and macro-economic variables rather than forces of supply and demand. Prices tend to spike any time negative information filters into the global market. Traditional approaches that have been used to manage such risks include avoiding overconcentration of investments in one region, insurance, negotiation, having joint ventures with local people and hedging where exposure to risk is inevitable (Carr, 2012). Tse and William (2013) found that speculation in commodity index futures influence individual commodity prices but do not destabilize commodity prices. The distortion results from uniformed reaction to speculation in both index-linked and non-index linked commodities resulting in persistent price destabilization and even when highly informed traders enter the market in order to take advantage of the distortions, they are unable to stabilize the market and thus volatility will remain high.

Collier (2007) advances that unless an economy is managed very well, volatility in commodity prices can be very easily transmitted to the whole economy. He gives the example of Nigeria which is classified among the ten most volatile economies in the world since the discovery of oil in the 1950's. Mackay and Moeller (2007) in a paper on the value of risk management established that the market will reward business entities that hedge risks when hedging creates value and will equally penalize business entities that hedge when hedging destroys the entity's value especially when such an entity uses commodities which exhibit high price volatility. This implies that the enterprise value will be largely determined by the timing and combination of the hedging techniques a business entity has adopted to manage risks. Indeed, Sheenah (2010) argues that a business entity will achieve higher stock

prices if its management can effectively demonstrate to the investors and financial analysts that they understand the risks they are facing and have taken concrete steps to manage them.

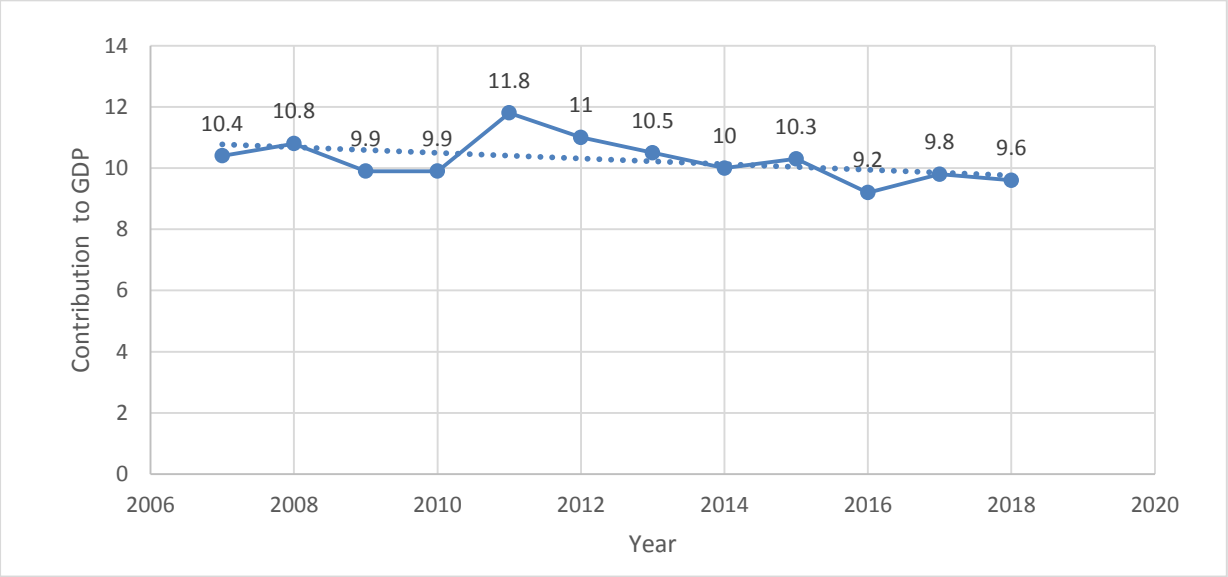
1.1.2 Kenyan Manufacturing Sector Risk Management and Financial Performance

The manufacturing sector in Kenya is highly exposed to commodity risk due over reliance on input commodities such as electricity, petroleum products, fluctuating industry specific raw materials and the existence of limited supply of such primary commodities used in the manufacturing process. Chege, et al., (2014) advances that the manufacturing sector in Kenya is geared towards production of consumer goods involving consumption of massive quantities of raw materials, low value addition and hence low returns on finished products. Consequently, the return and contribution to the Gross Domestic Product (GDP) has been low as the profit margins have not largely been adequate to cover operating costs and associated risks.

Figure 1 below depicts the percentage contribution of the manufacturing sector to the total GDP. The performance of the sector has been erratic and poor with a peak of 11.8% and a low of 9.2% with very minimal variation in between the years.

Figure 1

Manufacturing Sector Contribution to GDP



Note. Manufacturing Sector Contribution to GDP. Author's compilation using data from various economic surveys (2007 - 2018).

The average annual real GDP growth rate for the manufacturing sector for the past four decades as per Kenya National Bureau of Statistics, facts and figures 2015 has recorded a slowdown. In the period of 1970 to 1979 the highest ever growth rate of 10% was recorded. In the periods 1980 to 1989, 1990 to 1999 and 2000 to 2009 minimal growth rates of 4.8%, 2.5% and 3.8% respectively were documented. Therefore the manufacturing sector in Kenya contribution to the GDP has been quite low despite the fact that the sector is one of the envisioned drivers for attaining middle income status by 2030. Bigsten, et al., (2010) identified some causes of poor performance within the four decades to include poorly thought out import substitution strategy resulting in low technical efficiency and low competitiveness of products produced, poor infrastructure and processing methods and high commodity prices. Even with the rebasing of the Kenyan economy, the manufacturing sector has

continuously recorded low growth rates of 4.4%, 3.4%, 3.2%, 4.8%, 3.2%, 3.5%,3.6% 0.5% and 4.2% in 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018 respectively far much below the 10% target growth rate (KNBS, 2018).

Kenya industrial sector can be categorized into three broad sectors namely, manufacturing, mining and quarrying and construction sectors. In total, the industrial sector contributes 14.2% to the total GDP and out of this, the manufacturing sector accounts for the greatest input at 11.3%, building and construction sector has an input of 4.1% while mining and quarrying has a contribution of 0.7% (KAM, 2015). These figures allude to the poor performance across the sectors. Indeed, over the recent years, companies from these sectors in Kenya have issued profit warnings implying that their profitability would fall by over twenty five percent compared to the past year performance. One common characteristic in all these companies is that they all deal with commodities either directly or indirectly. Companies in the manufacturing and allied sector which have issued profit warnings in the recent past include Mumias Sugar Co., B.O.C. Kenya and Eveready E.A. Companies from other sectors include Crown paints Kenya Uchumi Supermarket, Liberty Kenya Holdings, Pan Africa Insurance, UAP Insurance, Britam Holdings, Sameer Africa, Standard Group, E.A. Cables, A.R.M. Cement, Car & General (K), Standard and Chartered, TPS East Africa, Atlas Development & Support Services and Express Kenya. These companies which had issued profit warnings over the past periods, had attributed the poor performance to be partly due to fluctuations in commodity prices, interest rates besides other factors such as high inflation and unfavorable political atmosphere. And even for companies which did not issue profit warnings, it was predicted that they would attain negative or lower profit

growth due to the factors outlined above besides showing symptoms of poor performance such as staff layoffs, freeze in hiring, closure of some branches and other indicators.

However, despite operating in such a volatile environment, for many business entities commodity risk and its management still ranks low in their risk priorities and does not receive the attention it deserves. In a Price Waterhouse Coopers (PWC) global annual survey 2012, involving six hundred companies they found that 75% of the surveyed companies attached low to medium importance to managing commodity risk. 60% of the surveyed companies took a reactive approach rather than a proactive one or did not manage commodity risk at all (Umbricht, et al., 2012). UNCTAD (2019) points to persistence of commodity risk in developing countries and gives examples of crude oil, copper and agricultural commodities as having registered significant price fluctuation between the periods 2008 – 2018. This serves to highlight the fact that besides other factors that contribute to business entities poor financial performance, lack of proper management of various risks and to a large extent: commodity risk may be a key contributor to the subdued financial performance of manufacturing entities in Kenya.

Risk management in the manufacturing sector in Kenya has always been associated with insurance practices whereby companies take various insurance policies against hazardous, control and opportunity risks such as fire theft, work place injury among others but not much is documented on the management of commodity risk. Historically, most manufacturing firms in Kenya have been able to withstand changes in commodity prices as these changes have always been cyclic, transitory and manageable with minimal planning of business activities with respect to management of risk. Ehrhart and Guerineaua (2013) in a study on commodity price volatility and its impact on developing

countries tax revenue found that import and export price volatility reduces revenue from foreign trade tax and revenue from income tax respectively. Few examples of such commodities which have been experiencing price volatility include crude oil and petroleum products, consumables like electricity, agricultural products, metals, minerals, construction materials, other imported and locally available raw materials (KIPPRA, 2014).

Kenya has one of the most vibrant manufacturing sectors within the East African region ranging from multinationals to small manufacturing concerns. Kenya Association of Manufacturers (KAM), the manufacturers' representative organization in Kenya has over five hundred members whom are classified into twelve major sub sectors namely: Building, Construction and Mining, Chemical and Allied, Energy, Electrical and Electronics, Food, Beverages and Tobacco, Leather Products and Footwear, Metal and Allied, Motor Vehicle Assembly and Components, Paper and Paperboard, Pharmaceutical and Medical Equipment, Plastics and Rubber, Textile and Apparel and Timber, Wood Products and Furniture Sectors.

Manufacturing has been identified as one of the sectors which have made significant albeit low contribution to the development of the Kenyan economy. In the period between 2003 - 2007, the sector reported an annual growth rate of 5.5% while in the period between 2007 - 2011, manufacturing was ranked third after transport and communication and wholesale and retail trade with an average contribution to the Gross Domestic Product (GDP) of 10.3%. In 2011 - 2014 the average growth rate was 4.8% (KNBS, 2012 & KIPPRA, 2014). According to vision 2030 and big four agenda, the manufacturing sector under the economic pillar has been identified as one of the six priority sectors that

will be used to increase the GDP growth rate to 10% per annum by 2012 and be able to sustain the 10% growth rate up to the year 2030. Besides, the sector is expected to contribute to job creation, attract Foreign Direct Investment (FDI) and generate foreign exchange earnings.

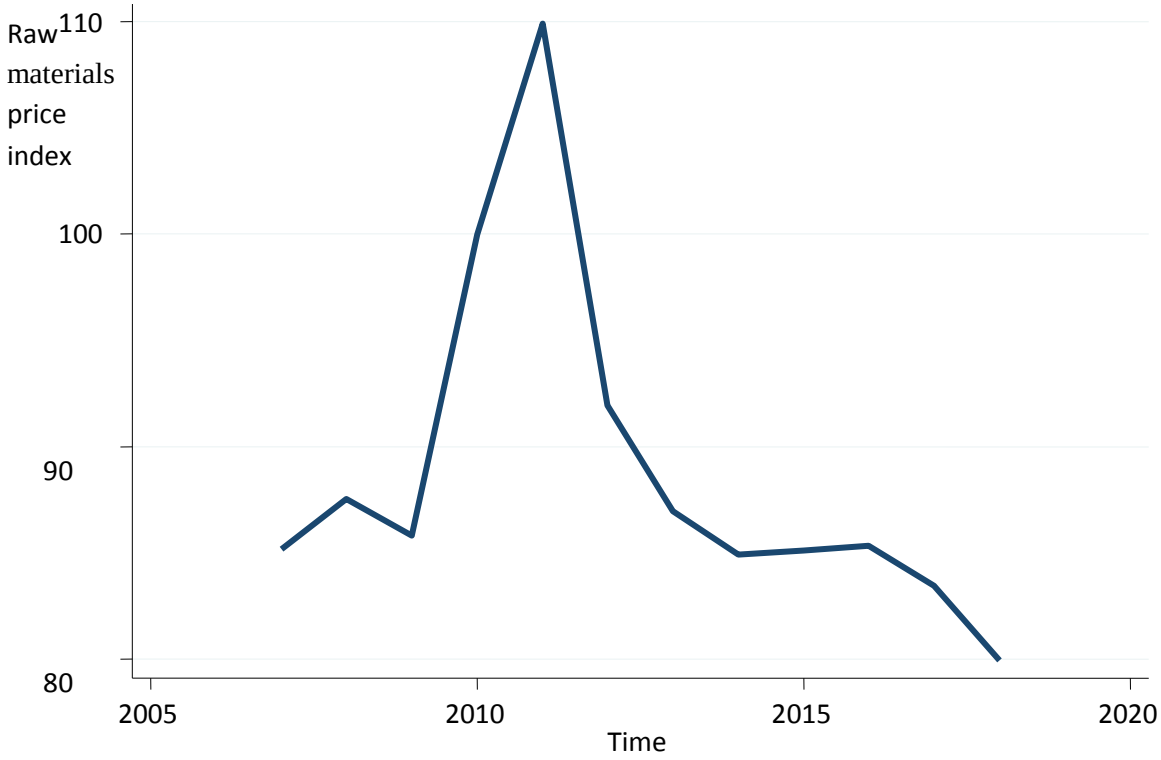
However, the manufacturing sector faces many challenges which extend across the whole economy, that need to be addressed if at all it's the sector that will drive vision 2030 and the achievement of the big four agenda. World Bank (2018) in a report on doing business in a more transparent world, Kenya was ranked at position sixty one out of the one hundred and ninety economies that were surveyed. Countries in the East African region like Rwanda fared much better at position twenty nine and while others like Tanzania and Uganda lagged behind at positions one hundred and forty four and one hundred and twenty seven respectively, the two countries' economies are said to be growing at a high rate and it's just a matter of time before they outperform Kenya's economy. A critical area where the economy was identified to be performing very poorly was in the provision of electricity at position seventy one out of one hundred and ninety way below the regional average of 45.91%. Other areas of poor performance identified include payment of taxes, enforcement of contracts, starting a business, trading across borders and registering property. On the other hand, the country attained an impressive position twenty nine out of a hundred and ninety countries in terms of the ease of getting credit where it was observed that the country has very strong legal rights for both lenders and borrowers, there is a high access of credit information and entrepreneurs can easily access credit.

Specific problems that have been identified to be facing the manufacturing sector include lack of stable energy sources, poor transport infrastructure, cumbersome tax payment system, burdensome regulatory environment, under developed markets, inadequate industrial financing and corruption among others. The manufacturing industry used sixty percent of the generated energy in the country (Masila-Achola, 2012). However, it has been observed that the energy provided is not enough and that the energy policies in place are not harmonized with the industrialization policies. The cost of provision of energy in the country is high and volatile which in turn ends up having a negative impact on the production. There is a direct relationship between the cost of energy and the cost of manufactured goods as it has been found that forty percent of the manufacturing cost goes into provision of energy which in turn results in higher prices for goods experienced within Kenya (Ondiek, 2010: Ateka & Ochieng, 2012: Sobhani, et al., 2014). One of the reasons that have been identified as the cause of lack of competitiveness of the country Kenyan goods within African market is the high cost of energy where for example the cost of energy is said to be four times what is charged in South Africa and Egypt.

Below the researcher presents key metrics associated with the manufacturing industry performance in Kenya in order to put into perspective how the industry has been performing. Figure 2 below depicts the raw materials price index in Kenya for various commodities as used in manufacturing companies over a ten year period. It's evident that industrial input prices have been quite volatile over the period with a spike in prices experienced in 2011.

Figure 2

Annual Raw Material Price Index



Key

Index, 2010 = 100

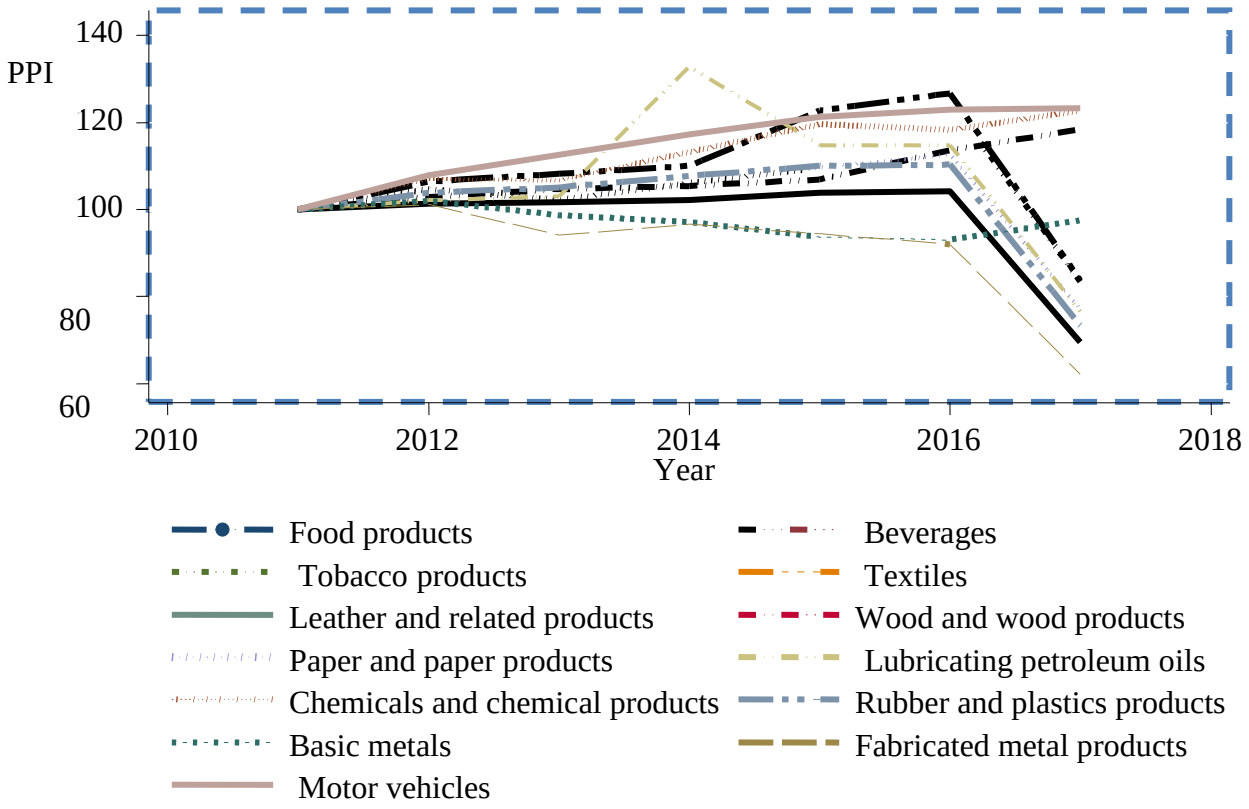
Note. The graph shows annual Raw Material Price Index from 2007 to 2018. Copyright 2018 World Bank commodity price data.

Over the same period under consideration, the manufacturing sector in Kenya output has been on the increase indicating that consumption of raw materials has gone up and obviously with an associated increase in commodity risk exposure.

Figure 3

Producer Price Index of Key Commodities in Kenya

…….



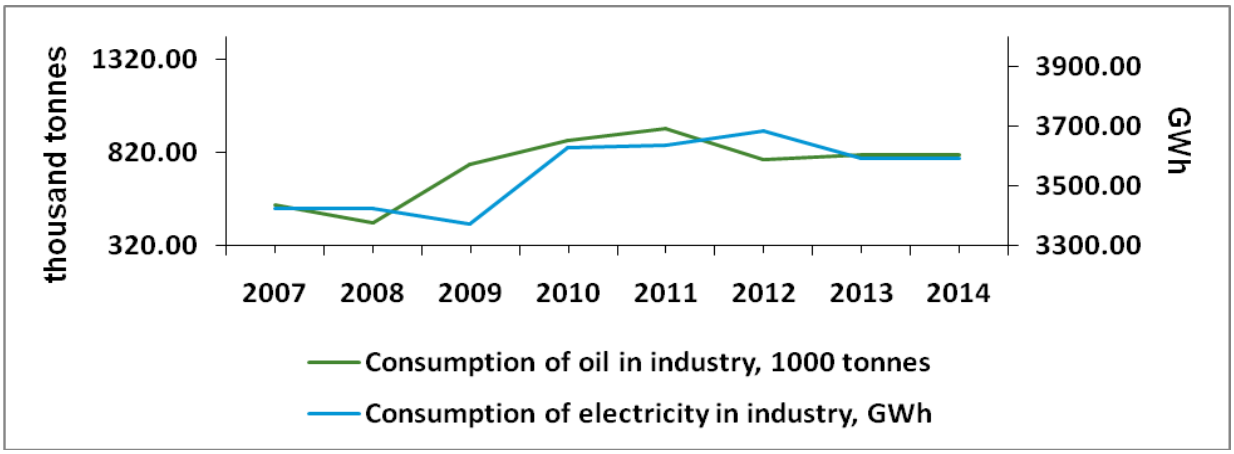
Note. The graph shows Producer Price Index of Key Commodities In Kenya. Copyright 2018 World Bank commodity price data.

As can be observed from figure 3 above, the producer price indices for various commodities traded within the country and under different sectors have generally been on an upward trend for the period under consideration. The increase in the producer price index (PPI) has been attributed to high cost of imported materials due to high cost of inputs, low production, inefficient methods of production, depreciation of the Kenyan shilling among other causes (Economic Survey, 2016). The manufacturing sector in Kenya is also affected by volatility in

the oil and energy prices leading to increased cost of production and a resulting reduction in profits (KIPPRA, 2014). Gil-alana, et al., (2017) carried out a time series analysis on historical cost of electricity in Kenya and came to a conclusion that oil prices, consumer price index (CPI) and interest rates have positive and significant effect on pricing of electricity. Indeed, the two commodities are consumed in tandem within the various industries as depicted below:

Figure 4

Consumption Data on Key Input Commodities



Note. The graph shows Consumption Data on Key Input Commodities. Copyright 2018 World Bank commodity price data.

The percentage contribution of the manufacturing sector to the total GDP has been poor with a peak of 11.8% and a low of 9.2% over the period under review with very minimal variation in between the years despite various interventions by the government such as establishment of special economic zones, industrial parks, funding of initiatives that support supply of commodities, increased energy production among others (KNBS, 2016). Kenya established

the National Cereals and Produce Board (NCPB) to ensure stability in maize prices, a critical commodity in the production of maize meal. Kenya has had various interventions aimed at regulating the energy sector. The Energy Regulatory Commission (ERC) was established in 2011 to regulate fuel prices besides licensing of independent oil marketers who introduced a moderating effect to the fuel prices (OECD, 2012). Government entities such as coffee board of Kenya (CBK) and Kenya tea development authority (KTDA) have been given the mandate promote sustainable production and marketing of the two cash crops. In order to cushion the producers from price volatility, the Kenyan government has proposed to reduce taxes besides establishing stabilization funds. Similar intervention measures have been made by the government and its agencies across all the industries and sectors within the economy.

1.1.3 Commodity Risk Management Tactics

Ghosh and Olsen (2009) advocate for use of revenue/sales volatility when measuring the volatility in a business entity as it is a superior and more objective measure. Sundaram (2016) identifies several factors that that contribute to sales volatility. Key among them is the level of specialization which limits the range of corporate diversification which eventually influences the financial performance of an entity. Business entities which are highly specialized are prone to greater revenue volatility compared to more diversified ones. The level of competition prevailing in an industry is also critical as high levels of competition will result in higher fluctuation in revenue especially when the operating environment does not enhance fair competition. Business entities which source materials from different markets and sell in diversified markets tend to experience less revenue volatility.

Inventory management basically entails having a tradeoff between holding, ordering and other related inventory costs. Inventory management will thus aim at maximizing the

benefits accruing from holding inventory. Capkun, et al., (2009) postulates that better inventory management can be achieved through having faster cycle times between the acquisition of raw materials and the production of finished goods, better management of input and output quality through reduction of waste during processing, and minimizing the amount of inventory held by an entity at any given time. Kontuš (2014) asserts that ROA, growth of sales, standard deviation of ROA and the leverage structure explains more than fifty percent of the variations in returns on stock. Coupled with inventory management, an entity will be able to perform better when it tailors inventory management with environmental and strategic factors. As Panigrahi (2013) argues that inventory conversion period has a negative linear relationship with the profitability as the longer the conversion period the less the profitability an entity will attain and vice versa given the opportunity costs associated with holding inventory for long.

Kontuš (2014) argues that there is no empirical evidence that higher levels of inventory in a firm will result to decreased profitability but the findings supported the notion that there exists a trade-off between profitability and inventory levels. Financial performance will be enhanced when internally and externally focused lean practices are implemented concurrently compared to a scenario where selective lean production practices are used (Hofer, et al., 2012). Shardeo (2015) argues that especially for manufacturing firms, they should aim at improving their inventory turnover ratio as much as possible given that there exists a positive association between the ratio and the net profit made by the firm. John, et al., (2015) came to the conclusion that entities that used scientific inventory management practices were able to achieve higher efficiency in utilization of available capacity, provide better services and reduce the lead time compared to firms that did not use scientific inventory management approaches. Nwakaego, et al., (2014) posit there

exists an average positive correlation between the financial performance of technical firms in Nigeria and the inventory management practices pursued.

There is a direct relationship between pricing and the revenue generated by a business entity. Equally, pricing is the most flexible among the "P's" of marketing as prices can be adjusted quickly compared to other elements of marketing strategy. Pricing tactics adopted by a business entity have a significant impact on the financial performance. Erten and Ocampo (2012) studied commodity prices between 1865 and 2009 and they discerned four super cycles of 30 to 40 years with the non-oil commodities super cycles tied to the world GDP while for the real oil prices have been on an upward trend all through except in a few instances when a downward trend was observed. Pathirana and Heenkenda (2011) argues for enhancing price competitiveness in manufacturing companies despite these companies facing high labour costs, reliance on imported raw materials, difficulty in formulating accurate costing quotes among others through conducting thorough customer needs evaluation and integrating them with pricing objectives of the company. Oke, et al., (2016) argue for a value based assessment pricing strategy and value based communication to avoid significant disparities which will impact negatively on revenue generation.

Schiele, et al., (2011) identified commodities sourcing tactics such as pooling of demand either internally or externally in order to attain economies of scale, price evaluation through enhanced negotiations, international sourcing, supplier integration tactics, product and process optimization as appropriate to use when saving on costs and recommended a balanced sourcing approach. Business entities that source commodities from the international markets have been proven to be keener on innovations so long as

they are proficient in suppliers' integration and have the adequate tools to foster the integration (Haartman & Bengtsson, 2015). Wu and Chen (2015) analyzed the optimal purchasing tactics that a risk averse manufacturer can use to purchase raw materials under price uncertainty using a two period purchasing model incorporating a long term contract and the spot market. Their conclusion was that even through profit may not be higher for mixed source model compared to a spot sourcing model: the utility of a mixed model is higher.

According to Lahiri and Purkayastha (2017) corporate diversification should be seen from the perspective of business entities venturing and actively competing in the new market it has entered. Several benefits that can result from such a move can be enumerated which include value maximization resulting from the scope of markets and product range they have to offer to their consumers, an entity that diversifies benefits from the complementary resources that are already existing within the entity such as the technical knowhow, expertise, customer loyalty, channels of distribution and existing successful brand names that the entity has already established. Besides, diversification will enhance cross selling to existing customers and easier mobilization of resources at a lower cost. Yigit and Tur (2012) posits that business entities that adopt unrelated diversification attain benefits such as risk reduction, reduction of transaction costs, better access to superior management skills and are better positioned to take advantage of arising opportunities within the operating environment. The risk is reduced as the unrelated market into which the entity is venturing into may not have the same risks as those in the current markets. For related diversification, the benefits include sharing of the already available physical resources', transfer of skills besides the sharing of general managerial expertise.

Diversification as one of the tactics a business entity can pursue has been observed to be effective in the reduction of business risk, generation of sustainable growth and the establishment of solid market share for manufacturing firms in Brazil (Mendonça & Las Casas, 2013). Ficici, et al., (2014) found that a delicate balance should be maintained between the benefits of international expansion against its loss as in the early stages of internationalization, higher costs incurred will eat into the entity profits. It's only in the mature stage that the business entities are able to achieve better performance due to economy of scale, learning curve and geographic diversification. Oyedipo (2012) found that revenue growth and financial performance are influenced by the mode of diversification adopted whereby it was observed that business entities pursuing related product-market diversification strategy attained fast growth which was sustainable in the long run and superior financial performance.

1.2 Statement of the Problem

Cost of raw materials constitutes 50% to 70% of the total cost of a product among manufacturing companies in Kenya and therefore any volatility in the market will have a significant impact on the performance of an entity (Ondiek, 2010: Ateka & Ochieng, 2012: Sobhani et al, 2014). Within the industrial sector cost of raw materials constitutes 81.2%, energy and water 8.1% while other inputs account for 10.6% (KNBS, 2013). Commodities such as electricity, oil, agricultural products, metals and minerals have been experiencing significant and often unexpected price changes (KIPPRA, 2014). This volatility is eventually translated to the financial performance of manufacturing entities and should therefore be adequately managed. Poor financial performance has been observed in companies listed in the Nairobi Securities Exchange where a significant number of companies have issued profit warnings. Ehrhart and Guérineau (2013) argue

that volatility in commodity prices may have micro and macroeconomic effects on a country. The microeconomic effects such as use of substitutes and reallocation of funds will vary depending on the options that a business entity has. The macroeconomic effects especially for a net importer country will result in a reduction in revenue and hence less expenditure and these effects will eventually be transferred to the various sectors of the economy.

A quick appraisal at the Kenyan financial markets shows very limited trading in other securities and instruments other than shares and bonds. This implies that business entities have very limited formalized options through which they can manage their commodity risks and thus even if they have to hedge against such risks, it can only be done at an individual business level through the use of non-derivative approaches or through proxy hedging in the international financial markets where they can access various commodity derivatives. A perusal of various listed entities financial statements and related literature indicate that some entities have adopted the use of derivatives besides other measures to manage commodity risk while for other entities, even after a read-through of related literature, it's not possible tell the approaches they are using to manage commodity risk. What cannot be ascertained from such literature is the complete range of risk management approaches under use, the extent of their use and their success rate. Therefore from the existing body of literature, it is not possible to adequately explain the relationship between commodity risk, its management and the financial performance of manufacturing companies within the Kenyan context.

1.3 Purpose of the Study

The purpose of this study therefore was to find out the relationship between commodity risk, its management and the financial performance of manufacturing companies within the Kenyan context. The study aimed at looking at the commodity risk management tactics adopted by manufacturing companies in Kenya and how they impact on the performance of manufacturing entities.

1.4 Objectives of the Study

1.4.1 General Objective

To determine the relationship between commodity risk, its management and the financial performance of manufacturing companies in Kenya.

1.4.2 Specific Objectives

The specific objectives formulated for the study are:

i. To evaluate the relationship between revenue volatility and the financial performance of manufacturing companies in Kenya.

ii. To determine the relationship between inventory management tactics and the financial performance of manufacturing companies in Kenya.

iii. To examine the relationship between commodities pricing tactics and the financial performance of manufacturing companies in Kenya.

iv. To determine the relationship between corporate diversification tactics and the financial performance of manufacturing companies in Kenya.

1.5 Research Hypotheses

Research hypotheses formulated for the study are:

Ho_1 Revenue volatility does not have a statistically significant relation with the financial performance of manufacturing companies in Kenya.

Ho_2 Inventory management tactics do not have a statistically significant relation with the financial performance of manufacturing companies in Kenya.

Ho_3 Commodities pricing tactics do not have a statistically significant relation with the financial performance of manufacturing companies in Kenya.

Ho_4 Corporate diversification tactics do not have a statistically significant relation with the financial performance of manufacturing companies in Kenya.

1.6 Justification of the Study

Commodity risk has of late emerged as an area of concern to most manufacturing companies due to the high commodities demand, intermittent shortages and the wide fluctuations observed in the commodities markets and entities financial performance. This research will thus be of importance to manufacturing companies as it will form a basis of evaluating their current trends in risk management and hopefully suggest ways in which these companies can improve on their risk management practices. The research will also be of importance to policy makers in the country as it can be a good guide on how they should come up with relevant policies on management of commodity risk exposure from a macro scale level which eventually should provide a conducive environment for investors to set up their operations in the country in line with vision 2030 and the big 4 agenda.

Besides, there has been consistent agitation for the introduction of more securities which are to be traded in the Nairobi Securities Exchange (NSE). Commodity risk management derivatives may be introduced as the solution to the desired wide range of financial

instruments through which business entities can use to hedge risks, create more opportunities for investors besides making the NSE trading activities more vibrant.

1.7 Significance of the Study

This study is important as it provides a broad and unique insight into the relationship between commodity risk, its management and the financial performance of manufacturing companies in Kenya. It's putting into perspective how commodity risk is affecting the performance of manufacturing companies in Kenya given that such companies have high exposure to commodity risks as they deal with large quantities of commodities. Understanding the issue of risk and its relationship with performance is critical as it forms the base of most organisational decisions.

1.8 Scope of the Study

This study focused on manufacturing companies in Kenya given that they are the major consumers of commodities: they are highly exposed to commodity risks and have the resources and technical knowhow on management of risks. The focus was on all members of Kenya Association of Manufacturers (KAM) based on the twelve sectors with special emphasis on how these companies manage exposure to commodity risk and if management tactics used have an impact on the financial performance of these companies.

The study focused on a ten year period from 2007 – 2016 given that a short study period is desirable as business entities keep on changing their tactics and in order to have many entities with stable tactics included in the sample, it is more appropriate to use a short

period (Daud, et al., 2009). The data for the period was readily available and relatively complete thus it forms an adequate base for analysis.

1.9 Limitations of the Study

Limitations that may be expected will include informal approaches that companies may use to manage risks and lack of proper documentation by such companies on the approaches they use to manage commodity risk. Also the location of some industries may limit their accessibility. The researcher has lumped together all the manufacturing companies instead of using the various sectors according to the KAM classification. Therefore it may not be possible to determine the specific tactics used by companies under each of the twelve sectors.

In order to overcome the limitations identified, the researcher has adopted a research approach that focuses on evaluating commodity risk management tactics from a very basic perspective and incorporated the same in the data collection instrument. Equally the researcher will dedicate adequate resources to facilitate visits to the selected companies in order to seek data related to the study which may not be available from alternative sources. The researcher used GMM by Arellano-Bover/Blundell-Bond estimator (1995) and (1998) which is appropriate as it introduces more flexibility when estimating the parameters of the models.

1.10 Assumptions of the Study

The researcher has made several key assumptions in the study. First is on the theoretical fit whereby the researcher assumes the theory and conceptual framework are an accurate reflection of the phenomenon studied. The second assumption is on conceptual coherence in

order to justify validity of findings. Operational logic is the third assumption in which the research instrument is assumed to be in correspondence with the study's conceptual framework. The fourth assumption focuses on the research merit as the hypothesis was that the research undertaken was relevant to the field of study and the research findings will contribute to the existing body of knowledge.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Under this chapter the researcher focuses on the theoretical and empirical literature on commodity risk management tactics and the financial performance of manufacturing companies. A conceptual framework was developed to depict the relationship between the dependent and the independent variables which forms the basis of analysis. The chapter is organized as follows: chronological account of the research problem, theoretical framework, conceptual framework, empirical review, summary of literature review and the research gap.

2.2 Theoretical Framework

This section presents the various theories upon which the research is grounded. The theories include prospect theory, theory of storage, theory of general equilibrium and modern portfolio theory.

2.2.1 Prospect Theory

Prospect theory key proponents include Amos Tversky and Daniel Kahneman who in 1979 wrote a paper on decision making under risk where the possibility of making a loss tend to have a higher influence on the decision made oblivious of the expected utility of other alternatives (Kahneman and Tversky, 1979). The theory states that when entities are choosing between different options/prospects, they will decide based on expected utility relative to a given reference point instead of considering the absolute outcomes which may be more beneficial to the entity. Chakrabarti and Kiran (2017) investigated the asymmetric relationship between return and volatility by considering three premises

namely leverage effect, feedback effect and behavioral theories. Leverage effect argues that innovation in returns influences volatility while feedback effect postulates that volatility innovation influences returns. The researchers found that behavioural biases exist in the markets and have a strong influence on the market performance and therefore behavioural theories when compared to leverage effect and feedback effect tend to provide superior explanation to short term return volatility relationship.

Kahneman and Tversky in 1992 published an improved prospect theory referred as cumulative prospect theory that has wider applicability in uncertain and risky prospects under which it is possible to assign different weights to gains and losses (Kahneman and Tversky, 1992). The reluctance to sell at a loss is premised on the prospect theory where the entity will hold back from venturing into a market if they perceive that a loss will be made. Equally, when consumers are subject to prospect theory preferences this tends to have an impact on prices and eventually on the sales made. Barberis (2013) affirms the relevance of prospect theory when evaluating issues of risk as even after thirty years, the theory still has wide applicability when evaluating how entities approach issues of risk. One shortcoming with prospect theory is the inability to determine the gain or the loss that should be used as a reference point when using the theory. Nevertheless, the theory has found wide application in finance, insurance, consumption choice among other economic decision making situations and will thus guide the research on revenue volatility.

2.2.2 Theory of Storage

The theory of storage by Holbrook Working (1949) is commonly used to explain the association between spot and future market prices in the commodities market. The theory

takes into account the inter-temporal price relations whereby the argument is that the relation between the delivery prices at two different dates will be dependent on the carrying cost of stock net the convenience yield. Storage costs such as insurance, warehousing, obsolescence, handling and maintenance costs will eventually influence the delivery price. However, a return on storage must be earned. Cifarelli and Paesani (2012) carried out an assessment on whether the theory of storage is still relevant to the present time. Using data on two commodities, cotton and tin and two different time periods, 1920s and 2000s they set out to determine whether commodity price volatility and it's association to market essentials has changed over time. They came to the conclusion that except for obvious factors such as faster diffusion of information in modern times and financialization of the commodities markets, the theory of storage is still relevant in evaluating spot and future prices of commodities. Other researchers who have come to a similar conclusion include Milonas and Henker (2001) who tested the theory on oil markets and found that convenience yield is a negative function of inventory while Heaney (2006) tested the theory on the London Metals Exchange (LME) and came to the conclusion that there exists convenience yields that are a diminishing, non-linear function of inventories.

The theory of storage highlights the benefits of holding optimal inventories of commodities. Indeed as argued earlier, holding inventories can be one of the most basic approach of managing commodity risk exposure as inventories have a convenience yield, helps in avoiding disruptions in production, aids in meeting unexpected demand and helps to avoid constant revision of products prices. And given the fact that Kenya does not have a functional and well-structured financial market dealing with a wide range of financial securities, looking at how inventory levels impact on future prices will be the best point

to start analyzing commodity risk exposure management. Research on commodities inventory management tactics will thus be guided by the theory of storage.

2.2.3 Theory of General Equilibrium

The theory of price determination is associated with Marshall (1870) who based the pricing of commodities on different periods which are referred as the lengths of the runs and the forces of demand and supply. The key argument behind the theory is that prices of commodities are dependent on duration it takes for the supply to adjust. The four key periods as envisioned by Marshall include the market period which applies to the very perishable commodities resulting in forces of demand playing a major role when pricing the commodities, whereby commodity prices tend to be high at the beginning of the period and fall as the market period comes to an end. The short period applies to those commodities that are not perishable but manufacturing capacity is fixed and production can only be increased by varying the inputs. Supply within the short period can only be partially adjusted to be in line with the demand to achieve short term equilibrium. In the long run period, the normal price of a commodity is achieved through the market forces whereby the influence of supply is greater than that of demand and has been observed to be the best period when evaluating commodities prices. The last period, referred to as the secular period is one in which all underlying factors have significantly changed and therefore no meaningful inference may be made based on them (Plott, et al., 2013).

The concept of price determination was extended by Leon Walras who advanced the theory of general equilibrium which focuses on price determination in the whole economy using a bottom up approach focusing on individual markets and agents (Donzelli, 2008). The Walrasian equilibrium has found wide application in the analysis commodity markets

with flexible prices and different economic agents and the two theories have often been referred to as companion theories when explaining price processes in a market (Zaratiegui, 2002). Theory general equilibrium has been adopted to guide the research on pricing tactics adopted by manufacturing companies in Kenya.

2.2.4 Modern Portfolio Theory (MPT)

Harry Markowitz 1952 formulated the Modern Portfolio Theory in a paper on portfolio selection and since then, the theory has found wide applicability in finance areas. MPT advances that through carefully choosing of investments to be included in a portfolio: an investor can effectively minimize the risk exposure and in the process maximize the portfolio expected return. MPT advocates for selecting of a collection of investments that will collectively have a lower risk than what could be achieved by individual investment. According to Markowitz, the risk of a portfolio should be the covariance of the portfolio and any investor should aim at creating a portfolio of low covariance investments. Different researchers have studied the relationship between corporate diversification and financial performance (Burgers, et al., 2009: Shen, et al., 2011: Olajide, 2012) and their theoretical grounding and reference has been the Modern Portfolio Theory.

Sharpe in 1963 extended the concept in the MPT and formulated the factor model which is used to determine how a security performs in relation to the general market index. Ross in 1976 formulated asset pricing model which has found wide application in assets pricing when factoring multiple risks (Fabozzi, et al., 2002). Scholars such as Chen and Yu (2011): Olajide (2012) argue that corporate diversification exploit's economies of scope and will only succeed when the marginal benefits of diversification are higher than the marginal costs and some of the benefits that may accrue from diversification include

stability in income flows, enhancement of profits, growth in revenue and better performance of the entity shares in the market. MPT therefore provides very solid grounding when researching on the impact of corporate diversification on the financial performance of manufacturing companies in Kenya.

2.3 Empirical Literature Review

This section presents the review of empirical literature on the commodity risk, risk management tactics and the financial performance of manufacturing companies in Kenya.

2.3.1 Revenue Volatility and the Financial Performance of Manufacturing Companies

Bodnar, Graham and Harvey (2011) classified risk exposure in businesses entities around the world into six major areas which included interest rate, foreign exchange, commodity, energy, credit and geopolitical risks. Of the 119 firms that they identified as facing commodity risk, fifty one percent of these business entities indicated that they appraised two or more sources of commodity risks. Most of the firms surveyed indicated that risk management was a function of the purchasing department. Risk management should largely be a finance function as a vital insight from the theoretical literature available on risk management is that business entities employ risk management because of financing constraints (Cifarelli, & Paladino 2010).

Ehrhart and Guerineaua (2013) investigated commodity price volatility and subsequent tax revenues based on the evidence from eighty developing countries between 1980 and 2008. They measured volatility in price of forty one commonly used commodities and found that volatility of import and export prices does affect negatively the revenue generated from international trade tax and income tax respectively although the negative

effect is not homogeneous between countries being moderated by the commodity traded under export price volatility and tariff structure under import price volatility. Volatility in commodity markets both at the national and international levels is commonly caused by discrepancies in the supply and demand fundamentals. For metals and energy products their volatility will be determined by the prevailing stage in the business cycle, agricultural commodities volatility will be influenced by business cycle and weather conditions while energy products volatility is influenced by political upheavals within the production areas (Al Janabi, 2009).

Baffes (2011) argues that business entities are often affected by volatility in commodity markets resulting in disrupted operations, high operating costs and poor financial performance as commodities such as electricity, oil, agricultural products, metals and minerals often experience significant and often unexpected price changes. This price risk has a direct financial effect on pricing of products, business entity cash flows, working capital and ultimately the financial performance of the organization. The global commodity price boom currently being experienced started in mid 2000s after three decades of commodity price decline. It has been argued that this boom has been precipitated by emerging economies like China which have become major consumers of commodities and increasing of financialization of commodities (UNCTAD, 2011), resulting in synchronized commodities booms and busts even in disparate commodity prices which are not reflective of supply and demand fundamentals.

Chiang, et al., (2018) in a study on business volatility and employee performance delineate business volatility as the variability that characterizes environmental actions related to a business entity operations and results from the entity inability to predict the probability of

future events. When operating in a volatile business environment, the management should strive to gather adequate and useful information that will assist in making financial decisions, failure to which will result in decisions that adversely affect financial performance. The researchers identified three types of business volatility namely: technological volatility, earnings volatility and sales volatility. Of the three measures, sales volatility was identified as a better and more objective measure of business volatility as it is able to capture the firm operating environment and its exposure to various risks. The researchers measured sales volatility as the coefficient of variation of sales where sales are taken to be the entity sales in year *i* while the sales mean was calculated by getting the mean sales over a rolling three year period. A higher value of coefficient of variation signifies higher level of sales volatility and vice versa. Using regression analysis and time series data from 1957 – 2015 they came to the conclusion that business volatility has a positive and significant influence on the performance of employees in a business entity as employees tend to work harder when the operating environment is volatile. The measures of performance used by the researchers were efficiency of the employees and the cost component associated with the employee remuneration which differs significantly with the measures adopted by this study.

Cariolle (2012) used export revenue data for the period 1970 – 2005 to analyse different measures macroeconomic volatility. The researcher evaluated different approaches that can be used to measure volatility focusing on macroeconomic volatility and established that there are significant costs that result from volatility within the economy. Generally, the approaches used are dependent on the choice of reference values and how the subsequent deviations are calculated. The typical measure of volatility is standard deviation of a given distribution measured around its average/mean or the trend. The researcher argues that standard deviation is appropriate when the variable to be measured is stationary at first difference and therefore

the hypotheses formulated should be restrictive. An alternative measure involves calculating the standard deviation of the residuals under an economic regression with the key measures being the coefficient of determination and the variations in the growth rates. A more robust measure of volatility involves calculating the standard deviation but incorporating a statistical filter in order to disaggregate the trend into both the long and short term trends. Wolf (2005) emphasises on the importance of the period when calculating volatility whereby when examining the short term impact of volatility, the ideal period should be of five or ten years. For medium term to long term effects of volatility, duration of over ten years should be considered. Overall, it's important to relate the deviations to the trend of a given period over which they occurred.

Solomon and Muntean (2012) highlight the central place of financial risk when assessing business entity profitability as risk has a direct impact on profitability. In a study on assessment of financial risk and an entity's profitability, the researcher used data from two companies over a five period duration. They identified market, credit, liquidity and interest rate risks as the major risks that affect the performance of entities. The key indicators during financial risk assessment include financial leverage or debt burden, financial breakeven and the leverage factor as these help to indicate fluctuations in the entity profitability occasioned by the financial structure. The level of debt affects the return on equity and in turn influences the level of risk exposure. Equally the researchers advocate for clear distinction between financial and economic returns whereby the financial leverage effect results from the difference between economic and financial returns. Al-Tarawneh, et al., (2017) evaluated the effect of noncore income on the financial performance in the banking industry using a sixteen period's data. To measure financial performance the researchers advocate for the use of ROA as they argue that it has two critical measures namely: EBIT which measures the efficiency of

a business in controlling various costs and the total assets turnover that will measure the efficiency of a business in utilizing assets to generate returns. The researchers established that there is a positive and significant relationship between non-interest income margin and the size of the entity. The researchers highlight the importance of considering the noncore income when evaluating the financial performance of a business entity.

Fang (2016) postulates that financial risk will manifest itself in manufacturing companies through low profitability and poor efficiency resulting from depressed gross profit margins, high product costs and low return on investment (ROI). The researcher focused on listed manufacturing companies in China and the risks that are associated with such firms. The method of analysis involved the use of theoretical and case analysis through comparison of individual companies listed in China securities exchange. The manufacturing entities lack funds and are on the brink of insolvency leading to unreasonable debt structure which has a negative impact on the debt repayment. Equally such firms have poor operating capacities resulting in a significant level of non-performing assets characterized by large bad debts, dead stock and low asset turnover. Manufacturing entities facing financial risks have weak growth ability and tend to stagnate in terms of their long term development. To mitigate the financial risks, the researcher recommends that such entities should establish and improve their internal control systems besides ensuring that a proper internal audit is conducted. These aspects tend to provide an early warning system which ensures risks are identified early enough and mitigation measures implemented.

Vătavu, et al., (2018) contends that when profitable business entities face decline in revenue, they take measures such as making drastic cuts in expenditure and deferring investing in capital expenditure and therefore such volatility may not affect their immediate financial

performance but this may be reflected on low return on assets. These researchers evaluated the effect of oil price and volume changes on business profitability in United Kingdom. Using a sample of thirty one oil and gas companies and panel data for 2006 – 2014 period, they used comparative regression analysis and GMM to analyse the data. They used both static and dynamic models as an alternative to the commonly used vector autoregressive (VAR) and structural vector autoregressive models (SVAR) with the assumption that there is a lag between price changes and their impact on the return of the entity. The researchers advocate for use of such models as it is not common to find completely exogenous variables in micro economic models given that many variables tend to be interdependent and endogenous to a certain extent. They came to the conclusion that a business entity which is profitable will be able to deal with volatility in prices and volume by maintaining and ensuring that they have sufficient cash flows, maintaining high stock turnover, ensuring efficient use of assets and maintaining high solvency ratios.

Menguc and Barker (2005) argues that volatility in sales affects predictability and planning of activities related to sales which eventually results in higher variability in a business entity financial performance. The researchers used self-report measures where sales volatility was measured using a seven item likert scale. Respondents were to express an opinion whether they agreed or disagreed their businesses were exposed to sales volatility. The data was analysed using hierarchical moderated regression analysis and the conclusion was that collaborative skills yield higher performance compared to individual marketer selling skills pointing to the fact that the financial performance of an entity should be a collective effort.

Mitra (2016) postulates that you can use two proxies when measuring entity specific return volatility namely idiosyncratic volatility and asynchronicity. Idiosyncratic is measured as the

natural log of variance of residuals from the asset pricing model while the asynchronicity is measured using the natural log of coefficient of determination. He considered 1,490 manufacturing firms and obtained 12,284 observations for a period of 10 years. The researcher came to the conclusion that earnings quality is negatively correlated with entity specific volatility in returns. Higher volatility will be observe in instances where greater information asymmetry exists, higher risk associated with liquidity of the market, disparate shareholding structure and subdued trading in the securities markets.

Ramesh, et al., (2017) In a paper on the effect of working capital on financial performance of manufacturing entities in Oman, using data for a ten year period and a sample of twenty companies, the researchers used pooled OLS regression analysis to analyse the data. They argue that due to the fact that manufacturing companies hold significant levels of current assets which are not necessarily productive, this tends to have a negative effect on ROA. They established a strong negative relationship between inventory conversion period (ICP) and the return on assets with longer conversion periods resulting in worse financial performance. They came to a conclusion that variations in the financial performance of manufacturing companies were explained to the tune of 52.4% by cash conversion cycle, the inventory conversion period and the accounts payable payment period.

Huang (2009) evaluated cash flow from sales and the return on stocks of companies listed in NYSE, NASDAQ and AMEX securities exchanges and used quarterly data from 1980 to 2004. In order to enhance cross sectional aggregation the researcher used firm size to standardize cash flows. The researcher advocates for use of sales as a measure of cash flow volatility as sales are able to capture seasonality in cash flows. As a measure of cash flow volatility, the researcher calculated the standard deviation of cash flow to sales where two

measures were used namely: standard deviation of cash flow to sales and the standard deviation of seasonality adjusted cash flow divided by book equity. The researcher used two step cross regression analysis on a monthly basis besides carrying out other robustness checks. He came to a conclusion that there is a negative relationship between cash flow volatility and stock return.

Kordestania and Mohammadi (2016) evaluated the relationship between earnings management and competition in the products market. As a measure of revenue/sales volatility the researchers calculated the standard deviation of the business entity sales scaled by assets. The researchers based their study on seventy seven listed companies over a period of ten years and used pooled OLS regression analysis. They concluded that having intense competition within the product market results in increased earnings management in business entities.

Deleersnyder, et al., (2004) evaluated business cycle fluctuations and their effect on durable goods sales patterns. They observed that sales tend to drop very fast when the economy is on a downward turn but the upward adjustment is not as fast when the economy recovers. To quantify the extent of cyclic fluctuations, the researchers calculated the percentage standard deviation within a series and the cyclical co movements to determine the extent fluctuations in the economy are transferred to specific sales performance. To analyse the data they used both static and dynamic models with the understanding that the effect of price adjustment takes time to be manifested. The researchers came to the conclusion that consumer durables are more susceptible to business cycle fluctuations than upheavals within the economy. Equally, there is co-movement between the gross national product (GNP) and the sales component as a decrease in GNP translate into a decrease in sales. The performance will be

influenced by the fact that consumers will tend to postpone consumption if they perceive the pricing is unfavourable, entities tend to increase prices in contractionary economy and decrease them in an expansionary economy and inert pricing practices. Companies that find themselves in such situations can either adjust the prices quickly in a cyclic rather than countercyclical manner or diversify into products which have different life cycles as replacement sales form a significant portion of entity total sales.

Sundaram (2016) evaluated trade liberalization and its effect on sales volatility in manufacturing firms over two time periods of 1989 – 1993 and 1994 – 1988. Sales volatility was determined using a residual approach by calculating the difference of the natural log of current and previous sales. From the predicted residuals, the researcher calculated the standard deviation for each of the periods. Business entity mean sales were used as a control variable for each of the period. This approach is appropriate as it ensures that the researcher is able to control for unobserved factors and time specific shocks which are evident in most business entities. The researcher obtained panel data and used dynamic models to analyse the data. The researcher came to the conclusion that volatility in prices of commodities can be addressed through focusing on the input and output tariffs charged on raw materials. Senses and Kurz (2016) use a similar residual approach when measuring volatility in employment growth rates within manufacturing firms.

Giovanni and Levchenko (2009) paper on trade openness and volatility focused on employment, production, pricing and quantity indices from entities in the manufacturing sector from sixty one countries, twenty eight different sectors and over a thirty year period. To estimate the volatility of output and its relationship with trade, the researchers computed volatility over discrete ten year durations where the volatility is taken as the log variance of

the annual growth rate in order to control for outliers and other related restrictions resulting from errors in the distribution. The researchers used panel regression analysis to analyse the data generated. They observed that volatility was five times higher in manufacturing companies located in developing countries which they attributed to higher trade openness within these countries.

Mohammed and Knapkova (2016) argue that effective and integrated risk management tends to influence financial performance as it enhances the company's understanding of exposures that will have an impact on the performance of the company and ensure that the company takes advantage of arising opportunities. Equally the management of a company will be able to be proactive when handling risk issues and this reduces volatility and results in stable earnings. The researchers based their study on companies listed in the Prague Stock Exchange over a six year period. Using linear hierarchical regression model, they came to a conclusion that there exists a positive and significant relationship linking risk management and the performance of a business entity.

Jafari, et al., (2011) established that there exists a significant relationship between total risk management and financial performance. If an entity is able to control negative effects of external risks and respond to environment changes it will have limited exposure to economic consequences resulting from market variations. The researchers attributed the better financial performance to three critical factors namely: less average capital expenditure as stability in revenue results in reduced business risk, enhance repayment of debt and the going concern status of the business making it more attractive to current and potential investors. The cost of contracting reduces if the entity can demonstrate to its stakeholders that it is actively managing risks. If an entity does not seem to effectively manage risks, stakeholders will

demand higher returns to cover themselves from the perceived risks besides lack of full commitment from employees when they perceive the entity has going concern issues. Lastly, lack of effective risk management will result in decrease in entity specific assets as stockholders will shy away from investing in such assets. The researchers based their study on companies listed in Tehran securities exchange over a six year period. Using bivariate regression analysis, they came to the conclusion that when entities consciously and actively control unfavourable situations that lead to increased risk exposure, financial performance will be enhanced. They also argue that performance can be enhanced by investing in intellectual capital which will give these companies a competitive advantage.

Kiseľáková, et al., (2015) evaluated the effect of risk on financial performance from a broad perspective focusing on both systematic and unsystematic risks. Using the capital asset pricing model (CAPM) and data for 2004 – 2013 period to measure systematic and unsystematic risk respectively the researchers concluded that both systematic and unsystematic risks have equal impact on the financial performance of business entities. Alshubiri (2015) used stepwise regression analysis over a five year period to evaluate the impact of business and financial risk on the performance of the industrial sector. For business risk, two measures were used namely: sales variability (standard deviation of earnings to price ratio) and sales growth as the difference between current and past net profit. For financial risk, two measures were used namely: the debt ratio and the current ratio. The researcher concluded that there is a statistically significant impact of business and financial risk on the performance of firms in the industrial sector as these risks has significant impact on variables such as earnings growth, their variability, financial leverage and the current ratio of any given entity.

Niresh and Velnampy (2014) in a study on firm size and profitability of listed manufacturing entities found that there was no correlation between the firm size and the financial performance of manufacturing companies listed in Colombo Stock Exchange, Sri Lanka. The study used data from fifteen companies over a five year period. The data was analyzed using multiple regression analysis and the researchers concluded that there was no significant relationship between the profitability of an entity and its size. Also they concluded that firm size has no impact on the profitability of an entity. They attributed this lack of association to the shift in managerial focus whereby in such firms, the current focus is on enhancing managerial utility rather than profit maximization.

Mwelu, et al., (2014) researched on risk in manufacturing companies in Uganda using cross sectional analysis and a sample of eighty companies. Using correlation, regression and factor analyses they established risk management influences the profitability of manufacturing entities. The researchers established that there is strong correlation between risk management and profitability ($r=0.598$: $p<0.01$) and the factor loadings were high (above 0.7). Olayinka, et al., (2017) studied firms in the emerging markets using value at risk (VaR) as a measure of enterprise risk and return on assets as a measure of financial performance. The researchers found that enterprise risk management has a significant positive impact on the financial performance of companies in the emerging markets.

Kinyua, et al., (2015) advocated for a robust internal control system as an approach for managing risk in companies. Using a sample of thirty eight companies listed in the Nairobi securities exchange and cross sectional data, the researchers evaluated the effect of internal control systems on financial performance. They found that 30.8% of variation in financial performance can be attributed to risk management. Business entities should have well

documented risk management policies, frequently update risk registers and encourage reporting of occurrences within the entity in order to identify potential and arising risks. The Nairobi securities exchange listed companies were found to have adequate capacity to assess risk (38%) and they engaged in risk mitigation with the key mitigation approaches being implementing inspection plans (62.9%), existence of a risk management committee (65.3%) and transfer of risk (57.9%).

Kariithi and Kihara (2017) analysed profitability, sales volume and market share in manufacturing firms in the pharmaceutical industry over a five year period using descriptive analysis and established that the three variables have a significant influence on an entity performance. Wanjohi, et al., (2017) established that there is a direct relationship between financial risk management and the return of an entity and they recommend active and robust risk management through the use of value at risk (VaR), risk simulation, use of derivatives and proper training on risk issues. Mugenda, et al., (2012) evaluated the risk management practices and their implications on the financial performance of manufacturing entities in Kenya. The researchers found that the sugarcane manufacturing firms in Kenya applied a variety of risk management practices. They established that there is a positive relationship between adoption of risk management practices and financial performance (r=0.67) and manufacturing entities should adopt integrative risk management approaches that focus on upside potential besides mitigating the downside losses.

2.3.2 Inventory Management and the Financial Performance of Manufacturing Companies

Shardeo (2015) analysed the effect of inventory management on the financial performance of an entity. The study focused on three steel manufacturing companies in

India and used a five year period data which was analysed using correlation analysis. The researcher argues that an ineffective inventory management system has a negative impact on operational costs such ordering and holding costs. It also results into fewer sales and customers as shortfalls in supply of products negatively affect customer relationships. It's common for business entities to consider inventory as a necessary evil rather than an asset which can be managed.

Mohamad, et al., (2016) in a paper on the relationship between inventory management and company performance found that there is a significant negative relationship between the key ratio, return on assets (ROA) and inventory days. They observed that a 1% increase in inventory days' results in a 0.0176% decrease in ROA implying that proper management of inventory reduces holding costs which eventually influence financial performance. The researchers used regression analysis and conducted an in-depth study on an entity operating in the textile industry. The data for the study was collected through interviews thereby resulting to a significant limitation of this study.

Capkun, et al., (2009) argues that inventory management influences short and long term financial performance and if a business entity does not focus on this critical area, it will end up underperforming its competitors. In a study focused on manufacturing companies and the relationship between inventory and financial performance, the researchers used time series data for a twenty six year period collected from US based manufacturing companies. The data was analysed using correlation analysis and OLS regression analysis applying both static and dynamic models. The researchers came to the conclusion that there exists significant positive correlation between the inventory held by an entity either as total inventory or its components such as raw materials, work in progress or finished

goods, and the financial performance of an entity. The highest correlation was observed between raw materials inventory and the entity financial performance as it affected both the gross and the net profit implying proper control of raw materials in manufacturing companies will lead to better financial performance. Work in progress inventory was found to have a significant effect on the gross profit while finished goods inventory was observed to affect the net profit more. Therefore in order to enhance the performance of manufacturing companies, proper management of all components of inventory should be undertaken. Shardeo (2015) established that inventory turnover, asset turnover and return on assets ratios are correlated with the net profit of the business entity. With the establishment of an inventory management system, it tends to improve the above ratios eventually enhancing the financial performance.

Olaniyi, et al., (2017) in a study on re-examining firm size-profitability nexus analysed data from sixty three non-financial firms in Nigeria. They collected data over a thirteen-year period and analysed it using two-step GMM beside carrying out a number of specification tests. The researchers came to the conclusion that beside other factors, there exist a bidirectional relationship between a business entity performance and its size. They attributed the results to the fact that firm size Granger-causes profitability and on the converse profitability negatively Granger-causes firm size. They also found that when the profits are increasing consistently, they will lead to a sustained growth of size of the entity.

Cannon (2008) exhaustively reviewed the impact of inventory on the financial performance and provided a comprehensive overview of the relationship. The researcher argued that manufacturing firms with clear manufacturing strategies will fare better

financially compared to those that just maintain low levels of stock. Indeed, a key argument is that having a superior inventory turnover does not necessarily result into better financial performance. The researcher concluded that there was little or no relationship that can be discerned between superior inventory management and the financial performance of manufacturing entities.

Kontuš (2014) asserts that a business entity can minimize its liquidity and business risks through optimal management of inventory and at the same time maximise its rate of return. Successful inventory management will therefore entail lowering amount of inventory held, reducing associated inventory costs and the subsequent result is increased profitability. Kouvelis, et al., (2011) advances that a core risk management strategy that manufacturing companies can use involves holding reserves. By having reserves in manufacturing capacity, inventory and a safe lead time it acts as a buffer against volatility and uncertainty in the markets. They further argues that through pure diversification and natural hedging, companies can reduce return variance from different markets which can be evened out as variability in one market is partially offset by the better returns from other markets.

However Larry, et al., (2004) presents an alternative view where by using buffer inventory and multiple suppliers such an approach has been identified as having an adverse effect on operational efficiency and competitive advantage as the additional holding costs make the companies less efficient. Equally, they argue that each commodity, service or product will have a unique risk profile and they identify four propositions relate to such commodities, services and products. The first proposition is that entities dealing in high technology markets need to manage the associate risks more

extensively compared to those operating in low technology markets. They attribute this to a higher degree of commercial uncertainty associated with high technology markets. The second proposition relates to those suppliers who provide commodities, services and products which have high security requirements. Such suppliers need more extensive risk management as consumers want to be assured that the product has not been tampered with and it won't become a hazard risk. The third proposition focuses on whether a supplier is a major or minor supplier. Major suppliers who provide high volume, high value or vital products should engage in more extensive risk management as reliance on such suppliers tends to increase the production risk. The last proposition is on purchaser's experience whereby those purchasers who have less experience in purchasing require more extensive risk management compared to those who are experts in purchasing. Additional risk management will protect such a purchaser from supplier opportunism besides ensuring that proper strategies on customization and adaptation are applied.

Sahari, et al., (2012) focused on the impact of inventory management and capital intensity on financial performance and based their research on eighty two construction firms in Malaysia. They used panel data for the period 2006 – 2010 and the data was analysed using correlation and regression analysis. Their findings were that there exists a positive correlation between inventory management and financial performance. They also observed that there exists a positive relationship between inventory management practices and capital intensity depicted by the capital structure that a business entity has adopted. The effect of inventory management measures adopted by manufacturing companies on financial performance are moderated by factors such as manufacturing cycle times, labour productivity and suppliers efficiency (Fullerton & Wempe, 2009).

Hofer et al., (2012) researched on the mediating role of inventory leanness and found that concomitant application of internally and externally focused lean inventory practices yields better financial performance than when selective lean inventory practices are implemented. Belekoukias, et al., (2014) researched on the effectiveness of lean methods such as value stream mapping (VSM), automation, kaizen, total productive maintenance (TPM), and Just-in-Time (JIT) focusing on their correlation and effectiveness on operational performance in one hundred and forty manufacturers across the world. The data for the study was collected using questionnaires and analysed using correlation and regression analyses. JIT and automation had the highest impact on operational performance implying that it is able to improve on costs related to inventory, reduction of quality defects through automation, speed is improved in terms of the lead time, cycle time and delivery time, it is more dependable in terms of level of inventory and time of delivery, it is more flexible allowing a business entity to change and adapt to new market trends. Kaizen had modest contribution: TPM had no impact while VSM had negative effect on the operational performance on manufacturing companies across the world. They attribute this to the fact that JIT through reduced inventory, a business entity is able to sort out any problems in the supply chain and thus such problems can be eliminated from their root cause.

Ogbo and Ukpere (2014) conducted a study on the effect of managing inventory on performance. Data was collected from eighty three respondents and was analysed using frequencies. They established there is a positive relationship between operational feasibility and inventory management which they attributed to better inventory utilization, minimization of holding costs and less wastage. Prempeh (2016) asserts that optimal working capital management will have a positive impact on the financial performance of

a business entity as it tends to increase the asset turnover ratio and the return on investment. The benefits that will accrue include developing dependable raw materials sources, reduced wastage and maximizing inventory turnover. Using cross sectional data collected using purposive sampling in four manufacturing companies from 2000 – 2014, the researcher analysed the data using OLS regression. The researcher came to the conclusion that there exists positive relationship between the financial performance of an entity and the approach used to manage raw materials inventory. A one percent improvement in the raw materials management will culminate into a nine percent improvement in an entity's profitability.

Folinas and Shen (2014) evaluated the link between inventory management and the financial performance of entities in the agricultural sector. The researcher sought to find out the nexus between inventory and the financial performance and whether inventory will influence financial performance. Using data collected over a seven year period from fifty five companies, regression analysis was used to analyse the data. The researchers came to the conclusion that there is no relationship between inventory turnover and earnings before interest and tax (EBIT) to sales ratio, return on total asset (ROA) and gross profit to sale ratio. They however established a strong relationship between inventory days and gross profit to sale ratio, earnings before interest and tax to sales ratio, and return on total assets. They argue that one of the limitations associated with using inventory to predict performance especially in the agricultural manufacturing companies is that the inventories they deal with are prone to weather vagaries and seasonality issues and this makes it difficult to consider inventory as a critical determinant of financial performance.

Ali et al., (2013) evaluated the relationship between various components of inventory and the financial performance of manufacturing companies and in order to get consistent measures, they scaled all the components by sales. They found that there was no significant statistical relationship between raw materials inventory and work in progress inventory and the financial performance of manufacturing companies. They established a negative correlation between finished goods inventory and the financial performance of manufacturing companies which they attributed to poor management of inventory by these firms.

Elysed and Wahba (2016) evaluated whether there exists any correlation between a business entity performance and the entity lifecycle. Focusing on the rapid growth, maturity and revival stages the researchers collected data from eighty four firms listed in the Egyptian stock exchange over a six year period. They advocated for the use of return on assets as a measure of performance as it is a better measure of operating efficiency compared to other measures such as return on equity which leans more towards measuring capital structure efficiency. The researchers measured inventory performance using inventory to sales ratio as advocated by different researchers (Capkun, et al., 2009: Obermaier & Donhauser, 2009: Eroglu & Hofer, 2011). The data was analysed in homogeneous clusters using panel regression analysis. They came to the conclusion that the organizational life cycle stage is a key determinant when evaluating the relationship between inventory and financial performance of a business entity. The researchers' advanced that the relationship between inventory to sales ratio and an entity financial performance is negative in the preliminary stages of growth and equally at the maturity phase, however it is positive in the brisk growth phase and the revitalization phase. They

attributed this to the fact that inventory management is a dynamic rather than a linear process in business entities that changes based on the interest of the stakeholders.

Shin, et al., (2015) affirm the logical assumption that there is an inverse relationship between optimal inventory and profitability. The researchers used cross sectional, time series data from one thousand, two hundred and eighty nine companies collected over a three year and eight year period. Profitability was measured as a ratio of net income and revenue while inventory to sales ratio was measured as a ratio of total inventory scaled by total revenue. The data was analysed using OLS regression and various specification tests were employed to enhance the robustness of the results. They came to the conclusion that an entity will perform better financially when it maintains a lower inventory to sales ratio. The researchers also came to the conclusion that efficient inventory management was more beneficial to small entities compared to medium and large entities. They argued that for medium and large business entities, the benefits are not that high as they could already be having such systems in place and their benefits have already been maximized. Another key finding of the study was on the effect of inventory on profitability based on the size of the entity. They found that when firm size is measured using revenue, firm size has a negative effect on performance while when the firm size is measured using asset size the firm size has a positive effect on performance.

Shardeo (2015) argue that the hidden costs associated with holding inventory end up eating into the profits and therefore the need to maintain optimal amounts of inventory. Besides, inventory management aims at achieving two objectives, namely availing the goods in time and at the right place and provide services at optimal costs. The researcher based the study on three manufacturing companies in India and the data was collected over a

five year period. The data was analysed using correlation analysis and the researcher came to the conclusion that manufacturing entities should aim at improving their asset turnover ratio as much as possible as inventory turnover is correlated to the financial performance of an entity.

Farooq (2018) argues that inventory turnover does not affect the return on assets, return on equity and net profit margin which he attributes to the fact that a more direct relationship exists between sales and the financial performance and therefore the relationship is seen more between the sales growth and profits and not inventory turnover and the financial performance. The researcher analysed data from seventy nine firms in Pakistan over a ten year period. Using GMM the researcher sought to find out if a relationship exists between inventory turnover and return on assets, return on equity and net profit margin. However the researcher found that firm size had a significant effect on the financial performance of the firm as such an entity is able to leverage on its asset base to generate more profits.

John, et al., (2015) evaluated the relationship between operational performance and inventory management approaches such as Vendor Managed Model, economic order quantity (EOQ), Just in Time (JIT), Thumb Rule, Automatic Replenishment, Scientific Model and ABC Model. Cross sectional data was collected through purposive and simple random sampling from five flour milling entities from one hundred and fifty respondents. The data was analysed using correlation and regression analysis after carrying out the appropriate specification tests. The researchers established that there exists a positive correlation between operational performance and the adopted inventory management method. They established

that 55.9% of variations in performance can be attributed to the inventory management approaches adopted.

Nwakaego, et al., (2014) postulate that by combining the optimal materials quantity, quality and timing of delivery it will enhance the profitability and return on equity of an entity. However, even though entities will apply the same inventory management approaches, these approaches end results will be dependent on the unique operating environments existing in each entity. The researchers based their study on engineering firms in Nigeria from which they collected panel data over a five year period. The researchers used correlation analysis to analyse the data and they came to conclusion that a positive correlation exists between ROA and ROE and the financial performance of an entity.

Mukopi and Iravo (2015) advances that different departments within the organisation will have different approaches towards inventory management with the sales and production departments advocating for large volume of stock in order to meet any arising needs while the finance department will advocate for lean inventory due to the competing needs for available funds and it's therefore crucial to harmonize the needs of various departments for effective inventory management. The researchers based their study on four sugar milling companies in Kenya and collected cross sectional data from twenty six respondents. The data was analysed percentages and regression analysis where they found that 78.9% of the performance of an entity can be attributed to inventory management.

Lwiki, et al., (2013) found there is a significant positive correlation between inventory management practices such as lean inventory systems, strategic suppliers relationships

and application of technology in inventory management and return on sales at r=0.74 and return on equity at r=0.653. Their research was based on sugar milling firms in Kenya over a six year period and the data was analysed using percentages and correlation analysis. Financial performance was measured using the return on sales and return on equity. Ondiek and Odera (2012) found that majority of the manufacturing firms in Kenya do not give materials management high prominence despite spending an average of 56% of their total turnover on materials and other related costs. 64% companies were found to be engaging in material management practices even though majority of them did it unknowingly and some of the key functions such as procurement were carried out by nonprofessionals.

Musyoka, et al., (2015) researched on the role of inventory management practices in textile, steel rolling and food manufacturing entities in Mombasa County. Data was collected from forty five companies using structured questionnaires. Performance was measured based on the output of the production department such as production targets and efficiency in delivery while the data was analysed using frequencies and percentages. They came to the conclusion that the use of computerized inventory management practices increases the efficiency of the manufacturing firms which translates to better financial performance in the long run.

Mukopi and Iravo (2015) came to an almost similar conclusion that through the use of lean inventory practices, incorporation of information technology and having strategic suppliers' relations helps to improve the efficiency of an entity. Sitienei and Memba (2015) established that increase in inventory conversion days will result in decreased

gross profit and return on assets and thus business entities should strive shortening the inventory conversion period if they have to improve on their profitability.

Ondimu, et al., (2018) researched on the impact of inventory management on the profitability of manufacturing entities listed in Nairobi securities exchange. The researchers focused on the effect of holding costs, inventory conversion period and optimal inventory orders on the financial performance of these entities. Performance was measured using return on assets and return on capital employed. Data for a five year period was collected and analysed using panel regression analysis. They established that there exists a negative relationship between the inventory conversion period (ICP) and the financial performance of manufacturing companies listed in the Nairobi securities exchange and a similar relationship was observed between inventory holding costs such as insurance and storage costs and the financial performance. They equally advanced that the amount of inventory actually held by a business entity had the greatest significant influence on the financial performance of manufacturing companies and that this resulted into a negative relationship between the actual inventories maintained by manufacturing companies per year and the financial performance of a given entity. To mitigate the negative effects of inventory on financial performance, the researchers recommended on the companies maintaining optimal inventory levels.

2.3.3 Commodities Pricing and the Financial Performance of Manufacturing Companies

The pricing tactics that a business entity adopts have a major bearing on its survival and success in the market it's operating in. There is a direct relationship between pricing and the revenue generated by a business entity. Equally, pricing is the most flexible among the "P's" of marketing as prices can be adjusted quickly compared to other elements of marketing

strategy and it is the only one that generates revenue for an entity compared to other “P’s” that end up consuming an entity’s funds. Faith and Edwin (2014) assert that pricing objectives will give the direction that a business entity will take when dealing with pricing decisions. Through pricing, business entities should be able to communicate the value of its products to its customers. Some of the key objectives that an entity can pursue include having a target return on investment or net sales for short run periods, stabilise prices in industries or sectors experiencing significant price fluctuations, through long term pricing tactics, maintain or grow target share market, match competitors prices and profit maximisation.

Three levels of pricing tactics can be adopted namely industry, product/market and transactional tactics. Industry tactics should focus on industry level pricing with the aim of crafting tactics that address current and future market place dynamics. The focus should be on changes in supply, shifts in demographics, emerging substitute products and new technologies (Miecinskiene & Lapinskaite, 2014). The product/market strategy focuses on pricing of products based on the relevance of the product in the market, benefits to the consumers and the prices of competing products. Decisions under this approach will be informed by how much consumers are willing to pay for the unique characteristics in a given product. Finally transactional tactics focuses on the final price paid by the consumer including discounts, credit terms if any and associated incentives and it tends to be the most complicated and critical aspect of pricing strategy.

Zsidisin, et al., (2013) outline the extent to which manufacturing companies are exposed to commodity risk. Beside the exposure through the primary raw materials, these companies have additional exposure from intermediate components and subcomponents. The ability of a business entity to control price volatility can be tied to how well an entity is able to meet the

customers' requirements. An appropriate approach to manage commodity price risk is by focusing on short and long term commodity prices whereby you can use technical analysis to forecast the short run prices and fundamental analysis when dealing with long term pricing. Under fundamental analysis the focus should be on the effect of supply and demand factors on commodities pricing through use of correlation analysis and regression. Different authors have established a nexus between commodity prices and other types of risks such as interest rate risk and exchange rate risk. Jacques (2010) argues that low interest rates precipitate liquidity booms fuelling commodity demand and the reverse holds true. When considered under mean reverting expectations increase in the interest rates will result in decrease in spot prices of commodities as suppliers reduce their inventory levels. The converse it true as when the rates of interest decrease, suppliers will increase their stocks leading to increase in commodity spot prices. The observed effect on inventory is that with the increase in spot prices commodities inventories will be increased while dishoarding will be evident when spot prices go down within the framework of the cost-of-carry model.

Oskooee, et al., (2015) found that even from a country perspective, exchange rate volatility will impact on the commodity trade especially for the large industries and this trickles to the rest of the economy through balance of payment constrains. Belke, et al., (2012) using a global co-integrated vector-autoregressive model on food and other commodities data for the period 1980 – 2011 they established that there exists a positive long run correlation between global liquidity and the prevailing commodity prices and that these commodity prices alter in a substantial manner to this co-integrating relation but the global liquidity does not alter but its major impact is to drives this relationship. Commodity prices have been observed to move from the range dictated by the market fundamentals due to financialization of commodities. As investors enter and leave the commodities markets, the prevailing prices will not be

indicative of the market fundamentals of demand and supply resulting in booms and busts even in unrelated commodities.

Huchet-Bourdon (2011) found that agricultural commodities displayed higher volatilities in 2000 – 2008 compared to the 1990s but with regular spikes and troughs in previous periods. The researcher analysed international price volatility of agricultural commodities and their relationship with other commodities such as fertilisers and crude oil using three measures of volatility namely: coefficient of variation in the price levels, corrected coefficient of variation based on the linear trend and the standard deviation of the log of prices. She sought to establish the link between the high volatility in agricultural commodity prices and the key inputs such as crude oil and fertilisers. She came to the conclusion that there was high correlation over twelve month periods rather than for shorter periods. Over the fifty year period under review, the researcher noted that a pattern was observable where a spike was registered in one year followed by a decline in the following year. A relationship was observed between increase in agricultural commodity prices and crude oil and fertilisers whereby an increase in crude oil and fertiliser prices resulted in a spike in agricultural commodities prices.

Ehrhart and Guerineaua (2013) alluded to a similar behavior being observed of a strong asymmetry to price cycles where a long term downward spiral of prices may prevail followed by a sudden upward spike in prices. The researchers used data from ninety different countries for the 1980 – 2008 periods and considered forty one commodities in the agricultural, mineral and energy sectors. Price volatility was measured as the standard deviation of country specific price indices based on both monthly and yearly data. The researchers concluded that for both imported and exported commodities volatility has a

negative effect on the revenue generated. Short term volatility has a negative effect on the indirect revenue while long term volatility affects negatively both direct and indirect revenue.

Devalkar et al., (2016) advance those business entities that operate in environments prone to price volatility experience shocks that lead to substantial financial distress due to negative cash flows resulting from adverse commodity prices the end result being higher working capital, increase in external debts and dead weight losses. Such business entities face real and opportunity costs such as loss of customers, employees and suppliers. Other related costs include punitive penalties due to irregular debt payments and foregoing investments opportunities due to constrained financing. Agrawal, Duttagupta and Presbitero (2017) sought to establish the transmission of international commodities volatility into the domestic economy. Commodity price swings in the international markets have a direct effect on the margins of exporters whereby a decline in a commodity net export price will have a negative effect on the profitability of such an exporter. The researchers came to the conclusion that credit advanced by commercial banks will be influenced by volatility in the commodity markets especially for low income countries and those that significantly rely on commodity sales. This was attributed to the fact that if a financial institution is significantly reliant on commodity revenues as the bulk of its financing, commodity shocks will lead the company to curtail its lending due to the limited revenue.

Paul, et al., (2010) asserts that different pricing tactics can be associated with four pricing scenarios: new product, competition, product mix and cost pricing. Profit, revenue, sales, output, growth and utility maximization have been identified as some of the key factors that influence pricing tactics in organizations. However, other factors such as suppliers'

ability to bargain, product differentiation, nature of market, consumers' price elasticity, technology among others have a significant influence on pricing tactics adopted.

Howard and James (2013) suggested that when organizations are faced with risks beyond their control as they formulate pricing tactics, they tend to result to externally oriented pricing tactics such as shifting the burden to consumers in order to deflect the perceived risks. A business entity can adopt either high or low pricing tactics which will be dependent on customers' ability to pay, degree of competition, demand and supply dynamics and the objectives being pursued (David & David, 2012). Baroto, et al., (2012) argue that for business entities to survive in competitive industries two key corporate tactics that they should adopt include cost and differentiation tactics. The cost strategy is critical in order to produce competitively priced quality goods while the differentiation strategy ensures production of unique products. Malik (2011) established that firm size has a mixed or no influence on the financial performance which may be attributable to the level and type of assets held by a business entity.

Eva Maria (2015) asserts that while small and medium-sized enterprises (SMEs) play a critical role in the manufacturing sector across the world, SMEs face significant price risks that may not necessarily affect large enterprises such as low resource base, poor economies of scale and are thus more prone to commodity risks. Al Tawalbeh and Abu-Rumman (2015) researched on the impact of product mix pricing tactics such as complementary, bundling and customer value and concluded that irrespective of the pricing tactics adopted, they should be tied to the company pricing objectives. These objectives can be quantitative: relating to profitability, market share and cost averaging

while qualitative objectives relate to crafting beneficial customer relationships, competitors and distributors and tactics aimed at long term viability of the business entity.

Yan and Wang (2010) argue that if the manufacturer and a retailer adopt a coordinative market structure the end results will be optimization of profit for both the manufacturer and the retailer. Toni, et al., (2016) assert that companies which pursue consumer value-based pricing tactics with attendant relatively high prices tend to yield higher returns than their peers who focus on either competition based pricing tactics or cost based pricing tactics. Thus lower or higher prices for commodities may not necessarily result into better financial performance of a firm. Therefore companies should adopt more strategic approaches to pricing decision as this will enhance the financial performance.

Oke, et al., (2016) in a paper on relevance of pricing tactics on financial performance observed that 91% of companies' financial performance within the brewing industry in Nigeria can be attributed to pricing tactics. They argued that a value based communication approach should be adopted on the key functions in an entity to ensure a positive relationship between sales growth and revenue growth. Manuere, et al., (2015) focused on variables such as profit and sales maximization, liquidity achievement, price differentiation and cost average and established that there is a positive correlation between the pricing tactics adopted and the performance of a business entity.

Oluwagbemiga, et al., (2014) found that there is a positive significant relationship between the cost management tactics adopted by a manufacturing firm and its performance and such firms should adopt cost reduction tactics which emphasize on minimizing production and administrative overhead costs in order to achieve the wealth creation and profit maximization

objectives. Egbunike and Okerekeoti, (2018) provides a nexus between the micro and macro-economic factors and their effect on the financial performance of manufacturing companies. The researchers advanced that these factors have both positive and negative effects on an entity's performance and how well a firm performs will be an indicator of the prowess of the management in controlling these factors. Equally, they argued that both micro and macro-economic factors will interact to influence the financial performance of business entities.

Gatsi, et al., (2013) focused on the effect firm size, corporate income tax and company growth on return on assets and came to the conclusion that there exists a negative relationship between corporate income tax and the financial performance of manufacturing companies because the higher the taxation the less the retained earnings. Firm size was found to have a positive effect on the financial performance because as the firm grows in size, it is able to implement better strategies that lead to superior performance. Equally such firms have a wider reach as they are able to control more resources which provide a competitive advantage. For the growth, there exists a positive relationship as the more a firm grows, the greater the scope of its operations and the better the performance. Maina and Memba (2016) who evaluated the effect of the various components of tax such as corporate tax, value added tax, custom duty and capital gain tax on the financial performance of companies. They established that the more tax a company pays, the lesser the financial performance.

Wasseja and Mwenda (2015) highlight the importance of pricing electricity costs in the commercial sector with electricity being a major input in the production sector. They argue that especially for the small business entities in the commercial sector, the prevailing electricity costs is a major concern given that it may be the determining factor between making a profit of a loss. Further the prevailing electricity prices have an effect on the

economy as higher electricity prices may result to relocation of industries to countries or regions with lower electricity costs leading to a slowdown in economic growth. Sije and Oloko (2013) focused on penetration pricing strategy and financial performance of companies in Kenya and observed that there is a strong positive correlation between penetration pricing strategy and financial performance of a business entity. They argued that based on the fact that the bulk of consumers in the Kenyan market will identify and consume reasonably priced products, then penetration pricing strategy is appropriate for the market.

Odalo, et al., (2016) evaluated the relationship between sales growth and the financial performance and they established that there exists a significant and positive relationship between sales growth and the financial performance. Using pooled OLS the researchers analysed the effect of sales growth on return on equity, return on assets and earnings per share. For both ROA and ROE they established that there is a positive relationship with sales growth as 11% of the variations in ROA were explained by the growth in sales while 11% of the variations in ROE were explained by sales growth. However they found a negative relationship between sales growth and earnings per share.

2.3.4 Corporate diversification and the Financial Performance of Manufacturing Companies

Ansoff (1957) introduced the theory of diversification and viewed corporate diversification from two perspectives: Corporate diversification which involves producing more than one type of product and international diversification through starting operations in foreign markets. Ravichandran and Bhaduri (2015) takes a different view of corporate diversification and presents three categories of diversification namely

concentric diversification where a business entity diversifies into an industry which is technologically similar to the line of operation it's currently undertaking, horizontal diversification where the entity manufactures new products which still have appeal to its current customers and conglomerate diversification through mergers and acquisition where the entity enters into an entirely new market and industry with the intention of attracting new customers hence improving financial performance.

Purkayastha (2013) postulates three perspectives that can be considered when considering the relationship between diversification and financial performance. These include institutional, sociological and resource based perspectives. Institutional factors resulting from institutional environments include dynamics in the product, capital and labour markets, laws and regulations and the enforcement of contracts. The degree of efficiency on the factors above significantly influences unrelated diversification. The sociological perspective focuses on the effect of protectionism, political and bureaucratic connections influence incentives and diversification outcomes making unrelated diversification more profitable that related diversifications in emerging economies. The resource based perspective argues that related diversification makes it possible for different businesses to share resources and research on the core competencies together eventually resulting to better financial performance.

Lahiri and Purkayastha (2017) assert that it's critical to differentiate between affiliated service firms and affiliated manufacturing firms' diversification-financial performance relationship given their findings that the impact of corporate diversification on financial performance is higher for affiliated service firms compared to that of affiliated manufacturing firms which they attributed to factors such as intangibility of services, inseparability of

manufacturing, delivery and utilization, heterogeneity and the transient nature of the commodities dealt in. Therefore generalization across different sectors should be avoided.

Yigit and Tur (2012) enumerates five key benefits that may result from unrelated diversification namely, risk reduction in situations of environmental uncertainty and for products in the decline stage of the life cycle of the product. Unrelated diversification will be appropriate in such a situation as it reduces the risk exposure resulting from the current undertakings. Reduction in transaction costs will result from unrelated diversification as the transaction costs on internal capital control are less when undertaking unrelated diversification. Decrease in cost when providing services such as public relations, security, audit and investment decisions to strategic business units will be realized. Superior business management skills will be available from a range of managers in charge of different units leading to higher profitability. Finally, unrelated diversification helps managers develop economic value for different product lines and markets with the end result being better financial performance.

Rumelt (1974) posited that related diversification results into higher profitability compared to unrelated diversification has gained wide acceptance and Rumelt classification has equally gained wide applicability in diversification studies. Boz, et al., (2013) using Rumelt classification postulate that diversification has a positive impact on organizational performance due to economies of scale and scope, market power, reduction of risks and learning curve effects. The researchers posits that related diversification result to higher profits compared to unrelated diversification as a business entity is able to exploit synergies that result from existing relationships to achieve costs or differentiation advantages. However diversification has its related risks such as bureaucratic costs that result from

running large business entities, agency conflicts when managers serve their interests and when business entities undertake misinformed business decisions.

Yigit and Tur (2012) using the Herfindahl index advance that organizational performance tends to increase up to the average diversification but declines after as the costs outweigh the benefits. Kahloul and Hallara (2010) applied Entropy and Herfindahl indices to evaluate the impact of diversification on firm performance with the argument that it's important to use a series of measures to ensure coherence of analysis. They came to the conclusion that when performance is constrained, companies tend to refocus their strategy and diversify less. Salma and Hussain (2018) in a paper on corporate diversification and financial performance of south Asia countries concluded that some of the variables related to corporate diversification that influence financial performance include ownership, debt ratio, firm size and risk. The researchers argue that companies will use diversification as an avenue of managing firm specific business risk.

Benefits of diversification tend to vary depending on the stage at which an entity is at. Ficici, et al., (2014) argue that at the initial stage when an entity is diversifying into foreign markets, the costs incurred tend to outweigh the benefits accrued from diversification leading to poor financial performance. As the entity settles in the market and expands, it's able to enjoy economies of scale and scope, risk diversification and exploration of available opportunities. However if an entity over diversifies this will have a negative effect on the profitability of the entity due to cost outweighing the benefits of diversification. Bouras, et al., (2014) established that diversification is a viable strategy that a business entity intending to enhance its financial performance can use. Through diversification, a business entity is able to reduce costs through economies of scope

especially when it diversifies in to non-related products. The researchers emphasize on the need to control variables such as market share, firm size and leverage when evaluating the effect of diversification on the financial performance.

Kusumaningtyas and Yendrawati (2015) using moderating regression analysis established that diversification has a positive effect on earnings management as with higher managerial ownership: companies will diversify as an earnings management strategy and vice versa. Yücel and Önal (2016) using a market based measure (Tobin Q) and an accounting measure (return on assets) and came to the conclusion that diversified entities show higher Tobin Q, return on assets, are bigger in size and have more investment opportunities compared to single firms as these firms are able to improve their efficiency and performance through the internal financial market which arises due to diversification.

Oh, et al., (2014) found that intra and inter-regional diversification generate as S curve relationship with financial performance. Further they came to the conclusion that unrelated Corporate diversification generates a negative moderating consequence on the relationship linking inter regional diversification and a business entity performance. Park and Jang (2014) using 2SLS (Two-Stage Least Square) and 3SLS (Three-Stage Least square) regressions found that related diversification has a positive effect on a business entity performance while unrelated diversification generates significant negative effect on financial performance. Business entities which are performing poorly financially tend to engage in unrelated diversification but this can be alleviated by use of debt financing to finance such diversification and in the process eliminate problems related to free cash flows such as over investment.

Bhatia and Thakur (2018) using entropy index to measure diversification of firms in India found a strong and positive relationship between firm performance and diversification. The researchers established that a two way relationship exists between diversification and the financial performance of firms whereby well diversified firms will have superior financial performance while those firms which perform well financially will naturally diversify their operations as such business entities capitalize on the synergetic effect of diversification and use it to enhance their growth. Krivokapic, et al., (2017) using the entropy index came to the conclusion that business entities that diversify in their line of business have a significant and positive correlation between the level of diversification and the financial performance. They came to the conclusion that size was a critical variable when evaluating the financial performance of business entities as they observed that growth in total assets resulted into an increase in the profitability of the firm.

Ghorbani (2013) asserts that diversification increases profitability through increased sales resulting from new markets and products. As MPT advances diversification is crucial as through carefully choosing of investments to be included in a portfolio: an investor can effectively minimize the risk exposure and in the process maximize the portfolio expected return. Even though a lot of research has been carried out on the relationship between corporate diversification and financial performance, the results from these studies have been inconclusive with the relationship being said to be positive, negative, non-significant or being inverted U-shaped (Asrarhaghighi, et al., 2013).

Researchers who have found a positive relationship between diversification and financial performance have argued that business entities can effectively use proprietary assets in a range of markets thereby improving financial performance. Researchers who found a

negative relationship argued that agency problems, cross subsidizing of less profitable segments and complex management structures tend to wipe out any benefits resulting from diversification. The contradictions that have been observed are attributed to use of different measures of the relationship between corporate diversification and financial performance with the common measures being accounting based (return on assets, profit margin and market capitalization): market based (Tobins q) and growth measures (sales growth) (Li, 2007: Hult, et al., 2008).

Potential returns from diversification are inversely related to the level of market development. In developed and perfect markets, diversification has negligible effect on the performance of a business entity therefore entities in developing economies tend to benefit more from diversification compared to those from economies with well-developed institutions (Boz, et al., 2013). Purkayastha (2013) argues that studies carried out in Chile, China, India and a host of other emerging countries point to the fact that diversification tend to be more profitable in emerging economies giving credence to institution based theory of diversification as conglomeration helps overcome market imperfection common in emerging economies. Ravichandran and Bhaduri (2015) argues that diversification is a profitable strategy when implemented wisely as related diversification increases productivity while unrelated productivity affects performance negatively.

Doaei, et al., (2012) found that diversification has no significant impact on the firm value due to relatively higher costs of diversification. Khodamoradi, et al., (2012) in a paper on corporate diversification and Economic Value Added (EVA) found that there was weak positive relationship between the two while corporate diversification was observed to have a weak negative relationship with Refined Economic Value Added (REVA).

However, the conclusion was that business entities can still leverage on diversification to increase EVA and REVA as it signifies optimal allocation of resources in an entity. Indeed, Ghorbani (2013) asserts that diversification results in better capital allocation in the internal capital market as the various departments in the business entity are able to attain a marginal return on capital which is equivalent to the cost of capital.

Fazli, et al., (2013) found that sales growth influenced the performance Japanese ICT industries over other Asian countries. The researchers argue that sales growth will give impetus to a business entity to enhance its financial performance by coming up with new lines of operations or products even as such companies maintain old profitable products. Phung and Mishra (2017) came to the conclusion that corporate diversification has a negative influence on the financial performance. They attributed this inverse relationship to inefficient corporate governance structures which result in firms pursuing suboptimal corporate diversification strategies which eventually result in poor financial performance. Kamran, et al., (2016) evaluated the impact of financial leverage on the financial performance focusing on measures such as return on assets and return on equity. The researchers concluded that there is a significant but negative relationship between debt measured using the debt ratio and the financial performance of an entity. This relationship is inverse whereby as the level of debt increases, the financial performance declines. Further, the researchers found that there exists a positive relationship between the debt ratio and the return on equity of a firm.

Lien and Li (2013) focused on corporate governance practices in emerging economies and how they impact on diversification and moderate performance of companies. They concluded that diversification can be used as an effective strategy when responding to

imperfections within an entity. However, they argue that institutional immaturity has resulted to creation of large conglomerates in emerging economies especially for family owned businesses which diversify in order to entrench family corporate control as different members of the family are assigned different units to control. In such instances, diversification will have a negative effect on organizational performance. As a solution, the researchers recommend seeking the optimal level of diversification and partnering with block shareholders who are geared towards maximizing shareholders value.

Mehmood, et al., (2019) evaluate the impact of corporate diversification and the financial structure on the financial performance of manufacturing companies in the Asian region. Using panel data for fourteen years, the researchers came to the conclusion that product and geographical diversification has an impact on the financial performance on manufacturing companies. Equally the dividend policy and the capital mix adopted significantly influences the performance of such firms.

Luqman, et al., (2017) evaluated the effect of firm size on the financial performance of non-financial firms in Nigeria and came to the conclusion that firm size when viewed from the total assets of the firm has a negative effect on the financial performance. Conversely, when the firm size is considered from the perspective of total sales, the effect is positive and therefore firms should put more emphasis on increasing their turnover and creating new markets for products rather than accumulate nonproductive assets.

Nwakoby and Hediwa (2018) evaluate the significance of business and corporate diversification on the financial performance. The researchers found significant positive correlation between corporate diversification and the financial performance of the firm.

However, there was no statistically significant relationship between business diversification and the financial performance. Ojo (2012) argues that high correlation exists between corporate diversification and the financial performance of companies in Nigeria with the key objectives of diversification being to enhance their financial performance, increase the companies' synergy, gain more market power and the agency motive. The researcher identified the common types of diversification adopted by companies as geographical and corporate diversification as they were found to have a higher positive effect in the financial performance of companies.

Manyuru, et al., (2017) evaluated the impact of diversification of companies listed in the Nairobi securities exchange and established that diversification has a varying effect on the entities. Their study centered around whether geographical and industrial diversification has an impact on the performance of the listed companies and they came to the conclusion that geographical diversification did not have a significant effect on the financial performance. However the research showed that there was a significant effect of the industrial diversification on the financial performance of business entities especially in the agricultural firms which may be attributable to the fact that Kenya is an agricultural country and such performance will be influenced by volatility in commodity prices.

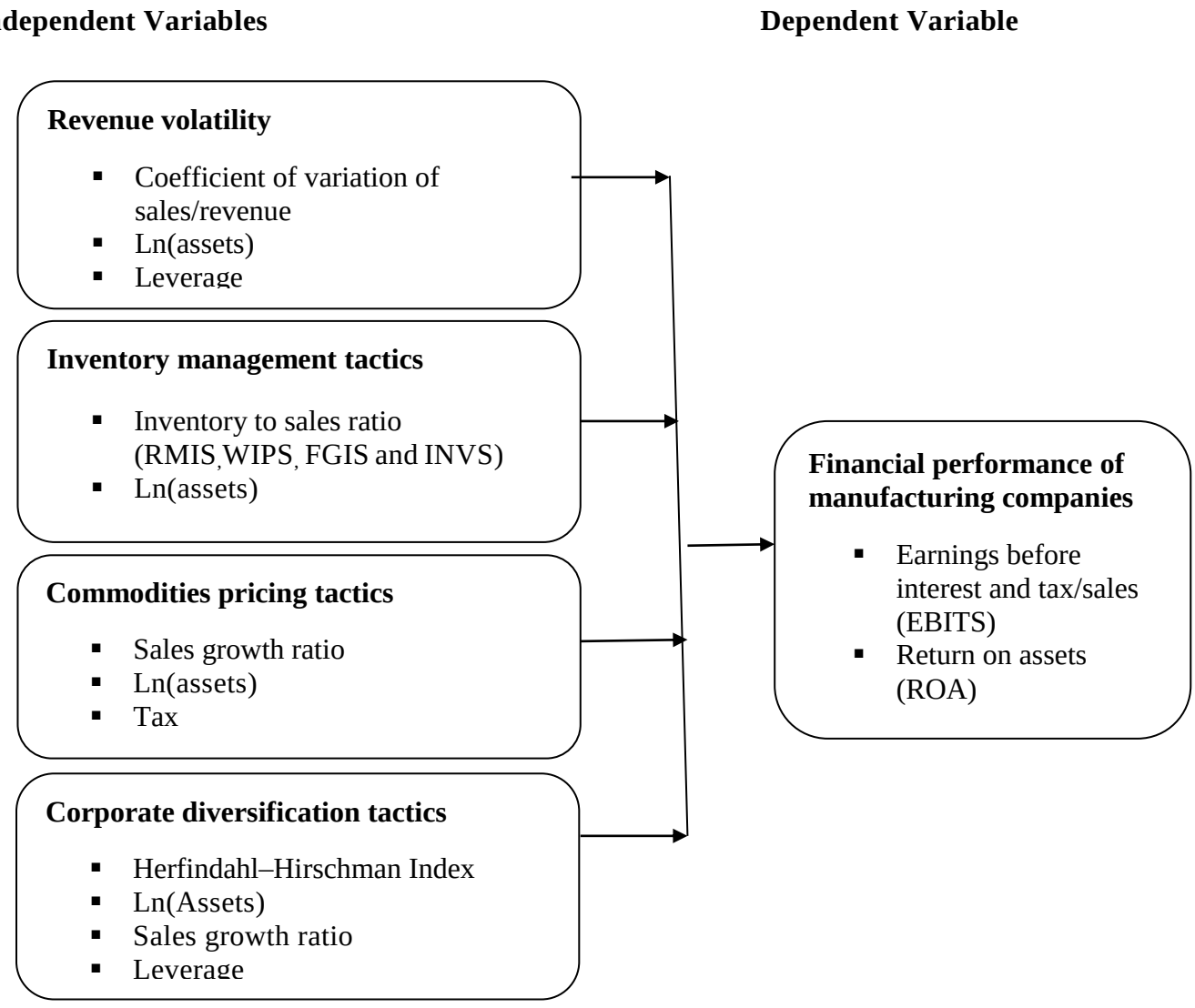
2.4 Conceptual Framework

Commodity risk exposure and management presents an interesting area of study given the fact that risks can presents gains and losses, the outcome of which almost entirely depend on the risk management tactics adopted, how they are used and their effectiveness. The study investigates the extent of revenue volatility in manufacturing companies as a proxy measure of commodity risk exposure. Other key variables of this study are commodity

risk management tactics such as inventory management tactics, commodities pricing tactics and corporate diversification tactics and their effect on financial performance of various manufacturing companies. The relationship between commodity risk management tactics and the financial performance of business entities can therefore be conceptualized as below:

Figure 5

Conceptual Framework



From figure 5, the independent variables include the respective commodity risk management practices while the dependent variable is business entity financial performance. The financial performance of a business entity is influenced by the exposure to commodity risk and how well the risk is managed.

Chiang, et al., (2018) measures sales volatility by calculating the coefficient of variation of sales by taking an entity sale in year *i* less the mean of sales over a five year period divided by the sales mean. The coefficient of variation is taken to be a superior measure compared to other measure since it is able to mitigate time and industry/firm specific effects. Capkun, et al., (2009) measured inventory performance by using inventory levels scaled by sales and concluded that by lowering the inventory to sales ratio better financial performance will be achieved both at the gross profit margin level and earnings before income and tax. The study measures corporate diversification using the Herfindahl–Hirschman diversification index as recommended by Herfindahl (1950) and Hirschman (1964). Business entities are considered diversified when at least 90% of the total sales results are from one segment (Lin & Su, 2008). Oke, et al., (2016) argue that sales growth, tax and dividends paid are influenced by customers' patronage which in turn are affected by price affordability and are therefore good proxies for measuring pricing tactics.

Sale/revenue volatility is expected to have a negative effect on the financial performance as explained under the prospect theory, business entities will tend to choose suboptimal options when investing when they perceive that the outcome will be negative. Thus when an entity perceives that there will be volatility in the operating environment, it tends to scale down its operations resulting to less revenue. Based on the level of inventory an

entity holds and the inventory management practices it has put in place, this will influence the financial performance of an entity. Inventory comes with significant costs especially for manufacturing companies and therefore poor inventory management practices results in lower financial performance.

The pricing tactics adopted by a manufacturing entity equally has a direct significant effect on the financial performance of an entity. The prices charged should be adequate to cover the operational and other related costs. Therefore a direct relation between commodity pricing and financial performance can be established whereby lower prices result in poor financial performance and vice versa. The products that a business entity has diversified into will impact on the financial performance as a relationship can be established between level of specialization and lower financial performance especially in a risky environment. Well diversified entities tend to have better financial performance due to the different streams of revenue generated by different products so long as they don't over diversify. Natural log of assets, leverage and sales growth ratio are included as control variables in different models.

2.5 Research Gaps

Lwiki, et al., (2013) focusing on how the financial performance of the sugar manufacturing firms in Kenya is affected by the inventory management practices adopted by such business entities established that there is a significant positive correlation between inventory management practices such as lean inventory systems, strategic suppliers' relationships and application of technology in inventory management and return on sales. However, their research was largely descriptive and focused on only one industry in the manufacturing sector. Chege, et al., (2014) points out that the

manufacturing sector in Kenya is geared towards production of consumer goods involving consumption of massive quantities of raw materials, low value addition and hence low returns on finished products. Consequently, the return and contribution to the Gross Domestic Product (GDP) has been low as the profit margins are not adequate to cover operating costs and associated risks. The researchers' scope was limited to the historical development of the manufacturing sector in Kenya.

Bigsten, et al., (2010) identified some of the causes of poor performance within the manufacturing sector as being poorly thought out import substitution strategy resulting in low technical efficiency and low competitiveness of products produced, poor infrastructure and processing methods and high commodity prices. The researchers focus was mainly on the chronological development of the manufacturing sector in Kenya. Ondiek (2010), in a paper on material management by Kenyan manufacturing firms observed that material costs amounted to fifty six percent of the total turnover and even though having a material management system would result in benefit's such as having optimal levels of stock, reduced costs, purchase of quality materials, quick response and better coordination, few manufacturing companies have implemented the system. The study was limited to the material management used by manufacturing firms in Kenya.

In this chapter, through review of relevant literature the researcher observed that very little research has been done on the manufacturing sector in Kenya and even less literature exists on the financial performance of the business entities in the sector. The researcher did not come across any research on commodity risk management tactics and financial performance of manufacturing companies in Kenya and thus the justification of undertaking the research.

2.6 Summary of Literature Review

This chapter highlighted the importance of commodity risks management especially to the bulk consumers such as manufacturers given the volatility which has been observed in the commodities markets. It argued that the commodities are affected by a multiplicity of factors besides the obvious demand and supply fundamentals and their end effects have a significant negative or positive impact on the enterprise value and the cash flows in a business entity and the eventual financial performance of an entity. Therefore commodity risk is a key financial risk that should be adequately managed if at all a business entity wants to enhance the enterprise value, have stability in cash flows and enhance its financial performance.

The researcher underscored the tough operating environment that commodities using and producing Kenyan companies have been operating in. Several have issued profit warnings over the recent past and have attributed the poor performance to be partly due to fluctuations in commodity prices, interest rates besides other factors such as high inflation and unfavorable political atmosphere. And even for companies which did not issue profit warnings, it has been predicted that they would attain negative or lower profit growth due to the factors outlined above.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

In this chapter, the researcher presents the research approaches that were utilized in the study. The researcher examines the research design, target population, data collection procedures, reliability and validity of research instruments and the techniques of data analysis. It gives a step by step account of how the above activities were carried out in order to address the purpose of the study.

3.2 Research Design

The research design used in this study was an analytical research design in order to get a better understanding of the impact of independent variables on the dependent variable. An analytical research design is appropriate when testing hypotheses and allows for inferences to be made about association and causality which are considered to be critical in this study. Equally the analytical research design is compatible with secondary data, quantitative and regression analysis which is the bedrock of this study (William, 2007). The researcher aimed at determine of the effect of various commodity risks management tactics on the financial performance of manufacturing companies and therefore the analytical research design was the most appropriate design to guide the collection, analysis and interpretation of data on the above variables.

3.3 Location of the Study

The researcher carried out the study in Kenya focusing on the specific regions where companies selected in the sample are located. Most of the manufacturing companies in Kenya are concentrated in the major towns such as Nairobi, Mombasa, Kisumu, Thika and Nakuru.

The researcher made site visits to those firms where data could not be obtained through other avenues and sought the data from the relevant authorities.

The researcher also sought the input of KAM and the Kenya revenue authority (KRA) as these two institutions are privy to the operations of manufacturing companies and they have significant data and statistics on the financials of these companies. For most listed companies, the data was available in their websites, Nairobi securities exchange website and on Africa financials website.

3.4 Population of the Study

The target population of study consisted of all the five hundred and two manufacturing companies in Kenya which are registered under the Kenya Association of Manufacturers (KAM). Even though there may be companies which are not members of KAM, the organization has been around since 1959 and thus has a very solid membership which should be representative of all manufacturing companies in Kenya. Besides, KAM has been very vocal in promoting proper business standards and policies that facilitate a competitive business environment and cost reduction such energy efficiency and conservation, energy audits and specialized seminars and workshops to cater for the members' needs. Thus, companies under KAM normally follow the best industry practices and therefore are highly appropriate for the study as they have the desirable characteristics (Mugenda & Mugenda, 2003).

3.5 Sampling Frame

The sampling frame gives a comprehensive list of the researcher population of interest. The sampling frame should be as inclusive as possible to ensure that biases are minimized

as much as possible. The sampling frame was the twelve sectors under which manufacturing companies are classified by KAM given that this is the most comprehensive and accurate record of manufacturing companies in Kenya. The companies in each of the sector constitute a cohesive group with common issues of concern and hence may adopt similar or concerted approaches when dealing with various issues of concern. The service and consultancy sector although it's one of the sectors, it has been excluded from the sampling frame as it's not involved in manufacturing activities.

Table 1

Sampling Frame

SECTOR	MEMBERS
Building, Mining & Construction	20
Chemical & Allied Sector	70
Energy, Electrical & Electronics	34
Food & Beverages	71
Leather & Footwear	7
Metal & Allied Sector	66
Motor Vehicle & Accessories	27
Paper & Board	63
Pharmaceutical & Medical Equipment	21
Plastics & Rubber	68
Fresh Produce	3
Textile & Apparels	35
Timber, Wood & Furniture	17
TOTAL	**502**

3.6 Sampling Procedure and Sample Size

3.6.1 Sampling Procedure

Stratified random sampling technique was used to determine the appropriate sample. The population was classified into thirteen major sub sectors namely: Chemical and Allied: Food, Beverages and Tobacco: Leather Products and Footwear: Metal and Allied: Energy, Electrical and Electronics: Motor Vehicle Assembly and Components: Pharmaceutical and Medical Equipment: Paper and Paperboard: Building, Construction and Mining:

Plastics and Rubber: Textile and Apparel and Timber, Wood Products and Furniture Sectors. This method was deemed to be the most applicable method as the population is heterogeneous and the sectors are clearly distinct (Bryman, 2011). For each of the stratum, simple random sampling was use to generate the desired sample.

3.6.2 Sample Size

The researcher selected a sample which was as representative as possible. To achieve this, the researcher used the finite population formula to calculate the sample as follows:

$$n = \frac{Z^2 \times pq\, N}{e^2 (N - 1) + Z^2 pq}$$

Where

n sample size for a finite population

N size of total population

P population reliability

e margin of error

Z Z score at 0.05 level of significance (1.96)

$$= \frac{1.96^2 \times 0.5 \times 0.5 \times 502}{0.05^2 (502 - 1) + (1.96^2 \times 0.5 \times 0.5)}$$

$$= 218$$

In reference to the calculation above and using simple random sampling, the researcher generated a sample of 218 respondents who were selected from each of the sectors proportionately as below:

Table 2

Sample Selection

SECTOR	MEMBERS	SAMPLE SIZE
Building, Mining & Construction	20	8
Chemical & Allied Sector	70	31
Energy, Electrical & Electronics	34	15
Food & Beverages	71	31
Leather & Footwear	7	3
Metal & Allied Sector	66	29
Motor Vehicle & Accessories	27	12
Paper & Board	63	27
Pharmaceutical & Medical Equipment	21	9
Plastics & Rubber	68	30
Fresh Produce	3	1
Textile & Apparels	35	15
Timber, Wood & Furniture	17	7
TOTAL	**502**	**218**

3.7 Data Collection Procedures

The study used panel data for a ten year period given that a short study period was desirable as business entities keep on changing their tactics and in order to have many entities with stable tactics included in the sample, it was more appropriate to use a short period (Daud, et al., 2009). Equally it was appropriate to use panel data to enables the researcher to control for unobserved effects associated to specific business entities hence providing a more powerful evidence base (Elsayed & Wahba, 2016). Data collected was

of a quantitative nature focusing on the financial statements of the companies selected in the sample. An appropriate data collection sheet was developed to ensure that relevant data on financial performance, revenue volatility, pricing tactics, inventory management tactics and diversification tactics was collected. This data was obtained from companies' websites, World Bank, Kenya National Bureau of Statistics and International Monetary Fund statistical abstracts or through visits to the individual company premises where data was not available from alternative sources. Personnel targeted in the companies visited included finance officers, risk managers or accountants.

3.8 Pilot Study

Given that the study focused on the collection of secondary data from manufacturing companies in Kenya, a data collection instrument was developed in consultation with the thesis supervisors and financial experts. The data collection instrument was tested on a sample of ten companies and adjustments were made based on the shortcomings that were identified during data collection. These companies were excluded from the final sample used in the analysis.

3.9 Data Analysis

The study adopted long run/static and dynamic models. The long run model makes the assumption that the past performance did not affect current performance and hence it did not include a lagged variable. Under the long run model, both fixed and random effect estimators were used to analyse the model. The researcher used STATA given that the statistical package is appropriate for regression analysis and has inbuilt function to enable use of the Generalized Method of Moments (GMM) procedure (Chausse, 2010). To check the normality, the researcher used standard deviation (Kline, 2011: Tabachnick & Fidell,

2013: Hair Jr, Black, Babin, & Anderson, 2010). Other key tests were carried out under the long run model and included the F test, correlation and Wald test with the aim of testing whether the coefficients of the independent variables were be able to jointly and significantly explain the variations in the dependent variable. If the null hypothesis is rejected, the conclusion is that the independent variables can be used to explain the variation in the dependent variable. The analysis involved testing the relationship between commodity risk management tactics and the financial performance of manufacturing companies using a model that takes the form below:

$$y_{i,t} = \beta + \beta x_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \text{.....3.1}$$

$y_{i,t}$ Measure of financial performance represented by EBITS and ROA

β Coefficients of the equation (β_1, β_2, β_3,and β_4)

$x_{i,t}$ Independent variables (revenue volatility, inventory management, commodity pricing and corporate diversification)

i 1,……,218 (individual manufacturing companies)

t 1,2……10 (time indicator)

ε Error term

α Firm specific effect

As a check for the robustness of the model used, the researcher applied the dynamic Generalized Method of Moments (GMM) to re-estimate the commodity risk - financial performance nexus. Under the dynamic model, the assumption is that an entity financial performance is dynamic in nature (Mishra, et al., 2014) and therefore the GMM by Arellano-Bover/Blundell-Bond estimator (1995) and (1998) is appropriate as it introduces more flexibility when estimating the parameters of the models. The researcher choose one

step GMM estimator as it has been found to be asymptotically efficient and robust especially in the presence of heteroskedasticity and cross correlation. GMM is also suitable when analyzing panel data with small *t* and large *n* as is the case with this study where t=10 and n=218. Further, the method is deemed to be suitable as accounting measures such as ROA are prone to measurement errors arising from application of varying accounting standards and policies and the method mitigates such related issues.

3.9.1 Financial Performance

Carton and Hofer (2010) analysed the different measures that can be used to measure financial performance and identified six key measures that can adequately differentiate between high and low performing organizations. The measures include return on assets, return on equity, return on sales, return on investments, EBITDA return on investment and operating margin. The researchers advocate for selecting financial performance measures that adequately discriminate among business entities with different levels of financial performance and recommend any of the above measures as being appropriate. Capkun, et al., (2009) contend that EBIT is a superior measure of financial performance as it indicates how well a business entity is able to efficiently control cost of sales, production and operating expenses. To measure financial performance, the study used earnings before interest and tax scaled by sales as a proxy of financial performance where earnings before interests and taxes for entity *i* in year *t* while sales are total sales for entity *i* in year *t*,

$$EBITS_{i,t} = \frac{EBIT_{i,t}}{Sales_{i,t}} \quad \text{.....3.2}$$

Ravichandran, et al., (2009) argue that ROA is an adequate measure for both internal and external users of financial information when evaluating the financial performance of a business entity. The ratio scales earnings before interest and tax by total assets where earnings before interests and taxes for entity *i* in year *t* and total assets for entity *i* in year *t*, as below:

$$ROA_{i,t} = \frac{EBIT_{i,t}}{\text{Total assets}_{i,t}} \quad \text{.....3.3}$$

3.9.2 Revenue/Sales Volatility

Chiang, et al., (2018) measures sales volatility by calculating the coefficient of variation of sales by taking an entity sale in year *i* less the mean of sales over a five year period divided by the sales mean. The coefficient of variation is taken to be a superior measure compared to other measures since it is able to mitigate time and industry/firm specific effects. The researchers came to a conclusion that there is a negative but significant relationship between revenue volatility and performance. Cariolle (2012) evaluated different approaches that can be used to measure volatility focusing on macroeconomic volatility and established that there is a range of different approaches that can be used when measuring volatility in different situations. The typical measure of volatility is standard deviation of a given distribution measured around its average/mean or the trend. The researcher argues that standard deviation is appropriate when the variable to be measured is stationary at first difference and therefore the hypotheses formulated should be restrictive. An alternative measure involves calculating the standard deviation of the residuals under an economic regression with the key measures being the coefficient of determination and the variations in the growth rates. A more robust measure of volatility involves calculating the standard deviation but incorporating a statistical

filter in order to disaggregate the trend into both the long and short term trends. A major shortcoming of standard deviation is that the standard deviation of any two variables cannot be compared in any meaningful way making the coefficient of variation a better measure. Kariithi and Kihara (2017) analysed profitability, sales volume and market share in manufacturing firms in the pharmaceutical industry over a five year period and established that the three variables have a significant influence on an entity performance.

The study thus adopts the coefficient of variation formula by Chiang, et al., (2018) when calculating revenue/ sales volatility as illustrated below:

$$COV\ (sales_i) = \frac{\sqrt{\sum^{3}_{i=1} ((Sales_i - Sales_{mean})^2/3)}}{Sales_{mean}} \quad \ldots\ldots\ldots\ldots 3.4$$

Where $Sales_i$ depicts the entity sales in period *i* and $Sales_{mean}$ is the mean of sales/revenue over a rolling duration of three periods. To normalize the raw entity specific data on volatility, the result is divided by the sales mean to alleviate time and industry effects (Ghosh & Olsen, 2009). A higher (lower) value of coefficient of sales indicates a higher (lower) level of sales/revenue volatility.

The study uses the two models below to measure revenue/sales volatility:

Long run model:

$$EBITS_{i,t} = \beta_0 + \beta_1 ln(assets_{i,t}) + \beta_2 revvol_{i,t} + \beta_3 LEV_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \ldots\ldots\ldots\ldots 3.5$$

Dynamic model:

$$EBITS_{i,t} = \beta_0 + \lambda EBITS_{i,t-1} + \beta_1 ln(assets_{i,t}) + \beta_2 revvol_{i,t} + \beta_3 LEV_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \text{.....3.6}$$

i 1,.....,218 (individual manufacturing companies)

t 1,2.....10 (time indicator)

Where $EBITS_{i,t}$ is performance of entity i at time t, $EBITS_{i,t-1}$ performance of entity i at time t-1, $Ln(assets_{i,t})$ the natural log of total assets is included as a control variable to factor in the size of the company, $revvol_{i,t}$ is the sales volatility measured by the coefficient of sales over an ten year period. $LEV_{i,t}$ is included as a control variable and measures the financial leverage. It is measured by ratio of total debt to total assets as long term debt commitment has a significant influence on an entity performance (Andersen, 2008: Mohammed & Knapkova, 2016: Pagach & Warr 2011).

Long run model:

$$ROA_{i,t} = \beta_0 + \beta_1 ln(assets_{i,t}) + \beta_2 revvol_{i,t} + \beta_3 LEV_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \text{.....3.7}$$

Dynamic model:

$$ROA_{i,t} = \beta_0 + \lambda ROA_{i,t-1} + \beta_1 ln(assets_{i,t}) + \beta_2 revvol_{i,t} + \beta_3 LEV_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \text{.....3.8}$$

i 1,.....,218 (individual manufacturing companies)

t 1,2.....10 (time indicator)

Where $ROA_{i,t}$ is performance of entity i at time t, $ROA_{i,t-1}$ performance of entity *i* at time *t-1,* $Ln(assets_{i,t})$ the natural log of total assets is included as a control variable to factor in the size of the company, $revvol_{i,t}$ is the sales volatility measured by the coefficient of sales

over a ten year period. $LEV_{i,t}$ is included as a control variable and measures the financial leverage. It is measured by ratio of total debt to total assets as long term debt commitment has a significant influence on an entity performance (Mohammed & Knapkova, 2016: Pagach & Warr 2011).

3.9.3 Inventory Management

Capkun, et al., (2009) posits that in order to be in line with the financial performance measures, it's appropriate to scale average inventory by sales and four types of inventories are considered. RMIS measures raw materials inventory (RMI) for entity *j* in year *t*: WIPS measures work in progress inventory (WIP) for entity *i* in year *t*: FGIS measures finished goods inventory (FGI) for entity *i* in year *t* and INVS measures total inventory for entity *i* in year *t* as below:

$$RMIS_{i,t} = \frac{Avg(RMI_{i,t-1}:RMI_{i,t})}{Sales_{i,t}} \quad \ldots\ldots 3.9$$

$$WIPS_{i,t} = \frac{Avg(WIP_{i,t-1}:WIP_{i,t})}{Sales_{i,t}} \quad \ldots\ldots 3.10$$

$$FGIS_{i,t} = \frac{Avg(FGI_{i,t-1}:FGI_{i,t})}{Sales_{i,t}} \quad \ldots\ldots 3.11$$

$$INVS_{i,t} = \frac{Avg(INV_{i,t-1}:INV_{i,t})}{Sales_{i,t}} \quad \ldots\ldots 3.12$$

All inventory measures are expected to have negative and statistically significant coefficients as the lower the inventory a business entity holds per unit of sales, the better the financial performance. A regression model is therefore derived equivalent to the one for Capkun, et al., (2009) to test the relationship between inventory management tactics and financial performance as below:

Long run model:

$EBITS_{i,t} = \beta_0 + \beta_1 \ln(assets_{i,t}) + \beta_2 RMIS_{i,t} + \beta_3 WIPS_{i,t} + \beta_4 FGIS_{i,t} + \beta_5 INVS_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$

…………………………………………………..…………………………………..3.13

Dynamic model:

$EBITS_{i,t} = \beta_0 + \lambda EBITS_{i,t-1} + \beta_1 \ln(assets_{i,t}) + \beta_2 RMIS_{i,t} + \beta_3 WIPS_{i,t} + \beta_4 FGIS_{i,t} + \beta_5 INVS_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$ …………………………………………………………………..3.14

i 1,…….,218 (individual manufacturing companies)

t 1,2……10 (time indicator)

EBITS measures operating profits, $EBITS_{i,t-1}$ performance of entity *i* at time *t-1*, the performance of inventory is measured by RMIS, WIPS, FGIS and INVS while $\ln(assets_{i,t})$, the natural log of total assets is included as a control variable to factor in the size of the company (Shin, et al., 2015). To increase the robustness of the analysis, entity level of assets contribution to financial performance is considered as follows:

Long run model:

$ROA_{i,t} = \beta_0 + \beta_1 \ln(assets_{i,t}) + \beta_2 RMIS_{i,t} + \beta_3 WIPS_{i,t} + \beta_4 FGIS_{i,t} + \beta_5 INVS_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$

……..……..3.15

Dynamic model:

$ROA_{i,t} = \beta_0 + \lambda ROA_{i,t-1} + \beta_1 \ln(assets_{i,t}) + \beta_2 RMIS_{i,t} + \beta_3 WIPS_{i,t} + \beta_4 FGIS_{i,t} + \beta_5 INVS_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$ ……..3.16

i 1,…….,218 (individual manufacturing companies)

t 1,2……10 (time indicator)

$ROA_{j,t}$ measures financial performance of entity *i* at time *t*, $ROA_{i:,t-1}$ performance of entity *i* at time *t-1*, $\ln(assets_{i,t})$, the natural log of total assets is included as a control variable to factor in the size of the company and $ROA_{j,t}$ measures the return on assets of entity *i* in time *t*.

3.9.4 Commodity Pricing

Hinterhuber (2004) studied Fortune 500 companies and found that pricing had the greatest impact on financial performance of an entity compared to other elements in the market mix. Oke, et al., (2016) asserts that sales growth, tax paid by an entity and dividends are good proxies to use when evaluating pricing tactics adopted by a business entity. The sales growth ratio used in the study was calculated as follows:

$$SGR_{i,t} = \frac{CYS_{i,t} - PYS_{i,t}}{PYS_{i,t}} \quad \text{……3.17}$$

Where $SGR_{i,t}$ represents sales growth ratio, $CYS_{i,t}$ is the current year sales for entity *i* in year *t* while $PYS_{i,t}$ represents previous year sales for entity *i* in year *t*.

A regression model is therefore derived to test the relationship between pricing tactics and financial performance as below:

Long run model:

$$EBITS_{i,t} = \beta_0 + \beta_1 \ln(assets_{i,t}) + \beta_2 SGR_{i,t} + \beta_3 Tax_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \ldots\ldots\ldots\ldots\ldots\ldots 3.18$$

Dynamic model:

$$EBITS_{i,t} = \beta_0 + \lambda EBITS_{i,t-1} + \beta_1 \ln(assets_{i,t}) + \beta_2 SGR_{i,t} + \beta_3 Tax_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \ldots\ldots\ldots 3.19$$

i 1,……,218 (individual manufacturing companies)

t 1,2……10 (time indicator)

Where $EBITS_{i,t}$ is performance of entity *i* at time *t*, $EBITS_{i,t-1}$ performance of entity *i* at time *t-1*, $SGR_{i,t}$ is the sales growth ratio of firm *i* at time *t*, $Tax_{i,t}$ is the amount of tax paid within a given financial period, $\ln(assets_{i,t})$ the natural log of total assets is included as a control variable to factor in the size of the company and $\acute{\varepsilon}$ is the error term.

Long run model:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln(assets_{i,t}) + \beta_2 SGR_{i,t} + \beta_3 Tax_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \ldots\ldots\ldots\ldots\ldots\ldots 3.20$$

Dynamic model:

$$ROA_{i,t} = \beta_0 + \lambda ROA_{i,t-1} + \beta_1 \ln(assets_{i,t}) + \beta_2 SGR_{i,t} + \beta_3 Tax_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t} \quad \ldots\ldots\ldots\ldots 3.21$$

i 1,…….,218 (individual manufacturing companies)

t 1,2……10 (time indicator)

Where $ROA_{i,t}$ is performance of entity *i* at time *t*, $ROA_{i,t-1}$ performance of entity *i* at time *t-1*, $SGR_{i,t}$ is the sales growth ratio of firm *i* at time *t*, $Tax_{i,t}$ is the amount of tax paid within a given financial period, $\ln(assets_{i,t})$, the natural log of total assets is included as a control variable to factor in the size of the company and ε is the error term.

3.9.5 Corporate Diversification

Daud, et al., (2009) using panel data analysis found that business entities that used focused strategy performed better the ones which diversified due to better utilization of resources. Researchers such as Raei, et al., (2015) and Kahloul and Hallara (2010) recommend the use of Herfindahl–Hirschman diversification index as it does not require the use of Standardized Industrial Classification (SIC) codes and it's suitable for analyzing data from emerging markets. Further, Herfindahl–Hirschman diversification index is deemed to be suitable as it is possible to simultaneously analyze data from several products/segments and determine the relative contribution of each segment/product to the total sales/revenue. Herfindahl–Hirschman diversification index was therefore used to measure diversification in manufacturing companies as it is possible to accurately collect the data needed.

$$HHI = \sum_{i=1}^{n} P_i^2 \quad \text{.....3.22}$$

Where *n* is the quantity of the business entity's activities and P_i is the comparative weight of each activity evaluated as the proportion of the sale x_i of the activity i of a business entity. Thus the calculation used was as follows:

$$HHI_{i,t} = \sum(ssales_{i,t}/sales_{i,t})^2 \quad \text{.....3.23}$$

Where $SSales_{i,t}$ represents sales a certain portion of the company sales (segment sales) of firm *i* at time *t* while $Sales_{i,t}$ are equal to the total sales of firm *i* at time *t*. Herfindahl–Hirschman diversification index variable for one portion of a business entity equal to 1. For entities that are diversified one part is less than 1 with the smaller coefficient indicating a greater extent of corporate diversification.

A regression model is therefore derived equivalent to the one for Kahloul and Hallara (2010) to test the relationship between diversification tactics of financial performance as below:

Long run model:

$$EBITS_{i,t} = \beta_0 + \beta_1 \ln(assets_{i,t}) + \beta_2 DIV_{i,t} + \beta_3 LEV_{i,t} + \beta_4 SGR_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$$

.....3.24

Dynamic model:

$$EBITS_{i,t} = \beta_0 + \lambda EBITS_{i,t-1} + \beta_1 \ln(assets_{i,t}) + \beta_2 DIV_{i,t} + \beta_3 LEV_{i,t} + \beta_4 SGR_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$$

.....3.25

i 1,.....,218 (individual manufacturing companies)

t 1,2……10 (time indicator)

Where $EBITS_{i,t}$ is performance of entity *i* at time *t*, $EBITS_{i,t-1}$ performance of entity *i* at time *t-1*, $DIV_{i,t}$ is corporate diversification level of firm *i* at time *t* measured by Herfindahl–Hirschman diversification index, $\ln(assets_{i,t})$, the natural log of total assets is included as a control variable to factor in the size of the company. $LEV_{i,t}$ depicts financial leverage and capital structure, measured by ratio of total debt to total assets which has a significant influence on firm performance. $SGR_{i,t}$ is measured as the average variation of turnover over the study period computed as $sales_n$ less $sales_{n-1}$ divided by $sales_{n-1}$.

Long run model:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln(assets_{i,t}) + \beta_2 DIV_{i,t} + \beta_3 LEV_{i,t} + \beta_4 SGR_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$$

……3.26

Dynamic model:

$$ROA_{i,t} = \beta_0 + \lambda ROA_{i,t-1} + \beta_1 \ln(assets_{i,t}) + \beta_2 DIV_{i,t} + \beta_3 LEV_{i,t} + \beta_4 SGR_{i,t} + \alpha_i + \acute{\varepsilon}_{i,t}$$

……3.27

i 1,…….,218 (individual manufacturing companies)

t 1,2……10 (time indicator)

Where is $ROA_{i,t}$ performance of entity *i* at time *t*, $ROA_{i,t-1}$ performance of entity *i* at time *t-1*, $DIV_{i,t}$ is corporate diversification level of firm *i* at time *t*, $\ln(assets_{i,t})$, the natural log of total assets is included as a control variable to factor in the size of the company. $LEV_{i,t}$ depicts financial leverage and capital structure, measured by ratio of total debt to total asset

which has a significant influence on firm performance. $SGR_{i,t}$ is measured as the average variation of turnover over the study period computed as $sales_n$ less $sales_{n-1}$ divided by $sales_{n-1}$.

3.9.6 Summary of the Models

The researcher developed long run and dynamic models based on both the general and specific objectives of the study. A summary of the models is presented in the table below:

Table 3

Summary of the Models

Objective	**Model No.**	**Purpose**
General objective	3.1	Testing the relationship between commodity risk management tactics and the financial performance
Specific Objectives		
Objective 1	3.5 – 3.8	Testing the relationship between revenue volatility and the financial performance
Objective 2	3.13 – 3.16	Testing the relationship between inventory management and the financial performance
Objective 3	3.18 – 3.21	Testing the relationship between commodity pricing and the financial performance
Objective 4	3.24 – 3.27	Testing the relationship between corporate diversification and the financial performance

3.9.7 Firm Size

The size of a business entity is a major factor that influences the adoption of various commodity risk management tactics. Researchers such as Stigler (1958), Fama and French (1995), Frank and Goyal (2003) and Jermias (2008) argue that large business entities have greater market share and thus perform better financially due to factors such as economies of scale, bigger customer base and cross selling. Oliveira and Martins (2011) assert that firm size, scope and management structure has a significant influence on adoption of financial tactics.

Shin, et al., (2015) stresses on the importance of controlling for the firm size as an entity's performance may be related to its size. Jorge and Augusto (2011) emphasizes the importance of controlling for an entity size as large entities have the financial capacity to hedge commodity risks and will enjoy greater economies of scale when hedging costs are factored. On the other hand small business entities have higher incentives to hedge due to greater bankruptcy costs. The effect of firm size on financial performance is expected to be positive.

3.9.8 Key Variables and the Expected Impact on EBITS and ROA

The independent variables of the study include revenue/sales volatility, RMIS, WIPS, FGIS, INVS, sales growth ratio and corporate diversification while the control variables include firm size, leverage and tax paid. The expected signage and the rationale of the relationships are presented in the table below:

Table 4

Different Variables Expected Outcomes

Variable	Type	Expected Sign	Coefficient	Rationale
Revvol	Independent variable	Negative		COV ↑⇒ EBITS and ROA ↓
RMIS	Independent variable	Negative		RMIS ↑⇒ EBITS and ROA ↓
WIPS	Independent variable	Negative		WIPS ↑⇒ EBITS and ROA ↓
FGIS	Independent variable	Negative		FGIS ↑⇒ EBITS and ROA ↓
INVS	Independent variable	Negative		INVS ↑⇒ EBITS and ROA ↓
SGR	Independent variable	Positive		SGR ↑⇒ EBITS and ROA ↑
DIV	Independent variable	Positive		DIV ↑⇒ EBITS and ROA ↑
Leverage	Control variable	Negative		LEV ↑⇒ EBITS and ROA ↓
Ln(assets)	Control variable	Positive		Ln(assets)↑⇒ EBITS and ROA ↑
Tax	Control variable	Negative		Tax ↑⇒ EBITS and ROA ↓

Revenue/sales volatility was expected to have a negative effect on the financial performance of the manufacturing entities because as commodity risks increase, the financial performance of a business entity will decline. Inventory was evaluated based on its various components RMIS, WIPS, FGIS and INVS and they were expected to have a negative effect on financial performance as from the extant literature reviewed there exists a negative relationship between the inventory maintained by an entity and its financial performance. A positive correlation exists between sales made by entity and its financial performance because as sales increase they should have a positive impact on the financial performance. Product diversity is expected to largely have a positive effect on the financial performance in the instance where a business entity does not suffer from diversification penalty due to over diversifying. Leverage which focuses on the capital structure was expected to have a negative effect on the financial performance of a business entity as financing costs eat into the profitability and therefore the higher the leverage, the lower the financial performance. It was also necessary to control for the firm size as the assumption is that larger entities control significant resources that they can use to enhance their financial performance. The tax regime under which an entity is under has a significant effect on the its performance as the higher the tax extracted from an entity, the lower the financial performance.

3.10 Tests of Specification in Panel Data

This section discusses the key tests that were carried out under this study to enhance the accuracy of the results generated.

3.10.1 Hansen's J Test for Instrument Exogeneity

The study used Hansen's J test of over identifying restrictions as a test of the validity of instrumental variables as it's adequate to evaluates the entire set of moment conditions (Baum, et al., 2003). Other alternative tests such as Sargan test (Hansen, 1982) the Basmann statistic (1960): and the difference-in-Sargan statistic (Hayashi, 2000) can be used with increasing number of instruments but given the fact that under this study the instruments are few, the Hansen's J test is adequate (Bascle, 2008). The Hansen's J test was used to test the null hypotheses and ensure that the instruments are exogenous. The Hansen's J test was used to determine if the residuals are correlated with the variables which are exogenous. The higher the p value the better the instrument validity and therefore the null hypothesis should be accepted. If the null hypothesis is not rejected, it implies that the model is appropriate to test the relationships.

3.10.2 Breush-Pagan Test for Heteroskedasticity

Breusch–Pagan (1979) test involved regressing squared residuals as a dependent variable and p indicator variables with the intention of testing for heteroskedasticity. Alternative tests used to test for heteroskedasticity in regression include White/Koenker (1981), Cook–Weisberg (1983) and Godfrey (1978), Baum, et al., (2003) tests. Kalina (2011) asserts that different tests have different properties and it's not possible to have an optimal heteroskedasticity test for a given data set and the solution is therefore to transform the model originally used to a different model in order to suppress the negative effects of heteroskedasticity. If the null hypothesis that the variance of the residuals is constant is rejected, it implies that heteroskedasticity is present and this should be rectified through rebuilding the regression model with new predictors. For the Breush-Pagan Test if the P-values are significant at 95% confidence level, the data is construed to have

heteroskedasticity. However if the P-values are insignificant (> 0.05) the data is construed not to have heteroskedasticity.

3.10.3 Wald Test for Joint Significance

The Wald test was used to test the joint significance of various coefficients (Tipton & Pustejovsky, 2015). Bollen, et al., (2014) advocates for the use of the Wald test as a coefficient significance test under GMM as you can test several parameters at once. The null hypothesis under the Wald Test is that the coefficients of all the independent variables are equivalent to zero. If the Wald test shows that the parameters are zero, they were excluded from the model otherwise if they are significant, they were deemed to be appropriate and will result in a statistically significant improvement in the fit of the model.

3.10.4 Hausman Test

In order to objectively determine whether to use fixed effect or random effect models, the researcher used the Hausman test. The null hypothesis of the test is to adopt random effect models but if it is rejected based on the p-values, then the fixed effect models is deemed to be appropriate. If P value >0.05, use random effects model and if otherwise use fixed effect model (Hausman, 1978).

3.11 Ethical Considerations

The study was carried out based on the best practices in research. The researcher has ensured that any source consulted has been cited or acknowledged appropriately: integrity of sources used has been observed and reported accordingly. The researcher observed the highest level professionalism, integrity and honesty when documenting, analyzing and interpreting data and presenting results. Data and information was generated using sound

techniques and processes, checked for consistency and accuracy before being made public and all this was done in strict compliance with the legal, regulatory and professional standards.

Equally, the researcher ensured that participants were informed on the purpose of the research, procedures involved in the research, benefits of the research to the society and any perceived risk that could arise from the study. The highest level of confidentiality and anonymity was maintained. The output of the study only contain statistical summaries and at no instances is the name of the company, respondent, company data or any information that can be identified with specific parties be included.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

Under this chapter, the researcher presents the results for the descriptive analysis of the data used under each of the objectives. Equally under the chapter a presentation of the panel regression analysis results is done with the appropriate diagnostic checks and their corresponding specification tests. The results from the various tests are analysed in a detailed format and linked to past research findings. The chapter first starts with an in depth analysis of the key characteristics of the study variables such as the averages, standard deviation, minimum and maximum values for each variable, skewness and kurtosis. Under the inferential analysis, the static and the dynamic models are analysed side by side using the panel regression methods and their results compared to enhance the robustness and accuracy of the model.

4.2 Findings of Descriptive Statistics

Table 5 shows the overall mean, standard deviation, minimum and maximum values, skewness, kurtosis of EBITS, return on assets, natural logarithm of assets, raw materials inventory, work in progress inventory, finished goods inventory, total inventory for entity, tax paid, sales growth ratio, corporate diversification, leverage and revenue volatility respectively.

Table 5

Summary Statistics for the Secondary Data Set

Variable	Type	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
EBITS	Dependent variable	351	0.0045	0.6391	-7.2000	0.9114	-0.689	6.3540
ROA	Dependent variable	351	0.0881	0.1418	-0.4799	0.6351	-0.1104	6.3288
Revvol	Independent variable	351	158.01	368.26	0.13	3502.9	-0.4293	4.0366
RMIS	Independent variable	312	1.9742	0.9807	0.2413	10.620	0.4922	4.2647
WIPS	Independent variable	286	0.4356	0.3385	0.1361	1.6337	1.9171	6.2719
FGIS	Independent variable	351	0.5614	0.1866	0.4271	1.5075	2.4562	8.9769
INVS	Independent variable	351	4.8881	0.8158	2.7271	10.852	2.7727	8.6846
SGR	Independent variable	351	0.0735	0.3415	-0.5770	3.4520	0.1065	4.0843
DIV	Independent variable	351	0.7356	0.2522	0.0000	1.0000	-0.4899	2.5346
Leverage	Control variable	351	0.5525	0.4671	0.0081	4.0911	0.2181	3.9519
Lnassets	Control variable	351	7.8721	1.9968	1.6094	12.603	-0.6596	3.7112
Tax paid	Control variable	351	356.42	941.35	-2680.0	5598.0	0.4027	3.6371

KEY:

EBITS-Earning Before Profit and Taxes scaled by sales, ROA-Return on assets, RMIS-raw materials inventory scaled by sales, WIPS- work in progress inventory scaled by sales, FGIS- finished goods inventory scaled by sales, INVS- total inventory for entity scaled by sales and SGR- sales growth ratio

From the Table 5 the average EBITS was 0.0044579 with standard deviation of 0.6390666. The maximum and minimum values were -7.2 and 0.911401 respectively. This implies that across the manufacturing companies the earnings before interest and tax scaled by sales have been registering significant fluctuations. This can be explained by almost similar operating environment prevalent within the country and can be correlated with similar observations under revenue volatility and the tax paid where significant volatility was observed. Average Return on assets as an alternative measure of performance shows a trend equivalent to that of EBITS although at a lesser scale with an average of 0.0881 and a standard deviation of 0.1418 implying that irrespective of the performance measure used, the manufacturing companies' performance followed the same trend in the period under review. Average natural logarithm of assets was 7.872096 with standard deviation of 1.996836, minimum of 1.609438 and maximum 12.60331. This depicts high variability that can be explained by the fact that the manufacturing companies are of different sizes ranging from small firms to multi nationals and thus the significant variation in this measure and justifies inclusion of the natural log of assets as a control variable. Average raw materials inventory, average work in progress inventory, average finished goods inventory and average total inventory as measures of different components of inventory held by manufacturing companies show near normal distribution across all measures (Tabachnick & Fidell, 2013).

Tax paid had mean of 356.42 with standard deviation 941.3536, minimum of -2680 and maximum of 5598.00. Tax paid has high variability that can be associated with the observed volatility in financial performance within most manufacturing companies. Sales growth ratio ranges from positive to negative values with near normal distribution across all measures. A similar trend is observed in corporate diversification and leverage where some companies have not diversified while others are highly diversified while the leverage is low for some companies and others are highly leveraged. The distribution across these measures points to almost normal distribution of data. The average revenue volatility was 158.0097 with standard deviation of 368.265, minimum of 0.13 and maximum of 3502.9. Revenue volatility has high standard deviation depicting high variability in revenue which can be tied to similar variability observed under the tax paid and the two measures of performance (Hair Jr, et al., 2010). In summary, given that the sample used is relatively large, the normality of the data used in the research is satisfactory as Tabachnick and Fidell (2013) argue, divergence from normality of Skewness and Kurtosis seldom make any significant distinction in the study when the samples is more than two hundred observations.

Table 5 shows the yearly averages of EBITS, return on assets, natural logarithm of assets, raw materials inventory, work in progress inventory, finished goods inventory, total inventory for entity, tax paid, sales growth ratio, corporate diversification, leverage and revenue volatility across the years. Results in Table 5 indicates that earnings before interest and taxes (EBITS) for manufacturing companies in Kenya increased from 2007-2011, however after 2011 EBITS declined. EBITS was lowest in 2012. Likewise, Return on asset ratio for manufacturing companies in Kenya was relatively high from 2007-2011,

however after 2012, average ROA started increasing at a declining rate and was lowest in 2016. Descriptive results also show that total assets measured as natural logarithm for the manufacturing companies in Kenya has been declining over the years. RMIS was low in the initial years, was on an increase between 2012 and 2014 then registered a decline in 2015 and 2016. WIPS was low between 2007 and 2011 but it registered marginal increases between 2012 and 2016. FGIS was low between 2007 and 2010 but registered marginal increases between 2011 and 2016 while for INVS had marginal increases between 2007 and 2014 then minimal decreases were recorded in 2015 and 2016.

The results also indicated that tax paid by manufacturing companies have been on the decline. This could be attributed to low performance in the latter years. Sales growth ratio for the manufacturing companies has been fluctuating across the years whereas corporate diversification remained relatively same across the years. Leverage position for most manufacturing companies recorded marginal increases over the years. The revenue volatility for most manufacturing companies has improved over the years. The data was normally distributed. The data was free from skewness and Kurtosis as can be observed from the Table 2**.** Kline (2011) advocates for skewness and kurtosis values that lie within a range of ≤ 3 and ≤ 10 respectively as these are considered to be within the acceptable range. Therefore it is thus appropriate to subject the data to further statistical analysis.

Table 6

Trend Yearly Averages of Different Variables

Year	EBITS	ROA	Revvol	RMIS	WIPS	FGIS	INVS	SGR	DIV	Leverage	Lnassets	Tax paid
2007	0.1422	0.1355	6.3293	0.0531	0.0059	0.0843	0.1433	0.0000	0.7686	0.4345	8.2445	412.0952
2008	0.1905	0.1460	6.6391	0.0564	0.0047	0.0861	0.1473	0.1464	0.7511	0.4440	8.3805	450.8095
2009	0.1767	0.1326	6.9176	0.0533	0.0044	0.0904	0.1480	0.1075	0.6524	0.4697	8.4922	489.7619
2010	0.1983	0.1403	9.5475	0.0487	0.0084	0.0923	0.1494	0.1549	0.6675	0.4955	8.5936	613.9552
2011	0.2180	0.1643	8.3746	0.0451	0.0088	0.1024	0.1559	0.1419	0.7278	0.4771	8.5433	666.7000
2012	-0.0342	0.0801	2.8758	0.0966	0.0506	0.1539	0.3010	0.0627	0.7504	0.5928	7.5119	247.0204
2013	-0.0772	0.0694	3.2852	0.1125	0.0593	0.1391	0.3130	0.0678	0.7360	0.5939	7.6103	311.6041
2014	-0.1581	0.0683	3.1944	0.1137	0.0701	0.1579	0.3447	0.0798	0.7309	0.6092	7.6232	289.1077
2015	-0.0339	0.0630	0.0000	0.0742	0.0432	0.1540	0.2746	0.0600	0.7587	0.5526	7.6617	271.1878
2016	-0.0659	0.0387	0.0000	0.0742	0.0557	0.1698	0.2997	0.0171	0.7497	0.6052	7.6995	292.0386

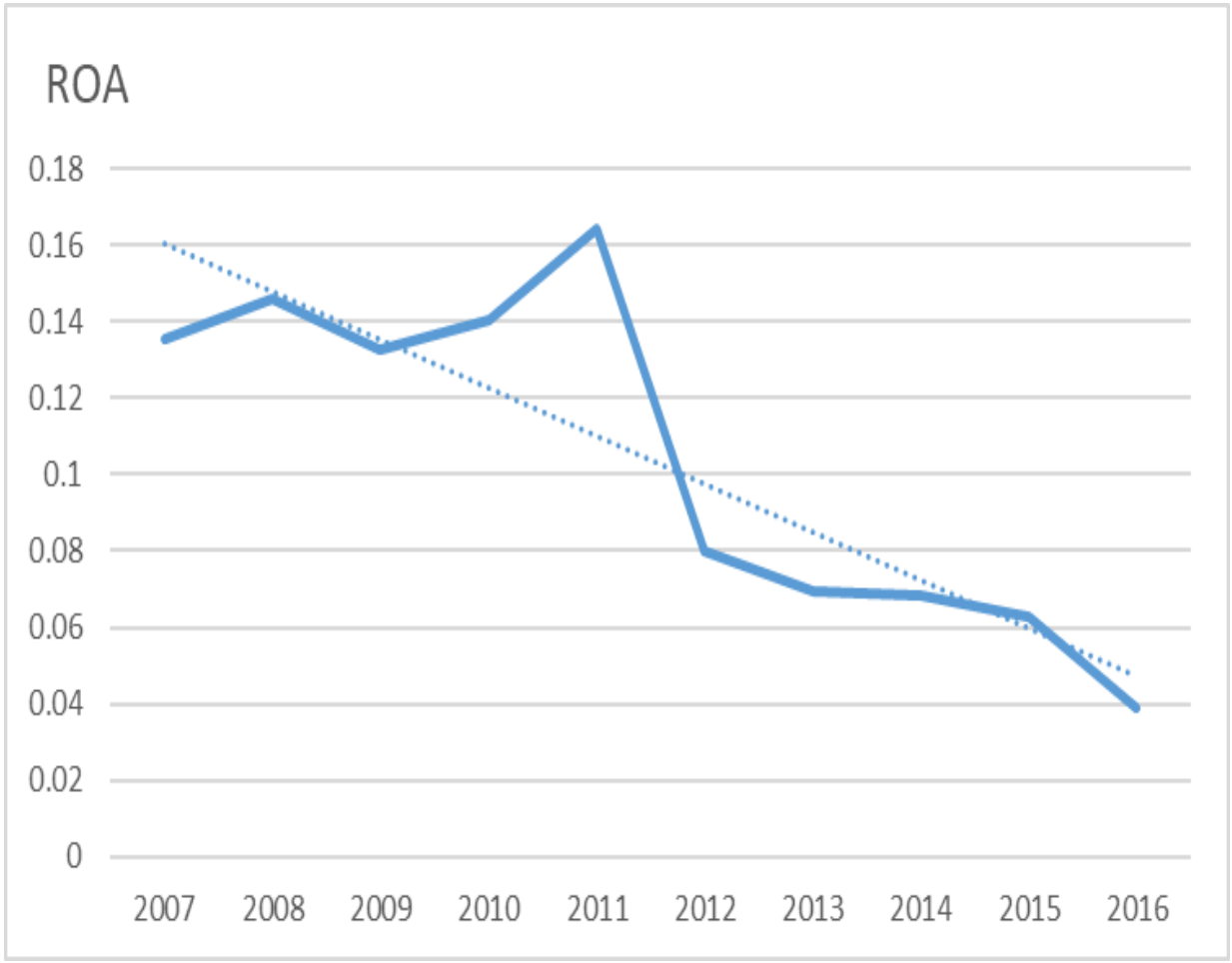
KEY:

EBITS-Earning Before Profit and Taxes scaled by sales, ROA-Return on assets, RMIS- raw materials inventory scaled by sales, WIPS- work in progress inventory scaled by sales, FGIS- finished goods inventory scaled by sales, INVS- total inventory for entity scaled by sales and SGR- sales growth ratio

The trend for the key variables are depicted in the graphs below:

Figure 6

Trend Analysis for ROA

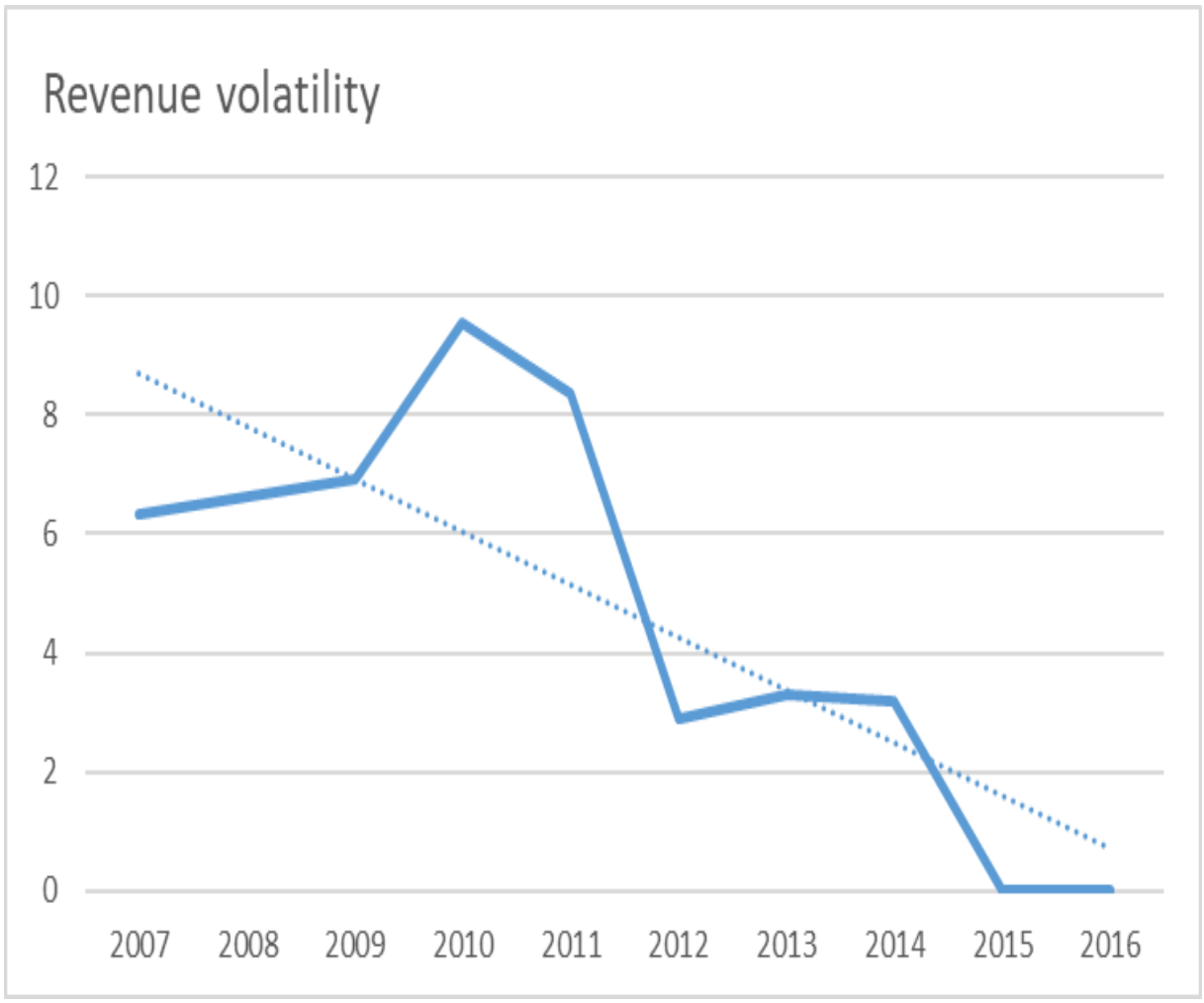


Note. The graph shows the trend for ROA over the ten year period.

As can be observed from figure 6 above, the ROA has been on a decline implying that the financial performance of manufacturing companies has been going down. The trend line shows a steep decline signifying that manufacturing companies are highly exposed to significant volatility in their income.

Figure 7

Trend Analysis for Revenue Volatility

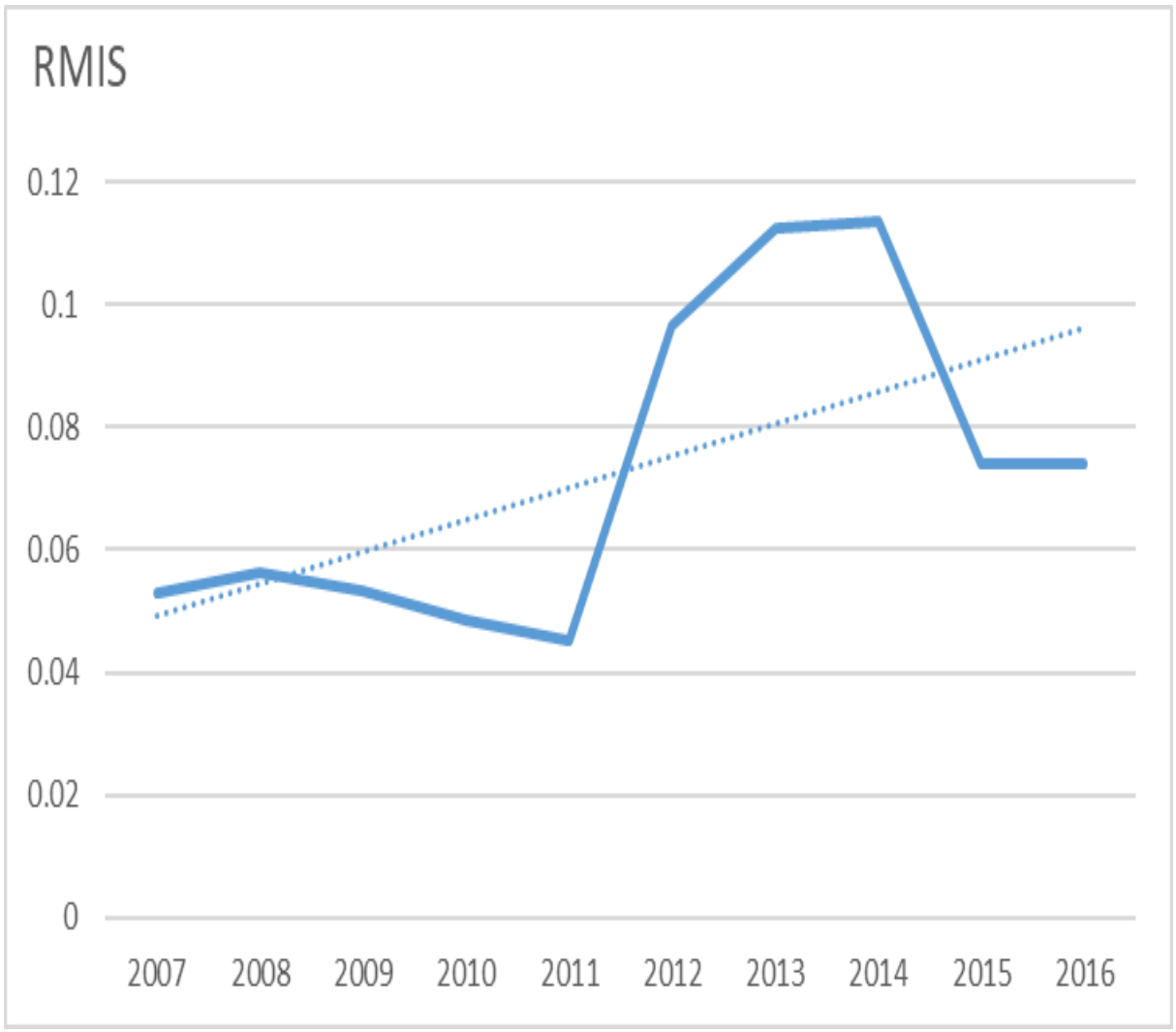


Note. The graph shows a ten year trend analysis for revenue volatility.

Figure 7 depicts a downtrend of revenue volatility over the ten year period. The decline is significant from a high of 9.5475 to a zero in the last two years. This implies that manufacturing companies in were experiencing declining sales/revenue volatility in the period under consideration.

Figure 8

Trend Analysis for RMIS

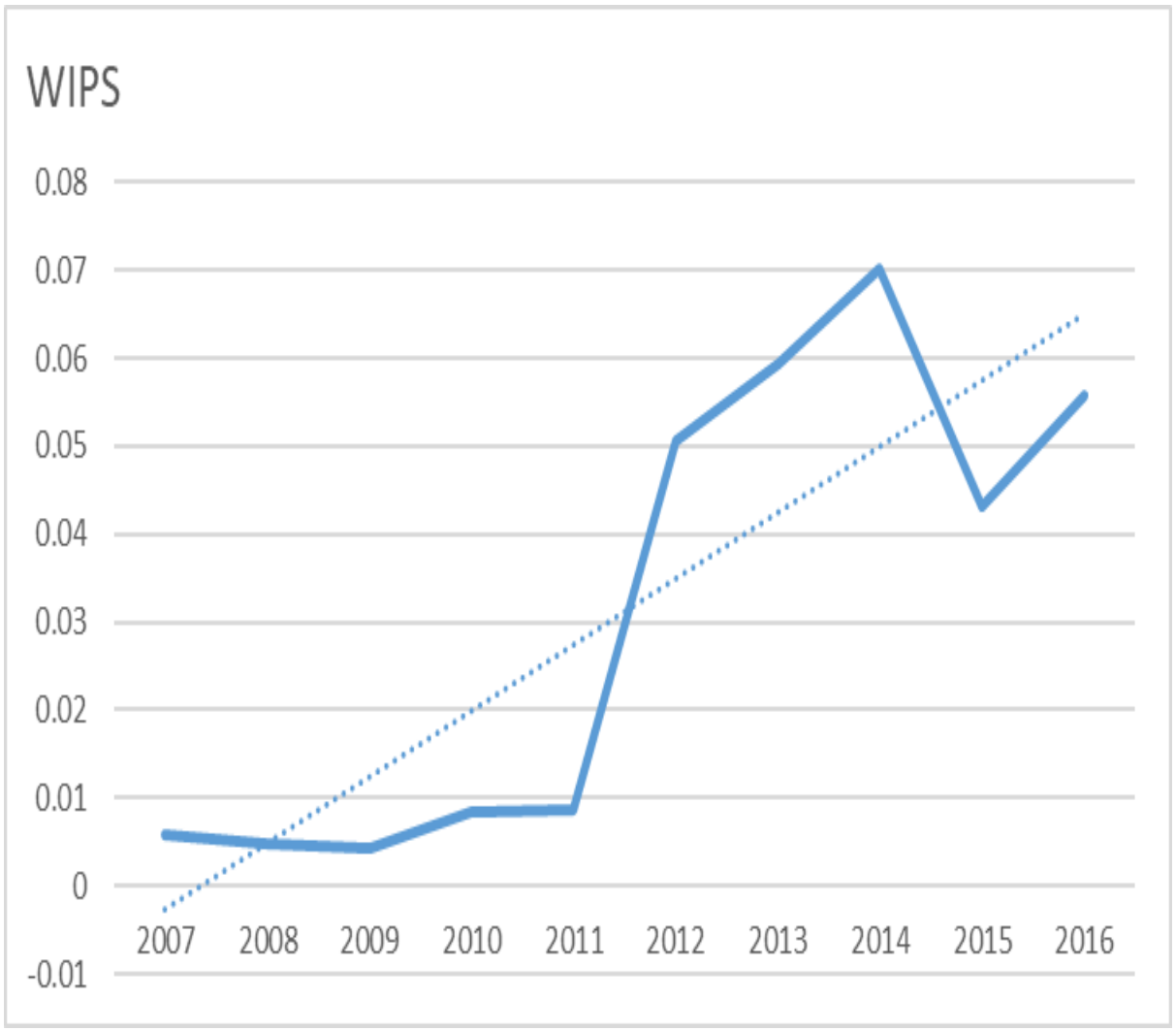


Note. The graph shows a ten year trend analysis for RMIS.

Figure 8 shows an uptrend for RMIS over the ten year period. This implies that manufacturing companies have taken into holding significant volumes of raw materials. With higher stocks being maintained, the expectation is higher stock management cost which end up eating into the profits.

Figure 9

Trend Analysis for WIPS

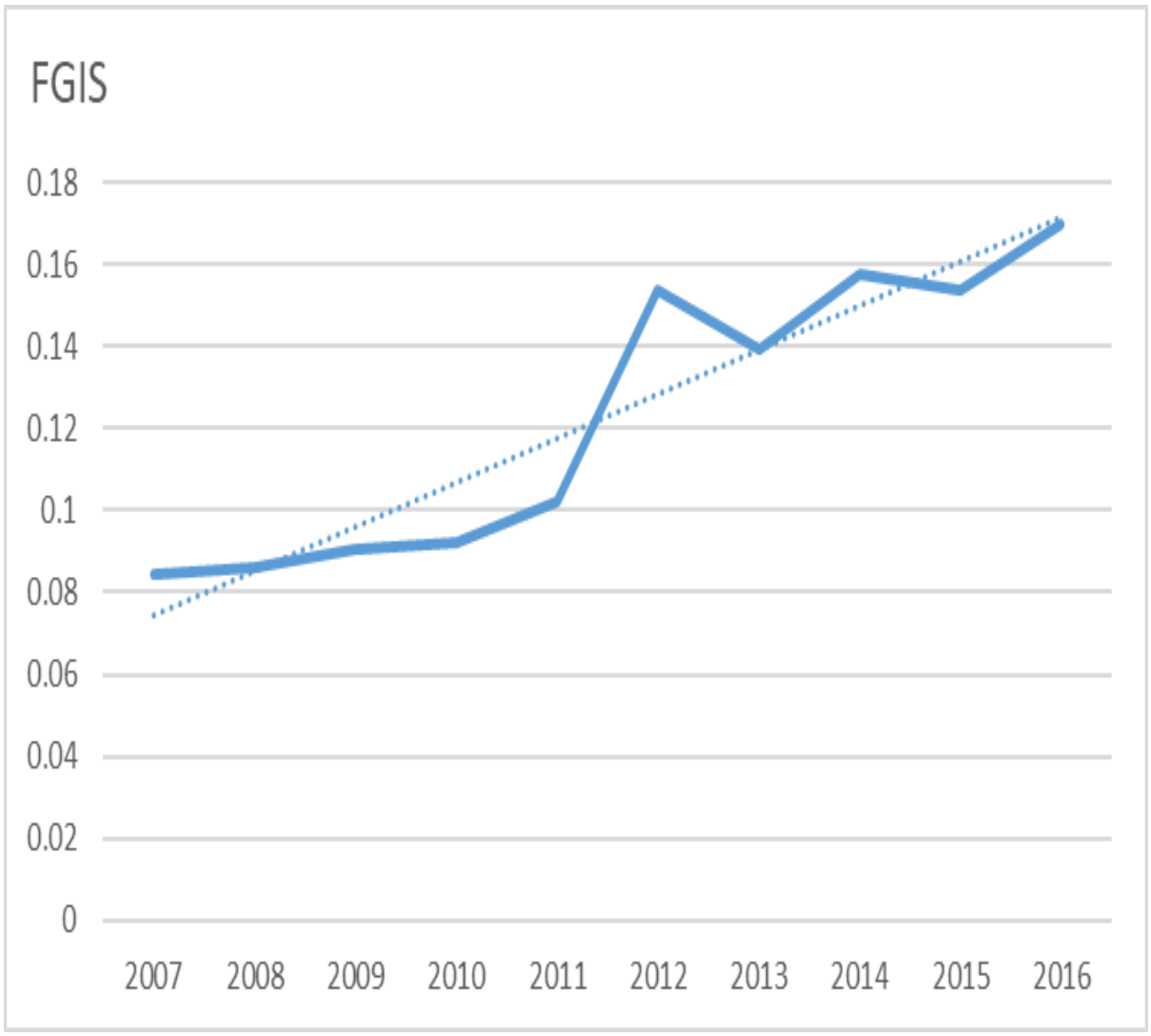


Note. The graph shows the trend for WIPS over the ten year period.

Figure 9 shows an uptrend for WIPS over the ten year period. This implies that manufacturing companies have taken into holding significant volumes of work in progress. With higher stocks being maintained, the expectation is higher stock management cost which end up eating into the profits.

Figure 10

Trend Analysis for FGIS

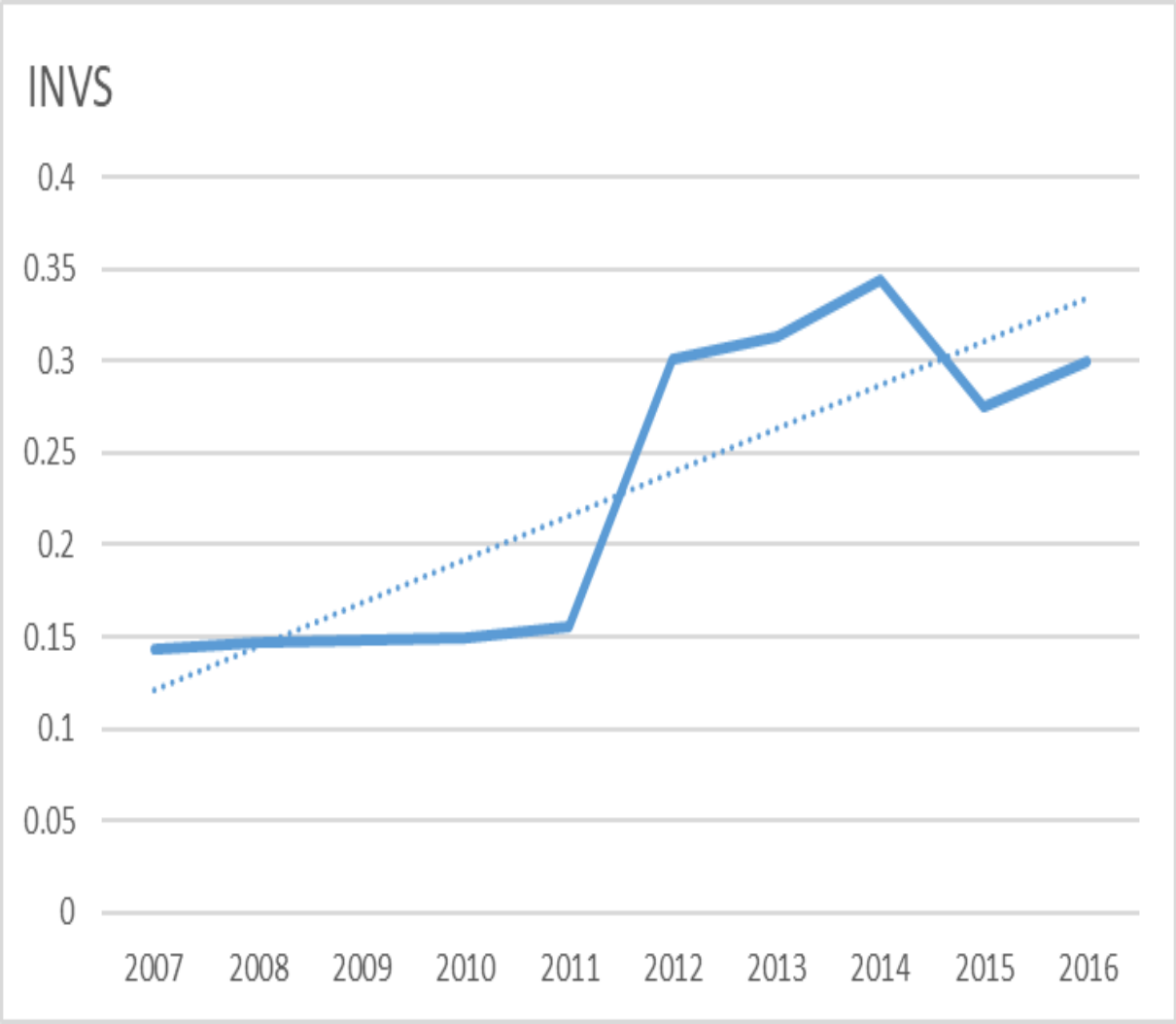


Note. The graph shows the trend for FGIS over the ten year period.

Figure 10 shows an uptrend for FGIS over the ten year period. This implies that manufacturing companies have taken into holding significant volumes of finished goods which can be tied to higher levels of RMIS and WIPS. With higher stocks being maintained, the expectation is higher stock management cost which end up eating into the profits.

Figure 11

Trend Analysis for INVS

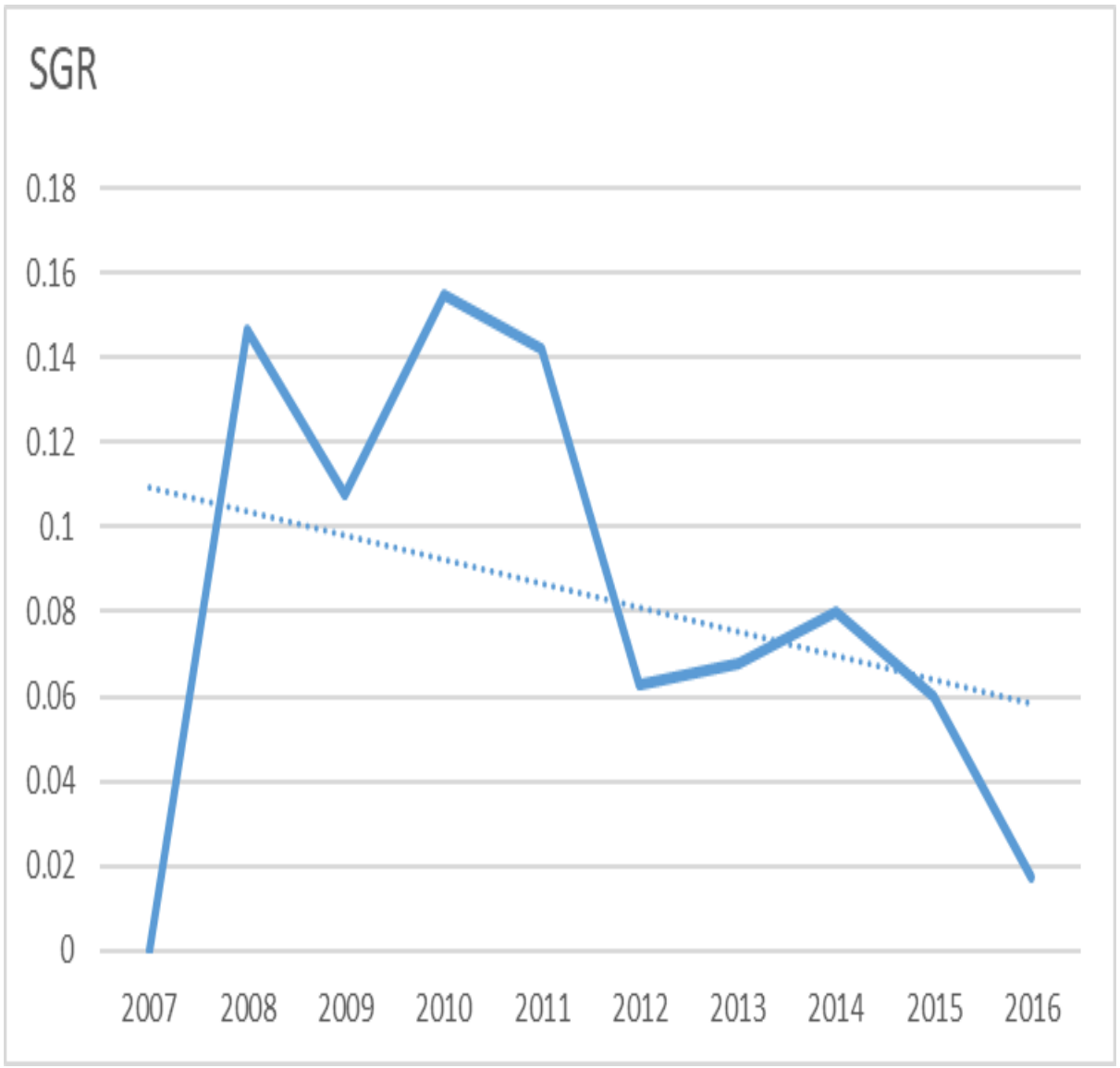


Note. The graph shows the trend for INVS over the ten year period.

Figure 11 shows an uptrend for INVS over the ten year period. This implies that manufacturing companies have taken into holding significant volumes of different constituent components which lead to higher levels of total inventory. With higher stocks being maintained, the expectation is higher stock management cost which end up eating into the profits.

Figure 12

Trend Analysis for SGR

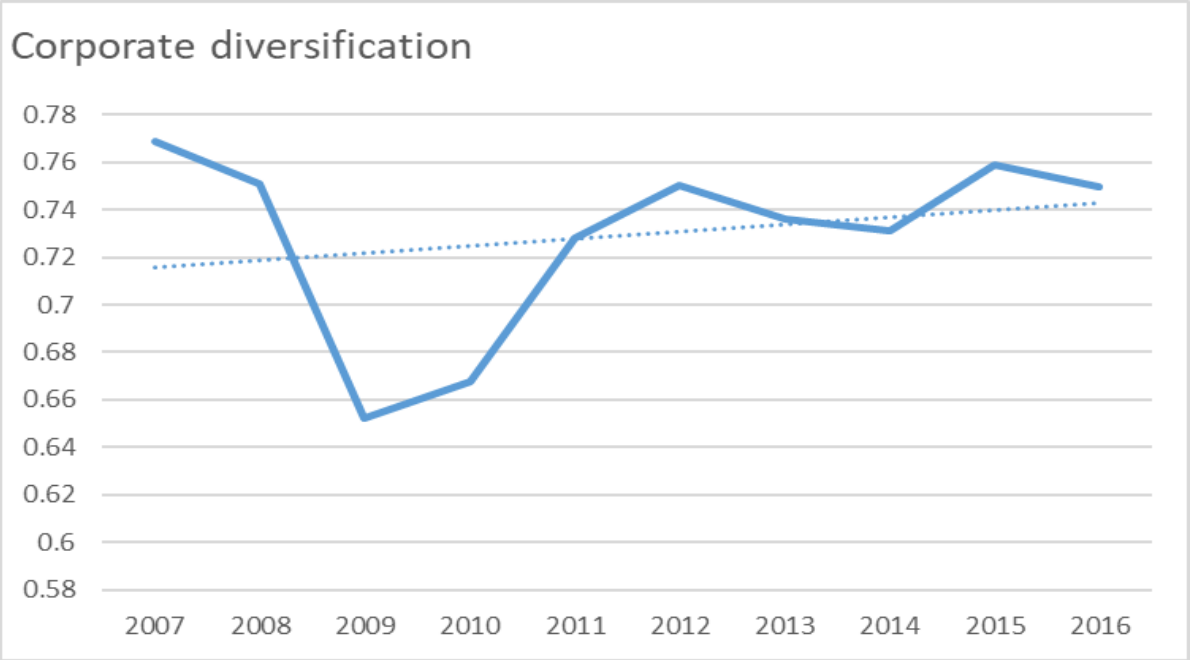


Note. The graph shows the trend for SGR over the ten year period.

Figure 12 depicts a downtrend in the SGR over the ten year period. The decline in SGR is an indicator that the efficiency with which manufacturing entities have been converting sales has been on a decline.

Figure 13

Trend Analysis for Corporate Diversification



Note. The graph shows the trend for corporate diversification over the ten year period.

Figure 13 shows an uptrend in corporate diversification over the period under consideration. This implies that manufacturing entities have been increasing the range of products under their operation. This may result in different streams of income which enhance the financial performance of the manufacturing entities.

4.3 Panel Data Specification Tests

In order to get an overview of the association between the dependent and independent variables, the researcher conducted pair wise correlation analysis. The analysis aims at testing for existence of multicollinearity and it is ideal for eliminating variables which are highly correlated.

4.3.1 Correlation between Revenue Volatility and Financial Performance

Commodity risk management was measured using revenue volatility and two control variables were included in the model namely: natural log of assets and leverage. Table 7 presents the results of the correlation analysis for Lnassets, revenue volatility, leverage and financial performance of manufacturing companies measured using EBITS and ROA.

Table 7

Correlation for Revenue Volatility and EBITS

	EBITS	**Lnassets**	**Revvol**	**Leverage**
EBITS	1.000			
Lnassets	0.1101	1.000		
	(0.0392)			
Revvol	0.0821	0.4097	1.000	
	(0.1249)	(0.000)		
Leverage	-0.0269	-0.12	0.0823	1.000
	(0.6158)	(0.0245)	(0.1239)	

Key: P-values in parenthesis

EBITS - Earning before Profit and Taxes scaled by sales and Revvol - revenue volatility.

The correlation results found that Lnassets and financial performance of manufacturing companies measured using EBITS are positively and significantly associated. These results are contrary to the ones of Niresh and Velnampy (2014) who found that there was no correlation between the firm size and the financial performance of manufacturing companies listed in Colombo Stock Exchange, Sri Lanka. The results found that revenue volatility and financial performance of manufacturing companies measured using EBITS

are positively but insignificantly associated. The results also indicated that Leverage and financial performance of manufacturing companies measured using EBITS is negative but insignificantly associated. These results are partly in agreement with those of Chiang, et al., (2018) who found that there is a negative but significant relationship between leverage and performance. And similarly the researchers concluded that performance has a positive and significant relationship with revenue volatility.

Table 8

Correlation for Revenue Volatility and ROA

	ROA	**Lnassets**	**Revvol**	**Leverage**
ROA	1.000			
Lnassets	0.1828	1.000		
	(0.0006)			
Revvol	0.1685	0.4097	1.000	
	(0.0015)	(0.000)		
Leverage	-0.1824	-0.12	0.0823	1.000
	(0.0006)	(0.0245)	(0.1239)	

Key: P-values in parenthesis

ROA - Return on assets and Revvol - revenue volatility.

Table 8 indicated that the correlation results for Lnassets and ROA are positively and significantly associated. These results concur with those of Al-Tarawneh, et al., (2017) who established a positive and significant relationship between non-interest income margin and the size of the entity. The results found that revenue volatility and ROA are positively and significantly associated at one percent level of confidence interval. The

results also indicated that leverage and ROA is negatively and significantly associated. These results are in variance with those of Huang (2009) who concluded that cash flow volatility is significantly and negatively collated to the returns of a firm.

4.3.2 Correlation between Inventory Management and Financial Performance

Table nine presents the results of the correlation analysis for Lnassets, raw materials inventory, work in progress, finished goods inventory, total inventory for entity and financial performance of manufacturing companies measured using EBITS and ROA.

Table 9

Correlation for Inventory Management and EBITS

	EBITS	**Lnassets**	**RMIS**	**WIPS**	**FGIS**	**INVS**
EBITS	1.0000					
Lnassets	0.1101	1.000				
	(0.0392)					
RMIS	-0.4025	0.0476	1.000			
	(0.0000)	(0.4019)				
WIPS	0.0829	-0.3051	0.3002	1.000		
	(0.1622)	(0.0000)	(0.0000)			
FGIS	-0.2767	-0.4624	0.2744	0.2878	1.000	
	(0.000)	(0.000)	(0.0000)	(0.000)		
INVS	-0.3638	-0.0469	0.6447	0.1526	0.5995	1.000
	(0.000)	(0.3811)	(0.000)	(0.0097)	(0.000)	

Key: P-values in parenthesis

EBITS - Earning before Profit and Taxes scaled by sales, RMIS - raw materials inventory scaled by sales, WIPS - work in progress inventory scaled by sales, FGIS - finished goods inventory scaled by sales, INVS - total inventory for entity scaled by sales and SGR - sales growth ratio.

The results found that raw materials inventory and EBITS are negatively and significantly associated at one percent level of significance. The results also indicated that work in progress inventory and EBITS are positively and insignificantly associated. Finished goods inventory and EBITS are negatively and significantly associated at one percent level of significance while total inventory for entity and EBITS are negatively and significantly associated at one percent level of significance. These findings concur with those of Shardeo (2015) who established that entities financial performance will have a positive relationship with inventory management when an entity performs well and the relationship will be negative if the entity performance slows down during a given financial period.

Table 10

Correlation for Inventory Management and ROA

	ROA	**Lnassets**	**RMIS**	**WIPS**	**FGIS**	**INVS**
ROA	1.000					
Lnassets	0.1828	1.000				
	(0.0006)					
RMIS	-0.1181	0.0476	1.000			
	(0.0370)	(0.4019)				
WIPS	0.0257	-0.3051	0.3002	1.000		
	(0.6650)	(0.0000)	(0.0000)			
FGIS	-0.2778	-0.4624	0.2744	0.2878	1.000	
	(0.000)	(0.000)	(0.0000)	(0.000)		
INVS	-0.2587	-0.0469	0.6447	0.1526	0.5995	1.000
	(0.000)	(0.3811)	(0.000)	(0.0097)	(0.000)	

Key: P-values in parenthesis

ROA - Return on assets, RMIS - raw materials inventory scaled by sales, WIPS - work in progress inventory scaled by sales, FGIS - finished goods inventory scaled by sales, INVS - total inventory for entity scaled by sales and SGR - sales growth ratio.

The results found that raw materials inventory and ROA are negatively and significantly associated at one percent. The results also indicated that work in progress inventory and ROA is positively and insignificantly associated. Finished goods inventory and ROA are negatively and significantly associated while total inventory for entity and ROA are negatively and significantly associated at one percent level of significance. These results

are contrary to those of Capkun, et al., (2009) who found that there is a significant and positive relationship between both total inventory and the constituent components of inventory namely: RMIS, FGIS and WIPS. However they concur with those of Mohamad, et al., (2016) in a paper on the relationship between inventory management and company performance found that there is a significant negative relationship between the key ratio, return on assets (ROA) and inventory days. Eroglu and Hofer, (2011) and Obermaier and Donhauser, (2009) came to the conclusion that the relationship between inventory and financial performance will vary depending on the organizational life cycle segment. The researchers' advance that the relationship between inventory to sales ratio and an entity financial performance of the business entity is negative in the preliminary growth segment and the maturity phase, however it is positive in the brisk growth phase and the revitalization phase and this may explain the variance in the correlation results.

4.3.3 Correlation between Commodities Pricing and Financial Performance

Commodities pricing was measured using two variables namely: sales growth ratio and tax paid. The Lnassets was included as a control variable. Table 11 presents the results of the correlation analysis for Lnassets, sales growth ratio and tax paid within a given financial period and financial performance of manufacturing companies measured using EBITS and ROA.

Table 11

Correlation for Commodities Pricing and EBITS

	EBITS	**Lnassets**	**SGR**	**Tax Paid**
EBITS	1.000			
Lnassets	0.110	1.000		
	(0.039)			
SGR	0.097	0.046	1.000	
	(0.069)	(0.387)		
Tax paid	0.165	0.496	0.077	1.000
	(0.002)	(0.000)	(0.152)	

Key: P-values in parenthesis

EBITS - Earning before Profit and Taxes scaled by sales and SGR - sales growth ratio.

The results found that sales growth ratio and EBITS are positively and significantly associated at ten percent. The results also indicated that Tax paid and EBITS is positively and significantly associated at one percent significance levels. These results are in agreement with those of Toni, et al., (2016) who found that there is a significant and increasing relationship between high product prices and the net profit margin however firms should concentrate more on strategic pricing rather than purely setting high or low prices as a competitive advantage.

Table 12

Correlation for Commodities Pricing and ROA

	ROA	**Lnassets**	**SGR**	**Tax Paid**
ROA	1.000			
Lnassets	0.183	1.000		
	(0.001)			
SGR	0.125	0.046	1.000	
	(0.019)	(0.387)		
Tax paid	0.454	0.496	0.077	1.000
	(0.000)	(0.000)	(0.152)	

Key: P-values in parenthesis

The correlation results in Table 12 found that sales growth ratio and ROA are positively and significantly associated. The results also indicated that Tax paid and ROA is positively and significantly associated. The findings are consistent with those of Agrawal, et al., (2017) who came to the conclusion that there is a strong correlation between returns and the commodity price index especially for those countries that have high dependence on commodity sales and the low income countries.

4.3.4 Correlation between Corporate diversification and Financial Performance

Corporate diversification was measured using Herfindahl–Hirschman diversification index (HHI). Three control variables namely, Lnassets, leverage and sales growth ratio were also included. Table 13 presents the results of the correlation analysis for Lnassets,

corporate diversification, leverage and sales growth ratio and financial performance of manufacturing companies measured using EBITS and ROA.

Table 13

Correlation for Corporate Diversification and EBITS

	EBITS	**Lnassets**	**DIV**	**Leverage**	**SGR**
EBITS	1.0000				
Lnassets	0.1101	1.0000			
	(0.0392)				
DIV	-0.2596	-0.4299	1.0000		
	(0.0000)	(0.0000)			
Leverage	-0.0269	-0.1200	0.1759	1.0000	
	(0.6158)	(0.0245)	(0.0009)		
SGR	0.0971	0.0463	0.0227	0.0054	1.0000
	(0.0691)	(0.3874)	(0.6714)	(0.9192)	

Key: P-values in parenthesis

EBITS - Earning before Profit and Taxes scaled by sales, DIV – corporate diversification and SGR - sales growth ratio

The results found that corporate diversification and EBITS are negatively and significantly associated. The results also indicated that leverage and EBITS is negatively but insignificantly associated. Sales growth ratio and EBITS are positively and significantly associated.

Benefits of diversification tend to vary depending on the stage at which an entity is at. Ficici, et al., (2014) provide a nexus between diversification benefits and associated costs. When a firm is diversifying into foreign markets, the costs incurred tend to outweigh the benefits accrued from diversification leading to poor financial performance. As the entity settles in the market and expands, it's able to enjoy economies of scale and scope, risk diversification and exploration of available opportunities. However if an entity over diversifies this will have a negative effect on the profitability of the entity due to cost outweighing the benefits of diversification.

Table 14

Correlation for Corporate Diversification and ROA

	ROA	**Lnassets**	**DIV**	**Leverage**	**SGR**
ROA	1.000				
Lnassets	0.183	1.000			
	(0.001)				
DIV	-0.402	-0.430	1.000		
	(0.000)	(0.000)			
Leverage	-0.182	-0.120	0.176	1.000	
	(0.001)	(0.025)	(0.001)		
SGR	0.125	0.046	0.023	0.005	1.000
	(0.019)	(0.387)	(0.671)	(0.919)	

Key: P-values in parenthesis

ROA – return on assets, DIV – corporate diversification and SGR – sales growth ratio.

The results demonstrate that corporate diversification and ROA are negatively and significantly associated. The results also indicated that leverage and ROA is negatively and significantly associated. Sales growth ratio and ROA are positively and significantly associated. The results as presented above are similar to those of Olajide (2012) who came to the conclusion that there is a positive relationship between natural log of assets and financial performance. Yücel and Önal (2016) using an accounting measure (return on assets) came to the conclusion that diversified entities show higher Tobin Q, return on assets, are bigger in size and have more investment opportunities compared to single firms as these firms are able to improve their efficiency and performance through the internal financial market which arises due to diversification.

4.3.5 Summary of the Correlation Results

The researcher generated a comprehensive table for all the key variables of the study. Below is a summary table highlighting the correlation for the key variables:

Table 15

Correlation for the Key Variables

	EBITS	ROA	Revvol	RMIS	WIPS	FGIS	INVS	SGR	DIV
EBITS	1								
ROA	0.5889	1							
	(0.000)								
Revvol	0.0812	0.1685	1						
	(0.1249)	(0.0015)							
RMIS	-0.4025	-0.1181	0.0705	1					
	(0.000)	(0.0370)	(0.000)						
WIPS	0.0829	0.0257	-0.1365	0.3002	1				
	(0.1622)	(0.6650)	(0.000)	(0.000)					
FGIS	-0.2767	-0.2778	-0.1473	0.2744	0.2878	1			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
INVS	-0.3638	-0.2587	-0.0795	0.6447	0.1526	0.5995	1		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.0097)	(0.000)			
SGR	0.0971	0.125	0.0278	0.0007	-0.1013	-0.0878	-0.02865	1	
	(0.0691)	(0.019)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
DIV	-0.2576	-0.402	-0.2839	0.1002	0.1684	0.2931	0.1812	0.0029	1
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Key: P-values in parenthesis

EBITS - Earning before Profit and Taxes scaled by sales, ROA – return on assets, Revvol – revenue volatility, RMIS - raw materials inventory scaled by sales, WIPS - work in progress inventory scaled by sales, FGIS - finished goods inventory scaled by sales,

INVS - total inventory for entity scaled by sales, SGR - sales growth ratio and DIV – corporate diversification.

Revenue volatility had three dimensions namely: revenue volatility, natural log of assets and leverage. The results found that revenue volatility and financial performance of manufacturing companies measured using EBITS are positively but insignificantly associated. These results are partly in agreement with those of Chiang, et al., (2018) who found that there is a negative but significant relationship between revenue volatility and performance. The researchers found that revenue volatility and ROA are positively and significantly associated at one percent level of confidence interval. These results are in variance with those of Huang (2009) who concluded that cash flow volatility is significantly and negatively collated to the returns of a firm.

Inventory management had four measures namely: RMIS, WIPS, FGIS, and INVS whereby the results of the correlation analysis for raw materials inventory, work in progress, finished goods inventory, total inventory for entity and financial performance of manufacturing companies measured using EBITS and ROA. The results found that raw materials inventory and EBITS are negatively and significantly associated. The results indicated that work in progress inventory and EBITS is positively and insignificantly associated. Finished goods inventory and EBITS are negatively and significantly associated at one percent level of significance while total inventory for entity and EBITS are negatively and significantly associated. These findings concur with those of Shardeo (2015) who established that entities financial performance will a positive relationship with inventory management when an entity makes a profit and the relationship will be negative if the entity made a loss during a given financial period.

The results found that raw materials inventory and ROA are negatively and significantly associated. The results also indicated that work in progress inventory and ROA is positively but insignificantly associated. Finished goods inventory and ROA are negatively and significantly associated while total inventory for entity and ROA are negatively and significantly associated. These results are contrary to those of Capkun, et al., (2009) who found that there is a significant and positive relationship between both total inventory and the constituent components of inventory namely: RMIS, FGIS and WIPS. However they concur with those of Mohamad, et al., (2016) in a paper on the relationship between inventory management and company performance found that there is a significant negative relationship between the key ratio, return on assets (ROA) and inventory days. Eroglu and Hofer, (2011) and Obermaier and Donhauser, (2009) came to the conclusion that the relationship between inventory and financial performance will vary depending on the organizational life cycle segment. The researchers' advance that the relationship between inventory to sales ratio and financial performance of the business entity is negative in the preliminary growth segment and the maturity phase, however it is positive in the brisk growth phase and the revitalization phase and this may explain the variance in the correlation results.

Commodities pricing was measured using sales growth ratio. The Lnassets and tax were included as control variables. The researcher found that sales growth ratio and EBITS are positively and significantly associated. These results are in agreement with those of Toni, et al., (2016) who found that there is a significant and increasing relationship between high product prices and the net profit margin however firms should concentrate more on strategic pricing rather than purely setting high or low prices as a competitive advantage.

The researcher found that sales growth ratio and ROA are positively and significantly associated. The findings are consistent with those of Agrawal, Duttagupta and Presbitero (2017) who came to the conclusion that there is a strong correlation between returns and the commodity price index especially for those countries that have high dependence on commodity sales and the low income countries.

Product diversification was measured using two variables namely: Herfindahl–Hirschman diversification index and sales growth ratio. The Lnassets and leverage were included as control variables. The results found that product diversification and EBITS are negatively and significantly associated and sales growth ratio and EBITS are positively and significantly associated. Benefits of diversification tend to vary depending on the stage at which an entity is at. Ficici, et al., (2014) provide a nexus between diversification benefits and associated costs. When a firm is diversifying into foreign markets, the costs incurred tend to outweigh the benefits accrued from diversification leading to poor financial performance. As the entity settles in the market and expands, it's able to enjoy economies of scale and scope, risk diversification and exploration of available opportunities. However if an entity over diversifies this will have a negative effect on the profitability of the entity due to cost outweighing the benefits of diversification.

The correlation results found that sales growth ratio and ROA are positively and significantly associated. Corporate diversification is negatively and significantly associated to ROA. The results as presented above are contrary to those of Olajide (2012) who came to the conclusion that there is a positive relationship between ROA and product diversification. Yücel and Önal (2016) using an accounting measure (return on assets) came to the conclusion that diversified entities show higher Tobin Q, return on assets, are

bigger in size and have more investment opportunities compared to single firms as these firms are able to improve their efficiency and performance through the internal financial market which arises due to diversification.

4.4 Panel Results

The researcher used panel regression to evaluate the relationships between the dependent and independent variables given that the data was two dimensional data. Five different models were generated to evaluate these relationships and the results are presented as follows. The long run model is evaluated first and its post estimation diagnostics analysed to ensure the findings are reliable. To decide between the fixed and random effect models, the Hausman test is used. Based on the Hausman test results the appropriate model is selected. The GMM specifications are presented together with their post estimation diagnostics and a discussion of the results is presented. To conclude under each of the models, the researcher presents a detailed comparative analysis of all the results from different models and a conclusion is made whether to accept or reject the associated null hypothesis.

4.4.1 Relationship between Commodity Risk, its Management and the Financial Performance of Manufacturing Companies in Kenya

The overall model was evaluated by including all the variables: raw materials inventory (RMI), work in progress inventory (WIPS), finished goods inventory (FGIS), total inventory for entity (INVS), sales growth ratio (SGR), tax paid, corporate diversification, leverage and revenue volatility and running against the lag of the two dependent variables $EBITS_{t-1}$ and ROA_{t-1}. The Hausman results showed that fixed effect model was

appropriate for both EBITS and ROA because the P-values were lesser than 0.05. Table 16 below shows the results of the overall model.

Table 16

Commodity Risk Management Fixed Effect Model

Variables	**Fixed Effect**		**GMM**	
	EBITS	**ROA**	**EBITS**	**ROA**
EBITSt-1	-	-	-0.0390 (-0.47)	-
ROA_{t-1}	-	-	-	0. 2627** (1.96)
Lnassets	-0. 0191 (-0.27)	-0. 0673*** (-3.71)	0. 0139 (0.11)	-0. 0823*** (-2.79)
RMIS	0. 3540*** (3.02)	-0. 0032 (-0.11)	0. 5530*** (2.80)	-0. 0134 (-0.30)
WIPS	-0. 1111 (-0.32)	-0. 2538*** (-2.82)	-0. 1729 (-0.30)	0. 0123 (0.08)
FGIS	1.7018*** (4.43)	0. 1087 (1.09)	2.4999*** (4.28)	-0. 0322 (-0.22)
INVS	-0. 1124 (-0.98)	-0. 0397 (-1.33)	-0. 1310 (-0.75)	-0. 0208 (-0.49)
Tax paid	0. 00004 (0.67)	0. 00010*** (5.96)	0. 00001 (0.12)	0. 00010*** (4.78)
SGR	0. 1763** (2.54)	0. 0491*** (2.71)	0. 1906 (2.12)	0. 0582*** (2.77)
Div	-0. 0679 (-0.27)	-0. 1368** (-2.12)	0. 0637 (-0.18)	-0. 0917** (-2.09)
Leverage	-0. 0609 (-0.43)	-0. 0984*** (-2.65)	-0. 0689 (0.007)	-0. 0883* (-1.80)
Revvol	-1.4147*** (-5.03)	0. 0421 (0.57)	-2.0525*** (-4.80)	0. 0308 (0.31)
_cons	0.4750 (-0.59)	0. 9611*** (4.56)	-1.2699 (-0.91)	0. 9238*** (2.76)
Rho	0. 8583	0. 7728		
Hansen's J	-	-	5.1331 (0.0235)	26.6772*** (0.0000)
F statistic	6.48*** (0.000)	9.65*** (0.000)	-	-
Wald test			71.77 (0.0000)	60.47 (0.0000)
Hausman Test	17.63 (0.0397)	32.21 (0.0002)	-	-

Key: Standard errors in parentheses

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

EBITS-Earning Before Profit and Taxes scaled by sales, ROA-Return on assets, RMIS-raw materials inventory scaled by sales, WIPS- work in progress inventory scaled by sales, FGIS- finished goods inventory scaled by sales, INVS- total inventory for entity scaled by sales and SGR- sales growth ratio.

The overall model results presented in Table 16 depicts the effect of variables such as revenue volatility, RMIS, WIPS, FGIS, INVS, sales growth ratio, corporate diversification, tax paid, leverage and the natural log of assets on the financial performance of manufacturing in Kenya. The lagged measure for financial performance ($EBITS_{t-1}$) is positive but has an insignificant influence on the financial performance. The lagged measure for financial performance (ROA_{t-1}) under the dynamic model is relatively high and positive as expected. After relaxing the conjecture of past performance influencing current performance, the coefficients do not significantly change showing consistency in the measures. Largely, the effect of various components of inventory is statistically insignificant implying that the inventory held by manufacturing companies in Kenya rarely affects the financial performance of such entities.

For raw materials inventory (RMIS) modeled with EBITS, the coefficients of the fixed model were statistically significant at one percent level of significance and the same is observed for generalized method of moments model where the coefficients was

statistically significant at one percent level of significance. This implies that the effect of EBITS is time lagged leading to the past performance affecting the current financial performance. When Raw materials inventory was modeled with ROA, the fixed model coefficient is statistically insignificant at one percent level of significance. The same results are observed with the generalized method of moments model which has a statistically insignificant coefficient implying the effect ROA is not time lagged. Consequently, the supposition that the raw materials inventory does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at one percent level of significance. conversely, the proposition that the raw materials inventory does not have a significant relation with the financial performance of manufacturing companies measured using ROA is not rejected at one percent level of significance. Prempeh (2016) alludes to the fact that manufacturing companies which enhance the management of their raw materials inventory end up performing better financially. However, this is largely dependent on the type of inventory held by the entity as raw materials which are relatively cheap may not have a significant effect on the financial performance (Capkun, et al., 2009).

When work in progress inventory (WIPS) is modeled with EBITS, the coefficients were negative and statistically insignificant at one percent level of significance for the fixed effect model. Under the generalized method of moments model the coefficients were negative and statistically insignificant at one percent level of significance. When Work in progress inventory was modeled with ROA, the fixed effect model coefficient was negative and significant at one percent level of significance. Under the generalized method of moments model the coefficient was statistically insignificant at one percent level of significance. As a result, the proposition that the work in progress inventory does

not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at one percent level of significance. The proposition that work in progress inventory does not have a significant relation with the financial performance of manufacturing companies measured using ROA is not rejected at one percent level of significance. This is in agreement to Farooq (2018) who argues that inventory turnover does not affect the return on assets which he attributes to the fact that a more direct relationship exists between sales and the financial performance and therefore the relationship is seen more between the sales growth and profits and not inventory turnover and the financial performance. The results are in consonance with those of Shin, et al., (2015) who disparaged the logical assumption that there is an inverse relationship between optimal inventory and profitability. They came to the conclusion that an entity will perform better financially when it maintains a lower inventory to sales ratio.

When finished goods inventory (FGIS) is modeled with EBITS, the coefficient of the fixed model were statistically significant at one percent level of significance. For the generalized method of moments the coefficient is also statistically significant at one percent level of significance. When finished goods inventory was modeled with ROA, the fixed model coefficient is statistically insignificant at one percent level of significance. For the generalized method of moments the coefficient is statistically insignificant at one percent level of significance. Therefore, the supposition that the finished goods inventory does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at one percent level of significance while the proposition that finished goods inventory does not have a significant relation with the financial performance of manufacturing companies measured using ROA is also not

rejected at one percent level of significance. Cannon (2008) argued that manufacturing firms with clear manufacturing strategies will fare better financially compared to those that just maintain low levels of stock. Indeed, a key argument is that having a superior inventory turnover does not necessarily result into better financial performance. The researcher concluded that there was little or no relationship that can be discerned between superior inventory management and the financial performance of manufacturing entities.

Total inventory (INVS) when modeled with EBITS, the coefficient of the fixed model is statistically insignificant at one percent level of significance. For the generalized method of moments the coefficient is statistically insignificant at one percent level of significance. When total inventory for entity was modeled with ROA, the fixed and generalized method of moments model were all statistically insignificant at one percent level of significance. Hence, the premise that the total inventory for entity does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. The supposition that total inventory for entity does not have a significant relation with the financial performance of manufacturing companies measured using ROA is not rejected at one percent level of significance. This goes against Kouvelis, et al., (2011) who advanced that a core risk management strategy that manufacturing companies can use involves holding reserves. By having reserves in manufacturing capacity, inventory and a safe lead time it acts as a buffer against volatility and uncertainty in the markets. With no statistical relationship between the various components of inventory and the financial performance of manufacturing companies, it is evident that even though such companies hold significant amounts of stock, such stock levels have no impact on their financial performance.

Sales growth ratio when modeled with EBITS, the coefficient of the fixed model was statistically significant at five and ten percent level of significance while the generalized method of moments model coefficient was statistically insignificant at one percent level of significance. When sales growth ratio was modeled with ROA, the fixed effect model coefficient was statistically significant at one percent level of significance while the generalized method of moments model was statistically significant at one percent level of significance. Therefore, the supposition that sales growth ratio does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at one percent level of significance. The suggestion that sales growth ratio does not have a significant relation with the financial performance of manufacturing companies measured using ROA is also rejected at one percent level of significance. The results are in agreement with Fazli, et al., (2013) that sales growth influenced the performance Japanese ICT industries over other Asian countries. The researchers argue that sales growth will give impetus to a business entity to enhance its financial performance by coming up with new lines of operations or products even as such companies maintain old profitable products.

Corporate diversification modeled with EBITS, the coefficient of the fixed model is statistically insignificant at one percent level of significance. For the generalized method of moments the coefficient is statistically insignificant at one percent level of significance implying past performance does not influences current and future performance.. When corporate diversification was modeled with ROA, the fixed model coefficient was statistically significant at five and ten percent level of significance while the generalized method of moments model was also statistically significant at five and ten percent level of significance. Therefore, the proposition that corporate diversification does not have a

significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. The proposition that corporate diversification does not have a significant relation with the financial performance of manufacturing companies measured using ROA is rejected at five and ten percent level of significance. Phung and Mishra (2017) came to the conclusion that corporate diversification has a negative influence on the financial performance. They attributed this inverse relationship to inefficient corporate governance structures which result in firms pursuing suboptimal corporate diversification strategies which eventually result in poor financial performance.

Revenue volatility when modeled with EBITS, the coefficients of the fixed and generalized method of moments model were all statistically significant at one percent level of significance. When revenue volatility was modeled with ROA, coefficients of the fixed and the generalized method of moments model were all statistically insignificant at one percent level of significance. Therefore, the proposition that revenue volatility does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at one percent level of significance. Conversely, the supposition that revenue volatility does not have a significant relation with the financial performance of manufacturing companies measured using ROA is also not rejected at one percent level of significance. Vătavu, et al., (2018) postulates revenue volatility may not necessarily result in inferior financial performance in a business entity as such entity can take measures that will ensure its expenditure is adjusted to be in line with the income expected to be generated.

For tax paid by an entity when modeled with EBITS, the coefficients of the fixed model was statistically insignificant while for the generalized method of moments model the coefficients were statistically significant at one percent level of significance. When tax paid by an entity was modeled with ROA, the fixed and generalized method of moments model were all statistically significant. The proposition that tax paid by an entity does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. The premise that tax paid by an entity does not have a significant relation with the financial performance of manufacturing companies measured using ROA is rejected at one percent level of significance. The results contrast Gatsi, et al., (2013) that there exists a significant negative relationship between corporate income tax and financial performance of listed manufacturing companies in Ghana.

For Lnassets modeled with EBITS, the coefficients of the fixed and generalized method of moments models were all negative but statistically insignificant hence indicating that the assets do not affect financial performance in a significant way. However, when Lnassets was modeled with ROA, the fixed model coefficients were statistically significant at one percent level of significance while the generalized method of moments model was statistically insignificant. For that reason, the supposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. However, the proposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured using ROA is rejected at one percent level of significance. As Phung and Mishra (2017) allude, it is common to get mixed results when evaluating the effect of firm size on the

financial performance of companies. This can be dependent on the measures used as Luqman, et al., (2017) argues, this variation is evident when firm size is modeled against total assets where they observed effect on the financial performance was negative and when it was modeled against total sales, the effect on the financial performance was positive.

Leverage when modeled with EBITS, the coefficients of the fixed model was insignificant at one percent level of significance while for the generalized method of moments model the coefficient was statistically insignificant at one percent level of significance. When leverage was modeled with ROA, the fixed and the generalized method of moments model the coefficients were all statistically significant at one percent level of significance. Therefore, the supposition that leverage does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. Equally, the premise that leverage does not have a significant relation with the financial performance of manufacturing companies measured using ROA is rejected at one percent level of significance. Kamran, et al., (2016) found there exists an inverse relationship between the level of debt measured using the debt ratio and the financial performance of a business entity as entities which increased their level of debt ended up returning inferior financial performance.

In summary, from the results above it is evident that revenue volatility, inventory management, commodities pricing and Corporate diversification tactics jointly determine the financial performance of a business entity. The highest association is evident between commodities pricing variables and the financial performance followed by leverage. The

hypothesis that commodity risk management does not have a significant effect on the financial performance of manufacturing is rejected in favour of the alternative hypothesis that commodity risk management influence the financial performance of manufacturing entities in Kenya. This implies that if manufacturing entities want to achieve superior financial performance, they should focus on managing risks associated with pricing of commodities and the financial risks, take advantage of opportunities presented by volatility in the commodities markets to generate superior returns, and diversify into products that add value to the business entity besides leading to better financial performance.

4.4.2 Relationship between Revenue Volatility and the Financial Performance

The first objective of this study was to evaluate the relationship between revenue volatility and the financial performance of manufacturing companies in Kenya. To test the first hypothesis that revenue volatility does not have a significant relation with the financial performance of manufacturing companies in Kenya, the long run model was estimated. The fixed and random effect models were analysed to establish the appropriate model. The Hausman test results showed that random effect model was appropriate for both EBITS and ROA given that the P-values were greater than 0.05. The results are presented in Table 17.

Table 17

Revenue Volatility Random Effects Estimates

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
Lnassets	-0. 0037 (-0.11)	-0. 0047 (-0.69)
Revvol	-0.5461*** (-7.00)	-0.0600*** (-3.24)
Leverage	-0.1145 (-1.16)	-0. 0686*** (2.91)
_cons	0. 2090 (0.78)	0. 1680*** (2.90)
Post Estimation Diagnostics		
Rho	0.7660	0.5504
Wald test chi2(3)	49.37*** (0.0000)	16.73 (0.0008)
Lm test Chibar2	201.37*** (0.0000)	324.54*** (0.0000)
Hausman Test	0.05 (0.9969)	2.96 (0.1001)

KEY

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

The random effect results in Table 17 were used to estimate models 3.5 and 3.7. The results show that Lnassets, revenue volatility and leverage are jointly significant in

elucidating the disparity in EBITS since the Wald statistic is statistically significant. When the same variables were measured to predict ROA as the dependent variable, it was established that the Lnassets revenue volatility and leverage are jointly significant in elucidating the disparity in ROA since the Wald statistic is statistically significant.

While measuring performance using EBITS, the LM test statistic is 201.37 and it is significantly higher than the expected critical value at one percent level of significance. Consequently, we reject the null hypothesis on the non-heterogeneity of the cross sections at one percent level of significance. As a result, we adopt the random effect model instead of the pooled OLS model. Using ROA as the measure of performance for manufacturing firms, the LM test statistic is 324.54 and it is significantly higher than the expected critical value at one percent level of significance. Consequently, we reject the null supposition on the non-heterogeneity of the cross sections at one percent level of significance. As a result, we adopt the random effect model instead of the pooled OLS model.

For EBITS model, the Hausman test statistics has a chi statistic of 0.05 and an attendant p value of 0.9969. Consequently, we accept the null hypothesis on the exogeneity of the regressors beside their individual heterogeneity at one percent level of significance. Therefore the random effect model is preferred over fixed effects model. As a result, the study will focus on interpreting the random effects model under the long run specification. Further, for ROA model, the chi test statistics is 2.96 and an attendant p value of 0.1001. Consequently, we accept the null hypothesis on the exogeneity of the regressors beside their individual heterogeneity at one percent level of significance. Therefore the random effects model is favoured over fixed effects model. As a result, the

study will focus on interpreting the random effects model under the long run specification.

As a check for the robustness of model and the consistency of the estimates, the dynamic model specification one step system GMM is used. The model results are shown in Table 18.

Table 18

One Step System GMM Estimates for Revenue Volatility

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
$EBITS_{t-1}$	-0. 0661 (-1.06)	-
ROA_{t-1}	-	0. 3155*** (2.77)
Lnassets	0. 0057 (0.07)	-0. 0509** (-2.07)
Revvol	-0. 8750*** (-7.27)	-0.0633* (-1.75)
Leverage	-0. 1128 (-0.65)	-0. 1606*** (-3.21)
_cons	0.2501 (0.37)	0. 5681*** (2.87)
Post Estimation Diagnostics		
Hansen J test	5.3493** (0.0193)	29.2235*** (0.0000)
Wald test	56.65*** (0.000)	46.86*** (0.000)

KEY

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

Table 18 depicts the results from the one step system GMM model for the long run specification of models 3.6 and 3.8. For EBITS model, the Hansen J statistic is 5.34933 with a commensurate p-value less than 0.05. Further, the Hansen J statistic for ROA model is 29.2235 with a commensurate p-value less than 0.05. We consequently reject the null hypothesis on the validity of the over identifying restrictions. However, this was corrected by running non log model and thus a robust model. Thus, from the preliminary analysis we conclude that the instruments adopted in the model are valid and will result in estimates which are consistent and precise. Below we therefore provide a summary of the findings appropriate to test the first hypothesis.

Table 19

Relationship between Revenue Volatility and the Financial Performance

Variables	**Random Effects**		**GMM**	
	EBITS	**ROA**	**EBITS**	**ROA**
$EBITS_{t-1}$	-	-	-0. 0661 (-1.06)	-
ROA_{t-1}	-	-	-	0. 3155*** (2.77)
Lnassets	-0. 0037 (-0.11)	-0. 0047 (-0.69)	0. 0057 (0.07)	-0. 0509** (-2.07)
Revvol	-0.5461*** (-7.00)	-0.0600*** (-3.24)	-0. 8750*** (-7.27)	-0.0633* (-1.75)
Leverage	-0.1145 (-1.16)	-0. 0686*** (2.91)	-0. 1128 (-0.65)	-0. 1606*** (-3.21)
_cons	0. 2090 (0.78)	0. 1680*** (2.90)	0.2501 (0.37)	0. 5681*** (2.87)
Rho	0.7660	0.5504	-	-
Hansen's J chi2(1)	-	-	5.3493** (0.0193)	29.2235*** (0.0000)
Wald statistic	49.37*** (0.0000)	16.73*** (0.0008)	56.65*** (0.000)	46.86*** (0.000)
Lm test	201.37*** (0.0000)	324.54*** (0.0000)	-	-
Hausman Test	0.05 (0.9969)	2.96 (0.1001)	-	-

Key: Standard errors in parentheses

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

Revenue volatility is observed to have a negative effect on the financial performance of the entities which can be attributed to lower returns resulting from taking or exposure to significant risks. This is contrary to the findings of Solomon and Muntean (2012) who highlight the central place of financial risk when assessing business entity profitability as risk has a direct impact on profitability. Thus in general, if manufacturing companies in Kenya intend to improve on their financial performance a key area they should focus on is the control of the commodity risk. A similar behaviour is observed when financial performance is measured using ROA. Both revenue volatility and leverage have a significant effect on the financial performance of manufacturing companies which can be attributed to suboptimal capital structure resulting to putting more strain on the financial resources of an entity. As Fang (2016) postulates, financial risk will manifest itself in manufacturing companies through low profitability and poor efficiency resulting from depressed gross profit margins, high product costs and low return on investment (ROI). In such a scenario the manufacturing entities lack funds and are on the brink of insolvency leading to unreasonable debt structure which has a negative impact on the debt repayment. Such firms have poor operating capacities resulting in a significant level of non-performing assets characterized by large bad debts, dead stock and low asset turnover. The lagged measures for financial performance ($EBITS_{t-1}$) is relatively high and negative as expected. Even after relaxing the assumption of past performance influencing current performance the coefficients do not significantly change showing consistency in the measures. From the random effects EBITS model, we observe that leverage have a negative effect on the earnings before interest but the effect is not significant. This

implies that as the level of debt in the company increases, the financial performance of a business entity will decline holding all other factors constant.

For EBITS model, the long run coefficient of revenue volatility is negative with a p-value which is significant at one percent level of significance. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. Therefore, the supposition that the revenue volatility does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected. The size of the generated coefficient indicates that a one unit increase in the revenue volatility increases EBITS by the same units in the long run if any other related conditions are held constant. This is in consonance with Menguc and Barker (2005) who argued that volatility in sales affects predictability and planning of activities related to sales which eventually results in higher variability in a business entity financial performance. As Mohammed and Knapkova (2016) argue manufacturing companies should adopt effective and integrated risk management approaches as they tends to influence financial performance through enhancing the company's understanding of exposures that will have an impact on the performance of the company and ensure that the company takes advantage of arising opportunities.

For ROA model, the long run coefficient of revenue volatility is negative with a p-value significant at one percent level of significance. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. The proposition that revenue volatility does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected. The size of the generated coefficient of revenue volatility indicates that a one unit increase in the revenue volatility

increases ROA by the same units in the long run if all other related conditions are held constant. Vătavu, et al., (2018) contends that when profitable business entities face decline in revenue, they take measures such as making drastic cuts in expenditure and deferring investing in capital expenditure and therefore such volatility may not affect their immediate financial performance but this may be reflected on low return on assets. The GMM results under both models show similar results indicating consistency of the measures.

For EBITS model, the long run coefficient of leverage is negative with a p-value insignificant at one percent level of significance. Consequently, we observe that the coefficient is insignificantly different from zero at one percent level of significance. The premise that leverage does not have a significant relation with the financial performance of manufacturing companies measured using EBITS model is not rejected at one percent level of significance. As Solomon and Muntean (2012) highlight, financial risk has central place of when assessing business entity profitability as risk has a direct impact on profitability. The key indicators during financial risk assessment include financial leverage or debt burden, financial breakeven and the leverage factor as these help to indicate fluctuations in the entity profitability occasioned by the financial structure. The level of debt affects the return on equity and in turn influences the level of risk exposure.

For EBITS model, the long run coefficient of Lnassets is negative with an insignificant p-value. Therefore, we observe that the coefficient does not differ significantly from zero at one percent level of significance. Therefore, the premise that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected. This is contrary to the findings of Al-

Tarawneh, et al., (2017) who found that there exists a positive and significant relationship between noninterest income margin and the size of the entity. Using the GMM estimation technique for robustness check, we observe an improvement in the coefficient of Lnassets whereby higher coefficients are attained for the EBITS model. This implies that the past performance has a higher significant and positive effect on the current financial performance.

For ROA model, the long run coefficient of Lnassets is negative with a p-value insignificant at one percent level of significance. Therefore, we observe that the coefficient does not differ significantly from zero at one percent level of significance. Therefore, the proposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured as ROA is not rejected. Ramesh, et al., (2017) argues that due to the fact that manufacturing companies hold significant levels of current assets which are not necessarily productive, this tends to have a negative effect on ROA. They established a strong negative relationship between inventory conversion period (ICP) and the return on assets with longer conversion periods resulting in worse financial performance. Using the GMM estimation technique for robustness check, we observe an improvement in the coefficient of Lnassets whereby higher coefficients are attained for the ROA model. This implies that the past performance has a higher significant and negative effect on the current financial performance of manufacturing firms.

For ROA model, the long run coefficient of leverage is negative with a p-value significant at one percent level of significance. Consequently, we observe that the coefficient is considerably different from zero at five and ten percent level of significance. The

supposition that leverage does not have a significant relation with the financial performance of manufacturing companies measured using ROA model is rejected. The size of the generated coefficient indicates that a one unit increase in the leverage reduces ROA by the same number of units in the long run if any other related conditions are held constant. Under the GMM model it is evident that leverage has a negative impact on the financial performance on manufacturing entities as we observe negative coefficients which are significant. This can be attributed to the level of debt incorporated in the capital structure of a firm as higher levels of debts result in poor financial performance. Fang (2016) advocates for manufacturing companies maintaining reasonable levels of debt in their capital structure as high levels of debt has the capacity to reduce the gains made.

In summary, the study results presented in Table 19 provide objective evidence that revenue volatility occasioned by commodity risk exposure has a negative and significant relationship with the financial performance of manufacturing companies in Kenya. Leverage has a negative and significant relationship with the return on assets in the long run and the erelationship will still be negative when you factor the past performance. The levels of assets held by the company equally have no significant relationship with the performance of manufacturing companies. From the study results, we therefore reject the null hypothesis that revenue volatility does not have a significant relation with the financial performance of manufacturing companies in Kenya in favour of the alternative hypothesis that revenue volatility influences negatively the financial performance of manufacturing companies in Kenya.

4.4.3 Relationship between Inventory Management and the Financial Performance

The second objective was to determine the relationship between inventory management and the financial performance of manufacturing companies in Kenya. To test the hypothesis that inventory management does not have a significant relation with the financial performance of manufacturing companies in Kenya, the long run model was estimated. The fixed and random effect models were estimated to establish the appropriate model. The Hausman results showed that fixed effect model was appropriate for both EBITS and ROA models since the model was statistically significant. The results are presented in Table 20.

Table 20

Inventory Management Fixed Effects Estimates

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
Lnassets	-0.0382	-0. 0641***
	(-0.52)	(-3.10)
RMIS	-0.1432*	-0. 0030
	(-1.94)	(0.14)
WIPS	-0.3376	-0.2389**
	(-0.92)	(-2.32)
FGIS	0. 9575**	0.1137
	(2.51)	(1.07)
INVS	-0.2938**	-0.0378
	(-2.50)	(-1.15)
_cons	1.5628**	0.5090***
	(2.14)	(3.89)
Post Estimation Diagnostics		
Rho	0. 8304	0. 8144
F test	5.06***	3.73**
	(0.0002)	(0.0030)
Hausman Test	15.12	21.51
	(0.0099)	(0.0006)

KEY

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

EBITS-Earning Before Profit and Taxes scaled by sales, ROA-Return on assets, RMIS-raw materials inventory scaled by sales, WIPS- work in progress inventory scaled by

sales, FGIS- finished goods inventory scaled by sales, INVS- total inventory for entity scaled by sales and SGR- sales growth ratio

The results in Table 20 are used to estimate model 3.13 and 3.15. Fixed effect models for both EBITS and ROA were used. The EBITS F statistic is 5.06 and it is significantly higher than the expected critical value at one percent level of significance. As a result, the variables which are natural log of assets, raw materials inventory (RMI), work in progress inventory (WIP), finished goods inventory (FGI) and total inventory for entity (INV) are jointly significant in elucidating the disparity in EBITS. For ROA, the F statistic is 3.73 and it is significantly higher than the expected critical value at five and ten percent level of significance. Hence, the variables which are natural log of assets, raw materials inventory, work in progress inventory, finished goods inventory and total inventory for entity are jointly significant in elucidating the disparity in ROA. For both EBITS and ROA models, the fixed effects model is favoured over pooled OLS since the F test was statistically significant. Hence, the null hypothesis was rejected since the cross sections were found not to be heterogeneous. As a result, the fixed effects model is preferred over pooled OLS.

For EBITS model, the Hausman test statistics have a chi statistic of 15.12 and an attendant p value of 0.0099. Consequently, we come to the conclusion that the regressors are not exclusively exogenous. Equally, the individual heterogeneity condition is not attained leading to the rejection of the null hypothesis at one percent level of significance. Consequently the fixed effect model is preferred over random effect model. Therefore, for the long run specification the fixed effects model should be interpreted. Further, for ROA model, the chi test statistics is 21.51 and an attendant p value of 0.0006. Consequently,

we come to the conclusion that the regressors are not exclusively exogenous. Equally, the individual heterogeneity condition is not attained leading to the rejection of the null hypothesis at one percent level of significance. Accordingly, the fixed effect model is preferred over random effect model.

As a check for the robustness of model and the consistency of the estimates, the long run specification one step system GMM is used. The model results are shown in Table 21.

Table 21

One Step System GMM Estimates for Inventory Management

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
$EBITS_{t-1}$	-.01488* (-1.88)	-
ROA_{t-1}	-	-0. 2519* (1.67)
Lnassets	-0.0538 (-0.44)	-0. 0531 (-1.60)
RMIS	-0.3095** (-2.75)	-0. 0079 (-0.26)
WIPS	0.3385 (-0.56)	0. 0135 (0.08)
FGIS	1.5133*** (2.62)	0. 1085 (-0.65)
INVS	-0.4245** (-2.45)	-0.0285 (-0.62)
_cons	2.3526** (1.99)	0. 6937** (2.14)
Post Estimation Diagnostics		
Hansen J test	6.1058 ** (0.0135)	29.674*** (0.0000)
Wald test	42.19*** (0.0000)	10.99* (0.0886)

KEY

Statistical significance

P-Value<0.01	***
P-Value<0.05	**
P-Value<0.1	*

EBITS-Earning Before Profit and Taxes scaled by sales, ROA-Return on assets, RMIS- raw materials inventory scaled by sales, WIPS- work in progress inventory scaled by sales, FGIS- finished goods inventory scaled by sales, INVS- total inventory for entity scaled by sales and SGR- sales growth ratio

Table 21 depicts the results from the one step system GMM model for the long run specification of models 3.14 and 3.16. For EBITS model, the Hansen J statistic is 6.2358 with a commensurate p-value less than 0.05. Further, the Hansen J statistic for ROA model is 29.674 with a commensurate p-value less than 0.01, 0.05 and 0.1. We consequently reject the null hypothesis on the validity of the over identifying restrictions. However, this was corrected by running no log model and thus a robust model. Consequently, we observe that the null hypothesis of the validity of the over identifying restrictions for the instruments is not rejected at five and ten percent level of significance. Thus, from the preliminary analysis we conclude that the instruments adopted in the model are valid and will result in estimates which are consistent and precise.

Focusing on the results generated from post estimation specification tests and relevant theory, only the fixed effects model and the GMM model results were analysed as shown in the Table 22 below:

Table 22

Relationship between Inventory Management and the Financial Performance

Variables	**Fixed Effects**		**GMM**	
	EBITS	**ROA**	**EBITS**	**ROA**
$EBITS_{t-1}$	-	-	-0.1488*	-
			(-1.88)	
ROA_{t-1}	-	-	-	-0.2519*
				(1.67)
Lnassets	-0.0382	-0. 0641***	-0. 0538	-0. 0531
	(-0.52)	(-3.10)	(-0.44)	(-1.60)
RMIS	-0.1432*	-0.0030	-0.3095***	-0.0079
	(-1.94)	(0.14)	(-2.75)	(-0.26)
WIPS	-0.3376	-0.2389**	-0.3385	0.0135
	(-0.92)	(-2.32)	(-0.56)	(0.08)
FGIS	0.9575**	0.1137	1.5133***	0.1085
	(2.51)	(1.07)	(2.62)	(-0.65)
INVS	-0.2938**	-0.0378	-0.4245**	-0.0285
	(-2.50)	(-1.15)	(-2.45)	(-0.62)
_cons	1.5628**	0.5090***	2.3526**	0. 6937**
	(2.14)	(3.89)	(1.99)	(2.14)
Rho	0.8304	0. 8144	-	-
Hansen's J chi2(1)	-	-	6.1058 **	29.674***
			(0.0135)	(0.0000)
F test	5.06***	3.73***	-	-
	(0.0002)	(0.0030)		
Wald test	-	-	42.19***	10.99*
			(0.000)	(0.0886)
Hausman Test	15.12	21.51	-	-
	(.0099)	(0.0006)		

Key: Standard errors in parentheses

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

EBITS-Earning Before Profit and Taxes scaled by sales, ROA-Return on assets, RMIS-raw materials inventory scaled by sales, WIPS- work in progress inventory scaled by sales, FGIS- finished goods inventory scaled by sales and INVS- total inventory for entity scaled by sales.

Table 22 indicates that the coefficients signage can adequately explain the relationship in the long run. The magnitude of the coefficients is largely as expected for the long run model. Focusing on the results generated from post estimation specification tests and relevant theory, only the fixed effects model and the GMM model results were analysed in the long run. The results show a strong correlation between total inventory and its constituent components and the financial performance of the firm. Under the fixed effect model, raw materials inventory has a statistically significant effect on the financial performance of manufacturing companies. The same can be observed for finished goods inventory implying that the lower the inventory held by a firm, the better the financial performance both under the EBITS and ROA models. Work in progress inventory has a negative but non-significant effect on the financial performance (Ali, et al., 2013). Total inventory has a negative and a statistically significant effect on the financial performance of manufacturing firms. The lagged measures for financial performance ($EBITS_{t-1}$ and ROA_{t-1}) are relatively high and negative as expected. Even after relaxing the assumption of past performance influencing current performance the coefficients do not significantly

change showing consistency in the measures. These results can be explained through the observations made during the research whereby companies were holding significant volumes of stock and hence higher holding and ordering costs. Equally, based on the nature of their operations and also what may be construed as an informal approach of managing commodity risk this can justify the large volumes of stock held by these manufacturing companies.

Raw materials inventory related to EBITS in the long run has a statistically significant coefficient. The coefficient varies considerably from zero at ten percent level of significance. The premise that the raw materials inventory does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected. The size of the generated coefficient indicate that a one unit increase in the raw materials inventory reduces EBITS by the same number of unit in the long run if any other related conditions are held constant. Under the GMM model, the coefficient is significant at one percent level of significance further affirming the consistency of the measures. The results agree with Shardeo (2015) that an ineffective inventory management system has a negative impact on operational costs such ordering and holding costs and these costs eventually negatively impact on the financial performance of the entity. Shen (2014) however ascertained that there is a strong relationship between key ratios such as inventory days and earnings before interest and tax (EBIT) to sales ratio, gross profit to sale ratio, and return on total assets (ROA). Ondiek and Odera (2012) found that the bulk of the manufacturing firms in Kenya do not give materials management high prominence despite spending an average of 56% of their total turnover on materials and other related costs. 64% companies were found to be engaging in material management practices even though majority of them did it unknowingly and

some of the key functions such as procurement were carried out by non-professionals and this can explain the adverse effect of inventory on the financial performance of manufacturing companies.

Raw materials inventory related to ROA in the long run presented a coefficient which is not significant at one level of significance. The supposition that raw materials inventory does not have a significant relation with the financial performance of manufacturing companies measured as ROA is not rejected at one percent level of significance. Under the GMM model similar results were generated confirming the consistency of the measures. The results are contrary with those of Mohamad, et al., (2016) that there is a significant negative relationship between the key ratio, return on assets (ROA) and inventory. Folinas and Shen (2014) established a strong relationship between inventory and earnings before interest and tax to sales ratio, gross profit to sale ratio, and return on total assets.

The relationship between work in progress inventory and EBITS is negative but statistically insignificant. Consequently, we observe that the coefficient is insignificantly different from zero at one percent level of significance. The premise that work in progress inventory does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected. Under the GMM model, the relationship between the two variables is still insignificant implying consistence in the estimates. Capkun, et al., (2009): Eroglu & Hofer (2011): Obermaier & Donhauser (2009) came to the conclusion that the relationship between inventory and financial performance will vary depending on the business entity life cycle phase. The researchers' advance that the relationship between inventory to sales ratio and an entity financial performance is

negative in the preliminary growth phase and the maturity phase, however it is positive in the brisk growth phase and the revitalization phase.

The relationship between work in progress inventory and ROA is negative but statistically significant. Consequently, we observe that the coefficient is significantly different from zero at one percent level of significance. The proposition that works in progress inventory does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected at five and ten percent level of significance. Contrary, under the GMM model the results obtained differ with those of the fixed effect model leading to the conclusion that there exists a bidirectional relationship between inventory and the financial performance of an entity. The results are in line with Shin, et al., (2015) who advanced the logical assumption that there is an inverse relationship between optimal inventory and profitability. They came to the conclusion that an entity will perform better financially when it maintains a lower inventory to sales ratio. The researchers also came to the conclusion that efficient inventory management was more beneficial to small entities compared to medium and large entities. Shardeo (2015) argue that the hidden costs associated with holding inventory end up eating into the profits and therefore the need to maintain optimal amounts of inventory.

Finished goods inventory related to EBITS in the long run indicated a statistically significant coefficient. Therefore, we observe that the coefficient differs significantly from zero at five and ten percent level of significance. The suggestion that the finished goods inventory does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at five and ten percent level of significance. The size of the generated coefficient indicates that a one unit increase in

the finished goods inventory increases EBITS by the same number of units in the long run if any other related conditions are held constant. Using the GMM model for robustness check, the results show that when you factor in the past performance, an increase in finished goods inventory will result in a decrease in the financial performance. According to Ali, et al., (2013) there exists a negative relationship between finished goods inventory and the financial performance when measured using operating profit margin which is in line with the findings of this study.

Finished goods inventory related to ROA in the long run presented a statistically insignificant coefficient. Therefore, we observe that the coefficient does not differ significantly from zero at one percent level of significance. The proposition that finished goods inventory does not have a significant relation with the financial performance of manufacturing companies measured as ROA is not rejected at one percent level of significance. Similar results are generated under the GMM model indicating that even when past performance has been factored, the effect of finished goods inventory is the same on the financial performance. This is contrary to the results of study by Ondimu, et al., (2018) who came to the conclusion that there exists a negative relationship between the inventory held by manufacturing entities listed in the Nairobi securities exchange in Kenya per annum and the financial performance when measured using ROA. This may be accredited to the high levels of inventory that the researcher observed being held by manufacturing companies and also due to the low cost nature of inventory held by these manufacturing companies most of which are in the consumer goods industry. Indeed as Capkun, et al., (2009) alluded, manufacturing companies in the consumer goods industries hold levels of stocks which are low cost in nature and may not have a significant effect on the financial performance of the entity.

Total inventory for entity related to EBITS in the long run has a negative and a statistically significant coefficient. Consequently, we observe that the coefficient is significantly different from zero at five and ten percent level of significance. The supposition that the total inventory for entity does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at five and ten percent level of significance. Under the GMM model, the relationship between total inventory and the financial performance is significant at five and ten levels of significance implying that past performance has an effect on the current performance. This partly concurs with the results of Cannon (2008) who concluded that there was little or no relationship that can be discerned between superior inventory management and the financial performance of manufacturing entities.

Total inventory for entity related to ROA in the long run presented a coefficient of negative and statistically insignificant relationship. Consequently, we observe that the coefficient is insignificantly different from zero at one percent level of significance. The premise that total inventory for entity does not have a significant relation with the financial performance of manufacturing companies measured as ROA is not rejected. Under the GMM model, similar results were generated implying that even when past performance is factored in to the model, the effect of total inventory on the financial performance is insignificant.

For EBITS model, the long run coefficient of Lnassets is negative with a p-value which is insignificant at one percent level of significance. Therefore, we observe that the coefficient does not differs significantly from zero at one percent level of significance.

Therefore, the supposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. The size of the generated coefficient is -0.0382 indicating that a one unit increase in the Lnassets ratio decreases EBITS by -0.0382 units in the long run if any other related conditions are held constant. Equally, when you factor in the past performance in form of lags for EBITS and ROA, we observe that the influence of Lnassets still remains negative under the GMM model. The findings are in line with those of Olaniyi, et al., (2017) who came to the conclusion that a bidirectional relationship subsists between a business entity performance and its size as constant profitability will lead to the expansion of a firm through acquisition of more assets to aid in operations.

For ROA model, the long run coefficient of Lnassets is negative with a p-value significant at one percent level of significance. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. Therefore, the proposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected at one percent level of significance. The size of the generated coefficient is -0.0641 indicating that a one unit increase in the Lnassets ratio decreases ROA by -0.0641 units in the long run if any other related conditions are held constant. Under the GMM model, the impact of Lnassets is negative but insignificant which concurs with Capkun, et al., (2009) argument that while its prudent to control for the size, the researcher should not be so much concerned about the sign or the significance of the coefficient as size will largely depend on business cycle, the industry a firm is operating in and the financial performance measures used in the analysis.

In summary, the results provided under Table 22 point to bidirectional relationships between a business entity performance and the various constituent components of inventory and this is be influenced by the nature of manufacturing a firm is engaged in, manufacturing strategies adopted and the levels of inventories held by the entities. From the results we see that past performance of the entity has a significant influence on the current performance to the extent that it can affect the signage of the coefficients and the expectations. From the study results, we therefore reject the null hypothesis that inventory management does not have a significant relation with the financial performance of manufacturing companies in Kenya in favour of the alternative hypothesis that inventory management influence the financial performance of manufacturing companies in Kenya.

4.4.4 Relationship between Commodities Pricing and the Financial Performance

The third objective was to examine the relationship between commodities pricing and the financial performance of manufacturing companies in Kenya. To test the third hypothesis that commodities pricing does not have a significant relation with the financial performance of manufacturing companies in Kenya, the long run model was estimated. The fixed and random effect models were estimated to establish the appropriate model. The Hausman results showed that random effect model was appropriate for both EBITS and ROA because the p value generated were greater than 0.05. The results are presented in Table 23.

Table 23

Commodities Pricing Random Effects Estimates

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
Lnassets	-0.0217	-0.0219***
	(-0.58)	(-3.11)
SGR	0.1878***	0.0458***
	(3.66)	(3.38)
Tax paid	0.00012***	0.00009***
	(2.86)	(8.44)
_cons	0. 0658	0.2137***
	(0.22)	(3.90)
Post Estimation Diagnostics		
Rho	0.8211	0.6138
Wald test chi2(3)	23.90***	88.89***
	(0.000)	(0.000)
Lm test Chibar2	258.29***	333.32***
	(0.000)	(0.000)
Hausman Test	0.86	26.46
	(0.8359)	(0.956)

KEY

Statistical significance

P-Value<0.01	***
P-Value<0.05	**
P-Value<0.1	*

The random effect results in Table 23 are used to estimate models 3.18 and 3.20. The results shows that natural log of assets, sales growth ratio and tax paid within a given financial period are jointly significant in elucidating the disparity in EBITS since the

Wald statistic is statistically significant at one percent level of significance. When the same variables were measured to predict ROA as the dependent variable, it was established that the total assets, sales growth ratio and tax paid within a given financial period are jointly significant in elucidating the disparity in ROA since the Wald statistic is equally statistically significant one percent level of significance.

While measuring the performance of manufacturing companies using EBITS, the LM test statistic is 258.99 and it is significantly higher than the expected critical value at one percent level of significance. Consequently, we reject the null hypothesis on the non-heterogeneity of the cross sections at one percent level of significance. As a result, we adopt the random effect model instead of the pooled OLS model. Using ROA as the measure of performance for manufacturing firms, the LM test statistic is 333.64 and it is significantly higher than the expected critical value at 1%, 5% and 10% level of significance. Consequently, we reject the null hypothesis on the non-heterogeneity of the cross sections at 1%, 5% and 10% level of significance. As a result, we adopt the random effect model instead of the pooled OLS model.

For EBITS model, the Hausman statistics has a chi statistic of 0.86 and an attendant p value of 0.8359. We thus do not reject the null hypothesis on the regressors being exclusively exogenous. Equally, the condition of individual heterogeneity is not rejected at one percent level of significance. Thus the random effect specification is preferred over fixed effects model. As a result, the study will focus on interpreting the random effects model under the long run specification... Further, for ROA, the chi test statistics is 26.46 and an attendant p value of 0.956. We thus do not reject the null hypothesis on the regressors being exclusively exogenous. Equally, the condition of individual

heterogeneity is not rejected at one percent level of significance. Thus the random effect specification is preferred over fixed effects model. As a result, the study will focus on interpreting the random effects model under the long run specification. As a check for the robustness of model and the consistency of the estimates in the dynamic model specification, we use one step system GMM. The model results are tabulated in Table 24 below.

Table 24

One Step System GMM Estimates for Commodities Pricing

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
$EBITS_{t-1}$	-0.0288 (-0.41)	-
ROA_{t-1}	-	0.2871*** (2.91)
Lnassets	-0.0256 (-0.23)	-0.0887*** (-4.04)
SGR	0.2109*** (3.52)	0.0511*** (3.67)
Tax paid	0.00009* (2.32)	0.00011*** (7.27)
_cons	0.1203 (0.17)	0.7195*** (4.07)
Post Estimation Diagnostics		
Hansen J test	5.1624** (0.0231)	31.8685*** (0.0000)
Wald statistic	17.76** (0.0014)	89.33*** (0.000)

KEY

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

Table 24 shows the one step system GMM estimates of models 3.19 and 3.21. The coefficient of the lagged EBITS is .7366 and is statistically significant at one percent level of significance. For EBITS, the Hansen J statistic is statistically significant. Further, the Hansen J statistic for ROA model is also statistically significant with a commensurate p-value less than 0.05. We accordingly reject the null hypothesis on the validity of the over identifying restrictions. However, this was corrected by running no log model. Consequently, the null hypothesis of the validity of the over identifying restrictions for the instruments is not rejected. Hence, the variables factored into the model are valid and will result in estimates which are consistent and accurate.

Table 25 below provides a summary of the findings in Tables 23 and **24** appropriate to test the third hypothesis in the long run. Table 23 indicates that the coefficients signage can adequately explain the relationship in the long run. The degree of the coefficients is analogous for the long run model as per the expectations. Focusing on the results generated from post estimation specification tests and relevant theory, only the random effects model and the GMM model results were analysed in the long run.

Table 25

Relationship between Commodities Pricing and the Financial Performance

	Random Effects		**GMM**	
Variables	**EBITS**	**ROA**	**EBITS**	**ROA**
$EBITS_{t-1}$	-	-	-0.0288 (-0.41)	-
ROA_{t-1}	-	-	-	0.2871*** (2.91)
Lnassets	-0.0217 (-0.58)	-0.0219*** (-3.11)	-0.0256 (-0.23)	-0.0887*** (-4.04)
SGR	0.1878*** (3.66)	0.0458*** (3.38)	0.2109*** (3.52)	0.0511*** (3.67)
Tax paid	0.00012*** (2.86)	0.00009*** (8.44)	0.00009* (2.32)	0.00011*** (7.27)
_cons	0.0658 (0.22)	0.2137*** (3.90)	0.1203 (0.17)	0.7195*** (4.07)
Rho	0.8211	0.6138	-	-
Hansen's J chi2(1)	-	-	5.1624** (0.0231)	31.8685*** (0.0000)
Wald statistic	23.90*** (0.000)	88.89*** (0.000)	17.76** (0.0014)	89.33*** (0.000)
Lm test Chibar2	258.29*** (0.000)	333.32*** (0.000)	-	-
Hausman test	0.86 (0.8359)	26.46 (0.956)	-	-

Key: Standard errors in parentheses

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

Table 25 shows that the variables Lnassets, sales growth ratio and tax paid both under the long run and the dynamic models influence the financial performance of Kenyan manufacturing firms. As Egbunike and Okerekeoti, (2018) argued, both micro and macro-economic factors will interact to influence the financial performance of business entities. Sales growth has a positive and significant influence on the financial performance which can be attributed to the positive correlation between growth in sales and the level of profitability of the firm. The signage of the coefficients is positive as expected and statistically significant at all levels of testing. Taxation has a positive effect on the financial performance of the manufacturing companies and this is attributable to the fact that tax policy feeds into the cost structure of a firm and ultimately determines the commodity prices set. This is contrary to Gatsi, et al., (2013) who established, there exists an inverse relationship between corporate tax paid and the financial performance of an entity because as both direct and indirect taxes increases, the level of financial performance will decline. The core argument is that taxation is dependent on the profitability and therefore the higher the profit made by a business entity, the more tax it has to pay. The lagged measures for financial performance (ROA_{t-1}) is relatively high and positive as expected. Even after relaxing the assumption of past performance influencing current performance the coefficients do not significantly change showing consistency in the measures.

Sales growth ratio modeled with EBITS in the long run is positive with a p-value significant at one percent level of significance. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. As a result, the

supposition that sales growth ratio does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected at one percent level of significance. The size of the generated coefficient is .1878 indicating that a one unit increase in the sales growth ratio improves EBITS by .1878 units in the long run if any other related conditions are held constant. Under the GMM model, the coefficient of sales growth ratio is .2109 and significant at one percent level of significance. The results agree with Odalo, et al., (2016) who established that there is a significant and positive relationship between sales growth and return on equity and return on assets. This can be attributed to the fact that the higher the sales made the greater the financial performance will be in the long run.

Sales growth ratio modeled with ROA in the long run presented a statistically significant coefficient. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. The proposition that sales growth ratio does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected. The size of the generated coefficient indicates that a one unit increase in sales growth ratio improves ROA by the same number of units in the long run if any other related conditions are held constant. . Even under the GMM model, equivalent results are attained confirming the consistency of the measures. Belke, et al., (2012) using a global co-integrated vector-autoregressive model established that there exists a positive long run correlation linking global liquidity and commodity prices and that the commodity prices adjust in a substantial manner to this co-integrating relation but the global liquidity does not adjust but steers the relationship. Toni, et al., (2016) assert that companies which pursue consumer value-based pricing tactics with attendant relatively high prices tend to yield higher returns their peers who focus on either competition based

pricing tactics or cost based pricing tactics. It therefore becomes evident that an increase in sales will result into a corresponding increase in the sales growth ratio. Due to these increases, the operational performance of the business entity will be enhanced resulting in more profits for the entity.

Tax paid within a given financial period modeled with EBITS in the long run indicated a positive and statistically significant coefficient. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. The premise that tax paid within a given financial period does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected. The size of the generated coefficient is positive and statistically significant indicating that a one unit increase in the tax paid within a given financial period increases EBITS by the same number of units in the long run if any other related conditions are held constant. This means that the manufacturing entities financial performance will increase in tandem with the increase in tax.

This argument is contrary to the results of Maina and Memba (2016) who evaluated the effect of the various components of tax such as corporate tax, value added tax, custom duty and capital gain tax on the financial performance of companies in Kenya. They established that the more tax a company pays, the lesser the financial performance. This is attributable to the fact that higher taxation tends to erode the gains made by a business entity financially. According to Eva Maria (2015) small manufacturing companies, which are a majority in Kenya, face significant price risks that may not necessarily affect large enterprises such as low resource base, poor economies of scale and are thus more prone to commodity risks. When this tough operating environment is coupled with heavy taxation

from the government, the ultimate results will be poor financial performance as they observed in the Kenyan situation.

Tax paid within a given financial period modeled with ROA in the long run presented a positive and statistically significant coefficient. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. The suggestion that tax paid within a given financial period does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected at one percent level of significance. The size of the generated coefficient indicates that a one unit increase in tax paid within a given financial period is matched by an increase in ROA by the same number of units in the long run if any other related conditions are held constant. . Even under the GMM model, equivalent results are attained confirming the consistency of the measures. The results contrast those of Gatsi, et al., (2013) that there is a significant negative relation between corporate income tax and financial performance of manufacturing companies in Ghana. The researchers argued that taxes have a severe effect on the capacity of manufacturing entities to retain earnings and be profitable in the long run.

For EBITS model, the long run coefficient of Lnassets is negative and statistically insignificant. Consequently, we observe that the coefficient is insignificantly different from zero at one percent level of significance. The supposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected. Even under the GMM model, equivalent results are attained confirming the consistency of the measures. For ROA model, the long run coefficient of Lnassets is negative and statistically significant at

one percent level of significance. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. The premise that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected. The size of the generated coefficient indicates that a one unit increase in the Lnassets ratio reduces ROA by the same number of units in the long run if any other related conditions are held constant. Malik (2011) established that firm size has a mixed or no influence on the financial performance which may be attributable to the level and type of assets held by a business entity.

In summary, the signage of the coefficients was as expected as sales growth ratio had a positive relationship with the financial performance. The expectation is that when sales increase they will result in higher profits and hence better financial performance. Equally, taxation tends to withdraw funds from the business and in those instances where companies are subjected to heavy taxation: it will result in poor financial performance. However given that the researcher only considered corporate tax which is levied on the profits made, a positive relationship between tax paid and financial performance was observed. The level of assets held by a business entity will have a negative effect on the financial performance depending on the type and level of assets held by a business entity. Manufacturing entities should thus aim at engaging in robust tax planning to ensure that they do not erode the financial gains made. Equally, manufacturing companies should aim at increasing the sales in order to have superior financial performance. From the study results, we therefore reject the null hypothesis that commodities pricing does not have a significant relation with the financial performance of manufacturing companies in Kenya

in favour of the alternative hypothesis that commodity pricing influence the financial performance of manufacturing companies in Kenya.

4.4.5 Relationship between Corporate Diversification and the Financial Performance

The fourth objective was to determine the relationship between corporate diversification and the financial performance of manufacturing companies in Kenya. To test the fourth hypothesis that corporate diversification does not have a significant relation with the financial performance of manufacturing companies in Kenya, the long run model was estimated. The fixed and random effect models were estimated to establish the appropriate model. The Hausman results showed that random effect model was appropriate for EBITS model because the p value was greater than 0.05 while the fixed effect model was used for the ROA model because the p value was less than 0.05. The results are presented in Table 26.

Table 26

Corporate Diversification Random and Fixed Effects Estimates

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
Lnassets	0.0041	-0.0573***
	(0.11)	(-3.71)
Div	-0.0248	-0.0780
	(-0.15)	(-1.59)
Leverage	-0.0460	-0.0842**
	(-0.40)	(-2.05)
SGR	0.2018***	0.0576***
	(3.88)	(3.99)
_cons	-0.0526	0.6389***
	(-0.15)	(4.77)
Post Estimation Diagnostics		
Rho	0.8063	0.7753
Wald test chi2(3)	15.31***	-
	(0.0041)	
F test	-	8.55***
		(0.000)
Lm test Chibar2	229.30***	-
	(0.000)	
Hausman Test	6.25	19.29
	(0.1812)	(0.0007)

KEY

Statistical significance

P-Value<0.01	***
P-Value<0.05	**
P-Value<0.1	*

The random effect results in Table 26 shows the estimates of models 3.24 and 3.26. For the EBITS model, the Wald statistic is 15.31 and it is significantly higher than the expected critical value at one percent level of significance. Hence, the variables natural log of assets, diversification, leverage and sales growth ratio are jointly significant in elucidating the disparity in EBITS under the random effects model. The F statistic was measured to predict ROA as the dependent variable, it was established that the F statistic was 8.55 and it is significantly higher than the expected critical value at one percent level of significance. Hence, the model variables natural log of assets, diversification, leverage and sales growth ratio are jointly significant in elucidating the disparity in ROA under the fixed effects model.

While measuring the performance of manufacturing companies using EBITS, the LM test statistic is 229.30 and it is significantly higher than the expected critical value at one percent level of significance. Consequently, we reject the null hypothesis on the non-heterogeneity of the cross sections at 1%, 5% and 10% level of significance. As a result, we adopt the random effect model instead of the pooled OLS model. Using ROA as the measure of performance for manufacturing firms, the F test statistic is 8.55 and it is significantly higher than the expected critical value at one percent level of significance. Consequently, we reject the null hypothesis on the non-heterogeneity of the cross sections at one percent level of significance. As a result, we adopt the fixed effect model instead of the pooled OLS model. As a check for the robustness of model and the consistency of the estimates, the dynamic model specification one step system GMM is used. The model results are shown in Table 27.

Table 27

One Step System GMM Estimates for Corporate Diversification

Variable	**EBITS**	**ROA**
Explanatory Variable	**Coefficient.**	**Coefficient.**
$EBITS_{t-1}$	-0.2709 (-0.39)	-
ROA_{t-1}	-	0.3222*** (2.96)
Lnassets	0.0278 (0.29)	-0.0608** (-2.53)
Div	0.2215 (0.85)	0.0615 (-0.94)
Leverage	-0.0001 (0.00)	-0.1933*** (-3.46)
SGR	0.2166*** (3.60)	0.0594*** (3.95)
_cons	-0.3902 (-0.46)	0.6878*** (3.25)
Post Estimation Diagnostics		
Hansen J test	30.1331 (0.6930)	28.6772 (0.7934)
Wald test	16.57 (0.0054)	43.44 (0.000)

KEY

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

Table 27 shows the one step system GMM estimates of models 3.25 and 3.27. For EBITS, the Hansen J statistic is 30.133 is statistically significant at five and ten percent level of

significance. Further, the Hansen J statistic for ROA model is not statistically significant at one percent level of significance. We consequently do not reject the null hypothesis on the validity of the over identifying restrictions. Thus, from the preliminary analysis we conclude that the instruments adopted in the model are valid and will result in estimates which are consistent and precise.

The findings in Table 26 through to 27 are summarized in Table 28. The table indicates that the coefficients signage can adequately explain the relationship in the long run. The magnitude of the coefficients is comparable for the long run model. Focusing on the results generated from post estimation specification tests and relevant theory, only the random effects model and the GMM model results were analysed in the long run.

Table 28

Relationship between Corporate Diversification and the Financial Performance

	Random Effects		GMM	
Variables	**EBITS**	**ROA**	**EBITS**	**ROA**
$EBITS_{t-1}$	-	-	-0.2709 (-0.39)	-
ROA_{t-1}	-	-	-	0.3222*** (2.96)
Lnassets	0.0041 (0.11)	-0.0573*** (-3.71)	0.0278 (0.29)	-0.0609** (-2.53)
Div	-0.0248 (-0.15)	-0.0780 (-1.59)	0.2215 (0.85)	-0.0615 (-0.94)
Leverage	-0.0460 (-0.40)	-0.0842** (-2.05)	-0.0001 (0.00)	-0.1933*** (-3.46)
SGR	0.2018*** (3.88)	0.0576*** (3.99)	0.2166*** (3.60)	0.0594*** (3.95)
_cons	-0.0526 (-0.15)	0.6389*** (4.77)	-0.3902 (-0.46)	0.6878*** (3.25)
Rho	0.8063	0.7753	-	-
F test	-	8.55*** (0.000)	-	-
Lm test Chibar2	229.30*** (0.000)	-	-	-
Hansen's J chi2(1)	-	-	30.1331 (0.6930)	28.6772 (0.7934)
Wald test chi2(3)	15.31*** (0.0041)	-	16.57*** (0.0054)	43.44*** (0.000)
Hausman test	6.25 (0.1812)	19.29 (0.0007)	-	-

Key: Standard errors in parentheses

Statistical significance

P-Value<0.01 ***

P-Value<0.05 **

P-Value<0.1 *

Corporate diversification modeled with EBITS in the long run indicated a negative and statistically insignificant coefficient at one percent level of significance. Therefore, we observe that the coefficient does not differs significantly from zero at one percent level of significance. The supposition that corporate diversification level of firm does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. Under the GMM model, equivalent results are obtained implying that diversification strategy is not critical when enhancing financial performance. The results are divergent with those of Boz, et al., (2013) that diversification has a positive impact on organizational performance owing to economies of scale and scope, market power, reduction of risks and learning curve effects. The results are also in contrast with Kusumaningtyas and Yendrawati (2015) that diversification has a positive outcome on earnings management. Ravichandran and Bhaduri (2015) argues that diversification is a profitable strategy when implemented wisely as related diversification increases productivity while unrelated productivity affects performance negatively.

Corporate diversification level of firm modeled with ROA in the long run presented a negative and statistically insignificant coefficient at one percent level of significance. Therefore, we observe that the coefficient do not differs significantly from zero at one percent level of significance. The premise that corporate diversification does not have a

significant relation with the financial performance of manufacturing companies measured as ROA is not rejected at one percent level of significance. For the GMM model equivalent results can be observed further reinforcing the fact that diversification as a strategy for enhancing financial performance may not result in superior financial performance. Yigit and Tur (2012) using the Herfindahl index advance that organizational performance tends to increase up to the average diversification but declines after as the costs outweigh the benefits and as such, a delicate balance should be maintained.. Kahloul and Hallara (2010) adopted a similar argument when they evaluated the impact of diversification on an entity performance with the postulate that it's important to use a series of measures to ensure coherence of analysis. They came to the conclusion that when performance is constrained, companies tend to refocus their strategy and diversify less. Benefits of diversification tend to vary depending on the stage at which an entity is at. As Ficici, et al., (2014) argue the initial stage when an entity is diversifying into foreign markets: the costs incurred tend to outweigh the benefits accrued from diversification leading to poor financial performance. As the entity settles in the market and expands, it's able to enjoy economies of scale and scope, risk diversification and exploration of available opportunities. However if an entity over diversifies this will have a negative effect on the profitability of the entity due to cost outweighing the benefits of diversification.

Sales growth ratio modeled with EBITS in the long run indicates a positive and statistically significant coefficient. The proposition that sales growth ratio does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is rejected. The size of the generated coefficient indicates that a one unit increase in the sales growth ratio improves EBITS by the same number of units in the

long run if any other related conditions are held constant. Equivalent results are generated under the GMM model implying that irrespective of the model used, the quality of the results remains the same. The results are in agreement with Ghorbani (2013) that diversification increases profitability through increased sales resulting from new markets and products. According to Lien and Li (2013) diversification can be used as an effective strategy when responding to imperfections within an entity.

Sales growth ratio modeled with ROA in the long run presented a coefficient which is positive and statistically significant. Therefore, we observe that the coefficient differs significantly from zero at one percent level of significance. The proposition that sales growth ratio does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected. The size of the generated coefficient indicates that a one unit increase in sales growth ratio improves ROA by equal number of units in the long run if any other related conditions are held constant. The GMM model provides similar results thereby validating the results generated under the long run model. Indeed, Mehmood, et al., (2019) provides a nexus between corporate diversification and the financing structure where they elucidate that measured diversification will result to better financial performance compared to excessive diversification which results into a worse performance due to the diversification penalty. Manufacturing firms should thus maintain a healthy mix of debt and equity financing as this when combined with diversification leads to better financial performance.

The relationship between leverage and EBITS in the long run is negative but statistically insignificant. The supposition that leverage does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected.

The robustness check under the GMM model generates the same results implying that the level of debt held in a firm does not influence the profits generated in a significant way in this model. Leverage modeled with ROA in the long run presented a coefficient which is negative and significant at five and ten percent level of significance. The assumption that leverage does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected. The size of the generated coefficient indicates that a one unit increase in leverage decreases ROA by the same units in the long run if any other related conditions are held constant. The results are in agreement with Bouras, et al., (2014) postulate that leverage among other factors like firm size and market share cannot be ignored when evaluating the financial performance of a firm. They argue that diversification has a positive and significant effect on the financial performance while leverage can have bi directional effect on the financial performance but it is one of key variable that impact on the financial performance of an entity. Managers' make significant financing and leverage decisions which in turn determine the return expected by the shareholders and the level of risk exposure. Understanding firm's leverage helps the manufacturing firm to determine a business' financial solvency and its dependency upon its borrowings.

Lnassets when modeled with EBITS in the long run indicated a positive but statistically insignificant coefficient at one percent level of significance. Consequently, we observe that the coefficient is insignificantly different from zero at one percent level of significance. The supposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured using EBITS is not rejected at one percent level of significance. For ROA model, the long run coefficient of Lnassets is negative and statistically significant one percent level of

significance. Consequently, we observe that the coefficient is significantly different from zero at one percent level of significance. The proposition that the natural log of assets does not have a significant relation with the financial performance of manufacturing companies measured as ROA is rejected at one percent level of significance. Malik (2011) established that firm size has a mixed or no influence on the financial performance which may be attributable to the level and type of assets held by a business entity

In summary from the results we observe that corporate diversification has a negative but insignificant relationship with the financial performance of manufacturing companies in Kenya and thus it may not be a useful strategy that manufacturing firms can pursue in order to enhance their financial performance. Leverage tends to have negative and significant effect on the return on assets largely because the finance costs are eating into the revenue generated by the manufacturing companies. Sales growth ratio as expected has a positive and significant impact on the financial performance given that high sales amount to higher profits and hence better financial performance. Overall the null hypothesis that corporate diversification does not have a significant relation with the financial performance of manufacturing companies in Kenya is not rejected.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Under this chapter, the researcher presents a synopsis of the key findings of the study, relevant discussions are articulated and the appropriated recommendations made. The scope of the study covered all the manufacturing companies operating within the Kenyan environment as listed by Kenya Association of Manufacturers totaling to five hundred and two companies. The synopsis is in tandem with the study objectives and the attendant hypotheses of the study. In the chapter, areas of further study are also included based on the findings of the study.

5.2 Summary of the Findings

The study focused on commodity risk management tactics and the financial performance of manufacturing companies in Kenya and was premised on the argument that manufacturing companies are large consumers of commodities and are thus exposed to significant commodity risks. Therefore such business entities should be using appropriate risk management tactics to ensure their operations are not adversely affected by exposure to such risks. The study focused on four variables namely commodity revenue volatility, inventory management tactics, pricing tactics and corporate diversification tactics. From the literature reviewed in chapter two, we get mixed results on the effect of commodity risk management on the financial performance of manufacturing companies. The literature reviewed exposed existing knowledge gaps in the area of commodity risk management with a narrow and disjointed approach being largely adopted by different researchers. Past research papers have addressed individual components of risk management and thus lack a holistic approach to studying risk management in

manufacturing entities. A gap therefore exists as from the literature reviewed: no past research has generated a model that combines revenue volatility, management of inventory, pricing of commodities and the level of diversification to evaluate the financial performance of manufacturing entities in Kenya. This study therefore fills the existing knowledge gaps by conducting a comprehensive study on the relationship between the four variables above and financial performance of manufacturing companies.

The four study hypotheses were tested through robust and appropriate approaches and key specification tests were carried out to ensure accuracy in the analysis. The researcher presents the results based on the best practices in research. A descriptive analysis of the results focusing on the key characteristics of the data such as the mean, the standard deviation, skewness and kurtosis is done and the results show that the data is normally distributed. Through correlation analysis, it is evident that multicollinearity does not exist between different variables as they have values less than 0.8 implying that all the variables can be included in the study.

To enhance the robustness of the study, the researcher adopted two key measures of financial performance namely, earnings before interest and tax scaled by sales (EBITS) and the return on assets (ROA). EBITS is considered to be a superior measure when measuring the internal `efficiency of a business entity in controlling different expenses such as cost of sales expenses and the operating expenses. ROA is equally considered to be an adequate measure for both internal and external users of financial information when evaluating the financial performance of a business entity. To further enhance the robustness of the model, the researcher used both long run and dynamic models. For the long run model, the researcher made the assumption that past performance did not have a

relationship with the current performance while under the dynamic model a lag was introduced with the assumption was that past performance had a relationship with the current performance. The results from the two models were compared and analyzed appropriately.

5.3 Conclusion

The researcher presents the findings under both the general and specific objectives of the study. The conclusion focuses on the observed relationship between a given variable and the financial performance of manufacturing companies in Kenya.

5.3.1 Commodity Risk Management and the Financial Performance of Manufacturing Companies in Kenya

The study sought to find out whether all the variables RMIS, WIPS, FGIS, INVS, sales growth ratio, tax paid, corporate diversification, leverage and revenue volatility in manufacturing companies in Kenya affects the financial performance of such entities. The null hypothesis was that commodity risk management does not have a significant relationship with the financial performance of manufacturing companies in Kenya while the alternative hypothesis was that commodity risk management does have a significant relationship with the financial performance of manufacturing companies in Kenya. The study findings as presented in chapter four indicate significant relationships among the variables under study and the financial performance of manufacturing entities in Kenya. Thus the null hypothesis that commodity risk management does not have a significant relation with the financial performance of manufacturing companies in Kenya was rejected in favour of the alternative hypothesis.

From the results obtained, it is evident that inventory management tactics have minimal relationship with the financial performance of manufacturing entities in Kenya. In contrast, commodity pricing tactics have significant relationship with the financial performance of manufacturing entities both under the fixed effect and the GMM models. Corporate diversification tactics does not have a significant relationship with the financial performance when measured using EBITS but it is significant when measured using ROA while for revenue volatility the relationship is not significant across all models. This implies that if manufacturing companies in Kenya are to effectively control and manage commodity risk, they should focus on optimal pricing of commodities and diversify into areas and products that add value to the company. The end results will be enhanced financial performance in the manufacturing companies.

5.3.2 Revenue Volatility and the Financial Performance of Manufacturing Companies

In the first objective, the study sought to find out whether revenue volatility in manufacturing companies in Kenya had a relationship with the financial performance of such entities. The null hypothesis was that revenue volatility does not have a significant relation with the financial performance of manufacturing companies in Kenya while the alternative hypothesis is that revenue volatility does have a significant relation with the financial performance of manufacturing companies in Kenya. The study findings as presented in chapter 4 indicate that the natural log of assets, revenue volatility, and leverage affect the financial performance of manufacturing entities in Kenya. With reference to the key variable revenue volatility, we observe negative and significant relationship with both measures of financial performance for both models. Thus the null hypothesis that revenue volatility does not have a significant relation with the financial

performance of manufacturing companies in Kenya is rejected in favour of the alternative hypothesis.

For EBITS model, Lnassets coefficient is negative and statistically insignificant at one percent under the random effects model while under the GMM model the coefficient is negative and statistically insignificant at one percent level of significance implying that the size of a manufacturing entity has a no significant relation with its financial performance. Under the ROA model, the Lnassets has a coefficient which is negative and insignificant at one percent while under the GMM model, Lnassets has a negative and significant relationship with ROA at five and ten percent level of significance.

The effect of leverage on financial performance is observed to be negative but insignificant under the EBITS model implying that leverage has no significant relationship on EBITS. Under the ROA model, we observe negative and significant relationship between leverage and ROA.

The conclusion arrived is that the relationship between revenue volatility and financial performance is significant and negative under both models signifying that there is an inverse relationship between commodity risk and the financial performance of manufacturing entities in Kenya.

5.3.3 Inventory Management and the Financial Performance of Manufacturing Companies

In the second objective, the study sought to find out whether inventory management tactics adopted by manufacturing companies in Kenya have a relationship with the

financial performance of such entities. The null hypothesis was that inventory management does not have a significant relation with the financial performance of manufacturing companies in Kenya while the alternative hypothesis is that inventory management does have a significant relation with the financial performance of manufacturing companies in Kenya. The study findings as presented in chapter 4 indicate that the natural log of assets, raw materials inventory (RMI), work in progress inventory (WIP), finished goods inventory (FGI) and total inventory for entity (INV) have a bidirectional relationship with the financial performance of manufacturing entities in Kenya. Thus the null hypothesis that inventory management does not have a significant relation with the financial performance of manufacturing companies in Kenya is rejected in favour of the alternative hypothesis.

For EBITS model, Lnassets coefficient is negative and statistically insignificant at one percent under the fixed effects model while under the GMM model the coefficient is negative and statistically insignificant at one percent level of significance implying that the size of a manufacturing entity has no significant relationship with its financial performance. Under the ROA model, the Lnassets has a coefficient which is negative and significant at one percent while under the GMM model, Lnassets has a negative and insignificant effect on the ROA at one percent. For the EBITS model the effect of RMIS is negative and significant under both fixed and GMM models signifying an inverse relationship between RMIS and financial performance. Under the ROA model the relationship between RMIS and financial performance is insignificant and negative both for the fixed and GMM models pointing to a bidirectional relationship between RMIS and financial performance. Under the WIPS except for the ROA fixed effect model whose

values are negative and significant at five and ten percent, in all the other models under WIPS were found to have insignificant relationship with the financial performance.

The FGIS has a different relationship with the financial performance of manufacturing entities whereby we observe a positive and significant relationship under the EBITS model both for the fixed and GMM models. INVS which is a composite of different inventory types largely alludes to a negative and significant relationship between this component of inventory and the financial performance of manufacturing entities when evaluated under the EBITS model while the results are negative and insignificant under the ROA model. Such results were attributed to high levels of inventory that the researcher observed were being held by manufacturing companies and also due to the low cost nature of inventory held by these manufacturing companies most of which are in the consumer goods industry.

5.3.4 Commodities Pricing and the Financial Performance of Manufacturing Companies

In the third objective, the study sought to find out whether commodity pricing tactics adopted by manufacturing companies in Kenya have a significant relationship with the financial performance of such entities. The null hypothesis was that commodity pricing does not have a significant relation with the financial performance of manufacturing companies in Kenya while the alternative hypothesis is that commodity pricing does have a significant relation with the financial performance of manufacturing companies in Kenya. The study findings as presented in chapter 4 indicate that the natural log of assets, sales growth ratio and tax paid have a significant relationship with the financial performance of manufacturing entities in Kenya. Thus the null hypothesis that commodity

pricing does not have a significant relation with the financial performance of manufacturing companies in Kenya is rejected in favour of the alternative hypothesis.

The Lnassets coefficient is negative and statistically significant at one percent only under the ROA random effects and GMM models while under all the other models the coefficients are negative but statistically insignificant implying that that firm size has an insignificant relationship with the financial performance which may be attributable to the level and type of assets held by a business entity. Sales growth ratio coefficients are positive and statistically significant at one percent level of significance under all the models which was attributed to the positive correlation between sales and the financial performance of a business entity as the higher the sales made the greater the financial performance will be in the long run. The coefficients under the tax paid are positive and statistically significant under all the models thereby vindicating the known fact that there exists a relationship between the taxes paid by a business entity and its financial performance. Higher levels of taxation will lead to subdued profits as tax policy feeds into the cost structure of a firm and ultimately determines the commodity prices set.

5.3.5 Corporate Diversification and the Financial Performance of Manufacturing Companies

In the fourth objective, the study sought to find out whether corporate diversification tactics adopted by manufacturing companies in Kenya have a significant relationship with the financial performance of such entities. The null hypothesis was that corporate diversification does not have a significant relation with the financial performance of manufacturing companies in Kenya while the alternative hypothesis is that corporate diversification does have a significant relation with the financial performance of

manufacturing companies in Kenya. The study findings as presented in chapter 4 indicate that the natural log of assets, leverage and sales growth ratio have a significant relationship with the financial performance of manufacturing entities in Kenya when measured using ROA while corporate diversification does not have any significant relationship with financial performance across all measures. Thus the null hypothesis that corporate diversification does not have a significant relation with the financial performance of manufacturing companies in Kenya is not rejected.

The Lnassets coefficient is negative and statistically insignificant at one percent level of significance under the ROA both for the random effect and GMM models. Equally under the EBITS model, the coefficient is positive but statistically insignificant at one percent level of significance and as earlier stated firm size has an insignificant relationship with the financial performance which may be attributable to the level and type of assets held by a business entity. Corporate diversification has a negative and insignificant coefficients for all the models implying that corporate diversification does not have a significant relationship with the financial performance of manufacturing companies.

Leverage has negative but statistically insignificant coefficients under the EBITS both for the random effect and GMM models' signifying that the level of debt in an entity is not prominent when evaluating the relationship between corporate diversification and the financial performance of manufacturing companies in Kenya. However under ROA we observe negative and significant relationship between leverage and financial performance both under the random effect and GMM models at five and ten percent levels of significance. This was attributed to leverage being bi directional on the financial performance and is one of the key variables that impact on the financial performance of a

firm. Managers' make significant financing and leverage decisions which in turn determine the return expected by the shareholders and the level of risk exposure. Sales growth ratio has coefficients which are positive and significant across all model types concurring with the supposition that diversification increases profitability through increased sales resulting from new markets and products so long as an entity has not over diversified.

5.4 Recommendations

The researcher after evaluating the results, he came with pertinent recommendations focusing on the area of study. Based on the objectives of the study, the researcher makes the following recommendations:

5.4.1 Commodity Risk Management

From the findings of the study, the researcher advocates for a measured approach to commodity risk management as the benefits may be positive or negative depending on the variable under consideration. Therefore manufacturing companies should carefully evaluate the need for managing the commodity risks before engaging in their full scale management.

5.4.2 Revenue Volatility

From the findings of the study, the researcher recommends that manufacturing entities should carefully select their assets so as to have a healthy assets mix as the research findings have proven that depending in the assets held by an entity, they can have either positive or negative effect on the financial performance of manufacturing entities. Revenue volatility has a negative relationship with the financial performance of manufacturing entities and thus should be closely monitored to ensure volatility in

revenue does not have an adverse effect on the financial performance. Equally, the level of debt incorporated into the capital structure of a business entity should be of concern as the findings from the study pointed to the fact that leverage has a significant relationship with the financial performance of manufacturing entities.

5.4.3 Inventory Management

Under this model the researcher observed the bi directional relationship between inventories and the financial performance and therefore recommends caution when choosing inventories to be held by a company. The different components of inventory have varying relationship with the financial performance of manufacturing companies with most significant effect being observed under RMIS and FGIS. The researcher consequently recommends that manufacturing entities should engage in prudent inventory management practices to reduce the holding, ordering and other material handling associated costs. The practices adopted should be informed by the type of materials used by an entity as it was found that low cost inventory has insignificant relationship with the financial performance of manufacturing companies.

5.4.4 Commodities Pricing

The research findings allude to significant positive relationship between financial performance of manufacturing entities and the sales growth ratio. This implies that the sales made by manufacturing entities have a significant relationship with the financial performance and hence such entities should strive to grow their sales in order to achieve superior financial performance. Equally, tax paid has a significant relationship with the financial performance of manufacturing entities implying that manufacturing should strive at reducing the tax payable through various tax avoidance practices and taking

advantage of various government concessions and incentives such as manufacturing under bond. The size of the entities measured using the level of assets was observed to have an insignificant relationship with the financial performance of manufacturing entities.

5.4.5 Corporate Diversification

Corporate diversification has an insignificant relationship with the financial performance as per the findings of the study. The researcher therefore recommends that manufacturing entities should only strive to diversify their operations when they establish that corporate diversification has a positive impact on organizational performance due to economies of scale and scope, market power, reduction of risks and learning curve effects. The researcher observed that leverage has a negative relationship with the financial performance of manufacturing entities and hence it can be concluded that manufacturing entities should maintain optimal capital structure with a healthy mix of equity and debt to meet the financing needs but equally avoid the negative effect of debt financing. Sales growth ratio has a significant and positive relationship with the financial performance of manufacturing entities and therefore entities should grow their sales through diversifying their operations.

5.5 Suggestions for Further Research

The researcher in this study analysed the impact of commodity risk management on the financial performance of manufacturing entities within the Kenyan context from a generalized perspective. The study did not analyse some important aspects such as segmenting data into different industries or sectors to determine the effect of commodity risk management on the financial performance of specific sectors which would form an

interesting area of study as it would give insight as to whether some sectors are affected by commodity risk more than others.

The study covered a ten year duration which is relatively short and it would be quite prudent and informative to consider a longer duration as this leads to generation of time series data and determine the long term effect of exposure to commodity risk. The researcher recommends use of a commodity price index when evaluating the effect of commodity prices on the financial performance of manufacturing entities in Kenya. Further, other variables that influence the financial performance can be incorporated into the model and determine whether there are other factors which have significant effect on the financial performance of such entities.

REFERENCES

Abkowitz, M. D. (2002). *Transportation risk management: A new paradigm. Security papers* (Knoxville: Southeastern Transportation Center, University of Tennessee), *6*(4), 93-103.

Agrawal, I., Duttagupta, R., & Presbitero, A. (2017). *International commodity prices and domestic bank lending in developing countries*. International Monetary Fund.

Al Janabi, M. (2009). Commodity price risk management: Valuation of large trading portfolios under adverse and illiquid market settings. *Journal of Derivatives & Hedge Funds, 15*(1), 15-50.

Al-Tarawneh, A., Khalaf, B. & Assaf, G. (2017). Noninterest income and financial performance at Jordanian banks. *International Journal of Financial Research, 8*(1), 166-171.

Ali, A. Fatih, M. & Yunus, K. (2013). *The relationship between inventory and financial performance: an analysis of a sector*. Conference proceedings of the International Conference on Economic and Social Studies (ICESoS` 13), Economic Crises and European Union.

Alshubiri, F. (2015). Measurement the impact of financial and business risk on performance: evidence of industrial sector of Oman. *Asian Social Science: 11*(22), 26-32.

Al Tawalbeh, M., & Abu-Rumman, A. (2015). The impact of marketing-orientated pricing on product mix pricing strategies. *International Journal of Economics, Commerce and Management, III*,(1), 1-18.

Andersen, T. J. (2008). The performance relationship of effective risk management: exploring the firm specific investment rationale, *Long Range Planning, 41*(2), 155-176.

Ansoff, H. (1957). Strategies for diversification. *Harvard Business Review, 35*, 113-124.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error components models. *Journal of Econometrics, 68*(1), 29-51.

Asrarhaghighi, E., Rahman, A., Sambasivan, M., & Mohamed, M. (2013). Diversification strategy and performance studies: Results, measures, and sampling design. *Journal of Advanced Management Science, 1*(1), 12-18.

Ateka, O., & Ochieng, V. (2012). An assessment of factors influencing selection of suppliers of raw materials in manufacturing industry in Kenya: A case of the East African Breweries Limited. *International Journal of Science and Research, 3*(6), 904-911.

Baffes, J. (2011). The long-term implications of the 2007–08 commodity-prices boom. *Development in Practice*, *21*(4-5), 517-525.

Barberis, N. (2013). Thirty years of prospect theory in economics: A review and assessment. *Journal of Economic Perspectives*, *27*(1), 173-196.

Bascle, G. (2008). Controlling for endogeneity with instrumental variables in strategic management research. *Strategic Organization, 6*(3), 285-327.

Baroto, M., Abdullah, M., & Wan, H. (2012). Hybrid Strategy: A new strategy for competitive advantage. *International Journal of Business and Management. 7*(20), 120-133.

Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *Stata journal*, *3*(1), 1-31.

Belekoukias, I., Garza-Reyes, J., & Kumar, V. (2014). The impact of lean methods and tools on the operational performance of manufacturing organizations. *International Journal of Production Research, 52*(18). 5346-5366.

Belke, A., Bordon, I., & Volz, U. (2012). *Effects of global liquidity on commodity and food prices.* Deutsches Institut für Wirtschaftsforschung, Discussion Papers.

Bhatia, A., & Thakur, A. (2018). Corporate diversification and firm performance: An empirical investigation of causality. *International Journal of Organizational Analysis*, *26*(2), 202-225.

Bigsten, A., Kimuyu, P., & Söderbom, M. (2010). *The manufacturing sector in Kenya: policies for prosperity*. Oxford: Oxford University Press.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, *87*(1), 115-143.

Bodnar, E., & Gordon, M. (2011). *Managing risk management*. SAIS, Johns Hopkins University Washington DC, 20036, USA.

Bollen, K., Kolenikov, S., & Bauldry, S. (2014). Model-implied instrumental variable-generalized method of Moments (MIIV-GMM) estimators for latent variable models. *Psychometrika, 79*(1), 20–50.

Bouras, A., Bouras, D., & Ajuzie, E. (2014). An empirical analysis of the effect of diversification on financial performance: The case of the US grocery store industry. *Review of Applied Economics, 10*(1), 69-81.

Boz, I. Yigit, I., & Anil, I. (2013). The relationship between diversification strategy and organizational performance: A research intended for comparing Belgium and Turkey. *Procedia - Social and Behavioral Sciences,* 99, 997-1006.

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroskedasticity and random coefficient variation. *Econometrica, 47*(5), 1287-1294.

Brooks, C. (2008). *Introductory Econometrics of Finance*, 2nd ed., the ICMA Center, University of Reading, CAMBRIDGE University press.

Brown, G.W. (2001). Managing foreign exchange risk with derivatives. *Journal of Financial Economics, 60*, 401-448.

Bryman, A. (2011). *Social research methods* (3rd ed.). New York, USA: OUP.

Burgers, W. Padgett, D. Bourdeau, B. and Sun, A., (2009). Revisiting the link between product and industry: Diversification and corporate performance, *International Review of Business Research Papers, 5*, 367-379.

Cameron, A., & Trivedi, P. (2005). *Microeconometrics: methods and applications*. Cambridge University Press.

Cannon, A. R. (2008). Inventory improvement and financial performance. *International Journal of Production Economics, 115*(2), 581-593.

Capkun, V., Hameri, A., & Weiss, L. (2009). On the relationship between inventory and financial performance in manufacturing companies. *International Journal of Operations & Production Management*, *29*(8), 789-806.

Cariolle, J. (2012). *Measuring macroeconomic volatility: Applications to export revenue data, 1970-2005.* (Vol. 1 ,p. 49). Working paper No 114 'innovative indicators' series.

Carr, G. (2012). *Managing geopolitical risk in energy markets*, retrieved from http://www.risk.net/energy-risk/feature/2144307/managing-geopolitical-risk-energy-markets.

Carton, R. & Hofer, C. (2010). Organizational financial performance: Identifying and testing multiple dimensions. *Academy of Entrepreneurship Journal, 16*(1), 1-22.

Chakrabarti, P. & Kumar, K. (2017). Does behavioural theory explain return-implied volatility relationship? Evidence from India. *Cogent Economics & Finance, 5*, 1-16.

Chausse, P. (2010). Computing generalized method of moments and generalized empirical likelihood with R. *Journal of Statistical Software, 34*(11), 1-35.

Chege, J., Ngui, D., & Kimuyu, P. (2014). *Scoping paper on Kenyan manufacturing*. WIDER Working Paper 2014/136.

Chen, C. J. & Yu, C. M. J. (2011). Managerial ownership, diversification, and firm performance: Evidence from an emerging market. *International Business Review, 21*(3), 518-534.

Chiang, W., Sun, L. & Walkup, B. (2018). Business volatility and employee performance, *American Journal of Business, 33*(3), 96-119.

Christopoulos, D. K., & Efthymios, G. T. (2004). Financial development and economic growth: Evidence from panel unit root and cointegration tests. *Journal of Development Economics, 73*(1), 55–74.

Cifarelli, G., & Paladino, G. (2010). Oil price dynamics and speculation: A multivariate financial approach. *Energy economics, 32*(2), 363-372.

Cifarelli, G., & Paesani, P (2012). *An assessment of the theory of storage: Has the relationship between commodity price volatility and market fundamentals changed over time?* Working paper No 12/2012.

Clarvis, M., Halle, M., Mulder, I., & Yarime, M. (2014). Towards a new framework to account for environmental risk in sovereign credit risk analysis, *Journal of Sustainable Finance & Investment, 4*(2), 147-160.

Collier, P. (2007). *Managing commodity booms: Lessons of international experience*. African Economic Research Consortium, Centre for the Study of African Economies, Oxford University.

Cook, R. D., & Weisberg, S. (1983). Diagnostics for heteroscedasticity in regression. *Biometrika, 70*, 1-10.

Daud, W., Salamudin, N., & Ahmad, I. (2009). Corporate diversification and performance. *International Business Education Journal, 2*(1), 01-18.

David, J., & David, S. (2012). Marketing-orientated pricing: Understanding and applying factors that discriminate between successful high and low price strategies. *European Journal of Marketing, 46* (11/12), 1647-1670.

Deleersnyder, B., Dekimpe, M., Sarvary, M. & Parker, P. (2004). Weathering tight economic times: The sales evolution of consumer durables over the business cycle. *Quantitative Marketing and Economics, 2*, 347-383.

Devalkar, S., Anupindi, R., & Sinha, A. (2016). *Dynamic risk management of commodity operations: Model and analysis*. Retrieved from: http://ssrn.com/abstract=2432067.

Doaei, M., Anuar, M., & Hamid, N. (2012). Corporate diversification and financial performance: A review of literature. *Asian Journal of Finance & Accounting, 4*, 56-74.

Donzelli, F. (2008). Marshall vs. Walras on equilibrium and disequilibrium. *History of Economics Review, 48*, 1-38.

Egbunike, C., & Okerekeoti, C. (2018). Macroeconomic factors, firm characteristics and financial performance: A study of selected quoted manufacturing firms in Nigeria. *Asian Journal of Accounting Research, 3*(2), 142-168.

Ehrhart, H., & Guerineau, S. (2013). *Commodity price volatility and tax revenues: Evidence from developing countries*. Etudes et Documents, E 2011.31, CERDI.

Elsayed, K., & Wahba, H. (2016). Reexamining the relationship between inventory management and firm performance: An organizational life cycle perspective. *Future Business Journal*, 2, 65-80.

Eroglu, C., & Hofer, C. (2011). Lean, leaner, too lean? The inventory-performance link revisited. *Journal of Operations Management*, *29*(4), 356-369.

Erten, B., & Ocampo, J. (2012). *Super-cycles of commodity prices since the mid-nineteenth century*. DESA Working Paper No. 110, ST/ESA/2012/DWP/110.

Eva Maria, F. (2015). Risk management in SMEs: a systematic review of available evidence. *The Journal of Risk Finance*, *16*(2), 122-144.

Fabozzi, F., Gupta F., & Markowitz, H. (2002). The legacy of modern portfolio theory. *The Journal of Investing*, 7-22.

Faith, D., & Edwin, A. (2014). A review of the effect of pricing strategies on the purchase of consumer goods. *International Journal of Research in Management, Science & Technology*. *2*(2), 88-102.

Fama, E., & French, K. (1995). Size and book-to-market factors in earnings and returns. *Journal of Finance*, *50*(1), 131-155.

Fang, F. (2016). A Study of financial risks of listed manufacturing companies in China. *Journal of Financial Risk Management, 5*, 229-245.

Farooq, U. (2018). Impact of inventory turnover on profitability of non-financial sector of Pakistan. *Journal of Finance and Accounting Research, 1*(1), 1-21.

Ficici, A., Wang, L., Aybar, C., & Fan, B. (2014). The correlation between the internationalization processes and performance of firms: The case of emerging market firms of the BRIC countries. *Journal of Economics and Political Economy, 1*(1), 4-25.

Folinas, D., & Shen, C. (2014). Exploring links among inventory and financial performance in the agricultural machinery industry. *International Journal of Food and Agricultural Economics, 2* (4), 1-12.

Frank, M., & Goyal, V. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics*, *67*(8), 217–248.

Fullerton, R., & Wempe, F. (2009). Lean manufacturing, non-financial performance measures, and financial performance. *International Journal of Operations & Production Management*, *29*(3), 214-240.

Gatsi, J., Gadzo, S., & Kportorgbi, H. (2013). The effect of corporate income tax on financial performance of listed manufacturing firms in Ghana. *Research Journal of Finance and Accounting, 4*(15), 118-124.

German, H. (2009). *Commodities and commodity derivatives: pricing and modeling agricultural, metals and energy*. USA: John Wiley & Sons.

Ghorbani, A. (2013). A study on effect of corporate diversification on information asymmetry using Bid- Ask: Evidence from Tehran Stock Exchange. *International Research Journal of Applied and Basic Sciences 5*(5), 618-622.

Ghosh, D. & Olsen, L. (2009). Business volatility and managers' use of discretionary accruals. *Accounting, Organizations and Society*, *34*(2), 188-205.

Gil-alana, L., Mudida, H., & Carcel, H. (2017). *Shocks affecting electricity prices in Kenya, A fractional integration study*. Retrieved from https://www.researchgate.net/publication/313874056 on 12th April 2017.

Giovanni, J. D., & Levchenko, A. A. (2009). Trade openness and volatility. *The Review of Economics and Statistics*, *91*(3), 558-585.

Haartman, R., & Bengtsson, L. (2015). The impact of global purchasing and supplier integration on product innovation. *International Journal of Operations & Production Management*, *35*(9), 1295-1311.

Hausman, T. (1978). Specification tests in econometrics. *Econometrica*, *46*(6), 1251–1271.

Heaney, R. (2006). An empirical analysis of commodity pricing. *Futures Markets, 4*(26), 391-415.

Hofer, C., Eroglu, C., & Hofer, A. (2012). The effect of lean production on financial performance: The mediating role of inventory leanness. *International Journal of Production Economics*, Elsevier, *13*(8), 242-253.

Howard, F., & James, M. (2013). The effect of decision context on perceived risk in pricing strategies: how managers view uncontrollable environmental forces. *Journal of Product & Brand Management*, *22*(1), 79-86.

Huang, A. (2009). The cross section of cash flow volatility and expected stock returns. *Journal of Empirical Finance*, *16*, 409–429.

Huchet-Bourdon, M. (2011). *Agricultural commodity price volatility: An overview*, OECD food, agriculture and fisheries papers, No. 52, OECD Publishing.http://dx.doi.org/10.1787/5kg0t00nrthc-en

Hult, G., Ketchen, D., Griffith, D., Chabowski, B., Hamman, M., Dykes, B., Pollitte, W., & Cavusgil, S. (2008). An assessment of the measurement of performance in international business research. *Journal of International Business Studies*, *39*, 1064-1080.

Ibraimi, S. (2014). Performance determinants of manufacturing firms: analysis from a strategic management perspective. *International Journal of Academic Research in Economics and Management Sciences*, *3*(2), 92-112.

ISO Guide 73 (2009). *Risk management – Vocabulary – Guidelines for use in standards*, retrieved from www.iso.org.

Jacques, A. S. (2010). Interest rates, commodity prices, and the cost-of-carry model. *The Journal of Risk Finance, 11(*2), 221-223.

Jafari, M., Chadegani, A. & Biglari, V. (2011). Effective risk management and company's performance: Investment in innovations and intellectual capital using behavioral and practical approach. *Journal of Economics and International Finance, 3*(15), 780-786.

Jermias, J. (2008). The relative influence of competitive intensity and business strategy on the relationship between financial leverage and performance. *British Accounting Review*, *40*(1), 71-86.

John, E., Etim, J., & Ime, U. (2015). Inventory management practices and operational performance of flour milling firms in Lagos, Nigeria. *International Journal of Supply and Operations Management*, *1*(4), 392-406.

Jorge, M. J. D. S., & Augusto, M. A. G. (2011). Financial risk exposures and risk management: evidence from European nonfinancial firms. *RAM. Revista de Administração Mackenzie*, *12*(5), 65-97.

Kahloul, I., & Hallara, S. (2010). The impact of diversification on firm performance and risk: An empirical evidence. *International Research Journal of Finance and Economics, 35*, 150-162.

Kahneman, D. & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*(2), 263-291.

Kahneman, D. & Tversky, A. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty, 5*(4), 297-323.

Kalina, J. (2011). Testing heteroscedasticity in robust regression. *Research Journal of Economics, Business and ICT. 4*, 25-28.

KAM (2015). *The KAM industrial business agenda: Priority actions to build competitive local industry to expand employment in KENYA*. Retrieved from https://issuu.com/kamkenya/docs/finalmpa2014

Kamran, M., Rose, K., & Ullah, W. (2016). Impact of financial leverage on firm's profitability: Evidence from chemical sector of Pakistan. *Journal of Business and Tourism*, *2*(1), 116-129.

Kariithi, J. & Kihara, A. (2017). Factors affecting performance of manufacturing firms in Kenya: A case of pharmaceutical firms in Nairobi County. *The Strategic Journal of Business & Change Management, 4, 2* (46), 817-836.

Khodamoradi, S., Bokaee, M., & Jalilian, J. (2012). Relationships between corporate diversification with economic performance variables (EVA, REVA). *Archives Des Sciences*, *65*(6), 17-31.

Kinyua, J., Gakure, R., Gekara, M. & Orwa, G. (2015). Effect of risk management on the financial performance of companies quoted In the Nairobi Securities Exchange. *International Journal of Business & Law Research, 3*(4), 26-42.

KIPPRA (2014). *Kenya economic report 2014, navigating global challenges while exploiting opportunities for sustainable growth*. retrieved from http://www.kippra.org/downloads/Kenya%20Economic%20Report%202014.pdf

Kiseľáková, D., Horváthová, J., Šofranková, B. & Šoltés, M. (2015). Analysis of risks and their impact on enterprise performance by creating enterprise risk model. *Polish Journal of Management Studies, 11*(2), 50-61.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (5th ed., pp. 3–427). New York: The Guilford Press.

KNBS (2013). Basic report on the 2010 census of industrial production, 2013.

KNBS (2016). Economic survey, 2016.

Koenker, R. (1981). A note on studentizing a test for heteroskedasticity. *Journal of Econometrics, 17*, 107-112.

Kontuš, E. (2014). Management of inventory in a company. *ECONVIEWS, 27*(2), 245-256.

Kordestania, G. & Mohammad, M. (2016). A study of the relationship between product market competition and earnings management. *Procedia Economics and Finance, 36*, 266-273.

Kouvelis, P., Li, R., & Ding, Q. (2011). *Managing storable commodity risks: role of inventories and financial hedges.* The Handbook of integrated risk management in global supply chains, Hoboken, NJ, USA: John Wiley & Sons, Inc.

Krivokapic, R. Njegomir, V. & Stojic, D. (2017). Effects of corporate diversification on firm performance: evidence from the Serbian insurance industry, *Economic Research-Ekonomska Istraživanja*, *30*(1), 1224-1236.

Kurz, C., & Senses, M. Z. (2016). Importing, exporting, and firm-level employment volatility. *Journal of International Economics, 98*, 160-175.

Kusumaningtyas, R., & Yendrawati, R. (2015). The effect of company diversification towards earning management moderated by managerial ownership. *Jurnal Dinamika Manajemen*, *6*(2), 178-186.

Kwak, S. (2011). *Revenue volatility: The determinants and consequences* (Doctoral dissertation, Rutgers University-Graduate School-Newark).

Lahiri, S., & Purkayastha, S. (2017). Impact of industry sector on corporate diversification and firm performance: Evidence from Indian business groups. *Canadian Journal of Administrative Sciences,* 34, 77-88.

Larry, C., Giunipero, R., & Aly, E. (2004). Securing the upstream supply chain: A risk management approach. *International Journal of Physical Distribution & Logistics Management, 34*(9), 698-713.

Li, L. (2007). Multinationality and performance: A synthetic review and research agenda. *International Journal of Management Reviews*, *9*, 117-139.

Lien, Y. &, Li, S. (2013). Does diversification add firm value in emerging economies? Effect of corporate governance. *Journal of Business Research*, *66*, 2425-2430.

Lin, C., & Su, D. (2008). Industrial diversification, partial privatization and firm valuation: evidence from publicly listed firms in China. *Journal of Corporate Finance*, *14*, 405-417.

Luqman, O., Bamidele, I. & Fatai, L. (2017). The effect of firm size on performance of firms in Nigeria. *The IEB International Journal of Finance, 15,* 2-21.

Lwiki, T., Ojera, P., Mugenda, N., & Wachira, V. (2013). The impact of inventory management practices on financial performance of sugar manufacturing firms in Kenya. *International Journal of Business, Humanities and Technology*, *3*(5), 75-85.

Mackay, P., & Moeller, S. (2007). The value of corporate risk management. *The Journal of Finance, 62*(3), 1379-1419.

Maina, S. & Memba, F. (2016). Relationship between tax policies and financial performance of medium size enterprises in Kenya, a case of Kiambu County. *International journal of social science and information technology, 2*(4), 409-425.

Malik, H. (2011). Determinants of insurance companies' profitability: An analysis of insurance sector of Pakistan. *Academic Research International*, *1*(3), 315-321.

Manuere, F., Gwangwava, E., & Jengeta, M. (2015). Strategic pricing and firm success: A study of SMEs in Zimbabwe. *Asian Journal of Business and Management 3*(3), 223-229.

Manyuru, A., Wachira, M,. & Amata, E. (2017). The impact of corporate diversification on firm value in Kenya, *African Journal of Business Management*, *11*(11), 241-249.

Martin, C., Carlos M., Omera K., & Oznur, Y. (2011), Approaches to managing global sourcing risk, *Supply Chain Management: An International Journal, 16*(2), 67-81.

Masila-Achola, M. (2012). *Energy infrastructure as an economic development enabler in a devolved government structure,* Kenya Association of Manufacturers.

Mehmood, R., Hunjra, A. I., & Chani, M. I. (2019). The impact of corporate diversification and financial structure on firm performance: Evidence from South Asian countries. *Journal of Risk and Financial Management, 12*(1), 49-56.

Mendonça, P., & Las Casas, A. (2013). Diversification as a sustainable growth strategy in the packaging market: Case study of a Brazilian company. *Journal on Innovation and Sustainability, 4*(2), 61-81.

Menguc, B. & Barker, T. (2005). Re-examining field sales unit performance: Insights from the resource-based view and dynamic capabilities perspective, *European Journal of Marketing, 39*(7/8), 885-909.

Miecinskiene, A., & Lapinskaite, I. (2014). The research on the impact of the changes of commodity price level in the world commodity exchanges on variation of general price level. *Economics & Sociology, 7*(4), 71-88.

Milonas, N., & Henker, T. (2001). Price spread and convenience yield behavior in the international oil markets. *Applied Financial Economics, 11,* 23-26.

Mishra, V., Choe. C., & Dey, T. (2014). Corporate diversification, executive compensation and firm value: evidence from Australia. *Australian Journal of Management, 39,* 395-414.

Mitra, R. (2016). The association between earnings quality and firm-specific return volatility: Evidence from Japan, *Review of Accounting and Finance, 15*(3), 294-316.

Mohamad, S., Nadia, N., Rahman, N., & Sakinahis, S. (2016). A study on relationship between inventory management and company performance: A case study of textile chain store. *Journal of Advanced Management Science, 4*(4), 299-304.

Mohammed, H. & Knapkova, A. (2016). The Impact of Total Risk Management on Company's Performance. *Procedia - Social and Behavioral Sciences,* 220, 271-277.

Mugenda, G., Momanyi, G. & Naibei, K. (2012). Implications of risk management practices on financial performance of sugar manufacturing firms in Kenya. *AFRREV IJAH, 1*(1), February, 14-29.

Mugenda, O., & Mugenda, A. (2003). *Research methods: Quantitative and qualitative approaches.* Nairobi: Acts Press.

Mukopi, C., & Iravo, M. (2015). An analysis of the effects of inventory management on the performance of the procurement function of sugar manufacturing companies

in the western Kenya sugar belt. *International Journal of Scientific and Research Publications, 5*(5), 1-14.

Musyoka, R., Omulo, V., Mwithiga, M., & Chepkulei, B. (2015). Role of inventory management practices on performance of production department. A case of manufacturing firms. *International Journal of Economics, Commerce and Management, III*(5), 1625-1656.

Mwelu, N., Rulangaranga, D., Watundu, S., Kaberuka, W. & Tindiwensi, C. (2014). Risk management and profitability of manufacturing firms in Uganda. *Industrial engineering letters, 4*(2), 49-54.

Nguyen, H. V. (2011). Why do non-financial firms select one type of derivatives over others? *Journal of Applied Business and Economics, 12*(3), 91-109.

Niresh, J. & Velnampy, T. (2014). Firm size and profitability: a study of listed manufacturing firms in Sri Lanka. *International Journal of Business and Management, 9*(4), 57-64.

Nwakaego, A., Ikechukwu, O., & Okechukwu, A. (2014). Inventory positioning and firm performance in engineering companies. Evidence from Nigeria. *World Engineering & Applied Sciences Journal, 5*(3), 85-91.

Nwakoby, N. & Hediwa, A. (2018). Effect of diversification on the financial performance of selected firms in Nigeria. *International Journal of Advanced Academic Research, 4*(12), 1-16.

Obermaier, R., & Donhauser, A. (2009). Disaggregate and aggregate inventory to sales ratios over time: The case of German corporations 1993-2005. *Logistics Research, 1*(2), 95-111.

Odalo, S. K., Njuguna, A. G., & Achoki, G. (2016). Relating sales growth and financial performance in agricultural firms listed in the Nairobi Securities Exchange in Kenya. *International Journal of Economics, Commerce and Management, 4*(7), 443-454.

OECD (2012). *Competition and Commodity Price Volatility.* 2012.

Ogbo, A., & Ukpere, W. (2014). The Impact of effective inventory control management on organisational performance: A study of 7up Bottling Company Nile Mile Enugu, Nigeria. *Mediterranean Journal of Social Sciences, 5*(10), 109-118.

Oh, H., Sohl, T., & Rugman, M. (2014). Regional and corporate diversification and performance of retail multinationals. *Journal of Henley Business School,* 1-30.

Ojo, O. (2012). Corporate diversification and firm performance: an empirical study. *Manager,* (9), 39-52.

Oke, M., Olarewaju, O., & Ayooluwade E. (2016). The relevance of pricing strategies on corporate performances in Nigeria. *International Journal of Economics, Commerce and Management*, *4*(1), 475-488.

Olajide, P. (2012). Corporate diversification and performance of manufacturing firms in Nigeria. *European Journal of Business and Management*, *4*(7), 226-234.

Olaniyi, C. O., Simon-Oke, O. O., Obembe, O. B., & Bolarinwa, S. T. (2017). Re-examining firm size-profitability nexus: Empirical evidence from non-financial listed firms in Nigeria. *Global Business Review*, *18*(3), 543-558.

Olayinka, E., Emoarehi, E., Jonah, A., & Ame, J. (2017). Enterprise risk management and financial performance: Evidence from emerging market. *International Journal of Management, Accounting and Economics, 4*(9), 937-952.

Oliveira, T., & Martins, M. F. (2011). Literature review of information technology adoption models at firm level. *The Electronic Journal Information Systems Evaluation, 14*(1), 110-121.

Oluwagbemiga, O., Olugbenga, O., & Zaccheaus, S. (2014). Cost management practices and firm's performance of manufacturing organizations. *International Journal of Economics and Finance: 6*(6), 234-239.

Ondiek, G. (2010). Assessment of materials management in the Kenyan manufacturing firms-exploratory survey of manufacturing firms based in Nairobi. *Journal of Social Sciences*, *3*(3), 40-49.

Ondiek, G., & Odera, O. (2012). Assessment of materials management in kenyan manufacturing firms. *Journal of Business Studies Quarterly*, *3*(3), 40-49.

Ondimu, J. O., Rotich, G., & Kipkirui, P. (2018). Effect of inventory management on financial performance of listed manufacturing firms in Kenya. *The Strategic Journal of Business & Change Management, 5*(2), 1615-1622.

Oskooee, B., Hegerty, M., & Hosny, A. (2015). Exchange-rate volatility and commodity trade between the E.U. and Egypt. *Empirica, 42*, 109-129.

Oum, Y., & Oren, S. (2010). Optimal static hedging of volumetric risk in a competitive wholesale electricity market. *Decision Analysis, 7*(1), 107-122.

Pagach, D., & Warr, R. (2011). The characteristics of firms that hire chief risk officer. *Journal of Risk and Insurance, 78*(1), 109-125.

Panigrahi, D. (2013). Relationship between inventory management and profitability: An empirical analysis of Indian cement companies. *Asia Pacific Journal of Marketing & Management Review*, *2*(7), 107-120.

Park, K., & Jang, S. (2014). Capital structure, free cash flow, diversification and firm performance: A holistic analysis. *International Journal of Hospitality Management, 33* 51-63.

Pathirana, S., & Heenkenda, N. (2011). Pricing strategies in the garment manufacturing Industry in Sri Lanka. *Annual Research Journal of SLSAJ, 11*, 84-91.

Paul, T., Ingen, B., & Ivo, A. (2010). Relating price strategies and price-setting practices. *European Journal of Marketing, 47*(1/2), 27-48.

Phung, D. N., & Mishra, A. V. (2016). Corporation diversification and firm performance: evidence from Vietnamese listed firms. Australian *Economic Papers, 55*(4), 386-408.

Pirrong, C. (2014). *The economics of commodity trading firms*, Bauer College of Business, University of Houston, White paper.

Plott, C. R., Roy, N., & Tong, B. (2013). Marshall and Walras, disequilibrium trades and the dynamics of the equilibration in the continuous double auction market. *Journal of Economic Behavior and Organization*, *94*, 190-205.

Poitras, G. (2013). *Commodity risk management: Theory and application* (1st Ed.). New York: Routledge.

Prempeh, K. (2016). The impact of efficient inventory management on profitability: Evidence from selected manufacturing firms in Ghana. *International Journal of Finance and Accounting, 5*(1), 22-26.

Purkayastha, S. (2013). Diversification strategy and firm performance: Evidence from Indian manufacturing firms. *Global Business Review 14*(1), 1-23.

Ramesh, G., Al-Habsi, H. & Al-Sharji, T. (2017). Effect of working capital management on the financial performance of manufacturing firms in Sultanate of Oman. *Innovative Journal of Business and Management, 6*(3), 38-42.

Raei, R., Tehrani, R., & Farhangzadeh, B. (2015). A study on relationship between diversification strategy, firm performance and risk: Evidence from Tehran Stock Exchange. *International Journal of Business and Social Science, 6(*1), 112-118.

Ravichandran, A., & Bhaduri, S. (2015). *Diversification and firm performance: A study of Indian manufacturing firms.* (Munich Personal RePEc Archive) MPRA Paper No. 68013.

Ravichandran, T., Yu Liu, Shu H., & Iftekhar H. (2009). Diversification and firm performance: exploring the moderating effects of information Technology Spending. *Journal of Management Information Systems, 25*(4), 205-240.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal, 9*(1), 86-136.

Rumelt, R.P. (1974). *Strategy, structure and economic performance*. Cambridge, MA: Harvard University Press.

Sahari, S., Tinggi, M., & Kadri, N. (2012). Inventory management in Malaysian construction firms: Impact on performance. *SIU Journal of Management*, *2*(1), 59-72.

Salma, U. & Hussain, H. (2018). A comparative study on corporate diversification and firm performance across South Asian Countries. *Journal of Accounting & Marketing, 7*(1), 2-7.

Sam, M., Fazli, M., & Hoshino, Y. (2013). Sales growth, profitability and performance: empirical study of Japanese ICT industries with three Asean Countries. *Interdisciplinary Journal of Contemporary Research in Business, 4*(11), 96-119.

Schiele, H., Horn, P., & Vos, B. (2011). Estimating cost-saving potential from international sourcing and other sourcing levers: Relative importance and trade-offs. *International Journal of Physical Distribution & Logistics Management*, *41*(3), 315-336.

Shardeo, V. (2015). Impact of inventory management on the financial performance of the firm. *Journal of Business and Management*, *17*(4), 1-12.

Shen, H., Wang, D., & Su. Z. (2011). Diversification and firm performance in China. *African Journal of Business*, *5*(27), 10999-11004.

Shin, S., Ennis, L., & Spurlin, W. (2015). Effect of inventory management efficiency on profitability: Current evidence from the U.S. manufacturing industry. *Journal of Economics and Economic Education*, *16*(1), 98-106.

Sije, A., & Oloko, M. (2013). Penetration pricing strategy and performance of small and medium enterprises in Kenya. *European Journal of Business and Social Sciences*, *2*(9), 114-123.

Sitienei, E., & Memba, F. (2015). The effect of inventory management on profitability of cement manufacturing companies in Kenya: A case study of listed cement manufacturing companies in Kenya. *International Journal of Management and Commerce Innovations, 3*(2), 111-119.

Sobhani, M., Malarvizhi, C. A., Al-Mamun, A., & Jeyashree, S. (2014). Strategic procurement and financial performance of Iranian manufacturing companies. *Asian Social Science*: *10*(1), 250-256.

Solomon, D. & Muntean, M. (2012). Assessment of financial risk in firm's profitability analysis. *Economy Transdisciplinarity Cognition, 15*(2), 58-67.

Stigler, G. (1958). The economies of scale. *Journal of Law and Economics*, *1*(1), 54–71.

Sundaram, A. (2016). *Trade liberalization and firm sales volatility evidence from India.*

University of Auckland, Draft report.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed., pp. 1–983). New Jersey: Pearson Education Inc.

Tipton, E., & Pustejovsky, J. E. (2015). Small-sample adjustments for tests of moderators and model fit using robust variance estimation in meta-regression. *Journal of Educational and Behavioral Statistics, 40*(6), 604-634.

Toni, D., Milanb, G., Saciloto, E., & Larentis, F. (2016). Pricing strategies and levels and their impact on corporate profitability. *Revista de Administração, 22*(2), 1-14.

Tse, Y., & William, M. (2013). Does index speculation impact commodity prices? an intraday futures analysis, *Financial Review, 48*(3), 365-383.

Umbricht, Y., Raftopoulos, C. & Stebbings, D. (2012). PwC treasury survey 2012, retrieved from http://www.pwc.com/

UNCTAD (2011). *Price formation in financialized commodity markets. The role of information.* United Nations Conference on Trade and Development, New York and Geneva.

UNCTAD (2019). *Managing commodity price risk in commodity-dependent developing countries.* Multi-year Expert Meeting on Commodities and Development, Eleventh session, Geneva.

Vătavu, S., Lobonț, O. R., Para, I., & Pelin, A. (2018). Addressing oil price changes through business profitability in oil and gas industry in the United Kingdom. *PloS one, 13*(6), 1-22.

Wanjohi, S., Wanjohi, J., & Ndambiri. J. (2017). The effect of financial risk management on the financial performance of commercial banks in Kenya. *International Journal of Finance and Banking Research. 3*(5), 70-81.

Wasseja, M., & Mwenda, S. (2015). Analysis of the volatility of the electricity price in Kenya using Autoregressive Integrated Moving Average Model. *Science Journal of Applied Mathematics and Statistics, 3*(2), 47-57.

WFE (2015). WFE/IOMA 2015 Derivatives market survey. Retrieved from: https://www.world-exchanges.org/home/index.php/news/world-exchange-news/wfe-ioma-releases-2015-derivatives-market-survey

Wolf, H. (2005). Volatility: Definitions and consequences. *Managing Economic volatility and Crises*. Cambridge, Cambridge University Press 2005.

Working, H. (1949). The theory of price of storage. *The American Economic Review, 39*(6), 1254-1262.

Wu, Q., & Chen, A. (2015). Optimal combined purchasing strategies for a risk-averse manufacturer under price uncertainty. *Journal of Industrial Engineering and Management*, *8*(4), 1087-1102.

Yan, R., & Wang, J. (2010). Service level, pricing strategy and firm performance in a manufacturer-giant retailer supply chain. *Journal of Product & Brand Management 19*(1), 61-66.

Yigit, I., & Tur, S. (2012). Relationship between diversification strategy applications and organizational performance according to Herfindahl Index criteria. *Procedia - Social and Behavioral Sciences 58*, 118 -127.

Yücel, E., & Önal, Y. (2016). Industrial diversification and performance in an emerging market. *PANOECONOMICUS*, *63*(4), 441-454.

Zaratiegui, J.M. (2002). Marshallian demand function and the adjustment of competitive markets. *International Journal of Applied Economics and Econometrics*, *10*, 369-380.

Zsidisin, G., A. Hartley, J. L., & Collins, W. A. (2013). Integrating student projects with real-world problems: the case of managing commodity price risk. *Supply Chain Management: An International Journal*, *18*(4), 389- 397.

APPENDICES

Appendix 1 Introduction Letter to NACOSTI

INSTITUTE OF POST GRADUATE STUDIES

Private Bag - 20157
KABARAK, KENYA
E-mail: directorpostgraduate@kabarak.ac.ke

Tel: 0773265999
Fax: 254-51-343012
www.kabarak.ac.ke

13th *February 2018*

Ministry of Higher Education Science and Technology,
National Council for Science, Technology & Innovation,
P.O. Box 30623 – 00100,

Dear Sir/Madam,

RE: RESEARCH BY STHEPHEN KANINI NDUNGU– GDB/M/0933/09/10

The above named is a student at Kabarak University taking PHD Degree in Business and Economics. He is carrying out research entitled. **"Commodity price risk management strategies and the Financial performance of manufacturing companies in Kenya."**

The information obtained in the course of this research will be used for academic purposes only and will be treated with utmost confidentiality.

Please provide the necessary assistance.

KABARAK UNIVERSITY DIRECTOR GRADUATE STUDIES 13 FEB 2018

Thank you.

Yours faithfully

Dr. Esther J. Kibor
AG DIRECTOR – (POST-GRADUATE STUDIES)

Kabarak University Moral Code

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)

KEBS Kabarak University is ISO 9001:2015 Certified

Appendix 2 NACOSTI Permit

THIS IS TO CERTIFY THAT:
MR. STEPHEN KANINI NDUNGU
of KABARAK UNIVERSITY, 377-217
LIMURU,has been permitted to conduct
research in *All Counties*

Permit No : NACOSTI/P/18/79935/22127
Date Of Issue : 10th April,2018
Fee Recieved :Ksh 2000

on the topic: *COMMODITY PRICE RISK MANAGEMENT STRATEGIES AND THE FINANCIAL PERFORMANCE OF MANUFACTURING COMPANIES IN KENYA*

for the period ending:
9th April,2019

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

Appendix 3 Introductory Letter

Ndung'u Stephen Kanini,
Kabarak University,
Private bag,
Kabarak,
Nakuru.

Dear Sir / Madam,

Ref: Permission to conduct research.

I am a Ph D student at Kabarak University undertaking a research thesis as a partial fulfillment of the Doctor of philosophy degree. I am researching on **"THE RELATIONSHIP BETWEEN COMMODITY RISK, ITS MANAGEMENT AND FINANCIAL PERFORMANCE OF MANUFACTURING COMPANIES IN KENYA."**

Your participation will assist me in completing my studies.

I assure you that the data collection sheet is not coded in any way and the responses will be kept absolutely confidential. It's very important that you provide data which is complete and accurate.

Any report from the study will only show statistical summaries and not individual responses.

Your cooperation will be highly appreciated.

Yours faithfully,

Ndung'u Stephen Kanini.

Appendix 4 Data Collection Sheet

Name of the company ----------

Position held in the company----------

Please provide the data on the various items below for the ten year period.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Earnings before interests and taxes (EBIT) (sh)											
Total assets(sh)											
Total debt(sh)											
Total Sales/revenue(sh)											
Operating cash flow(sh)											
Current assets(sh)											
Current liabilities (sh)											
Use commodity derivatives	Yes										
	No										
Opening raw materials inventory (RMI) (sh)											
Closing raw materials inventory(sh)											
Opening Work in progress inventory (WIP) (sh)											
Closing Work in progress inventory											
Opening finished goods inventory (FGI) (sh)											
Closing finished goods inventory											

Opening total inventory (RMI, WIP & FGI) (sh)										
Closing total inventory (RMI, WIP & FGI) (sh)										
Gross profit (sh)										
Tax paid (sh)										

Sales by segment/product

Please provide data on the value of sales made by the company (Where the entity has a range of products/segments, indicate the sales made under each product/segment)

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Segment/product 1 (sh)										
Segment/product 2 (sh)										
Segment/product 3 (sh)										
Segment/product 4 (sh)										
Segment/product 5 (sh)										
Segment/product 6 (sh)										
Segment/product 7 (sh)										
Segment/product 8 (sh)										
Segment/product 9 (sh)										

Thank you for your assistance.

Appendix 5 Collected Data

Company code	Year	EBITS	ROA	Lnassets	RMIS	WIPS	FGIS	INVS	Tax	SGR	DIV	LEV	revvol
1	2012	0.0175	0.0225	7.2291	0.3295	0.2209	0.7034	4.3645	10.0	0.0000	0.5493	0.3684	0.2768
1	2013	0.0195	0.0250	7.2731	0.3299	0.2212	0.7043	5.0026	12.0	0.0423	0.5880	0.3026	0.2777
1	2014	0.0280	0.0371	7.3727	0.3159	0.2108	0.6692	4.8973	20.0	0.1402	0.5588	0.3593	0.2426
1	2015	0.0607	0.0883	7.6478	0.2802	0.1843	0.5798	4.6288	49.0	0.4463	0.5735	0.4623	0.1532
1	2016	0.0671	0.0978	7.7890	0.2818	0.1856	0.5839	4.6414	59.0	0.1550	0.5676	0.4801	0.1573
2	2012	0.1144	0.0918	6.0521	0.2413	0.1803	0.4823	4.4205	8.0	0.0000	1.0000	1.1435	0.0557
2	2013	0.1574	0.1051	6.4723	0.2473	0.1759	0.4972	4.4354	15.0	0.2669	1.0000	0.8331	0.0706
2	2014	-0.178	-0.106	6.3986	0.2569	0.1688	0.5213	4.4595	0.0	-0.169	1.0000	1.0399	0.0947
2	2015	0.1577	0.4123	4.7362	0.2619	0.1708	0.5340	4.4915	0.0	-0.169	1.0000	0.8246	0.1074
2	2016	0.0914	0.2118	4.4427	0.2930	0.1938	0.6119	4.7252	0.0	-0.338	1.0000	1.0706	0.1853
3	2012	0.0860	0.0549	6.4583	0.2603	0.1695	0.5298	4.4790	3.0	0.0000	0.7556	0.3762	0.1032
3	2013	0.0718	0.0423	6.5639	0.2568	0.1688	0.5211	4.4592	-1.0	0.0270	0.7244	0.3865	0.0945
3	2014	0.0776	0.0504	6.4846	0.2576	0.1683	0.5231	4.4612	-3.0	0.0167	0.6886	0.4412	0.0965
3	2015	0.1106	0.0650	6.5834	0.2679	0.1752	0.5490	4.5364	-1.0	0.0000	0.7155	0.4108	0.1224
3	2016	0.0761	0.0440	6.6503	0.2771	0.1820	0.5720	4.6056	-8.0	0.0518	0.6577	0.4256	0.1454
4	2012	0.0857	0.1196	9.0170	0.2640	0.1723	0.4591	4.4270	89.0	0.0000	0.5911	0.7658	0.1308
4	2013	0.0263	0.0303	9.0673	0.2802	0.2015	0.4668	4.5161	-1.0	-0.130	0.6301	0.7950	0.1792
4	2014	0.0285	0.0317	9.1110	0.2950	0.2134	0.4698	4.5930	0.0	0.0068	0.6080	0.8065	0.2192
4	2015	0.0933	0.1164	9.0369	0.2846	0.2050	0.4769	4.5481	119.0	0.0424	0.6137	0.7625	0.2003
4	2016	0.0673	0.0765	9.2337	0.2782	0.1998	0.4795	4.5185	24.0	0.1089	0.6082	0.7866	0.1868
5	2012	0.0219	0.0094	6.4552	0.2444	0.1876	0.4357	4.3525	3.0	0.0000	0.6970	0.3758	0.0675
5	2013	0.0459	0.0193	6.5117	0.2459	0.1864	0.4319	4.3484	1.0	0.0328	0.7137	0.3730	0.0866
5	2014	0.0792	0.0325	6.6039	1.4478	0.1883	0.4415	4.3638	-2.0	0.0707	0.6052	0.3808	0.0825
5	2015	0.0741	0.0292	6.6241	1.4305	0.1873	0.4316	4.3436	1.0	-0.019	0.6433	0.3944	0.0623
5	2016	0.0557	0.0231	6.5396	1.4220	0.1869	0.4336	4.3405	-0.2	-0.033	0.6945	0.3945	0.0592
6	2012	0.1325	0.1894	6.1964	1.5278	0.1966	0.5106	4.4928	16.0	0.0000	0.5414	0.9776	0.2137
6	2013	0.0808	0.0961	6.1924	1.5195	0.2091	0.5787	4.5957	20.0	-0.171	0.5614	0.8630	0.3058
6	2014	0.1074	0.1530	6.0822	1.5214	0.1975	0.5300	5.7735	-5.0	0.0722	0.5191	1.0434	0.2532
6	2015	0.1267	0.1872	6.1862	1.5266	0.1963	0.5123	5.7544	14.0	0.1506	0.5013	0.9856	0.2117
6	2016	0.0769	0.0924	6.1654	1.5208	0.2064	0.5673	5.8382	17.0	-0.203	0.5153	0.8424	0.2343
7	2012	0.0948	0.0841	8.1727	1.6910	0.1840	0.5030	5.7770	41.0	0.0000	1.0000	0.4087	0.2346
7	2013	0.0975	0.0869	8.1890	1.7161	0.1840	0.4962	5.7809	46.0	0.0216	1.0000	0.4224	0.2675
7	2014	0.0968	0.0737	8.4063	1.8020	0.1840	0.4825	5.8037	51.0	0.0620	1.0000	0.3792	0.2610
7	2015	0.1111	0.0969	8.3109	1.7486	0.1839	0.4953	5.7934	58.0	0.0399	1.0000	0.4553	0.2507
7	2016	0.0686	0.0862	7.9926	1.6517	0.1839	0.5721	5.8289	49.0	0.0479	1.0000	0.6255	0.2862
8	2012	0.0569	0.0464	7.6544	1.6170	0.2711	0.5976	6.1093	3.0	0.0000	1.0000	0.4455	0.2959
8	2013	0.0646	0.0524	7.6676	1.6601	0.2729	0.5848	6.1205	4.0	0.0075	1.0000	0.4378	0.3014
8	2014	-0.069	-0.057	7.7258	1.6825	0.3447	0.7974	6.5648	3.0	0.0865	1.0000	0.5004	0.5236
8	2015	0.2779	0.2487	7.7459	1.6308	0.3976	0.9829	6.8917	-10.0	0.0976	1.0000	0.3914	0.6870
8	2016	-0.043	-0.038	7.7297	1.5960	0.3953	0.9908	6.8778	3.0	-0.028	1.0000	0.4651	0.6801
9	2012	0.0194	0.0296	7.4916	1.7249	0.2382	0.6208	6.0769	15.0	0.0000	0.5585	0.5220	0.1942
9	2013	0.0187	0.0162	8.3251	1.6065	0.2219	0.5704	5.9256	17.0	0.3074	0.5718	0.8073	0.1438
9	2014	0.0228	0.0446	7.6535	1.5919	0.2199	0.5642	5.9070	14.0	0.1516	0.5078	0.4853	0.1376

9	2015	-0.032	-0.044	7.5480	1.7819	0.6287	0.6451	6.1498	-53.0	-0.358	0.5572	0.5024	0.2185
9	2016	0.0052	0.0042	8.3645	1.6193	0.5715	0.5759	4.9575	-12.0	0.3043	0.5333	0.8164	0.1493
10	2012	0.0545	0.0517	4.0604	2.3148	0.8162	0.8721	5.8460	0.0	0.0000	1.0000	0.9828	0.4455
10	2013	-0.113	-0.094	3.9703	2.6830	0.9458	1.0289	6.3165	0.0	-0.200	1.0000	1.0566	0.6023
10	2014	-0.236	-0.166	3.9890	2.9063	1.0244	1.1240	6.6018	0.0	-0.136	1.0000	1.1296	0.6974
10	2015	0.0882	0.0896	4.2047	2.1493	0.7580	0.8016	5.6347	0.0	0.7895	1.0000	0.9104	0.3750
10	2016	-0.107	-0.109	4.0073	2.5050	0.8881	0.6852	5.8332	0.0	-0.122	1.0000	1.0335	0.4554
11	2012	0.0717	0.0862	7.4685	1.5698	0.6268	0.5344	4.9657	4.0	0.0000	0.3427	0.3545	0.2163
11	2013	0.0654	0.0865	7.5170	1.5382	0.6005	0.5160	4.9019	-13.0	0.1548	0.3554	0.3496	0.1844
11	2014	0.0842	0.1172	7.5049	1.5103	0.6200	0.5515	4.9491	-56.0	0.0399	0.3729	0.3726	0.2080
11	2015	0.0835	0.1210	7.4736	1.5553	0.6410	0.5577	5.0000	15.0	0.0087	0.3864	0.3975	0.2334
11	2016	0.0701	0.0869	7.5486	1.5935	0.6255	0.5226	4.9624	50.0	-0.076	0.3436	0.3683	0.2146
12	2012	0.1489	0.0933	4.3175	2.1805	1.3429	1.1394	6.6988	0.2	0.0000	1.0000	0.0533	0.7128
12	2013	0.0160	0.0105	4.3307	2.2441	1.3879	1.1666	6.8077	0.1	0.0638	1.0000	0.0526	0.7400
12	2014	0.1064	0.0746	4.2047	2.3792	1.4835	1.2245	7.0392	2.0	-0.060	1.0000	0.0746	0.7979
12	2015	0.1778	0.1081	4.3041	2.4361	1.5238	1.2488	7.1366	0.2	-0.042	1.0000	0.0676	0.8222
12	2016	0.0192	0.0119	4.4308	2.3123	1.4362	1.1958	6.9246	0.1	0.1556	1.0000	0.1905	0.7692
13	2012	0.1189	0.2539	5.2627	1.8389	0.7987	0.5455	3.1157	10.0	0.0000	0.6086	0.6839	0.1189
13	2013	0.0871	0.1685	5.2149	1.8805	0.7313	0.5277	3.1395	3.0	-0.135	0.5306	0.7609	0.1011
13	2014	0.1072	0.2222	5.1930	1.6847	0.7357	0.6116	3.0275	4.0	0.0478	0.5509	0.8500	0.1850
13	2015	0.0950	0.2054	5.2204	1.7780	0.7453	0.5716	3.0809	7.0	0.0724	0.6081	0.7081	0.1450
13	2016	0.0588	0.1292	5.1818	1.9673	1.1920	1.0481	4.2075	8.0	-0.022	0.5004	0.7022	0.6215
14	2012	0.0333	0.1000	1.6094	1.5718	0.8761	0.6599	3.1078	1.0	0.0000	1.0000	1.6000	0.2333
14	2013	0.0353	0.1000	1.7918	1.6359	0.4587	0.6325	2.7271	0.0	0.1333	1.0000	1.8333	0.2059
14	2014	0.1667	0.5000	1.7918	1.7923	0.7313	0.5655	3.0891	0.3	0.0588	1.0000	1.5000	0.1389
14	2015	-0.013	-0.040	1.6094	1.9064	0.4876	0.5166	2.9107	0.0	-0.166	1.0000	1.8000	0.0900
14	2016	-0.181	-0.333	1.7918	1.9362	0.9486	0.5039	3.3886	0.0	-0.266	1.0000	1.8333	0.0773
15	2012	0.0063	0.0133	2.7081	1.9707	0.3485	0.4891	2.8082	0.0	0.0000	1.0000	0.9333	0.0625
15	2013	0.0097	0.0188	2.7726	1.9283	0.7348	0.5072	3.1704	0.0	-0.031	1.0000	0.9375	0.0806
15	2014	0.0625	0.1176	2.8332	1.9342	0.7987	0.5047	3.2376	0.0	0.0323	1.0000	0.8235	0.0781
15	2015	0.0030	0.0067	2.7081	1.9751	0.7335	0.4872	3.1958	0.0	0.0313	1.0000	0.8667	0.0606
15	2016	-0.003	-0.005	2.8332	1.9220	0.7313	0.5099	5.2185	0.0	-0.090	1.0000	0.9412	0.0833
16	2012	0.0848	0.1074	7.2682	2.1352	1.0211	1.1200	6.2706	46.0	0.0000	0.4963	0.5844	0.6934
16	2013	0.0908	0.0892	7.5353	2.0466	0.9897	1.0820	6.1567	-81.0	0.0138	0.3874	0.4960	0.6554
16	2014	0.1010	0.1350	7.2123	1.9543	0.9570	1.0425	6.0381	-51.0	-0.015	0.3794	0.5494	0.6159
16	2015	0.0955	0.0904	7.5903	1.9408	0.9523	1.0367	6.0208	57.0	0.0348	0.4805	0.4528	0.6101
16	2016	0.0483	0.0442	7.6411	1.3935	0.7586	0.8023	5.3176	54.0	0.0149	0.6826	0.4630	0.3757
17	2012	0.0470	0.0667	7.6054	1.5015	0.4874	0.4578	4.6911	68.0	0.0000	0.4268	0.3678	0.1329
17	2013	0.0936	0.1211	7.6563	1.5340	0.4909	0.4586	4.7101	91.0	-0.040	0.4055	0.4423	0.1519
17	2014	0.1720	0.1937	7.8819	1.5614	0.3313	0.5231	4.7803	-118.0	0.0903	0.3985	0.5957	0.2221
17	2015	0.0427	0.0582	7.6396	2.1222	0.3324	0.5251	4.7948	-150.0	-0.050	0.4992	0.4954	0.2366
17	2016	0.0814	0.1041	7.6917	2.0625	0.3343	0.4568	4.7108	-95.0	-0.010	0.4780	0.3982	0.1526
18	2011	0.5514	0.2873	5.8721	1.7756		0.4455	4.5930	30.0	0.0000	1.0000	0.2225	0.0189
18	2012	0.0794	0.0131	6.6346	1.8281		0.4623	4.6602	9.0	-0.318	1.0000	0.0907	0.0357
18	2013	-0.088	-0.012	6.5958	1.8237		0.4609	4.6546	-31.0	-0.190	1.0000	0.1066	0.0343

18	2014	-0.614	-0.132	6.1003	1.8792		0.4787	4.7257	-17.0	-0.058	1.0000	0.1906	0.0521
18	2015	-1.220	-0.166	6.2146	1.9232		0.4928	4.7820	-24.0	-0.291	1.0000	0.2120	0.0662
18	2016	0.2293	0.0628	6.3509	1.7961		0.4521	4.6192	14.0	1.3088	1.0000	0.1606	0.0255
19	2007	0.1909	0.1349	7.7719	1.7948		0.4517	4.6176	79.0	0.0000	1.0000	0.4669	0.0251
19	2008	0.2447	0.1657	7.8868	1.8171		0.4588	4.6461	107.0	0.0752	1.0000	0.4110	0.0322
19	2009	0.2761	0.1991	7.9631	1.8364		0.4650	4.6708	169.0	0.1498	0.3614	0.3428	0.0384
19	2010	0.2412	0.1678	8.0768	1.8016		0.4538	4.6263	169.0	0.0806	0.3787	0.3131	0.0272
19	2011	0.3661	0.1647	8.2475	1.8083		0.4560	4.6349	197.0	-0.232	0.7827	0.2776	0.0294
19	2012	0.2491	0.1337	8.5299	1.8004		0.4535	4.6248	195.0	0.5821	0.4908	0.2405	0.0269
19	2013	0.2320	0.1335	8.4025	1.8048		0.4549	4.6304	208.0	-0.056	0.5107	0.2427	0.0283
19	2014	0.0854	0.0391	8.2576	1.8392		0.4659	4.6745	73.0	-0.310	0.4312	0.2263	0.0393
19	2015	0.1040	0.0414	8.2209	1.8642		0.4739	4.7064	74.0	-0.162	0.3797	0.2189	0.0473
19	2016	0.2370	0.1081	8.1809	1.8383		0.4656	4.6733	130.0	0.0999	0.6216	0.2156	0.0390
20	2007	0.0596	0.0207	8.2493	2.0933		0.4900	4.8854	-30.0	0.0000	0.5275	0.2275	0.1698
20	2008	0.9114	0.1960	8.8201	2.1482		0.4867	4.9139	381.0	0.0989	0.4567	0.3071	0.1841
20	2009	0.3680	0.1004	8.9869	1.9642		0.4876	4.7979	227.0	0.4986	0.4456	0.2921	0.1260
20	2010	0.6205	0.1567	9.1160	1.8921		0.4932	4.7629	389.0	0.0532	0.4900	0.2824	0.1086
20	2011	0.5960	0.1679	9.1550	1.9648		0.4861	4.7952	564.0	0.1601	0.4491	0.2852	0.1247
20	2012	-0.034	-0.010	9.0964	1.9744		0.5047	4.8104	-39.0	0.0428	0.4571	0.2798	0.1182
20	2013	0.0515	0.0160	9.1110	2.0005		0.4917	4.8294	68.0	0.0133	0.5876	0.2950	0.1418
20	2014	0.0315	0.0058	9.6111	1.8807		0.4865	4.7970	16.0	-0.019	0.5596	0.1881	0.1256
20	2015	0.3464	0.0601	9.6832	1.8656		0.4869	4.7877	-62.0	0.0083	0.4319	0.1549	0.1210
20	2016	0.2571	0.0546	9.7302	1.8287	0.3688	0.4778	4.7449	259.0	0.2818	0.4386	0.1699	0.0996
21	2007	0.1831	0.0589	8.2308	2.0173	0.3198	0.4647	4.7080	71.0	0.0000	1.0000	0.2897	0.1498
21	2008	-0.102	-0.031	8.1831	1.9886	0.3200	0.4718	4.7058	-47.0	-0.092	1.0000	0.2950	0.1476
21	2009	0.1094	0.0416	8.2741	1.9441	0.3200	0.4649	4.6838	36.0	0.3607	0.8753	0.3295	0.1256
21	2010	0.4521	0.2310	8.5809	1.9922	0.3198	0.4521	4.6869	347.0	0.8275	0.9475	0.3488	0.1287
21	2011	0.3967	0.2160	8.7050	1.9432	0.3198	0.4540	4.6723	409.0	0.2064	0.9481	0.2919	0.1141
21	2012	0.3238	0.1613	8.8878	1.8294	0.3504	0.4687	4.7033	309.0	0.0980	0.9528	0.3173	0.1451
21	2013	0.3111	0.1353	8.9902	1.8534	0.3277	0.4792	4.6815	300.0	-0.032	0.7505	0.2699	0.1233
21	2014	0.2995	0.1231	9.0536	1.9443	0.3199	0.4719	4.6907	300.0	0.0060	0.5204	0.2291	0.1717
21	2015	0.1066	0.0322	9.0547	2.0766	0.3200	0.4756	4.7391	-68.0	-0.262	0.9569	0.2355	0.2338
21	2016	0.2835	0.1034	9.1362	2.0965	0.3201	0.4604	4.7305	202.0	0.3073	0.9715	0.2493	0.1722
22	2007	0.0842	0.1581	7.0809	2.1435	0.3409	0.5184	4.8414	53.0	0.0000	1.0000	0.6283	0.2832
22	2008	0.0423	0.0896	6.7298	2.1532	0.3405	0.5345	4.8599	10.0	-0.204	1.0000	0.5627	0.3017
22	2009	0.0413	0.0681	6.9058	2.0240	0.3365	0.5193	4.7944	13.0	-0.073	0.6632	0.6042	0.2362
22	2010	0.0446	0.0624	7.0648	2.0590	0.3370	0.6018	4.8894	6.0	-0.006	0.7547	0.6547	0.3312
22	2011	-0.032	-0.043	6.9246	2.1461	0.3343	0.6557	4.9677	49.0	-0.159	0.6835	0.7257	0.4095
22	2012	0.0495	0.0591	7.0484	2.2276	0.3296	0.6121	4.9429	1.0	0.0000	0.7234	0.6959	0.3847
22	2013	0.0714	0.1083	6.8480	2.1656	0.3282	0.5999	4.9076	15.0	0.0385	0.7948	0.5796	0.3494
22	2014	0.0452	0.0591	6.8352	2.0109	0.3287	0.6842	4.9411	-70.0	-0.147	0.8836	0.7656	0.3829
22	2015	-0.187	-0.158	7.1959	1.8716	0.5348	0.7639	5.3399	21.0	-0.075	1.0000	0.4813	0.4049
22	2016	-0.526	-0.268	6.9875	1.9599	0.6225	0.8950	5.6562	-47.0	-0.508	1.0000	0.5420	0.5606
23	2007	0.2147	0.2797	8.6825	1.7927		0.4287	4.5965	525.0	0.0000	0.8015	0.3665	0.0383
23	2008	0.2376	0.2926	8.7977	1.8840		0.4298	4.6282	614.0	0.0606	0.8192	0.3481	0.0700

23	2009	0.2037	0.2538	8.7907	1.9104		0.4299	4.6371	498.0	0.0047	0.7979	0.2827	0.0789
23	2010	0.2238	0.2695	8.9841	1.8356		0.4293	4.6115	608.0	0.1725	0.7675	0.3201	0.0533
23	2011	0.2275	0.2902	9.0843	1.8623		0.4320	4.6231	804.0	0.1711	0.7616	0.3056	0.0649
23	2012	0.2479	0.2867	9.2758	1.8739		0.4375	4.6325	994.0	0.0979	0.7491	0.3141	0.0743
23	2013	0.2433	0.2843	9.3452	1.8557		0.4366	4.6255	1054.0	0.0832	0.7422	0.2797	0.0673
23	2014	0.2348	0.2625	9.3880	1.8516		0.4366	4.6241	1164.0	-0.001	0.7185	0.2659	0.0660
23	2015	0.1930	0.1876	9.4491	1.8602		0.4391	4.6296	601.0	-0.075	0.7419	0.2948	0.0714
23	2016	0.1794	0.1669	9.4071	1.9254		0.4399	4.6522	771.0	-0.082	0.7473	0.2851	0.0940
24	2007	0.0657	0.0721	8.0590	1.8846	0.4197	0.6107	4.8208	48.0	0.0000	1.0000	0.3795	0.2626
24	2008	0.1001	0.0985	8.0314	2.2299	0.4216	0.6242	4.8843	15.0	-0.127	1.0000	0.3059	0.3261
24	2009	0.0815	0.0889	8.0080	2.2397	0.4194	0.6045	4.8646	64.0	0.0829	0.5322	0.2406	0.3064
24	2010	0.0356	0.0418	7.9533	2.1120	0.4188	0.6006	4.8211	5.0	0.0204	0.5916	0.2383	0.2629
24	2011	0.0740	0.0870	8.0472	2.0741	0.4174	0.5680	4.7749	52.0	0.0987	0.9811	0.2800	0.2167
24	2012	0.0840	0.1009	8.1315	2.0773	0.4175	0.5652	4.7733	111.0	0.1113	0.9569	0.3156	0.2429
24	2013	0.1144	0.1256	8.2077	2.0881	0.4169	0.5759	4.7864	55.0	-0.013	0.4830	0.2696	0.2921
24	2014	-0.006	-0.006	8.2576	2.0873	0.4174	0.6372	4.8482	-3.0	-0.062	0.7773	0.3425	0.3681
24	2015	0.0166	0.0149	8.2298	2.1379	0.4165	0.6919	4.9171	21.0	-0.109	0.6976	0.3356	0.4533
24	2016	-0.284	-0.245	8.0989	2.0914	0.4135	0.8017	5.0086	-213.0	-0.143	0.6762	0.4424	0.5097
25	2007	0.1725	0.2042	7.6980	1.9512		0.4509	4.6123	123.0	0.0000	0.6094	0.6402	0.0541
25	2008	0.1823	0.1914	7.8958	1.9643		0.4560	4.6213	143.0	0.0809	1.0000	0.6284	0.0631
25	2009	0.1730	0.1595	8.0077	1.9480		0.4595	4.6198	113.0	-0.018	0.6764	0.5802	0.0616
25	2010	0.1800	0.1691	8.1035	1.9255		0.4544	4.6079	174.0	0.1221	0.6573	0.5357	0.0497
25	2011	0.1102	0.0997	8.1639	1.9752		0.4660	4.6346	85.0	0.0222	0.7775	0.5293	0.0764
25	2012	0.1169	0.1208	8.1611	1.9717		0.4721	4.6396	82.0	0.1395	0.7474	0.4746	0.0814
25	2013	0.0872	0.1165	8.1904	1.9207		0.4665	4.6186	111.0	0.3320	0.6840	0.5610	0.0604
25	2014	0.0928	0.1242	8.1817	1.9061		0.4634	4.6110	106.0	-0.007	0.6557	0.5130	0.0528
25	2015	-0.051	-0.053	8.3793	1.8960		0.4526	4.5971	-106.0	-0.061	0.6204	0.5689	0.0389
25	2016	0.1047	0.1144	8.3905	1.8843		0.4482	4.5891	71.0	0.0729	0.5548	0.5287	0.0309
26	2007	0.1971	0.1698	8.4129	2.0111	0.4177	0.4424	4.6307	199.0	0.0000	0.5234	0.6064	0.0725
26	2008	0.2095	0.1524	8.7565	2.0407	0.4144	0.4428	4.6356	202.0	0.1901	0.5143	0.6651	0.0774
26	2009	0.1975	0.0837	9.4043	2.1079	0.4143	0.4403	4.6532	303.0	0.1136	0.5083	0.6599	0.0950
26	2010	0.2245	0.0808	9.7150	2.0867	0.4715	0.4473	4.7328	321.0	0.1594	0.5434	0.7196	0.1746
26	2011	0.2000	0.0796	9.9306	2.0675	0.4924	0.4454	4.7538	212.0	0.3715	0.5786	0.7030	0.1956
26	2012	0.1988	0.0841	10.2018	2.2617	0.4114	0.4532	4.7090	545.0	0.3936	0.7179	0.7358	0.1508
26	2013	0.1721	0.0821	10.2991	2.2202	0.4114	0.4652	4.7084	651.0	0.2437	0.7795	0.7232	0.1502
26	2014	0.1608	0.0599	10.5163	2.2249	0.4114	0.4623	4.7069	525.0	-0.030	0.8263	0.7448	0.1487
26	2015	-0.083	-0.023	10.8578	2.3135	0.4138	0.4522	4.7271	-648.0	0.0723	0.6170	0.6757	0.1689
26	2016	-0.075	-0.018	10.8407	2.3009	0.4168	0.4679	4.7431	-1179	-0.129	0.6923	0.4556	0.1849
27	2007	0.2493	0.2661	9.9389	1.9157	0.4333	0.4704	4.6511	1633.0	0.0000	0.5721	0.2724	0.0627
27	2008	0.1840	0.1791	10.2476	1.9188	0.4340	0.4859	4.6686	1477.0	0.2422	0.5661	0.4116	0.0792
27	2009	0.3204	0.2993	10.3770	1.9242	0.4497	0.4753	4.6612	2626.0	0.0920	0.5546	0.3479	0.0702
27	2010	0.2727	0.2298	10.4135	1.9185	0.4484	0.4592	4.6416	2265.0	-0.064	0.5318	0.3507	0.0523
27	2011	0.2463	0.2639	10.4194	1.9003	0.4443	0.4523	4.6237	2607.0	0.2781	0.6132	0.2784	0.0399
27	2012	0.2334	0.2033	10.6698	1.9387	0.4530	0.4580	4.6528	2294.0	0.0448	0.6406	0.1200	0.0574
27	2013	0.2114	0.1668	10.6693	1.9805	0.4625	0.4641	4.6842	1843.0	-0.095	0.6128	0.1282	0.0773

27	2014	0.2085	0.1833	10.6211	1.9731	0.4609	0.4567	4.6723	1898.0	0.0619	0.6188	0.1318	0.0664
27	2015	0.2278	0.2124	10.6461	1.9532	0.4630	0.4617	4.6832	2586.0	0.0880	0.5856	0.1102	0.0744
27	2016	0.2491	0.2321	10.6167	1.9793	0.4691	0.4701	4.7077	2381.0	-0.029	0.6035	0.0967	0.0908
28	2007	0.0780	0.1068	7.3304	2.0321	0.5420	0.5302	4.8814	64.0	0.0000	0.9820	0.4666	0.1672
28	2008	0.0510	0.0626	7.5746	2.0814	0.5608	0.5400	4.9315	47.0	0.1435	0.7942	0.5780	0.1923
28	2009	0.0739	0.1011	7.5278	2.1227	0.5641	0.5316	4.9402	54.0	0.0640	0.9914	0.4970	0.1966
28	2010	0.0645	0.1004	7.5868	2.0523	0.5216	0.4967	4.8269	78.0	0.2068	0.9896	0.5030	0.1399
28	2011	0.0620	0.1079	7.7030	2.0562	0.5184	0.4912	4.8184	72.0	0.2558	0.9990	0.5251	0.1357
28	2012	0.0634	0.1244	7.7222	2.0974	0.5329	0.4979	4.8572	91.0	0.1502	1.0000	0.4792	0.1551
28	2013	0.0704	0.1233	7.9879	2.0837	0.4263	0.5015	4.7142	120.0	0.1638	0.9751	0.5379	0.1560
28	2014	0.0397	0.0623	8.2566	2.0941	0.4276	0.5084	4.7261	132.0	0.1706	0.9722	0.6504	0.1679
28	2015	0.0554	0.0822	8.4205	2.1022	0.4278	0.5272	4.7476	186.0	0.1156	0.9647	0.7021	0.1894
28	2016	0.0656	0.0953	8.5289	2.0829	0.4272	0.5334	4.7471	140.0	0.0907	0.9616	0.6912	0.1889
29	2007	0.1906	0.2056	8.0740	2.1866	0.4722	0.5137	4.8195	180.0	0.0000	0.6789	0.6564	0.2613
29	2008	0.1978	0.2553	8.0209	2.1170	0.4552	0.5070	4.7686	207.0	0.1349	0.6153	0.5509	0.2104
29	2009	0.1935	0.1535	8.1727	2.0943	0.4552	0.5374	4.7920	230.0	-0.284	0.5891	0.5315	0.2338
29	2010	0.0841	0.0671	8.4160	2.0291	0.4550	0.5021	4.7362	75.0	0.2817	0.7216	0.5028	0.1780
29	2011	0.1160	0.1156	8.5158	1.9436	0.4286	0.4811	4.6800	150.0	0.3796	0.7024	0.5446	0.1116
29	2012	0.1802	0.1240	8.7402	1.9890	0.4231	0.5287	4.7339	231.0	-0.135	0.6577	0.5318	0.1758
29	2013	0.1324	0.0871	8.8305	1.9842	0.4256	0.5015	4.7088	187.0	0.0470	0.6757	0.5518	0.1507
29	2014	0.1132	0.0731	8.9734	1.9524	0.4281	0.4656	4.6666	166.0	0.1321	0.6571	0.6081	0.1080
29	2015	-0.174	-0.077	9.0341	1.9999	0.4411	0.5015	4.7352	-346.0	-0.269	0.7269	0.6243	0.1764
29	2016	-0.145	-0.070	8.9290	1.9870	0.4345	0.4986	4.7191	-228.0	-0.019	0.8070	0.6614	0.1609
30	2007	0.0620	0.0503	10.7647	2.2111		0.5568	4.8074	930.0	0.0000	0.3605	0.5298	0.1302
30	2008	0.0841	0.0589	10.9990	2.2374		0.5650	4.8236	973.0	0.0895	0.3594	0.6007	0.1384
30	2009	0.0870	0.0793	11.1783	2.1407		0.5351	4.7639	1557.0	0.5569	0.3848	0.6248	0.1085
30	2010	0.0813	0.0742	11.2925	2.1425		0.5357	4.7650	1917.0	0.1220	0.3889	0.6417	0.1091
30	2011	0.0968	0.0585	11.7050	2.1733		0.5452	4.7840	2035.0	-0.002	0.3759	0.6115	0.1186
30	2012	0.0816	0.0574	11.8205	2.1151		0.5272	4.7481	3890.0	0.3077	0.3820	0.5928	0.1006
30	2013	0.1006	0.0485	12.1238	2.2483		0.5683	4.8303	3125.0	-0.070	0.3840	0.6567	0.1417
30	2014	0.1422	0.0681	12.3019	2.2485		0.5684	4.8304	3742.0	0.1854	0.3798	0.6689	0.1418
30	2015	0.1483	0.0582	12.5146	2.1932		0.5513	4.7963	4822.0	0.0130	0.3682	0.7826	0.1247
30	2016	0.1562	0.0569	12.6033	2.4383		0.5353	4.7642	4526.0	0.0151	0.3389	0.7795	0.1087
31	2007	0.2752	0.1942	7.5278	2.1242	0.4065	0.5611	4.7051	120.0	0.0000	1.0000	0.2474	0.1471
31	2008	0.2056	0.1283	7.6290	2.1424	0.4071	0.5781	4.7277	95.0	-0.021	0.7554	0.2931	0.1694
31	2009	0.1549	0.1001	7.5949	2.1510	0.4070	0.5947	4.7466	78.0	0.0008	0.7173	0.2289	0.1883
31	2010	0.0727	0.0416	7.6109	2.1463	0.4086	0.5989	4.7517	35.0	-0.101	0.7189	0.2465	0.1935
31	2011	0.1577	0.1046	7.5049	2.1435	0.4088	0.5631	4.7154	64.0	0.0433	0.8403	0.2691	0.1568
31	2012	0.1776	0.1156	7.5959	2.1390	0.4069	0.5567	4.7051	89.0	0.0747	0.8648	0.2683	0.1471
31	2013	0.1866	0.0881	7.8759	2.1297	0.4067	0.5529	4.6985	108.0	-0.040	0.8993	0.2115	0.1404
31	2014	0.1550	0.0874	7.7407	2.1290	0.4066	0.5446	4.6899	48.0	0.0434	0.8975	0.2404	0.1334
31	2015	0.1349	0.0689	7.7498	2.1461	0.4075	0.5683	4.7195	73.0	-0.085	0.8479	0.2615	0.1632
31	2016	0.1226	0.0596	7.7030	2.1272	0.4091	0.5733	4.7216	64.0	-0.091	0.8890	0.2375	0.1634
32	2007	0.2245	0.2282	9.1345	2.8048	0.4083	0.4431	4.7740	664.0	0.0000	0.5112	0.4937	0.2158
32	2008	0.2491	0.2486	9.2406	2.7370	0.3047	0.4454	4.7567	717.0	0.0917	0.5157	0.5253	0.1985

32	2009	0.2002	0.2106	9.2633	2.7236	0.3056	0.4466	4.7559	631.0	0.0789	0.5179	0.5569	0.1977
32	2010	0.1851	0.2253	9.3166	2.6924	0.3070	0.4493	4.7529	955.0	0.2204	0.5070	0.9373	0.1947
32	2011	0.2315	0.5543	9.0372	2.6237	0.3077	0.4549	4.7411	1386.0	0.4874	0.5087	0.8727	0.1829
32	2012	0.1673	0.5594	9.1187	2.5131	0.3110	0.4395	4.7020	1484.0	0.5147	0.2024	0.8855	0.1438
32	2013	0.1808	0.5655	9.2306	2.4840	0.3086	0.4472	4.6973	1746.0	0.0463	0.1913	0.9225	0.1391
32	2014	0.1867	0.5756	9.3121	2.5417	0.3089	0.4450	4.7111	1840.0	0.0692	0.1922	0.9147	0.1529
32	2015	0.2142	0.6351	9.3994	2.5969	0.3623	0.4629	4.8437	2163.0	0.0496	0.1955	0.2341	0.1802
32	2016	0.1692	0.5106	9.4054	2.6035	0.3136	0.4607	4.7524	1677.0	0.0240	0.1483	0.7983	0.1763
33	2007	0.5378	0.1824	6.9948	2.0872		0.4289	4.5626	72.0	0.0000	0.4992	0.1540	0.0023
33	2008	0.5866	0.1876	7.0984	2.0858		0.4285	4.5619	75.0	0.0459	0.5008	0.1529	0.0019
33	2009	0.6130	0.2464	7.2269	2.0837		0.4280	4.5608	111.0	0.4289	0.5087	0.1519	0.0014
33	2010	0.6371	0.2612	7.3212	2.0835		0.4279	4.5606	131.0	0.1212	0.5033	0.1448	0.0013
33	2011	0.5851	0.1937	7.4616	2.0829		0.4277	4.5603	72.0	-0.071	0.5014	0.1569	0.0011
33	2012	0.5087	0.2330	7.6074	2.0857		0.4285	4.5618	146.0	0.6007	0.0000	0.1788	0.0019
33	2013	0.5761	0.2491	7.6980	2.0884		0.4292	4.5633	159.0	0.0336	0.0000	0.1270	0.0026
33	2014	0.6150	0.2006	7.8372	2.0876		0.4290	4.5629	107.0	-0.133	0.0000	0.1488	0.0024
33	2015	0.5716	0.1559	7.9960	2.0878		0.4291	4.5630	187.0	-0.019	0.0000	0.1657	0.0025
33	2016	0.4483	0.1210	8.0333	2.0920		0.4302	4.5653	172.0	0.0272	0.0000	0.1324	0.0036
34	2007	0.3985	0.3040	10.3452	2.3912	0.3127	0.4538	4.6862	3107.0	0.0000	0.8675	0.3297	0.1118
34	2008	0.3350	0.3273	10.4120	2.3343	0.3125	0.4535	4.6702	3132.0	0.3691	0.6757	0.3349	0.0961
34	2009	0.3154	0.3142	10.4501	2.3014	0.3211	0.4696	4.6934	3245.0	0.0591	0.6839	0.3502	0.1032
34	2010	0.3266	0.3227	10.5563	2.2979	0.3181	0.4639	4.6811	3730.0	0.1034	0.6771	0.4761	0.0966
34	2011	0.2767	0.2640	10.7591	2.2887	0.3064	0.4502	4.6432	3235.0	0.1825	0.5878	0.4838	0.0850
34	2012	0.3354	0.4094	10.7251	2.3389	0.3074	0.4567	4.6652	4066.0	0.2367	0.5237	1.0084	0.1070
34	2013	0.2540	0.2599	10.9634	2.3891	0.3075	0.4642	4.6864	4593.0	0.0638	0.5520	0.8684	0.1283
34	2014	0.2393	0.2333	11.0488	2.3763	0.3086	0.4754	4.6962	3548.0	0.0378	0.5417	0.8552	0.1380
34	2015	0.2829	0.2797	11.0845	2.3982	0.3090	0.4864	4.7138	4616.0	0.0511	0.4949	0.7951	0.1556
34	2016	0.2625	0.2735	11.0308	2.4038	0.3088	0.4749	4.7036	5598.0	-0.001	0.5596	0.8240	0.1454
35	2007	0.1823	0.1578	9.3857		0.3042	0.4271	4.5592	516.0	0.0000	0.9960	0.3003	0.0010
35	2008	0.1394	0.1177	9.5577		0.3045	0.4383	4.5709	375.0	0.1586	0.9861	0.3611	0.0127
35	2009	0.0923	0.0620	9.7686		0.3051	0.4396	4.5734	-417.0	-0.017	0.9980	0.4255	0.0152
35	2010	0.1378	0.1170	9.8165		0.3060	0.4283	4.5638	608.0	0.3249	0.9659	0.4000	0.0056
35	2011	0.1771	0.1207	10.0509		0.3055	0.4324	4.5669	713.0	0.0146	0.9563	0.3754	0.0087
35	2012	0.0962	0.0546	10.2183		0.3085	0.4328	4.5729	-249.0	-0.016	0.9453	0.4306	0.0147
35	2013	0.2136	0.0936	10.2140		0.3131	0.4801	4.6287	562.0	-0.230	0.8935	0.5095	0.0705
35	2014	0.2862	0.1590	10.0663		0.3100	0.4784	4.6212	699.0	0.0935	0.8183	0.5490	0.0630
35	2015	-1.244	-0.336	9.9249		0.3112	0.4368	4.5820	-1663	-0.577	0.6177	0.7097	0.0238
35	2016	-1.094	-0.254	10.2043		0.3041	0.4274	4.5593	-1336	0.1365	0.7155	0.7152	0.0011
36	2007	0.0294	0.0608	8.2207	2.3565	0.3040	0.4482	4.6550	23.0	0.0000	0.5932	0.3764	0.0968
36	2008	0.0708	0.1405	8.4684	2.3621	0.3040	0.4424	4.6507	190.0	0.2314	0.5831	0.3774	0.0925
36	2009	0.0258	0.0539	8.6244	2.4591	0.3040	0.4423	4.6769	75.0	0.2320	0.5453	0.4346	0.1187
36	2010	0.0305	0.0695	8.5299	2.5765	0.4888	0.4482	4.7147	99.0	-0.010	0.5239	0.3355	0.1565
36	2011	0.0526	0.1126	8.6498	2.5001	0.4681	0.4462	4.6919	190.0	0.0599	0.6068	0.3440	0.1337
36	2012	0.0327	0.0817	8.7641	2.4202	0.4464	0.4436	4.6676	164.0	0.3081	0.5095	0.3800	0.1094
36	2013	0.0449	0.0839	9.0006	1.7479	0.4922	0.4552	4.7250	154.0	-0.052	0.5239	0.4708	0.1668

36	2014	0.0332	0.0703	8.9906	1.7236	0.4824	0.4561	4.7161	185.0	0.1228	0.5262	0.4160	0.1579
36	2015	0.0419	0.0909	9.0636	1.6419	0.4496	0.4469	4.6741	206.0	0.1012	0.5040	0.3840	0.1159
36	2016	0.0362	0.0776	9.1270	1.6345	0.4467	0.4453	4.6695	226.0	0.0545	0.4987	0.3808	0.1114
37	2007	0.0098	0.0054	7.0121		0.3540	0.6315	4.7631	-3.0	0.0000	0.9490	0.3604	0.2049
37	2008	0.2122	0.1242	6.8896		1.4925	0.5596	4.6912	33.0	-0.057	0.9264	0.3676	0.1330
37	2009	0.1413	0.0899	7.0630		1.4732	0.5403	4.6719	30.0	0.2922	0.9553	0.4101	0.1137
37	2010	0.1788	0.1348	7.3126		1.4971	0.5642	4.6958	60.0	0.5209	0.9912	0.4543	0.1376
37	2011	0.2157	0.1713	7.3588		1.4822	0.5493	4.6809	81.0	0.1035	0.9888	0.3783	0.1227
37	2012	0.0860	0.0616	7.5822		1.4999	0.5670	4.6986	35.0	0.1283	1.0000	0.4223	0.1404
37	2013	0.0517	0.0337	7.6396		1.4918	0.5589	4.6905	76.0	-0.038	1.0000	0.3824	0.1323
37	2014	0.1534	0.0949	7.5648		1.5716	0.6387	4.7703	56.0	-0.118	1.0000	0.2846	0.2121
37	2015	0.0326	0.0177	7.5924		1.6337	0.7008	4.8324	6.0	-0.099	1.0000	0.2804	0.2742
37	2016	0.2779	0.1443	7.7532		1.5865	0.6536	4.7852	-102.0	0.1257	1.0000	0.2945	0.2270
38	2012	0.2186	0.1469	5.7683		1.3614	0.4285	4.5601	45.0	0.0000	1.0000	0.2438	0.0019
38	2013	0.3387	0.1224	5.8377		1.3631	0.4302	4.5618	6.0	-0.423	1.0000	0.2391	0.0036
38	2014	0.0217	0.0065	5.7301		1.3622	0.4293	4.5609	2.0	-0.258	1.0000	0.2597	0.0027
38	2015	0.0492	0.0191	5.7494		1.3615	0.4286	4.5602	5.0	0.3261	1.0000	0.2675	0.0020
38	2016	0.3750	0.1383	5.6419		1.3629	0.4300	4.5616	-8.0	-0.147	1.0000	0.2730	0.0034
39	2012	-0.093	-0.056	9.5500	1.4976	0.3044	0.4382	4.6083	-60.0	0.0000	0.6690	0.7075	0.0501
39	2013	0.0370	0.0211	9.6886	1.4962	0.1362	0.4377	4.6069	356.0	0.0827	0.8558	0.5606	0.0487
39	2014	-0.013	-0.005	9.6625	1.4828	0.1361	0.4376	4.6013	-13.0	-0.016	0.9217	0.5734	0.0431
39	2015	-0.068	-0.025	10.0482	1.4661	0.1362	0.4385	4.5956	-185.0	-0.070	0.9081	0.4025	0.0374
39	2016	-0.178	-0.056	10.2343	1.4500	0.1364	0.4352	4.5866	-411.0	0.0539	0.9510	0.3554	0.0284
40	2007	-0.440	-0.097	4.7274		0.2560	0.9366	5.5682	-3.0	0.0000	1.0000	0.7080	0.5200
40	2008	-0.166	-0.043	4.5218		0.2562	0.9374	5.5699	-4.0	-0.040	1.0000	0.6413	0.5208
40	2009	0.0182	0.0051	4.3694		0.2675	0.9848	5.6646	3.0	-0.083	1.0000	1.0000	0.5682
40	2010	0.0348	0.0107	4.3175		0.2772	1.0253	5.7456	0.1	0.0455	1.0000	1.0000	0.6087
40	2011	0.0615	0.0113	4.2627		0.3711	1.4166	6.5282	0.4	-0.434	1.0000	0.9859	1.0000
40	2012	0.0455	0.0074	4.2195		0.3929	1.5075	6.7100	0.1	-0.153	1.0000	0.9853	1.0909
40	2013	0.0213	0.0141	4.2627		0.1797	0.6187	4.9325	-2.0	3.2727	1.0000	1.0000	0.2021
40	2014	0.0345	0.0400	3.9120		0.1561	0.5200	4.7351	27.0	0.2340	1.0000	1.0200	0.1034
40	2015	0.0656	0.0506	4.3694		0.1450	0.4740	4.6430	-25.0	0.0517	1.0000	0.9114	0.0574
40	2016	0.0923	0.1224	3.8918		0.1368	0.4397	4.5744	2.0	0.0656	1.0000	1.6122	0.0231
41	2012	0.1017	0.2218	6.5624	1.4667	0.1385	0.4412	4.6081	-13.0	0.0000	0.6664	0.8333	0.0499
41	2013	0.1368	0.2500	6.7754	1.4948	0.1389	0.4422	4.6222	24.0	0.0376	0.6042	0.7740	0.0640
41	2014	0.0788	0.1318	6.9613	1.5068	0.1392	0.4413	4.6273	-8.0	0.1024	0.6162	0.6133	0.0691
41	2015	0.1134	0.1952	7.1907	1.4872	0.1374	0.4538	4.6246	20.0	0.2935	0.6333	0.5614	0.0664
41	2016	0.0935	0.1565	7.3271	1.4791	0.1365	0.4761	4.6399	31.0	0.1148	0.6739	0.5273	0.0827
42	2012	-0.369	-0.046	8.5390	2.6214	0.1451	0.4650	5.1232	0.0	0.0000	1.0000	0.8047	0.5650
42	2013	-1.496	-0.160	8.5639	2.9013	0.1467	0.4738	5.2513	0.0	-0.119	1.0000	0.8593	0.6931
42	2014	-0.097	-0.046	8.5631	1.7382	0.1378	0.4518	4.7251	0.0	3.4520	1.0000	0.9276	0.1669
42	2015	-0.278	-0.099	8.5327	1.8330	0.1382	0.4642	4.7773	0.0	-0.276	1.0000	1.0516	0.2191
42	2016	-0.412	-0.121	8.5468	1.8922	0.1395	0.4418	4.7838	0.0	-0.163	1.0000	1.1998	0.2256
43	2012	0.0988	0.0295	6.7020	1.5440	0.1361	0.5953	4.7832	7.0	0.0000	1.0000	0.0688	0.1687
43	2013	0.0640	0.0192	6.8967	1.6856	0.1361	0.6522	4.8970	6.0	0.2222	1.0000	0.2032	0.2256

43	2014	-0.142	-0.037	7.0519	2.1298	0.1361	0.8306	5.2537	-13.0	0.0168	1.0000	0.2823	0.4040
43	2015	0.0516	0.0322	6.9007	1.5075	0.1361	0.5806	4.7539	10.0	1.0530	1.0000	0.2064	0.1540
43	2016	0.0606	0.0351	6.8752	1.4590	0.1361	0.5612	4.7150	10.0	-0.095	1.0000	0.1467	0.1346
44	2012	-4.333	-0.461	6.3351	2.3583	0.1640	0.6516	5.2832	-78.0	0.0000	1.0000	0.1596	0.7250
44	2013	-4.661	-0.479	6.3509	2.5010	0.1747	0.6385	5.3718	-83.0	-0.016	1.0000	0.1640	0.8136
44	2014	-7.200	-0.347	6.7190	3.3335	0.1720	1.0641	6.1207	-86.0	-0.322	1.0000	0.1268	1.5625
44	2015	-1.396	-0.087	6.8363	3.4280	0.1526	1.0904	5.7823	-24.0	0.4500	1.0000	0.1869	1.2241
44	2016	-2.692	-0.169	6.7166	3.1748	0.1660	1.1670	5.8370	-42.0	-0.103	1.0000	0.1755	1.2788
45	2012	0.0704	0.0338	9.3070	1.8341	0.1368	0.4468	4.5822	222.0	0.0000	0.9593	3.4113	0.0240
45	2013	-0.402	-0.183	9.2431	1.8344	0.1382	0.4539	4.5954	-111.0	-0.109	0.9540	3.6988	0.0372
45	2014	-1.032	-0.341	9.1762	1.8326	0.1396	0.4459	4.5927	-499.0	-0.322	0.9399	4.0911	0.0345
45	2015	-0.591	-0.218	9.5860	1.8318	0.1370	0.4594	4.5947	111.0	0.6888	0.9516	2.9595	0.0366
45	2016	-0.889	-0.268	9.5470	1.8322	0.1370	0.4707	4.6064	314.0	-0.214	0.9620	3.2679	0.0483
46	2012	-1.911	-0.116	7.0139	8.4723	0.6386	0.9266	9.1979	0.0	0.0000	1.0000	0.0081	4.6397
46	2013	-2.000	-0.110	7.0031	10.1131	0.7257	0.9266	10.0664	0.0	-0.102	1.0000	0.0082	5.5082
46	2014	-2.892	-0.150	6.9791	10.6205	0.8747	0.9355	10.8528	0.0	-0.082	1.0000	0.0084	6.2946
46	2015	-0.923	-0.090	7.0917	5.1629	0.5831	0.6300	7.6514	0.0	1.1071	1.0000	0.0125	3.0932
46	2016	-1.346	-0.076	7.4559	5.5776	0.7135	0.7429	8.4357	0.0	-0.169	1.0000	0.0306	3.8776
47	2012	0.0286	0.0250	3.6889		0.1361	1.0266	5.1582	-0.3	0.0000	1.0000	0.7000	0.6000
47	2013	0.0444	0.0455	3.7842		0.1361	0.9377	5.0693	0.5	0.2857	1.0000	0.7727	0.5111
47	2014	0.1806	0.1646	4.3694		0.1361	0.8363	4.9679	3.0	0.6000	1.0000	0.7722	0.4097
47	2015	0.2027	0.1351	4.7095		0.1361	1.1631	5.2947	1.0	0.0278	1.0000	0.6036	0.7365
47	2016	0.2118	0.1154	5.0499	1.8316	0.1361	1.3442	5.4758	2.0	0.1486	1.0000	0.6667	0.9176
48	2012	0.0328	0.0324	8.7675	1.8403	0.1371	0.5688	4.7073	-104.0	0.0000	0.7320	0.3117	0.1491
48	2013	0.0320	0.0300	8.8343	1.8435	0.1370	0.5755	4.7147	-151.0	0.0151	0.6506	0.3166	0.1566
48	2014	0.0236	0.0257	8.8217	1.8424	0.1365	0.5557	4.6926	-51.0	0.1465	0.6379	0.3106	0.1344
48	2015	0.0065	0.0076	8.7651	1.8451	0.1364	0.5352	4.6724	-150.0	0.0283	0.8930	0.2931	0.1142
48	2016	0.0167	0.0196	8.8010	1.8472	0.1364	0.5153	4.6530	12.0	0.0273	0.8756	0.2861	0.0948
49	2007	0.0215	0.0837	9.4933	1.8580	0.1736	0.4590	4.7553	283.0	0.0000	0.6660	0.6243	0.0324
49	2008	0.0256	0.1242	10.2295	1.8996	0.1767	0.4718	4.7938	725.0	1.6059	0.6962	0.6061	0.0452
49	2009	0.0247	0.0742	10.3794	2.1558	0.1956	0.5506	5.0304	639.0	-0.281	0.3934	0.9720	0.1240
49	2010	0.0360	0.1139	10.3802	2.1666	0.1964	0.5540	5.0404	921.0	0.0524	0.3679	1.0000	0.1274
49	2011	0.0274	0.1861	10.3946	2.0214	0.1857	0.5093	4.9063	1660.0	1.1846	0.3684	1.0502	0.0827
49	2012	-0.034	-0.282	10.0726	2.0303	0.1864	0.5120	4.9145	-2680	-0.133	0.6533	1.1079	0.0854
49	2013	0.0209	0.0705	10.3909	1.9811	0.1827	0.4969	4.8690	6.0	-0.430	0.4926	0.6589	0.0703
49	2014	0.0346	0.1142	10.2275	1.9426	0.1799	0.4850	4.8335	430.0	-0.167	0.5329	0.5998	0.0584
49	2015	0.0414	0.2061	9.7629	1.8886	0.1759	0.4684	4.7837	885.0	-0.052	0.4619	0.5077	0.0418
49	2016	0.0367	0.1569	10.0942	1.8929	0.1762	0.4697	4.7876	1125.0	0.1957	0.4680	0.5923	0.0431

Appendix 6 Sampling Frame

The following is the distribution of members across the 13 sectors of KAM, but may be reviewed from time to time as may be directed by the Board.

Building, Mining & Construction

1. Skylark Construction Ltd
2. Wareng Ndovu Enterprises 2005
3. Athi River Mining Ltd
4. Bamburi Cement Limited
5. Bamburi Special Products Ltd
6. Central Glass Industries
7. Flamingo Tiles (Kenya) Limited
8. Glenn Investments Ltd C/O
9. Homa Lime Company Ltd
10. Karsan Murji and Company Limited
11. Kay Salt Ltd
12. Kemu Salt Packers
13. Kenbro Industries Ltd
14. Kenya Builders and Concrete Ltd
15. Malindi Salt Works
16. Manson Hart Kenya Ltd
17. Mombasa Cement Ltd
18. Orbit Enterprises Ltd
19. Saj Ceramics Ltd
20. Savannah Cement

Chemical & Allied Sector

1. Basco Products (K) Ltd
2. Bayer East Africa Ltd
3. Beiersdorf East Africa Ltd
4. Blue Ring Products Ltd
5. BOC Kenya Limited
6. Buyline Industries Limited
7. Canon Chemicals Limited (Former United Chemicals) Ltd
8. Carbacid (CO2) Limited
9. Chemicals And Solvents (EA) Ltd
10. Chrysal Africa Limited
11. Coates Brothers (E.A.) Limited
12. Continental Products
13. Coopers K Brands Ltd
14. Crown Berger Kenya Ltd
15. Crown Gases Ltd

16. Crown Paints (Kenya) Ltd
17. Darfords Enterprises Ltd
18. Deluxe Inks Ltd
19. Desbro Kenya Limited
20. Diversey Eastern and Central Africa Limited
21. Eastern Chemicals Industries
22. Elex Products Ltd
23. Eveready Batteries East Africa Ltd
24. Faaso Exporters Ltd
25. Galaxy Paints and Coating Co. Ltd
26. Grand Paints Ltd
27. Haco Tigerbrands East Africa Ltd
28. Henkel Kenya Ltd
29. Intercomsumer Products Ltd
30. Johnson Diversey East Africa
31. KAPI Limited
32. Kel Chemicals Limited
33. Kip Melamine Co. Ltd
34. Kridha Limited
35. Maroo Polymers Ltd
36. Match Masters Ltd
37. MEA Ltd
38. Metoxide Africa Ltd
39. Milly Glass Works Ltd
40. Murphy Chemicals Ltd
41. Oasis Limited
42. Odex Chemicals Ltd
43. Orbit Chemicals Industries Limited
44. Orbit Enterprises Ltd
45. Osho Chemicals Industries Ltd
46. Pan Africa Chemicals Ltd
47. Polychem East Africa
48. Procter and Gamble East Africa Ltd
49. PZ Cussons EA Ltd
50. Reckitt Benckiser (E.A.) Ltd
51. Revolution Stores Ltd
52. Rumorth Group of Companies Ltd
53. S C Johnson And Son Kenya
54. Sadolin Paints (E.A.) Ltd
55. Sanergy
56. Soilex Prosolve Limited
57. Strategic Industries Limited
58. Supa Brite Ltd
59. Superfoam Ltd
60. Syngenta East Africa Ltd
61. Synresins Ltd
62. Tata Chemicals Magadi Ltd
63. Tri-Clover Industries (K) Ltd
64. Twiga Chemical Industries Limited

65. Unilever East and Southern Africa

66. Vitafoam Products Limited

67. Westminister Paints and Resins Ltd

Energy, Electrical & Electronics

1. Alloy Steel Casting Ltd
2. Amedo Centre Kenya Ltd
3. Assa Abloy East Africa Limited
4. Aucma Digital Technology Africa Ltd
5. Avery East Africa Ltd
6. Baumann Engineering Limited
7. Biogas Power Holdings (EA) Ltd
8. Centurion Systems Limited
9. East African Cables Ltd
10. Holman Brothers (E.A) Ltd
11. Iberaafrica Power (EA) Ltd
12. International Energy Technik Ltd
13. Karan Biofuel Ltd
14. Kenwest Cables Ltd
15. Kenya Power Ltd
16. Libya Oil Kenya Limited (Formerly Mobil Oil Kenya)
17. Manufacturers and Suppliers (K) Ltd
18. Marshall Fowler (Engineers)
19. Metlex International Ltd
20. Metsec Ltd
21. Mustek East Africa Limited
22. Optimum Lubricants Ltd
23. PCTL Automation Ltd
24. Pentagon Agencies
25. Power Technics Ltd
26. Powerex Lubricants
27. Reliable Electricals Engineers (Nrb) Ltd
28. Socabelec (EA) Ltd
29. Solimpexs Africa Ltd
30. Sollatek Electronics (Kenya) Limited
31. Specialised Power Systems Ltd
32. Synergy-Pro
33. Virtual City Ltd
34. Vivo Energy Kenya Ltd

Food & Beverages

1. Africa Spirits Limited
2. Agriner Agricultural Development
3. Agro Chemical and Food Company Ltd
4. Alpine Coolers Limited
5. Arkay Industries Ltd
6. Belfast Millers Ltd
7. Broadway Bakery Ltd
8. Brookside Dairy Ltd
9. Bunda Cakes and Feeds Ltd
10. Buzeki Dairy Limited
11. C. Dormans Ltd
12. Candy Kenya Ltd
13. Capwell Industries Limited
14. Chirag Kenya Limited
15. Deepa Industries Limited
16. Edible Oil Products
17. Europack Industries Limited
18. Farmers Choice Ltd
19. Githunguri Dairy Farmers CoOperative Society
20. Global Fresh Ltd
21. Global Tea and Commodities (K) Limited
22. Gonas Best Ltd
23. Green Forest Foods Ltd
24. Happy Cow Ltd
25. Insta Products (EPZ) Ltd
26. Jambo Biscuits (K) Ltd
27. Kabianga Dairy Ltd
28. Kakuzi Ltd
29. Kapa Oil Refineries Limited
30. Kenafric Industries Ltd
31. Kenblest Limited
32. Kenya Nut Company Ltd
33. Kenya Sweets Ltd
34. Kenya Tea Development Agency
35. Kenya Tea Growers Association
36. Kevian Kenya Ltd
37. Kwality Candies and Sweets Ltd
38. Lari Dairies Alliance Ltd
39. London Distillers
40. Mafuko Industries Limited
41. Mayfeeds Kenya Limited
42. Milly Fruit Processors Ltd
43. Mini Bakeries (Nbi) Ltd
44. Mjengo Ltd
45. Mombasa Maize Millers

46. Mount Kenya Bottlers Ltd
47. Mzuri Sweets Ltd
48. NAS Airport Services Ltd
49. Nesfoods Industries Ltd
50. Nestle Foods Kenya Ltd
51. New Kenya Co-Operative Creameries Ltd
52. Nicola Farms Ltd
53. Nutro Manufacturers EPZ Ltd
54. Palmhouse Diaries Ltd
55. Patco Industries Limited
56. Pearl Industries Ltd
57. Pembe Flour Mills Ltd
58. Proctor and Allan (E.A.) Ltd
59. Promasidor Kenya Ltd
60. Sigma Supplies Ltd
61. Spice World Ltd
62. The Breakfast Cereal Company (K) Ltd
63. Unga Group Ltd
64. United Millers Ltd
65. Usafi Services Ltd
66. Valley Confectionery Ltd
67. Valuepak Foods
68. W. E. Tilley (Muthaiga) Ltd
69. Wanainchi Marine Products (K) Limited
70. Wrigley Company (E.A.) Ltd
71. Xpressions Flora Ltd

Leather & Footwear

1. Alpharama Limited
2. Bata Shoe Company (Kenya) Ltd
3. Budget Shoes Limited
4. C and P Shoe Industries Ltd
5. Leather Industries of Kenya Limited
6. Sandstorm Africa Limited
7. Zingo Investments Limited

Fresh Produce

1. Avoken Limited
2. Fontana Limited
3. Maridadi Flowers Lt

Metal & Allied Sector

1. African Marine and General Engeeniring Co. Ltd
2. Allied East Africa Ltd
3. Alloy Steel Casting Ltd
4. Apex Steel Limited
5. Apex Steel Limited - Rolling Mill Division
6. Ashut Engineers Ltd
7. ASL Limited- Steel Division
8. ASP Company Ltd
9. Athi River Steel Plant
10. Blue Nile Wire Products Ltd
11. Booth Extrusions Limited
12. Brollo Kenya Limited
13. City Engineering Works (K) Limited
14. Cook N Lite Ltd
15. Corrugated Sheets Ltd
16. Crystal Industries Ltd
17. Davis and Shirtliff Ltd
18. Devki Steel Mills Ltd
19. Doshi Enterprises Ltd
20. East Africa Glassware Mart Ltd
21. East Africa Spectre Limited
22. East African Foundry Works (K) Ltd
23. Elite Tools
24. Elite Tools Ltd
25. Farm Engineering Industries Limited
26. Friendship Container Manufacturers Ltd
27. General Aluminum Fabricators Ltd
28. Greif East Africa Ltd
29. Hobra Manufacturing Ltd
30. Insteel Limited
31. Kaluworks Ltd
32. Kens Metal Industries

33. Kenya General Industries Ltd
34. Khetshi Dharamshi and Co. Ltd
35. Kitchen King Ltd
36. Laminate Tube Industries Limited
37. Mabati Rolling Mills Limited
38. Marvel Lifestyle Ltd
39. Mecol Limited
40. Metal Crowns Ltd
41. Modulec Engineering Systems Ltd
42. Nail and Steel Products Ltd
43. Nampak Kenya Ltd
44. Napro Industries Limited
45. Narcol Aluminium Rolling Mills Ltd
46. Ndume Ltd
47. Orbit Engineering Ltd
48. Richfield Engineering Ltd
49. Rolmil Kenya Ltd
50. Sheffield Steel Systems Ltd
51. Soni Technical Services Ltd
52. Southern Engineering Co. Ltd
53. Specialised Engineering Co. (EA) Ltd
54. Standard Rolling Mills Ltd
55. Steel Structures Ltd
56. Steelmakers Ltd
57. Steelwool (Africa) Ltd
58. Tarmal Wire Products Ltd
59. Technosteel Industries Limited
60. Tononoka Steel Ltd
61. Vicensa Investments Ltd
62. Viking Industries Ltd
63. Warren Enterprises Ltd
64. Welding Alloys Limited
65. Wire Products Ltd

Motor Vehicle & Accessories

1. Alamdar Trading Company Limited
2. Associated Battery Manufacturers (EA) Ltd
3. Associated Vehicle Assemblers Ltd
4. Auto Ancillaries Ltd
5. Auto Springs Manufacturers Ltd Company
6. Autofine Filters and Seals Ltd
7. Automotive and Industrial Battery Manufacturers

8. Banbros Ltd
9. Bhachu Industries Ltd
10. Chui Auto Spring Industries Ltd
11. CICA Motors
12. Foton East Africa Ltd
13. General Motors East Africa Limited
14. Impala Glass Industries Ltd.
15. Kenya Grange Vehicle Industries Ltd
16. Kenya Vehicle Manufacturers Limited
17. King-Bird (K) Ltd
18. Labh Singh Harnam Singh Ltd
19. Mann Manufacturing Co. Ltd
20. Megh Cushion Industries Ltd
21. Mutsimoto Company Limited
22. Pipe Manufacturers Ltd
23. Sohansons Limited
24. Theevan Enterprises Ltd
25. Toyota Kenya Ltd
26. Unifilters Kenya Ltd
27. Varsani Brake linings Ltd

Paper & Board

1. Paper House of Kenya Ltd
2. Adpak International Limited
3. Allpack Industries Ltd
4. Andika Industries Ltd
5. Associated Paper and Stationery Ltd
6. Autolitho Ltd
7. Bag and Envelope Converters
8. Bags and Balers Manufacturers (K) Ltd
9. Cempack Solutions Ltd
10. Chandaria Industries Ltd
11. Colour Labels Ltd
12. Colour Packaging Limited
13. Colourprint Ltd
14. D.L Patel Press Ltd
15. De La Rue Currency and Security Print Ltd
16. Dodhia Packaging Limited
17. East Africa Packaging Industries Limited
18. Elite Offset Ltd
19. Ellams Products
20. Ellams Products Ltd
21. English Press Limited

22. Flora Printers Ltd
23. General Printers Limited
24. Graphics and Allied Ltd
25. Guaca Stationers Ltd
26. Highland Paper Mills Ltd
27. Icons Printers Ltd
28. Interlabels Africa Ltd
29. International Paper and Board Supplies Ltd
30. Kartasi Industries Limited
31. Kenafric Diaries Manufacturers Limited
32. Kenya Litho Ltd
33. Kim-Fay East Africa Ltd
34. L.A.B International Kenya Limited
35. Label Converters
36. Manipal International Printing Press Ltd
37. Modern Lithographic (K) Ltd
38. Mufindi Paper Ltd
39. Nation Media Group Limited Printing Plant
40. National Printing Press Limited
41. Packaging Manufacturers (1976) Ltd
42. Palmy Enterprises
43. Paper House of Kenya Ltd
44. Paperbags Limited
45. Pressmaster Ltd
46. Printing Services Ltd
47. Printpak Multi Packaging Ltd
48. Printwell Industries ltd
49. Punchlines Ltd
50. Ramco Printing Works Ltd
51. Regal Press Kenya Ltd
52. Sintel Security Print Solutions Ltd
53. Soloh Worldwide InterEnterprises Ltd
54. Stallion Stationary Manufacturers Ltd
55. Standard Group Ltd
56. Statpack Industries Ltd
57. Taws Limited
58. Tetra Pak Ltd
59. The Rodwell Press Ltd
60. Twiga Stationers and Printers Ltd
61. Uneeco Paper Products Ltd
62. United Bags Manufacturers Ltd

Pharmaceutical & Medical Equipment

1. African Cotton Industries Ltd
2. Alpha Medical Manufacturers Ltd
3. Beta Healthcare International
4. Biodeal Laboratories Ltd
5. Biopharma Ltd
6. Cosmos Limited
7. Dawa limited
8. Elys Chemical Industries Limited
9. Gesto Pharmaceuticals Ltd
10. Glaxo Smithkline Kenya Ltd
11. KAM Industries
12. Laboratory and Allied Limited
13. Manhar Brothers (K) Ltd
14. Medivet Products Ltd
15. Novelty Manufacturing Ltd
16. Oss.chemie (K) Limited
17. Pharm Access Africa Ltd
18. Pharmaceutical Manufacturung Co. (K) Ltd
19. Regal Pharmaceuticals Ltd
20. Revital Healthcare (EPZ) Ltd
21. Universal Corporation limited

Plastics & Rubber

1. ACME Containers Ltd
2. Afro Plastics (K) Ltd
3. Betatrad (K) Ltd
4. Bluesky Industries Ltd
5. Bobmil Industries Ltd
6. Brush Manufacturers
7. Cables and Plastics Ltd
8. Canaaneast Company
9. Complast Industries Limited
10. Coninx Industries Ltd
11. Dune Packaging Limited
12. Dynaplas Limited
13. Elgon Kenya Ltd
14. Eslon Plastics of Kenya Ltd
15. Five Star Industries Ltd
16. Fleya Kenya Limited
17. General Plastics Limited
18. Hi-Plast Ltd
19. Jamlam Industries Ltd
20. Jumbo Chem
21. Kamba Manufacturing (1986) Ltd
22. Kenpoly Manufacturers Limited

23. Kenrub Ltd
24. Kentainers Ltd
25. Kenya Suitcase Manufacturers Limited
26. King Plastic Industries Ltd
27. Kinpash Enterprises Ltd
28. L.G. Harris and Co. Ltd
29. Laneeb Plastic Industries Ltd
30. Metro Plastics Kenya Limited
31. Mombasa Polythene Bags Ltd
32. Nairobi Plastics Ltd
33. Ombi Rubber Rollers Ltd
34. Packaging Industries Ltd
35. Packaging Masters Limited
36. Plastic Electricons
37. Plastics and Rubber Industries Ltd
38. Polly Propelin Bags Ltd
39. Polyblend Limited
40. Polyflex Industries Limited
41. Polythene Industries Ltd
42. Premier Industries Limited
43. Prosel Ltd
44. Pyramid Packaging Ltd
45. Raffia Bags (K) Ltd
46. Rubber Products Ltd
47. Safepak Limited
48. Sameer Africa Ltd
49. Sanpac Africa Ltd
50. Shiv Enterprises (E) Ltd
51. Signode Packaging Systems Ltd
52. Silpack Industries Limited
53. Solvochem East Africa Ltd
54. Springbox Kenya Ltd
55. Styroplast Limited
56. Sumaria Industries Ltd
57. Super Manufacturers Ltd
58. Techpak Industries Ltd
59. Thermopak Ltd
60. Top Pak Ltd
61. Treadsetters Tyres Ltd
62. Umoja Rubber Products Limited
63. Uni-Plastics Limited
64. Vectus Kenya
65. Vyatu Ltd
66. Wonderpac Industries Ltd
67. Zaverchand Punja Ltd

Textile & Apparels

1. Adpack Limited
2. Alltex EPZ Ltd
3. Alpha Knits Ltd
4. Ashton Apparel EPZ Ltd
5. Bedi Investments Limited
6. Brilliant Garments
7. Fantex (K) Ltd
8. Kamyn Industries Limited
9. Kavirondo Filments Ltd
10. Kema (EA) Limited
11. Ken-Knit (Kenya) Ltd
12. Kenwear Garment Manufacturers
13. Kikoy Co. Ltd
14. Le Stud Limited
15. Leena Apparels Ltd
16. Lifeworks Shukrani Limited
17. Longyun Garments
18. Midco Textiles (EA) Ltd
19. New Wide Garments (K) Ltd
20. Ngecha Industries Ltd
21. Senior Best Garments Kenya EPZ Ltd
22. Shin-Ace Garments Kenya (EPZ) Ltd
23. Spin Knit Limited
24. Spinners and Spinners Ltd
25. Squaredeal Uniforms Centre Ltd
26. Straightline Enterprises
27. Summit Fibres Limited
28. Sunflag Textile and Knitwear Mills Ltd
29. Tarpo Industries Limited
30. Teita Estate Ltd
31. Thika Cloth Mills Ltd
32. United Aryan (EPZ) Ltd
33. Vajas Manufacturers Ltd
34. Wildlife Works (EPZ) Ltd
35. World of Kikoys

Timber, Wood & Furniture

1. Comply Industries Ltd
2. Economic Housing Group Ltd
3. Elburgit Enterprises Ltd
4. Fine Wood Works Ltd
5. Furniture International Limited
6. Kenya Wood Limited

7. Newline Ltd
8. Panesars Kenya Ltd
9. PG Bison Ltd
10. Rai Plywoods (Kenya) Ltd
11. Rosewood Furniture Manufacturers
12. Shah Timber Mart Ltd
13. Shamco Industries Ltd
14. Shayona Timber
15. Timber Treatment International Ltd
16. Timsales Ltd
17. Woodtex Kenya Ltd

Source: Kenya Association of Manufacturers website, http://www.manufacturersandexportersdirectory.co.ke/index.php retrieved on 27th November 2017

Appendix 7 List of Publications

1. Ndung'u, S., Kibati P., & Muhanji S. (2019). Product Diversification and the Financial Performance of Manufacturing Companies in Kenya. *Journal of Economics and Finance*, *10*(6), 43-50.
2. Ndung'u, S. K., Kibati, P., & Muhanji, S. (2020). Evaluation of the Nexus between Revenue Volatility from Commodity Sales and Financial Performance of Manufacturing Companies in Kenya. *International Academic Journal of Economics and Finance*, *3*(5), 238-250.