ANTI-COUNTERFEIT MEASURES AND THEIR EFFECTS ON BALANCE OF TRADE AND PERFORMANCE OF THE MANUFACTURING SECTOR IN KENYA

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NOVEMBER, 2024

DECLARATION

This thesis is my original work and has not been presented for a degree or for any other award in any University.

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DEDICATION

Dedicated to my dear wife Mary, my sons Oneronny and Donmyles, and my parents and friends.

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I thank the all-powerful God who has allowed me to progress this far by giving me education and good health. Additionally, I appreciate my supervisors, Prof. Perez Onono and Prof. Nelson Wawire, for their encouragement, support, and helpful criticism in ensuring that the thesis is completed to the best of my ability.

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ABBREVIATIONS AND ACRONYMS

ACA	Anti-Counterfeit Authority
ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
BETA	Bottom-Up Economic Transformation Agenda
BG	Breusch Godfrey
BIC	Bayesian Information Criterion
DF	Dickey Fuller
ECM	Error Correction Model
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
HQIC	Hannan Quinn Information Criterion
IC	Information Criteria
IPR	Intellectual Property Right
IRF	Impulse Responses Functions
KAM	Kenya Association of Manufacturers
MPA	Manufacturing Priority Agenda
OECD	Organization for Economic Cooperation and Development
PP	Phillips Perron
SBIC	Schwarz Bayesian Information Criterion
SC	Schwarz Criterion
SVAR	Structural Vector Autoregression
USD	United States Dollars
VAR	Vector Autoregression

OPERATIONAL DEFINITION OF TERMS

Anti-Counterfeit Output: The value of counterfeit goods confiscated from the Kenyan market.

Anti-Counterfeit Measures: These are actions taken by the government of Kenya to stop the proliferation of counterfeit goods including creation of public awareness on counterfeit goods by the Anti-counterfeit Authority (ACA) and enforcement of the anti-counterfeit law.

Balance of Payment: Is a systematic record of all the economic transactions between residents of a particular country and the rest of the world over a given period of time.

Balance of Trade: This is the difference between value of exports and imports.

Counterfeit Good: A product that deceives a customer by closely mimicking the look of the original product.

Employment: This is engagement in an economic activity which considers employable person above fifteen years but below sixty-four years having paid work.

Gross Domestic Product: The total monetary value of all final and finished goods and services produced in Kenya over a period of time usually one year.

Manufacturing: The physical or chemical transformation of materials, substances or components into new products.

ABSTRACT

Manufacturing is one of the most important economic sectors in Kenya. Although the sector is expected to propel Kenya into an industrialized middle-income nation and reduce the trade deficit by 2030, the country's gross domestic product decreased from 13 percent in 2010 to 8 percent in 2022. Presence of counterfeit goods in the market is a persistent element that challenges growth of the sector. Counterfeit goods cost Kenya's manufacturing industry approximately 68 billion Shillings annually in lost sales, 70 percent of which are reported to occur in the energy, electrical and electronics, building, mining and construction, plastic and rubber, textiles and apparels, metal and allied sectors. The dismal performance of the manufacturing sector may have contributed to poor performance of Kenya's external balance. Kenya experienced a trade deficit of USD 11.4 billion in 2023. The Kenyan government established the Anti-counterfeit Authority to counter trade in counterfeit goods. The authority's anti-counterfeit measures involve public awareness and enforcement of the anti-counterfeit law. Despite the budget allocations to these efforts, counterfeit goods continue to command a substantial share of the goods market in Kenya. Increase in counterfeit goods has the potential of stifling the manufacturing sector and compromise government's effort in reversing the declining trend in the manufacturing sector. Counterfeit goods can also have adverse effects on balance of trade by discouraging production for exports. A study on counterfeit goods and effectiveness of anti-counterfeit measures was deemed necessary to understand the factors causing demand for counterfeit goods, the effect of anti-counterfeit measures on manufacturing and balance of trade in Kenya. The objectives of the study were to: examine the determinants of demand for counterfeit goods in Kenya, determine the effect of anti-counterfeit measures on the performance of the manufacturing sector in Kenya, and establish the effect of anti-counterfeit measures on balance of trade in Kenya. The study used time series data for the period 2010 to 2020. The data was obtained from publications of the Anti-Counterfeit Authority, the Kenya National Bureau of Statistics and the Central Bank of Kenya. The study adopted an Autoregressive Distributed Lag model to estimate the first and second objectives. A structural vector autoregressive model was used to estimate the third objective. The results showed that an increase in public awareness by one percent leads to decrease in value of counterfeit goods seized by 3.73 percent *ceteris paribus*. In addition, an increase in budgetary allocation enforcement of the anti-counterfeit law leads to a decrease in value of counterfeit goods seized by 3.44 percent *ceteris paribus*. The results showed that an increase in public awareness by one percent leads to increase in value added by the manufacturing sector to the GDP by 0.33 percent ceteris paribus. In addition, an increase in budgetary allocation to enforcement of the anti-counterfeit law leads to a decrease in the value added by the manufacturing sector to the GDP by 0.24 percent *ceteris paribus*. The impulse response function showed that shocks to logarithm of expenditure on public awareness regarding the effects of counterfeit goods by one standard deviation increases the balance of trade for the first two periods. The findings imply that anti-counterfeit measures reduce counterfeit goods thus improving the manufacturing sector's output and balance of trade. The study therefore recommends that government should allocate more funds to the Anti-Counterfeit Authority for effective implementation of their mandate.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

As global trade continues to expand, the proliferation of counterfeit goods poses significant challenges to economies worldwide, particularly in developing nations like Kenya. This thesis investigates anti-counterfeit measures and their effects on balance of trade and the performance of the manufacturing sector in Kenya.

1.1.1 Global View of Counterfeit Goods

Trade in counterfeit goods is a global problem that is worsening by the day, affecting brands and consumers. It is considered a major economic problem and is the world's fastest-growing crime wave (Phillips, 2007). The existence of counterfeit goods has a wide range of implications on brands as well as consumers. While brands lose sales, customer loyalty and reputations, consumers spend money on low-quality products (Organization for Economic Co-operation and Development (OECD), 2018). Aside from that, there are far-reaching effects, such as a decline in economic growth of a country, health and safety issues especially because of buying medicine, cosmetics and electronics that are fake (OECD, 2018). The fake goods are a product of sub-par materials and those whose safety standards are not checked during manufacturing (OECD, 2018).

According to the OECD, trade in counterfeit goods accounts for an estimated 2.5 percent of the world's trade volume each year, and that global trade in fake goods is on the rise (OECD, 2021). Generally, trade in counterfeit goods is growing internationally in scope, scale, and threat. Counterfeit goods infringe on trademarks and industrial designs while pirated goods infringe on literary and artistic works. Figure 1.1 shows the trade of global trade in counterfeit and pirated products in the period 2013 – 2020.

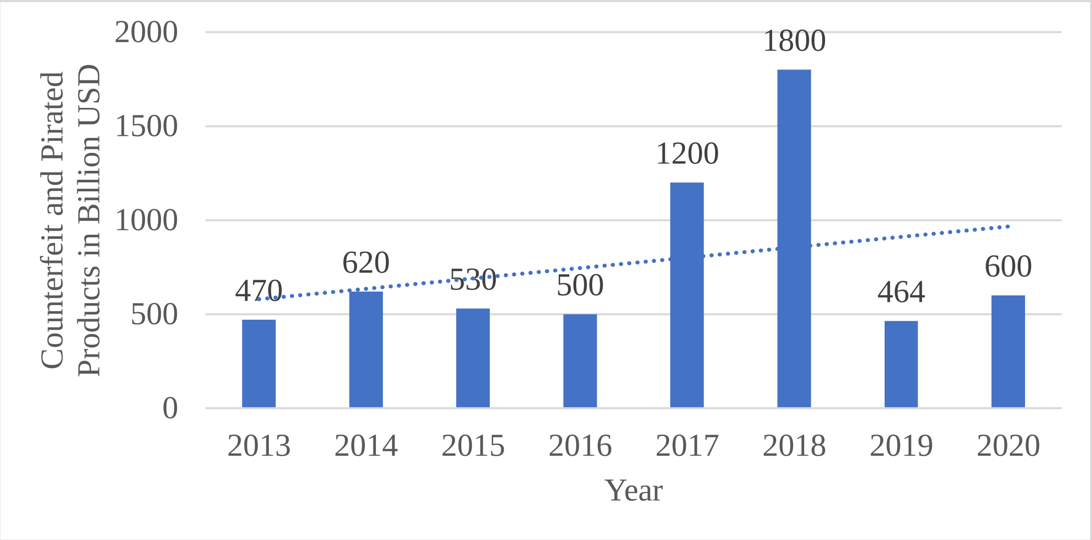

Figure 1.1: Estimates of Global Trade in Counterfeit and Pirated Products in Billion USD

Source*: OECD, 2021*

From figure 1.1, the trends of trade in counterfeit and pirated products are on the rise. The trade in counterfeit was 470 billion USD in 2013. However, the amount increased to USD 1800 billion USD in 2018 but later dropped to 464 billion USD in 2019. The amount of trade in counterfeit and pirated products later increased to 600 billion USD in 2020. The rise in counterfeits could be a result of misuse of free trade zones and counterfeiters thriving in economies where trade regulation and governance standards are weak (OECD, 2021).

The increase in counterfeit goods in the market adversely affects brands causing loss of brand name, reduced sales revenue, job losses, and decreased output (OECD, 2018). This has forced the companies to create and put into action a worldwide anti-counterfeit measures that prioritize the needs of the customer. Priority two countermeasures include increased enforcement and public education about the dangers of consuming counterfeit goods. Firms also undertake various measures to mitigate counterfeiting. For instance, while firms engage in legal actions they can also invest in training and technology as well as vertical integration with their retailers (Guan & Rehme, 2012). Nations that have a robust representation of trademark holders have established anti-counterfeit associations with membership organizations promoting adequate IPR protection, information collecting and liaison with enforcement authorities (Organization for Economic Co-operation and Development, 1998). National anti-counterfeit authorities mainly focus on enforcement of the anti-counterfeit law and public awareness creation on the effects of counterfeit goods on the economy as a way of curbing counterfeits (Rullani, Beukel, & De Angelis, 2021).

The distribution of counterfeit goods is an issue of concern in Africa. Trade in counterfeit goods is a lucrative industry at global level according for about 7 percent of total trade in the world. The trade is rampant among the developing regions especially Africa that are characterized by high poverty levels and weak regulatory systems. This counterfeit trade poses economic implications in Africa. The economic implications include loss of tax revenue, rise in unemployment and shifting of business opportunities to foreign countries. It is argued that trade in counterfeit hinders the continent’s long-term development through allowing criminal activity. It also reduces innovation of local businesses. The counterfeit goods are also said to be a major health issues in the continent exposing African people to harmful electronic devices and medicines (Meeking, 2013).

1.1.2 Counterfeit Goods in Kenya

The presence of counterfeit goods in the Kenyan market is one of the problems that have affected performance in the manufacturing sector and also balance of trade in Kenya (Ngethe, 2017). Such trade also leads to job losses, lowers foreign direct investment and contributes to loss of government revenue through tax evasion and affects investment by prospective manufacturing firms (Ngethe, 2017). The counterfeit goods do not only infringe on the intellectual property rights of the genuine manufacturers but also wear down the image of their products and firms at large (Kenya Association of Manufacturers, 2017).

The manufacturing sector in Kenya is estimated to lose over KES 68 billion in annual sales as a result of counterfeit goods (Anti-Counterfeit Authority, 2020). Trade in counterfeit goods is one of the dominant components of illicit trade whose total value in Kenya stood at KES 826 billion in 2018 (Anti-Counterfeit Authority, 2020). Counterfeit products also have had direct adverse effects the lives of Kenyans as they pose health risks (Kenya Association of Manufacturers, 2017).

Trade in counterfeit is rampant in the Kenyan market because their prices attracts both consumers and middlemen, and are easily distributed without detection (Fink *et al*., 2016). However, quantifying the value of counterfeit goods is difficult because of the clandestine nature of the goods and illicit trade in general. This notwithstanding, quantifying counterfeit market value is vital both for understanding its effect on the market and determining how best to combat the vice. Use of law enforcement output, such as value of seized goods is considered one of the most important sources of information that can assist in triangulation of counterfeit market dynamics (Fink *et* *al*., 2016; Pratt and Zeng, 2020). Figure 1.2 shows the value of seized goods by Anti-Counterfeit Authority for the period 2010 to 2022.

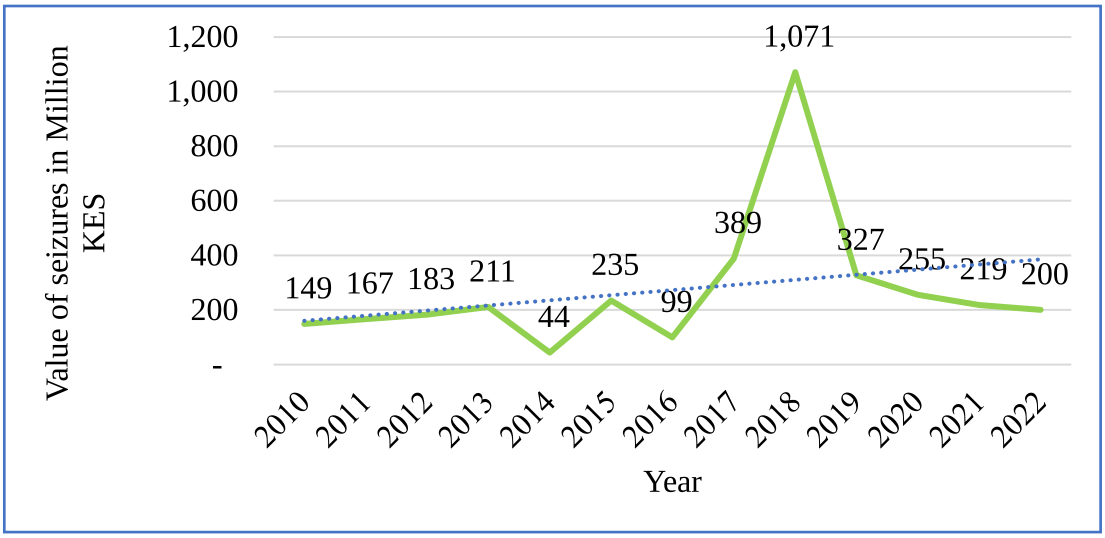

Figure 1.2: Value of seized Counterfeit Goods by Anti-Counterfeit Authority in Million KES

Source: *Anti-Counterfeit Authority (2023)*

As shown in Figure 1.2 counterfeit seizures slightly increased from 2010 to 2013 but dropped in 2014. According to Anti-Counterfeit Authority (2019), this could be attributed to decreased inspections and subsequently seizures following the exit of inspectors from the Authority. The seizures then drastically rose in 2015 when the Authority employed more inspectors for enforcement purposes. Again in 2016, there was a drop-in seizures to KES 99 million as compared to KES 235 million of 2015. This drop may have been as a result of reduced budgetary allocation to the Authority before rising again in 2017 to KES 39 million (Anti-Counterfeit Authority, 2019). According to Glasner (2019), producing a good is enough to create demand for it. The seizures reflect availability of counterfeit goods in the Kenyan market. From 2010 to 2017, Anti-Counterfeit Authority has seized counterfeit goods worth KES 1.7 billion and destroyed counterfeit products worth KES 700 million (Anti-Counterfeit Authority, 2019).

Trade in counterfeit goods is penalized in Kenya by a fine or jail, and the severity of the penalty imposed is proportional to the offense committed according to the established legislation. The Anti-Counterfeit Regulations operationalized the Anti-Counterfeit Authority in June 2010 (Ongola, 2014). The Commercial Law Guidebook was also launched by stakeholders to streamline the general understanding of illicit trade in counterfeit goods. Further, the Anti-Counterfeit sub-committee established in 2005 by manufacturers in the country to push the government to take notice of the unfair competition caused by counterfeit goods (Ongola, 2014).

The Anti-Counterfeit Authority (ACA) was established with the main aim of prohibiting trade in counterfeit goods and determining penalties for counterfeiters as a way of preventing the vice (Ongola, 2014). The authority also sensitizes and apprise the public on matters concerning counterfeiting, how to fight counterfeiting, and devising and promoting training programmes to combat trade in counterfeiting and other dealings. The authority together with many organizations and regulatory agencies work together to consolidate efforts that foster inter-agency corporations to combat this growing trade. For example, the Authority has worked in partnership with other law enforcement agencies and KAM to come up with inter-agency interventions in the fight against counterfeit goods and other forms of illegal trade.

The main argument of this study is that the real economic effect is the extent to which infiltration of counterfeit goods leads to displacement of genuine economic activities in the manufacturing sector and balance of trade channels of the economy. The study approaches this problem by evaluating the extent to which anti-counterfeit measures deter counterfeit activity in the Kenyan market. In light of this argument, the study sought to evaluate the determinants of demand for counterfeit goods, measured using value of seized goods, and its effect on performance of the manufacturing sector and balance of trade in Kenya.

1.1.3 Manufacturing Sector in Kenya

The manufacturing sector in Kenya has been identified as one of the country's most important sectors in growing the economy. The sector is projected to drive the country into an industrialized middle-income economy by the year 2030 according to Kenya Vision 2030, the country's economic Blue Print (Republic of Kenya, 2007). Kenya Vision 2030 targets to transform Kenya into an industrial hub by developing a strong, diverse, and competitive manufacturing industry (Republic of Kenya, 2007). The Medium-Term Plan (MTP) III of the Vision 2030 which largely focused on the "Big Four" agenda targeted to increase manufacturing sector's contribution to GDP to 15 percent by the year 2022 from 8.4 percent in 2018 in order to create more jobs and wealth in the economy (Republic of Kenya, 2017). The Manufacturing Priority Agenda (MPA) launched in 2018 established a multi-Agency Team made up of representatives from several institutions to combat illicit trade in Kenya. The Ministry of Industrialization, Trade and Enterprise Development's National Export Development and Promotion Strategy, designed under the MPA agenda, aims to minimize the balance of trade deficit by growing exports at a 25 percent annual rate (Kenya Association of Manufacturers, 2019).

Kenya produces both food and non-food products. The manufactured food products registered a growth of 0.7 percent in 2023 as compared to a growth of 1.7 percent that was recorded in 2022. This impressive growth was principally driven by increased production of dairy products, prepared and preserved fruits and vegetables, animal and vegetable fats and oils and bakery products. The Kenya's manufacturing sector produces 552.9 million litres of milk, about 1,495,700 and 625,300 tonnes of wheat and maize flour. The country's manufacturing sector also produces 10,200 tonnes of biscuits, 226,100 tonnes of cooking oil, 244,200 tonnes of edible fats and margarine, 472,800 tonnes of sugar, 27,500 tonnes of milled coffee and 570,400 tonnes of tea. The country also produces 580,500 tonnes of soft drinks (Republic of Kenya, 2024).

For non-food products, the country manufacturing sector assembled 13,106 vehicles and produced 272,500 tonnes of galvanized sheets. The sector also produces leather and related products, wood and products of wood, chemical and chemical products, machinery and equipment, motor vehicles, trailers and semi-trailers. The sector also produces other non-metallic mineral products, which mainly consists of cement. In 2023, Kenya exported 190,800 tonnes of cement to Uganda and Tanzania. The country also exported 263,600 tonnes of cement to other countries during the same year. In the year 2023, the bulk of Kenya's exports were destined to the Africa continent. The exports to this destination were valued at KES 435 billion, translating to 43.2 percent of the country's total export earnings. This performance accounted for 21.6 percent increase compared to the year 2022. The development was mainly supported by increase in exports to the East African Community (EAC) bloc which contributed 30.3 percent to the total exports' earnings, in the same period (Republic of Kenya, 2024).

The presence of counterfeit goods in Kenya has led to closure of some companies, while others have shifted production to other countries, citing unfair trade practices that include imported substandard and counterfeit goods as well as dumping (Maina, 2020). Tata Chemicals and Kenya Fluorspar reduced their production, Eveready East Africa laid off more than 300 workers and closed its Nakuru facility, and Reckitt Benckiser, Colgate Palmolive, Bridgestone, Cadbury Kenya, Devki Steel, and Procter & Gamble relocated manufacturing to other countries. Another manufacturing firm, Sameer (producer of Yana tyres) closed down in 2017 while Hebatullah Brothers (manufacturers of aluminium and Kenya's largest suppliers of both protective and decorative glass) are struggling with unmoving products courtesy of the influx of cheap and low-quality aluminium and glass products from China (Maina, 2020).

Manufacturing performance has deteriorated over the last decade (2007-2017). The output of the sector in terms of its contribution to GDP dropped from 11 percent in 2007 to 9.2 percent in 2016 and 8.37 percent in 2017(Kenya Association of Manufacturers, 2017). This declining performance of the sector would jeopardize the achievement of the targets the country has set in its Vision 2030 leading to unemployment, reduced exports and reduced revenues for the government (Macharia, Gathiaka & Ngui, 2022). Figure 1.3 shows the contribution of the manufacturing sector to GDP for the period 2010 to 2022.

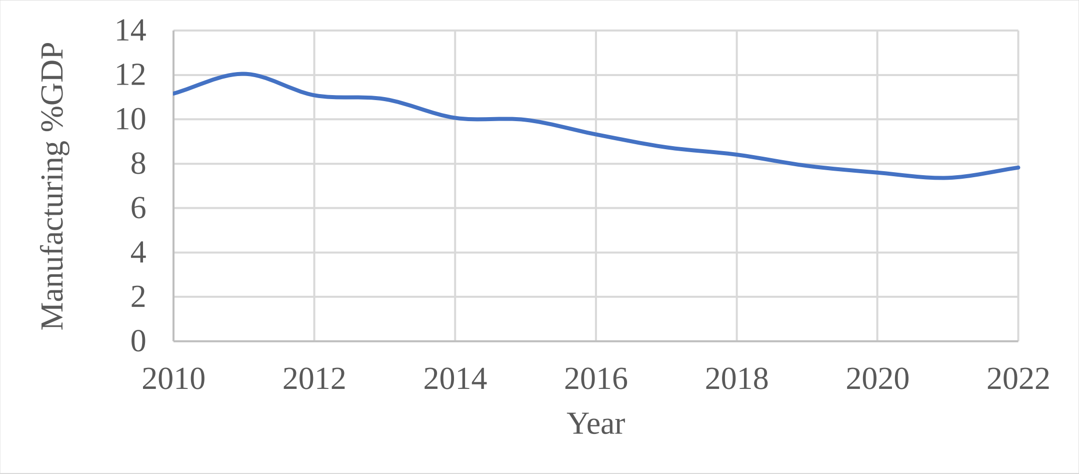

Figure 1.3: Manufacturing Sector Contribution to GDP

Source: *Manufacturing Priority Agenda (KAM, 2020)*

As shown in Figure 1.3 contribution of the manufacturing sector to GDP has been on the decline despite the government efforts to raise the contribution (Kenya Association of Manufacturers, 2020). The average contribution of the sector to GDP in Kenya in the period 2010 to 2017 was 10 percent. It reached its peak of 11.8 percent in 2011 and has been on a downward trend thereafter hitting 8.4 percent in 2017. The spike in 2011 is attributed to growth in the leather industry where three additional tanneries came into place (Republic of Kenya, 2024). Other than fighting the counterfeit goods, the Kenyan government through its Bottom-Up Economic Transformation Agenda (BETA) is keen in revitalizing the sector through reinvigoration of the country's leather, construction, pharmaceuticals, garments and textile subsectors by the year 2027 (Republic of Kenya, 2024).

In 2023, the Kenya's manufacturing sector grew by 2 percent despite numerous challenges brought about by high production costs, inflation and exchange rate that was fluctuating. The sector's output expanded by 2.8 percent. However, this was lower as compared to 3.7 percent that was recorded in 2022. The agro-based industries showed mixed growth patterns. Positive growth was noted in the dairy, animal and animal products prepared and preserved fruits and vegetable, and bakery products subsectors. However, the sugar, cocoa, chocolate subsectors declined in production. The non-food industries again showed a mixed growth. While leather and related products, plastic subsectors showed a positive growth, wood, paper and paper related, trailers and semi-trailers declined in production (Republic of Kenya, 2024).

Most jobs depend directly or indirectly on a country's manufacturing sector such that each manufacturing job supports three more jobs in the economy (Haraguchi, Cheng & Smeets, 2017). Protection and enforcement against counterfeit goods could help Kenya to potentially increase employment by between 220,000 and 440,000 jobs (Republic of Kenya, 2013). Growth in the manufacturing industry generates jobs in a range of skills and professions. The number of individuals working in the sector rose by 2.7% from 287,400 in 2014 to 295,400 in 2015 (Kenya Association of Manufacturers, 2017). In 2016, jobs in the manufacturing sector grew by 11.8 percent (300,900 individuals) of the 2.55 million pay jobs it had in 2015, compared to 11.9 percent (295,500 people) of the 2.48 million wage jobs it had in 2015. While the sector's employment has grown in absolute terms, its share of formal employment remains low, estimated at about 8 percent lower than agriculture and services sectors which posted about 60 percent and 32 percent respectively in 2017.

There are several well-thought-out measures in revamping the manufacturing sector. These include consistent lobbying by stakeholders in the manufacturing sector with the government to put effort in the fight against unfair competition stemming from counterfeit goods. One practical technique to guaranteeing the success of these measures was the establishment of the Enforcement Manual to Combat Illicit Trade (also known as the Illicit Trade Manual). The manual is intended to raise awareness of the counterfeit problem and current processes for reporting and handling cases, and is a useful resource for investigators, judiciary, and the general public (Kenya Association of Manufacturers, 2020).

The Kenyan government has devised an ambitious Bottom-Up Economic Plan to handle both complex internal and global issues. The essence of the Bottom-Up method is to ensure that markets run properly and, more significantly, that they serve the interests of society's impoverished and economically disadvantaged elements. This plan's major goal is to improve the lives of the poor and vulnerable by developing an economy that benefits all strata of society, particularly those at the bottom of the socioeconomic ladder (Republic of Kenya, 2024).

The Bottom-Up Economic Plan seeks to foster an environment conducive to the growth of businesses, industries, and trade. The plan strives to provide opportunities and empower local entrepreneurs by fostering economic growth from the ground up, hence creating economic success at the community level. This approach acknowledges that long-term economic progress depends on the participation and prosperity of the entire people. Furthermore, the plan recognizes Kenya's economy's interdependence with the global landscape. It considers the intricacies of the international economic climate and strives to develop policies that protect the nation's economic interests on a global scale. The government intends to address current imbalances in wealth and income distribution, create inclusive growth, and alleviate poverty through this Bottom-Up approach. The strategy strives to ensure that the poor and marginalized have access to critical services, education, healthcare, and employment opportunities by prioritizing their needs. Furthermore, the Bottom-Up Economic Plan's success is dependent on active collaboration between the government, corporate sector, civil society, and other stakeholders. The plan attempts to harness community efforts toward creating economic success that benefits every Kenyan citizen by involving all key parties (Republic of Kenya, 2024).

1.1.4 Balance of Trade Position in Kenya

Kenya has historically been operating a balance of trade deficit. This means the value of exports have been lower than that of imports. Kenya’s main imports comprise mainly of transportation equipment and machinery; motor vehicles; oil; iron and steel; resins and plastic products and petroleum products which are virtually all manufactured commodities (Maina, 2015). On the contrary, Kenya’s exports are agricultural products, including, coffee, tea and horticultural commodities (Maina, 2015). The country’s trade deficit has been widening over time. The trade deficit in 2016 was KES 853.7 billion, which rose to KES 1,131.5 billion in 2017. This was triggered by a 20.5 percent rise in imports from KES 1,431.8 billion in 2016 to KES 1,725.6 billion in 2017, while total exports increased dismally by 2.8% from KES 578.1 billion in 2016 to KES 594.1 billion in 2017. The widening trade deficit is linked to the importation of essential commodities while the country exports low value exports. In addition, Kenya exports are mainly primary products or semi-processed products from the agricultural sector that yield less revenue. Further, Kenya is a major exporter of tea and coffee whose prices are prone to fluctuation in international market (Todaro and Smith, 2020). Figure 1.4 shows the Kenyan Trade Balance figures for the period 2010 to 2022.

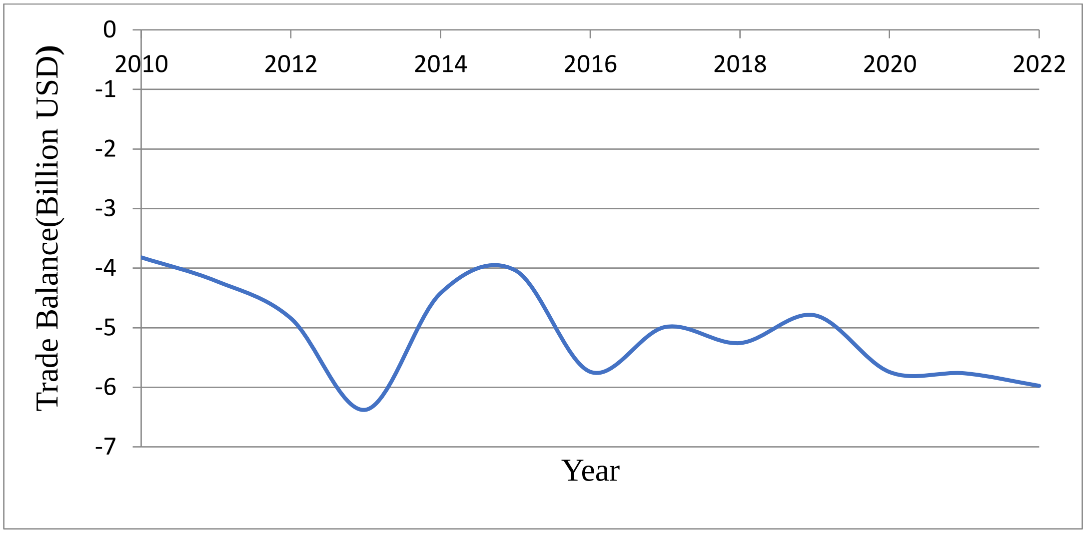

Figure 1.4: Kenyan Trade Balance in Billion USD

Source: *World Development Indicators*

From Figure 1.4, Kenya has continually recorded negative trade balance between the years 2010 to 2021 recording highest deficit of US$ 6.48 billion in 2013. The trade deficit once again improved in 2016 reducing to US$ 4 billion but then rose again to a high of US$ 6 billion in 2021. Lower worldwide oil prices, as well as fewer acquisitions of transportation equipment, may have led to the reduction trade deficit in 2016 (Murunga, Wawire & Muriithi, 2021). According to Gao and Wu (2023), counterfeit goods may be sold at a low price which can make producers of genuine goods not to break even. This action leads to reduction in export goods thus leading to trade deficit.

1.2 Statement of the Problem

Counterfeit goods pose a major problem with significant negative impacts to the country's economy and the people at large. Trade in counterfeit goods in the country has continued to exist and the total value of this trade in counterfeit stood at KES 826 billion in 2018. It is feared that unless quick actions are made to eradicate counterfeit goods, most of the goods in Kenya will be counterfeit by 2030. Counterfeit goods may reverse Kenya's effort to revive the dwindling manufacturing sector. The manufacturing sector in Kenya is estimated to lose over KES 68 billion in annual sales as a result of counterfeit goods. This has made the sector to perform dismally with an average annual growth rate of less than 5 percent and a downward trend of its contribution to GDP of less than 10 percent from 2010 to 2020. This continued dismal performance of manufacturing sector contributes to low employment and tax revenue making Kenya not to attain her potential economic growth. In addition, as those in the manufacturing sector are discouraged thus closing down their operations, exports reduce, compromising the country's balance of trade. For government to take appropriate policies with regard to counterfeit goods, there was need to carry out an exhaustive study on the drivers of counterfeit goods. There was also the need to study the role of anti-counterfeit measures on Kenya's manufacturing sector and investigate the role of the anti-counterfeit measures on balance of trade in Kenya.

Studies on the subject of counterfeit goods in Kenya differ from the present one in terms of scope and context. For example, Kabiru (2013) examined the effects of counterfeits on pharmaceutical distribution and retailing in Mombasa County and did not demonstrate how the manufacturing sector has been affected by counterfeit pharmaceuticals. Ngethe (2017) studied the effects of counterfeits on sales and distribution of pharmaceutical products in Nairobi County, which also does not give an overall view of the entire manufacturing sector, and its performance. Ruttoh's (2017) study on the effects of counterfeiting on economic growth and foreign direct investment in Kenya failed to show how the manufacturing sector in Kenya was affected by the same. Other studies in different geographical regions include Pratt and Zeng (2020) and Rullani, Beukel, & De Angelis (2021). The former study investigated the economic value and drivers of counterfeit purchases in the Hong Kong’s Tourism sector. The latter study investigated the anti-counterfeit measures employed by an international mobile manufacturer using data from 150 sales outlets sourced across the globe. This study, therefore, sought to examine the determinants of demand for counterfeit goods and investigate the role of anti-counterfeit measures on the manufacturing sector output and balance of trade.

1.3 Research Questions

This study sought to answer the following research questions:

i. What are the determinants of demand for counterfeit goods in Kenya?

ii. What are the effects of anti-counterfeit measures on the performance of the manufacturing sector in Kenya?

iii. What are the effects of anti-counterfeit measures on balance of trade in Kenya?

1.4 Objectives of the Study

The general objective of the study is to examine the effects of anti-counterfeit measures on balance of trade and the performance of the manufacturing sector in Kenya. The following were the specific objectives of the study:

i. To examine the determinants of demand for counterfeit goods in Kenya.

ii. To determine the effects of anti-counterfeit measures on the performance of the manufacturing sector in Kenya.

iii. To establish the effects of anti-counterfeit measures on balance of trade in Kenya.

1.5 Significance of the Study

This study is of value to various stakeholders. To begin with, identifying the determinants of demand for counterfeit goods in the Kenyan market provides insight to Anti-Counterfeit Authority and other related agencies mandated to fight counterfeit goods in the country to device measures on how to counter the vice and put in place measures to remove counterfeit goods from the Kenyan market. The second objective sought to evaluate the extent to which anti-counterfeit measures affect the manufacturing sector. These findings therefore paint a bigger picture on the channels through which the manufacturing sector is affected by counterfeit goods. The findings are of importance to stakeholders in the manufacturing sector including Kenya Association of Manufacturing (KAM), Kenya Private Sector Alliance (KEPSA), Ministry of Industrialization, Trade and Enterprise Development among other institutions charged with promoting trade, industrialization and formulation of policies that facilitate advancement of a competitive business environment and sustainable growth in the manufacturing sector. Lastly, the third objective examines the effects of anti-counterfeit measures on balance of trade in Kenya. The study adds to the existing pool of knowledge and literature on measures that not only promote bilateral trade between Kenya and its partners but also globally. Therefore, the findings are beneficial to the Ministry of Industrialization, Trade and Enterprise Development, Chamber of Commerce and Ministry of Foreign Policy as it helps in policy advocacy geared towards improvement in international trade.

1.6 Scope of the Study

This study focused on the role of anti-counterfeit measures on balance of trade and performance of the manufacturing sector in Kenya. The choice of the manufacturing sector was due to the role of sector to Kenya's economic growth. In addition, the sector goods are the ones that compete with counterfeit. Manufacturing sector contributes immensely to country's export thus has the potential of improving trade balance. The study used quarterly data for the period 2010 to 2020, owing to the fact that Kenya established the Anti-Counterfeit Authority in 2010. This means a total of 44 observations were considered. The central limit theorem indicates states that the distribution of a sample mean approximates a normal distribution as the sample size gets larger irrespective of distribution of the population. A sample size of at least 30 observations is often considered sufficient for the central limit theorem to hold (Kwak & Kim, 2017). Reliable and credible data on counterfeit goods in the country is available only from the time Anti-Counterfeit Authority started its operations.

1.7 Organization of the Study

This study is organized into five chapters. Chapter one provides background to the study, statement of the problem, research questions, objectives, significance and scope of the study. Chapter two presents literature review and provides theoretical literature, empirical literature and summary of literature. Chapter three is on methodology of the study and includes, research design, theoretical framework, model specification, definition and measurement of variables, data type and source, time series property tests, and data analysis techniques. Chapter four provides the descriptive statistics, statistical tests results, and presents the findings for each objective. Chapter five provides summary, conclusion of the study. The chapter also provides recommendations and suggestions for further study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter is comprised of theoretical literature and also offers a critical empirical examination of the research on counterfeit items and impacts on the economy.

2.2 Theoretical Literature Review

2.2.1 The Theory of Counterfeit-Market

The Theory is coined from the work of Gentry, Putrevu, and Clifford (2000). The model uses the fundamental presumptions of economic theory, namely that producers and consumers in a market may make informed decisions. That is to say, given the limitations imposed by information or resource availability, their main goal is to maximize their welfare (profit for producers or utility for consumers). According to Gentry *et al*., (2000), there are two types of consumers: those with perfect information about the products and those with incomplete information.

According to the theory, under certain conditions, customers gravitate towards a particular brand and are willing to choose the product despite its shortfalls. A counterfeit tends to give customers the opportunity to distinguish between the brand and the product (Gentry *et al.,* 2000). When consumers have complete knowledge, they purchase counterfeit products if they believe that they are less expensive, lower-quality counterfeit items will better meet their wants or purchasing characteristics than more expensive, higher-quality real goods. The former is referred to as market state of stability, while the latter is referred to as a market failure.

According to the law of supply, the supply of counterfeit goods grows as the price rises. The substitution effects between counterfeit and genuine products is shown in figure 2.1.

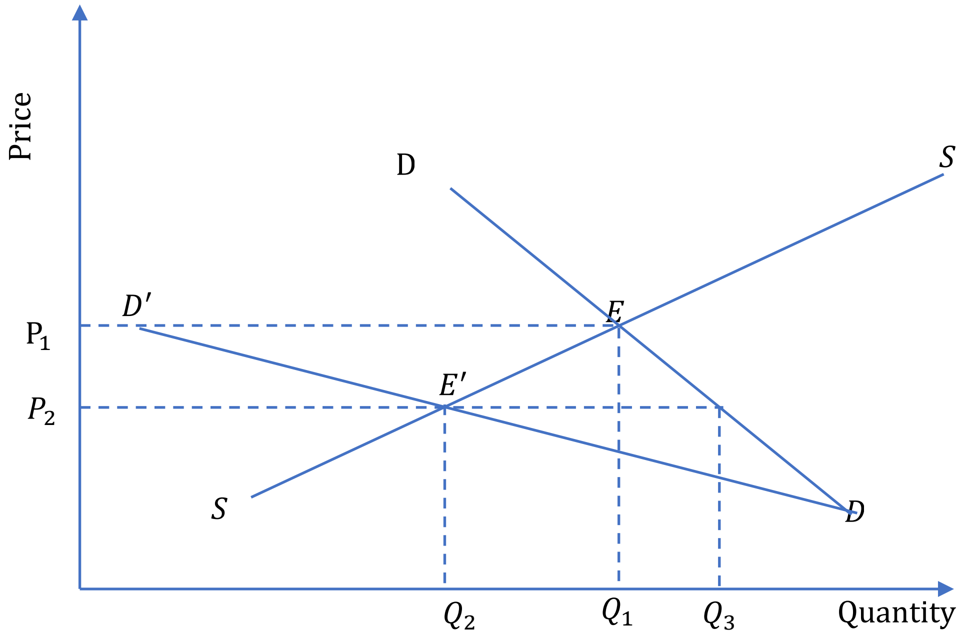

Figure 2.1: Substitution Effect

Source: *Gentry et al. (2000)*

The initial supply and demand of a genuine brand product are defined by the supply curve (SS) and demand curve (DD) in figure 2.1. The market equilibrium at point E shows that supply and demand are determined by market participants for the ideal quantity of Q_1 at the targeted price level P_1. There is neither scarcity nor abundance. The legitimate brand of the product would be negatively impacted if counterfeit goods were to enter the market as some of the consumers shift to the counterfeits. The brand's demand curve shifts from DD to DD' as a result of the substitute impact. The breadth of the two curves is increased by the price difference. Since legal producers have the final say in the matter, the demand for counterfeit goods does not immediately affect the supply of brand goods. The new market equilibrium with a lower quantity Q_2 and price P_2 is reached at point E'. Ultimately, the demand for authentic brand products decreases from Q_1 to Q_2 as a result of the negative substitution effect Q_2-Q_1 and the positive income effect Q_3-Q_1 brought on by lower pricing. Therefore, the production of real brand goods is hampered by counterfeit items (Yao, 2006; Commuri, 2009).

The theory shows that supply for genuine goods is affected by both its price and the price of counterfeit goods as presented in equation 2.1.

$$X = f(P_G, P_C, Z) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots .. (2.1)$$

Where X is value of counterfeit products, P_G represent price of genuine goods, P_C represents price of counterfeit goods and Z represents other factors. The theory thus describes determinants of demand for counterfeit goods such as prices of real and counterfeit products; consumer behavior; opportunity costs of counterfeit goods in terms of legal fees and fines when caught; and manufacturers' appetite for income, among others (OECD, 2007). The theory is therefore coherent to the objective one of this study which intends to examine factors determining counterfeit goods in Kenya economy. The theory also explains how infiltration of counterfeit goods causes displacement of output and by extension growth of manufacturing sector of the economy.

2.2.2 Theory of Absorption Approach to Balance of Trade

The theory was first proposed by Alexander in 1952 and was developed further by Johnson in 1958. The hypothesis stipulates that an economy's ability to improve its trade balance depends on its ability to produce more goods and services than it consumes, with domestic residents' spending on products and services being referred to as "absorption." The theory concentrates on "the relationships between real expenditure and real income, as well as the relationships between the two and price levels." The difference between the total value of products and services exported (Y) and what is absorbed (A) by the domestic economy is the foreign balance B, according to Alexander. The total demand in the domestic market is given by the sum of Consumption (C), Investment (I) and Government spending (G) hence given as (C + I + G), or the sum of products and services pulled off the domestic market, is referred to as absorption. This can be represented as shown in equation 2.2.

$$B = X - M = Y - A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.2)$$

Where B stands for the net balance of trade, while Y and A represent total domestic output and spending, respectively. The country's BOP will be favourable if total value payments getting into the country are more than those getting out; if total value payments getting out of the country are more than those getting in, the country experiences deficit BOP. A country's trade deficit can be closed in one of two ways: lowering spending or raising output (Alexander, 1952). Thus, government anti-counterfeit measures, key variables in this study are likely to improve balance of trade through boosting the output. This is achieved through ensuring that country’s manufacturing sector is protected from unhealthy competition form counterfeits that originate from foreign countries.

2.2.3 The Elasticity Approach to Balance of Payment

The elasticity approach forecasts how changes in policy including exchange rate impacts a nation's balance of payments (Thirlwall, 2021). The approach operates under the presumption that, in an equilibrium state, currency depreciation or devaluation can improve the balance of payments, through effects on the current account.

The current account of a country measures the balance of commerce in goods and services; thus, it measures the money the nation obtains from exports to the rest of the world less the amount that its households spend on imports. When exports expand more quickly than imports, a nation's overall revenue from net exports rises, and when imports grow more quickly than exports, it falls. According to the hypothesis, when a nation's currency weakens, international buyers purchase a greater proportion of its exports while domestic consumers purchase fewer imports; as a result, depreciation either improves or shifts the current account balance toward surplus. But before depreciation can raise the current account balance, the Marshall-Lerner condition—must be met. This requires that the elasticity of demand for those exports is elastic or greater than one, otherwise the current account worsens.

However, according to Ceyhan and Gürsoy (2021), the devaluation of exchange rate may make the terms of trade worse as individual firms continue to import expensively due to existing contracts. This is demonstrated by the J-curve phenomenon which demonstrates that objective of devaluation of exchange rate is usually felt after some time as firms start to sign new contracts of supply of raw material from foreign countries. In the context of the present study, elasticity approach informs the need to adopt antic-counterfeit measures as a way creating foreign customers trust in our manufacturing products. This assists the government to meet its objectives of realizing improved balance of payment.

2.2.4 Theory of Reasoned Action

The theory of reasoned action was put forward by Ajzen and Fishbein (1977). The theory argues that individuals seek to behave in ways that give them a chance to not only obtain favourable outcomes but also meet other people's expectations. This cognitive theory is anchored on an assumption that a decision to engage in behaviour depends on the outcomes that the individual intends to get from the behaviour. According to this theory, a decision to engage in a behaviour, buying a counterfeit product in the current case is explained by the individual's intention to perform the behaviour directly. In addition, an individual's intention to carry out the behaviour can be detected if the attitude and subjective norms of the consumer are known. This theory therefore implies that behavioural factors are important factors that may make people to buy counterfeit goods. This theory informs this study since price of the counterfeit which can determine individual's decision in buying a counterfeit good is included.

2.2.5 Theory of Planned Behaviour

The theory of behaviour was founded by Ajzen (1991). The author introduced additional variable of the perceived behavioural control as a major determinant of the intentions and behaviour of improving the principal limitation of theory of TRA. Perceived behavioural control can be defined as personal difficulty or ease of performing a behaviour. The theory avers that intention to do something is influenced by the perception of access to the necessary skills, resources and opportunities that can allow an individual to perform a behaviour. The theory of planned behaviour can thus be largely used in this context in explaining the decision of buying purchase counterfeit goods. The theory is applicable to the current study since pricing is used as a determinant of the value of counterfeit goods seized.

2.2.6 Endogenous Growth Theory

Endogenous growth is a model of long-term economic growth majorly developed in 1980s by economists for instance Robert Lucas and Paul Romer. The theory avers that economic growth come about as a result endogenous or internal factors as opposed to external factors. Some of the internal factors include advancement in technology that was considered to be exogenous in earlier models like the Solow-Swan model. The theory is applicable to the current study since proliferation of counterfeit may discourage innovation and investment human capital by firms in the manufacturing sector in Kenya. These two are major components of economic growth and therefore reduced investment leads to low performance of the manufacturing output. This translates to low economic performance in a country.

2.2.7 The Theory of Demand

The theory of demand is a fundamental theory in economics. It explains how consumers allocate income to various commodities and the allocation changes with change in prices of the commodities in question, price of related commodities, income of the consumers and government policy. The theory is applicable to this study because it shows how quantity of counterfeit commodity demanded responds to changes in price of the counterfeit good, price of genuine good, income of the consumers of counterfeit goods and government policy. The government policy in the current study refers to anti-counterfeit measures that involve expenditure in public awareness and enforcement of the anti-counterfeit law.

2.3 Empirical Literature Review

The concept of counterfeiting has attracted attention of many scholars both in developed and developing countries. In developing countries, Mniwasa (2022) investigated the role of anti-counterfeiting criminal Law on tackling the counterfeit goods in the manufacturing industry of Tanzania. To achieve the objective, the study conducted desktop literature review to establish the effectiveness of anti-counterfeiting criminal Law in combating counterfeiting in Tanzania. The study findings illustrate weak enforcement of anti-counterfeiting criminal Law as the major cause of increased proliferation of counterfeit goods especially in the pharmaceutical sub-sector of Tanzania. The approach adopted by this study does not give a researcher an opportunity to ask follow-up questions. In addition, some of the sources reviewed literature may have had biased findings or outdated information thus leading to conclusions that are inaccurate. Mniwasa (2022) study informs the choice of anti-counterfeit law as counterfeiting deterring factor. However, the present study departs from this approach by using quantitative data that establishes causal relationships between different variables.

Ghadge, Duck, Er and Caldwell (2021) studied the deceptive counterfeit risk in global supply chains. The study explored the perceived sources of counterfeit goods, their impact on economies and potential measures of mitigating the risk. The study carried out an online survey to collect qualitative data from 140 procurement experts. The study used Chi-square test, a non-parametric testing in estimating the relationship between mitigation measures and counterfeiting. The study findings showed that effective mitigation measures lead to reduced counterfeiting. Ghadge *et al*., (2021) concentrated on counterfeit among the developed countries. There is need for country specific study and especially for developing countries that may have weak regulatory framework. The present study bridges this gap by focusing on the role of anti-counterfeit measure in Kenya.

In another study, Jaffery (2021) carried out an empirical study aimed at controlling counterfeiting in the automotive supply chain in Pakistan. The methodology adopted by the author was systematic review of literature. The study concentrated on scholarly contribution on counterfeiting in different disciplinary studies. The study considered literature review that had used different methodologies and cutting across three decades. The study's findings showed that intervention by government through enforcement of counterfeiting is important in reducing counterfeiting in Pakistan. The present study departs from Jaffery (2021) that majorly focused on desktop literature review by using quantitative data to carry out the estimations. However, the present study recognizes the role of government intervention in reducing counterfeiting. In this light, the study includes public expenditure on awareness of the dangers associated with counterfeit goods as one of the explanatory variables. The study also includes public expenditure in enforcing anti-counterfeit law as one of the regressors.

In another study, Pratt and Zeng (2020) investigated the determinants of counterfeit purchases in Hong Kong. The study used binary logistical models for analysis. The study established that relative price of counterfeit versus genuine goods, individual characteristics and social influences had a positive effect on counterfeiting. The study results also showed that anti-counterfeit measures reduce the proliferation of counterfeit goods. The present study departs from Pratt and Zeng (2020) by investigating anti-counterfeit measures on counterfeiting in Kenya.

In another study, D'Amato, Belvedere and Papadimitriou (2019) studied the illegitimate trade in the fashion industry in Italy. To achieve the study's objectives, a survey was carried out on Italian high-end fashion companies and 112 questionnaires were collected for analysis. The results revealed a negative correlation between targeted bundle of anti-counterfeit measures and counterfeiting in Italy. This study was narrow in scope since it focused on counterfeiting in the clothing sub-sector. In addition, the study focused on developed country. The present study departs from D'Amato *et al.,* (2019) by focusing on the whole manufacturing sector.

In another study, Mwithiga and Kamakil (2017) investigated the effects of counterfeiting on profitability of the manufacturing sector in Kenya. The study used ordinal logistic regression on qualitative data that was collected using questionnaire. The study findings showed that enforcement of anti-counterfeit measures lead to reduced counterfeiting in Kenya. The present study focuses on output of the manufacturing sector, a departure from Mwithiga and Kamakil (2017) that focused on the effect of anti-counterfeiting measures on profitability of the manufacturing sector. In addition, the study was qualitative unlike the present study that takes quantitative approach. The current study considers budgetary allocation to awareness creation and enforcement of anti-counterfeit law as anti-counterfeit measures.

A similar study focusing on developing country is Ruttoh (2017). The study investigates the role of counterfeiting on Kenya's economic growth. To achieve the objective, the study used time series data running from 1975 to 2010. Since the variables were integrated of different order, the study adopted Vector Auto regression (VAR) model. The study's findings revealed a negative relationship between counterfeiting and economic growth in Kenya. The present study departs from this study by focusing on effects of anti-counterfeit measures on manufacturing and balance of trade that are critical for the country's economic performance.

In a related study on developing countries, Fink *et al*., (2016) studied the effect of anti-counterfeiting on counterfeiting in developing economies. The methodology adopted by the author was systematic review of literature. The findings showed a negative relationship between intellectual property rights enforcement such as brand development, improvement in quality and trademark identification and investment in research and development and counterfeiting. The present study departs from Fink *et al*., (2016) that majorly focused on desktop literature by using quantitative data to carry out the estimations.

In a similar study, Basu, Basu and Lee (2015) carried out a survey among the Indian consumers to determine factors that motivate them to buy counterfeits. The study adopted a logit model. The study offers insights with regards to methodological rigor. The use of rigorous quantitative analysis, that include Structural Equation Modelling (SEM) in testing the relationship between decision making styles and the purchase of counterfeit goods help to uncover the relative importance of different decision-making styles within groups that demand counterfeit goods. This approach thus enhances the validity of the study's conclusions. The study's results revealed that inflation was driver of demand for counterfeit goods. Basu, *et al*., (2015) informs the present study by incorporating inflation variable as a determinant counterfeit in Kenya. However, the present study departs from Basu *et al*., (2015) contextually.

Another study focusing on a developing country is Nduati (2014). The author investigated the determinants of counterfeit goods in Kenya. The study employed a descriptive cross-sectional study methodology. The study findings showed that anti-counterfeit measures for instance copyright protection, maintaining standards for products, and the enforcement of intellectual property rights are all important aspects of government policies that reduce counterfeiting. The current study borrowed from Nduati (2014) and used the variables of anti-counterfeit measures by government, prices of counterfeit products and consumer attitudes towards counterfeits as determinants of demand for counterfeit goods in Kenya. In addition, the present study focuses on the effects of anti-counterfeit measures in Kenya.

In another study, Norum and Cuno (2011) conducted an empirical study to investigate factors influencing market demand for counterfeit products among college students in the United States. Their research was based on the counterfeit market hypothesis, which seeks to optimize consumer utility while keeping a tight budget in mind. Market data was gathered, and demand functions for counterfeit products were estimated using logistic regression. Consumer awareness to the counterfeit issue did not substantially discourage the purchasing of counterfeit products, according to the findings. They discovered that customer attitudes play a significant role in the purchasing of counterfeit products. Norum and Cuno (2011) concentrated on counterfeit in a developed country. There is need for similar study with focus on a developing country that may be characterized by weak regulatory framework. This present study bridges this gap by focusing on the role of anti-counterfeit measures on counterfeiting in Kenya

In another study, Phau and Teah (2009) investigated the factors that influence the attitudes of consumers towards counterfeits of luxury brands in Singapore. The study used ordinal logistic regression model. Survey data from 204 respondents was used in the study. The findings of the study showed price of the counterfeit and awareness of the dangers of counterfeit goods to be determinants of demand for counterfeit luxury good. This study is important in the study of counterfeit goods due to the fact that the authors used a survey method. Such approach provides empirical data that can support their hypotheses. In addition, the use of SEM allowed the authors to analyze complex relationships between the study variables. Although Phau and Teah (2009) study differs from the present one in terms of context, the study informs the choice of price of the counterfeit goods and public awareness as the determinants of the value of counterfeits.

2.4 Overview of Literature

The body of literature on the economic impact of counterfeit goods is expansive, yet much of it focuses on developed economies, where regulatory frameworks are stronger, and counterfeiting typically has different economic consequences compared to developing nations like Kenya. Studies such as those by Beqiraj *et al*., (2020) and Norum and Cuno (2011) provide insights into the effects of counterfeit goods on consumer behaviour, profitability, and brand value. However, their focus on well-regulated markets like the United States and Europe limits their relevance to countries with weaker enforcement mechanisms and more vulnerable economic sectors. In these developed economies, anti-counterfeit measures, including strict intellectual property rights enforcement, have been shown to reduce the demand for counterfeit goods. In contrast, countries such as Kenya face distinct challenges where enforcement is often weak, and counterfeit goods have a more profound impact on key sectors like manufacturing. Although international studies, such as those by Pratt and Zeng (2020) in Hong Kong, have investigated the factors driving counterfeiting, they do not provide insights into how counterfeit goods affect broader economic indicators like trade balances or sectoral performance in developing economies. This lack of applicability to developing contexts presents a clear gap in the literature, as Kenya's economy, particularly its manufacturing sector, remains understudied in terms of the impact of counterfeit goods.

In Kenya, relevant studies have been conducted, yet they too fail to provide a comprehensive understanding of the impact of counterfeit goods on the manufacturing sector and the country's balance of trade. Nduati (2014) examined government policies designed to curb counterfeit goods but did not evaluate how these policies affect sector-wide outcomes such as industrial output or employment generation. Similarly, Mwithiga and Kamakil (2017) focused on the profitability of manufacturing firms but did not delve into broader indicators like GDP contribution or the sector's export performance. Ruttoh (2017) explored the effects of counterfeit goods on Kenya's economic growth and foreign direct investment (FDI), but the study lacked a specific focus on the manufacturing sector, which plays a pivotal role in the country's industrial and trade ambitions. Although these studies contribute to understanding counterfeiting's microeconomic effects, they leave critical gaps in addressing how counterfeit goods disrupt industrial growth and international trade dynamics in Kenya. Moreover, these studies have generally taken qualitative or limited quantitative approaches, which do not provide a thorough understanding of the macroeconomic implications of counterfeit goods, particularly how they affect Kenya’s competitive advantage in international markets and trade balances.

To address these gaps, this study adopted endogenous growth theory as a more comprehensive framework to analyse how anti-counterfeit measures influence economic performance, focusing on the manufacturing sector and the balance of trade in Kenya. The endogenous growth theory, as advanced by Romer (1990), emphasized that economic growth was driven by factors within the economy, particularly technological innovation and policy interventions, which are crucial for Kenya’s development. Counterfeit goods can undermine innovation by allowing counterfeiters to profit without incurring research and development (R&D) costs, discouraging genuine producers from investing in innovation. By enforcing anti-counterfeit measures, such as public awareness campaigns and intellectual property law enforcement, Kenya can protect domestic industries, boost manufacturing output, and improve international competitiveness. Furthermore, endogenous growth theory highlights how sector-specific interventions, such as anti-counterfeit policies, can lead to sustained economic growth by enhancing innovation, protecting jobs, and improving export performance. These policy interventions not only enhance the productivity of the manufacturing sector but also mitigate the negative effects of counterfeit goods on trade balances by ensuring that domestic products remain competitive in international markets. Hence, this study’s focus on the manufacturing sector and balance of trade provides a more nuanced understanding of how anti-counterfeit measures can foster long-term economic growth and global competitiveness in Kenya, thereby filling the existing research gaps.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter outlines the research design, theoretical frameworks adopted, model specifications for each objective, data type and data source. The chapter also outlines the estimation technique used in the study.

3.2 Research Design

The study used causal research design. The design is also known as explanatory research. The research design aimed at determining the cause-and-effect relationship between variables. In this design, one or more independent variables are manipulated so as to observe how the changes affect dependent variables. This research design was used to identify whether changing one explanatory variable directly causes a change in the dependent variable.

3.3 Theoretical Framework

This section presents theoretical framework used in the study. Three theories were used to derive the models used for analysis. Theory of demand was used to link demand for counterfeit goods to its determining factors, genuine market and law enforcement. This theory was used in the development of the model that analyses determinants of demand for counterfeit goods. The endogenous growth theory was used in assessing the impact of anti-counterfeit measures on manufacturing sector performance. After that, the absorption approach to balance of trade theory was created and applied to determine how Kenya's anti-counterfeit measures affect the country's trade balance.

3.3.1 Determinants of Demand for Counterfeit Goods in Kenya

Demand for counterfeit goods is anchored on the theory of demand. According to Cowell (2018), individual demand curve is related to indifference curves preferences and budget constraints. According to this demand theory, an individual derives utility from various goods. Assuming one of these goods is counterfeit good, the utility function can be expressed as shown in equation 3.1 below.

$$U = f(Q_c, Q_g) \quad \text{……………………………………………………} \quad (3.1)$$

Where U represents utility, Q_c represents counterfeit good and Q_g represents genuine good. It is important to note that the consumer would want to consume larger quantity of the aforementioned goods but he/she will be constrained by the level of income. This means the consumer will be faced with a maximization problem that is seeking to maximize utility from consumption of the above two goods subject to his level of income or money (M). Demonstrating this consumer preference using Cobb-Douglas function, the relationship can be expressed as follows.

$$\text{Maximize } U = (Q_c)^{\alpha}(Q_g)^{\beta} \quad \text{……………………………………….....} \quad (3.2)$$

$$\text{Subject to } \quad P_g Q_g + P_c Q_c = M \quad \text{……………………………….….....…} \quad (3.3)$$

Where U, Q_c , Q_g are as defined in equation 3.1 while α and β are weights placed by consumer on counterfeit good and genuine good, respectively. M, P_c, P_g, are money, price of counterfeit good while is the price of genuine good, respectively. To solve for demand for counterfeit good, we form a lagrangean function as follows:

$$L = (Q_c)^{\alpha}(Q_g)^{\beta} + \lambda(M - P_c Q_c - P_g Q_g) \quad \text{…………………….....……} \quad (3.4)$$

Where λ measures value for consumer value for money.

To get conditional demands for counterfeit good and genuine good, we get first order conditions as shown in equations 3.5 and 3.6

$$\frac{\partial L}{\partial Q_c} = \alpha(Q_c)^{\alpha-1}(Q_g)^{\beta} - \lambda P_c = 0 \quad (3.5)$$

$$\frac{\partial L}{\partial Q_g} = \beta(Q_c)^{\alpha}(Q_g)^{\beta-1} - \lambda P_g = 0 \quad (3.6)$$

$$\frac{\partial L}{\partial \lambda} = M - P_c Q_c - P_g Q_g = 0 \quad (3.7)$$

From equation 3.5, it can be shown that:

$$\lambda = \frac{\alpha(Q_c)^{\alpha}(Q_g)^{\beta}}{P_c Q_c} = \frac{\alpha U}{P_c Q_c} \quad (3.8)$$

From equation 3.6, it can be shown that:

$$\lambda = \frac{\beta(Q_c)^{\alpha}(Q_g)^{\beta}}{P_g Q_g} = \frac{\beta U}{P_g Q_g} \quad (3.9)$$

From equation 3.7, it can be shown that:

$$P_c Q_c + P_g Q_g = M \quad (3.10)$$

From equations 3.8 and 3.9, it can be shown that:

$$Q_g = \frac{\beta\, P_c Q_c}{\alpha P_g} \quad (3.11)$$

Substituting in equation 3.10, it can be shown that:

$$P_c Q_c + P_g \frac{\beta P_c Q_c}{\alpha P_g} = M \quad (3.12)$$

From equation 3.12, it can be shown that:

$$Q_c = [\frac{\alpha}{\alpha+\beta}] \frac{M}{P_c} \quad (3.13)$$

Since α and β are constants, it can be shown that demand for counterfeit good, Q_c is a function of money, M and its price. This relationship is shown in equation 3.14

$$Q_c = f(M, P_c) \quad (3.14)$$

Browning and Zupan (2020) introduces more factors in the demand function. These factors include price of related product and government policy. Government policy in this case is anti-counterfeit measures that involve expenditure on the enforcement of anti-counterfeit law and public awareness. Therefore, equation 3.14 can be expanded to give the following equation.

$$Q_c = f(M, P_c, P_g, G) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.15)$$

3.3.2 Effects of Anti-Counterfeit Measures on the Performance of the Manufacturing Sector in Kenya

Establishing the effect of anti-counterfeit measures on the performance of the manufacturing sector was theoretically anchored on the endogenous growth theory such as the Romer (1990) model. According to this model, the aggregate production function is stated as follows:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.16)$$

Where Y is output, A is the technology growth rate, K is the capital stock and L is labour input. The subscript t illustrates time, α represents the output elasticity of capital stock while $1-\alpha$ represents the output elasticity of labour.

The anti-counterfeit measures, denoted by S_t by can be introduced in the model by directly affecting the productivity of the economy by ensuring that the goods produced are of higher quality, thereby increasing the effective output. This can be represented as follows:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} S_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.17)$$

Assume the economy produces two types of goods: manufacturing goods ($Y_{M,t}$) and ($Y_{N,t}$) non-manufacturing goods. To focus on the manufacturing sector, we replace the general output Y_t in the original endogenous growth model with manufacturing output $Y_{M,t}$. The production function for the manufacturing sector can be written as:

$$Y_{M,t} = A_{\ t}K_t^{\alpha}L_t^{1-\alpha}\ S_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ldots\ldots\ldots\ldots.\ (3.18)$$

3.3.3 Effects of Anti-Counterfeit Measures on Balance of Trade in Kenya

The effects of anti-counterfeit measures are anchored on endogenous growth theory. The endogenous theory model according to Romer (1990) can be represented as follows:

$$Y_{\ t} = \ A_{\ t}K_t^{\alpha}L_t^{1-\alpha} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots.\ (3.19)$$

Where Y is output, A is the technology growth rate, K is the capital stock and L is labour input. The subscript t illustrates time, α represents the output elasticity of capital stock while $(1-\alpha)$ represents the output elasticity of labour.

The endogenous growth theory emphasizes that technology (A) grows as a result of knowledge accumulation through R&D and innovation. This is modelled as shown in equation 3.20.

$$\dot{A} = \ \emptyset\mathrm{R} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ldots\ldots\ (3.20)$$

Where $\dot{A}$ represents the rate of change of technology, R represents resources allocated to research and development (R&D) and $\emptyset$ is a parameter representing the efficiency of R&D in creating new knowledge.

Counterfeit goods affect $\emptyset$ and R through reduction of returns on investment in research and development. An effective anti-counterfeit measures denoted by τ would alleviate the negative effect of counterfeiting through protection of intellectual property and ensuring that the firms get benefits of their innovations.

Let τ represent the strength of the anti-counterfeit measures, where $0 \leq \tau \leq 1$. A value of $\tau = 1$ represents perfect enforcement (no counterfeiting), while $\tau = 0$ represents no enforcement (rampant counterfeiting). Then, the research and development function can be modified as shown in equation 3.21.

$$\dot{A} = \emptyset\tau R \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.21)$$

Where $\emptyset\tau$ is a function that increases with τ, indicating that stronger anti-counterfeit measures enhance the efficiency of research and development.

Exports (X) are driven by the country's technological advancements and competitive advantage, which are, in turn, influenced by $\dot{A}$. Equation 3.22 illustrates balance of trade (BOT) which is given as the difference between exports and imports.

$$BOT = X - M \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.22)$$

Where M represents imports. Since X is positively related to A (as more advanced technology leads to more competitive and higher-value exports),

$$X = kA \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.23)$$

Substituting the growth of technology:

$$X = k(A_0 + \emptyset\tau R_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.24)$$

Where A_0 is the initial level of technology and *t* represents time. Thus, the balance of trade becomes:

$$BOT = k(A_0 + \emptyset\tau R_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.25)$$

From equation 3.23, it is shown that technological growth, strengthened by anti-counterfeit measures, improves the country's export competitiveness.

3.4 Models Specification and Definitions and Measurement of Variables

3.4.1 Determinants of Demand for Counterfeit Goods

From equation 3.11, it is important to reiterate that the value of seizure of counterfeit goods is the single most valid source of official statistics on the dynamics of the counterfeiting markets. These statistics may not capture the entirety of trends and dynamics of the counterfeit market because enforcement heavily depends on the anti-counterfeit efforts, formulation and implementation of policies, government directives, and enforcement processes employed by the authority. Secondly, it is important to acknowledge that increase in value of seized goods can be caused by two main factors: expansion of counterfeiting production and trade and/or improvement on detection rate and anti-counterfeit measures.

This notwithstanding, value of seized goods, as applied to this study, refers to anti-counterfeit output because it also captures improvement in anti-counterfeiting measures and is therefore vital to policy (Yao, 2006). Note that, it is difficult to estimate supply of counterfeit goods since the demand is observed in shadow-economic activities. The assumption adopted in this study is that the average price of seized goods reflects the dynamics of prices in the counterfeit market. The empirical model used to establish the determinants of demand for counterfeit goods in Kenya is based on Equation 3.11 from the theoretical framework and is estimated using Autoregressive Distributed Lag (ARDL) model.

Several studies identified and law enforcement activities such as seizure and public awareness as the most important anti-counterfeit measures (Yao, 2006; Norum &

Cuno, 2011; Basu *et al*., 2015; Wang, 2018). The following empirical model was specified from equation 3.15:

$$LVCF = \beta_0 + \beta_1 LPA_t + \beta_2 LEnf_t + \beta_3 LPCI_t + \beta_4 LCPI_t + \beta_5 LExc_t + \beta_6 LFDIGDP_t + \beta_7 LNOC_t + \beta_8 dum1_t + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots.. (3.26)$$

Where $LVCF$ represents the natural logarithm of the value of seized goods, $LNOC$ represents the natural logarithm number of the number of complaints was used to capture consumer attitude, LPA represents the logarithm of Expenditure on Public Awareness, $LEnf$ represents the logarithm of Expenditure on Law enforcement, $LExc$ represents the logarithm of exchange rate to represent demand sensitivity to depreciation of currency, $LCPI$ represent the logarithm of consumer price index used to capture the level of prices, $LPCI$ is the logarithm of Per Capita Income which measures the economic conditions, $LFDIGDP$ is the logarithm of the ratio of FDI and GDP used as a control variable, $dum1$ represents dummy variables taking 1 for period starting from quarter 2 of 2018 and value of zero for the earlier period. β_0 to β_8 are parameters to be estimated while μ_t is the error term. The variables, their definitions and measurements are for model 3.26 are presented in Table 3.1.

Table 3.1: Determinants of Demand for Counterfeit Goods

Variable	Definition of Variable	Measurement of Variable
Value of Counterfeit Goods seized (VCF_t)	The amount of counterfeit goods discovered in the country. This is the dependent variable for the model	Was measured by the money value of confiscated counterfeit goods at time t (measured quarterly)
Per Capita Income in Kenya (PCI_t)	The mean or average income of a people in a nation or geographical area (Kenya)	Was measured by real GDP per capita (measured quarterly)
Consumer Price Index (CPI_t)	The average change in prices paid by consumers over a period of time for a basket of goods	Was measured by weighted averages of the percentage price changes for a basket of consumer goods (measured quarterly)
Expenditure on Public Awareness by Government (PA_t)	The amount of money set aside by government to combat or prevent counterfeit goods in the market through public awareness	Was measured by the real value of ACA's expenditure on public awareness programs at time *t* (measured quarterly)

3.4.2 Effects of Anti-Counterfeit Measures on the Performance of the Manufacturing Sector

The second objective sought to examine the effects of anti-counterfeit measures on the performance of manufacturing sector. To achieve this objective, equation 3.18 is linearized through the introduction of natural logarithms and introduction of more explanatory variables. The model estimated is shown in the equation 3.27.

$$LMVAGDP_t = \delta_0 + \delta_1 LEnf_t + \delta_2 LPA_t + \delta_3 LAB_t + \delta_4 LExc_t + \delta_5 LFDI_t + \delta_6 dum2_t + v_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3.27)$$

Where $LMVAGDP$ represent the logarithm of the share of manufacturing share in GDP, $LEnf$ represents the logarithm of expenditure for enforcement of the ACA law, LPA represents the logarithm of expenditure for creating public awareness on counterfeit goods, LAB represents the labour in Manufacturing to total Labour Ratio, $LExc$ represents the natural logarithm of exchange rate, $LFDI$ is the logarithm of FDI and $dum2$ represents dummy variables taking 1 for period starting from quarter 1 of 2012 and value of zero for the earlier period. t and v are time components and error term, respectively. The variables, their definitions and measurements are for model 3.25 is presented in Table 3.2.

Table 3.2: Effects of Anti-Counterfeit Measures on the Performance of Manufacturing Sector

Variable	Definition of Variable	Measurement of Variable
Manufacturing Value Added ($MVAGDP_t$)	Value added by the manufacturing sector to the Gross Domestic Product (GDP) in Kenya. This is the dependent variable for the model	Was measured by the total money value added by the manufacturing sector to the GDP ratio (measured quarterly) at time *t*
Expenditure on Public Awareness by Government (PA_t)	The amount of money set aside by government to combat or prevent counterfeit goods in the market through public awareness	Was measured by the real value of ACA's expenditure on public awareness programs at time *t* (measured quarterly)
Expenditure on Enforcement by Government (Enf_t)	The amount of money set aside by government to combat or prevent counterfeit goods in the market through enforcement activities	Was measured by the real value of ACA's expenditure on enforcement activities at time *t* (measured quarterly)
Labour in Manufacturing to total Labour Ratio (LAB_t)	Total number of people employed in the manufacturing sector divided by the total number of individuals employed in the county	Was measured by the Labour in Manufacturing to total Labour Ratio (measured quarterly) at time *t*
Exchange Rate (Exc_t)	The value of one currency for the purpose of conversion to another	Was measured by the average value of Kenya Shillings in relation to the USD (measured quarterly) at time *t*
Foreign Direct Investment to GDP ratio ($FDIGDP_t$)	Proportion of Kenya's FDI inflows in the country's GDP	Was measured by the ratio of FDI inflows to the country's GDP (measured quarterly) at time *t*

3.4.3 Effects of Anti-Counterfeit Measures on the Balance of Trade in Kenya

To achieve the objective of establishing the effects of anti-counterfeit measures on the country's balance of trade, equation 3.21 is enhanced through incorporation of more explanatory variables. The study introduced exchange rate and inflation as determinants of balance of trade. Similar variables had been used earlier by Bahmani-Oskooee and Ratha (2004). The study disaggregated anti-counterfeit measures into two components, namely, government expenditure on the enforcement of the anti-counterfeit law (Enf) and government expenditure on public awareness on the effects of counterfeit on the Kenyan economy (PA). The specified equation was as shown in equation 3.25.

$$BOT_t = \gamma_0 + \gamma_1 LEnf_t + \gamma_2 LPA_t + \gamma_3 LCPI_t + \gamma_4 LEXC_t + \gamma_5 dum3_t + \varepsilon_t \quad (3.28)$$

Where BOT represent the balance of trade, $LEnf$ represents natural logarithm of expenditure for enforcement of the ACA law, LPA represents expenditure on public awareness, CPI represents natural logarithm of consumer price index, $LEXC$ represents the exchange rate and $dum3$ represents dummy variables taking 1 for period starting from quarter 3 of 2015 and value of zero for the earlier period. γ_0 to γ_5 are parameters to be estimated.

The variables, their definitions and measurements are for model 3.28 are presented in Table 3.3.

Table 3.3: Effects of Anti-Counterfeit Measures on Balance of Trade

Variable	**Definition of Variable**	**Measurement of Variable**
Balance of Trade (BOT_t)	The net export of a country. It was used as the dependent variable	The money value (KES) of the difference between the country's exports and imports at time *t*, (X-M) (measured quarterly)
Expenditure on Public Awareness by Government (PA_t)	The amount of money set aside by government to combat or prevent counterfeit goods in the market through public awareness	Was measured by the real value of ACA's expenditure on public awareness programs at time *t* (measured quarterly)
Expenditure on Enforcement by Government (Enf_t)	The amount of money set aside by government to combat or prevent counterfeit goods in the market through enforcement activities	Was measured by the real value of ACA's expenditure on enforcement activities at time *t* (measured quarterly)
Exchange Rate (Exc_t)	The monetary value of one currency against another currency to ease conversion and transaction	Was measured by the average value of Kenya Shillings in relation to the USD (measured quarterly) at time *t*
Consumer Price Index (CPI_t)	The variations in customer prices over time for selected products	Was measured by weighted averages of the percentage price changes for a basket of consumer goods (measured quarterly)

3.5 Data Type and Source

The study used quarterly secondary data from the year 2010 to 2020 as this is the period when Anti-Counterfeit Authority was established in Kenya. The variables used in the study include per capita income, inflation measured by consumer price index, foreign direct investment share in GDP, exchange rate and balance of trade. Data on these variables was accessed from Kenya National Bureau of Statistics and Central Bank of Kenya publications. The study also used value of the counterfeit goods, number of complaints launched with regards to counterfeit goods, ACA budgetary allocation on public awareness regarding counterfeit goods, ACA budgetary allocation on enforcement of the anti-counterfeit law. Data on these variables was sourced from Anti-Counterfeit Authority publications.

3.6 Pre-estimation Test

a) The Stationarity Test

The main aim of carrying out unit root test is to avoid the case of spurious regression where two series are seen to have a relationship when there is no true relationship. This econometric problem makes inference testing difficult since the estimates are inconsistent (Verbeek, 2017). Non-stationary series means the series has a unit root. Equation 3.28 is the starting point in testing for presence of unit root.

$$Y_t = \beta + \rho Y_{t-1} + \varepsilon_t \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (3.29)$$

Where Y_t represents a series whose non-stationarity status is to be verified, Y_{t-1} represents the lag one of the series of interest while ε_t is disturbance term. Equation 3.29 can be manipulated further by subtracting lag one of Y_t from both sides to give;

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \varepsilon_t \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \ (3.30)$$

Where $\delta = \rho - 1$

The Dickey-Fuller (DF) test is used to test for presence of a unit root. To achieve this, equation 3.29 is estimated, and coefficient of the independent is examined. If δ is found to be equal to zero, the given series is said to be non-stationary. However, if it is found to be negative, then unit root is said to be absent (Dickey & Fuller, 1979). The problem of the Dickey Fuller, there is possibility that the error terms are related, given that it is a time series problem. To solve this, Augmented Dickey-Fuller (ADF) is established by including as many lags of the dependent variable as explanatory variables until the problem of autocorrelation is solved. The ADF specification is as shown in equation 3.31.

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \sum_{t=1}^{n} \alpha_k \Delta Y_{t-k} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.31)$$

Where n is large enough to guarantee absence of serial correlation.

The problem of ADF is that introduction of many lags of the dependent variable may cause the problem of multicollinearity. This is because, there is high chance that the lags may be related. This means that although the ADF solves the problem of autocorrelation, the problem of multicollinearity is introduced. To avoid this, Phillips-Perron test is introduced to solve the problem of Dickey Fuller without introducing lags of the dependent variable. The PP test estimate equation 3.29, but use some form of the student *t* statistic to correct the serial correlation problem. The idea behind the PP test is that it is a non-parametric statistical method, which makes it robust in the presence of serial correlation (Gujarati, 2009). The study, therefore, used the Phillips Perron test in checking the existence of unit root.

b) Optimal Lag Selection

The purpose of choosing optimal lag is to reduce residual correlation. This study used the traditional information criteria (Akaike Information Criterion (AIC), Hannan Quinn (HQ) and Schwarz Criterion (SC)) and an alternative criterion (modified

Information Criteria ($IC(p, s)$) that selects the lag order p and the rank structure s due to the weak form (WF) restriction as recommended by Carrasco, Castro and Teixeira (2009).

c) The Cointegration Test

Two series are said to be cointegrated if the series are themselves non-stationary, but their linear combination are stationary. Cointegration tests is meant to investigate possibility of long run relationship among variables. Under the $ARDL$ framework, $ARDL$ bounds test is uded to test for cointegration. The test is based on F-statistic / Wald statistic. The H_0 under the $ARDL$ bounds test is long-run relationship is absent. Pesaran $et\ al.$ (2001) report two critical values. The assumption made by the first set of critical values is that all variables in a model are 1(0). The second set assumes the variables are 1(1). The authors suggest that if Pesaran and Shin (1995) is less than F test, critical values of 1(1) bound, null hypothesis (H_0) are rejected, implying a long-run relationship. However, the F statistic lies between the necessary bounds; the results are inconclusive. The $ARDL$ bounds tests are shown in equations 3.32 and 3.33 to estimate the determinants of demand for counterfeit goods and effects of anti-counterfeit measures on performance of the manufacturing sector, respectively.

$$\begin{aligned}\Delta LVCF_t = \beta_0 &+ b_{1i}LVCF_{t-i} + b_{2i}LPA_{t-i} + b_{3i}LEnf_{t-i} + b_{4i}LPCI_{t-i}\\ &+ \beta_{5i}LFDIGDP_{t-i} + \beta_{6i}LExc_{t-i} + \beta_{7i}LCPI_{t-i} + \beta_{8i}LNOC_{t-i}\\ &+ \rho\mathrm{dum1} + \sum_{i=1}^{q}\beta_{1i}\Delta LVCF_{t-i} + \sum_{i=1}^{q}\beta_{2i}\Delta LPA_{t-i} + \sum_{i=1}^{q}\beta_{3i}\Delta LEnf_{t-i}\\ &+ \sum_{i=1}^{q}\beta_{4i}\Delta LPCI_{t-i} + \sum_{i=1}^{q}\beta_{5i}\Delta LFDIGDP_{t-i} + \sum_{i=1}^{q}\beta_{6i}\Delta LExc_{t-i}\\ &+ \beta_{7i}\Delta LCPI_{t-i} + \beta_{8i}\Delta LNOC_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.32)\end{aligned}$$

$$\Delta LMVAGDP_t = \alpha_0 + r_{1i}LMVAGDP_{t-i} + r_{2i}LEnf_{t-i} + r_{3i}LPA_{t-i} + r_{4i}LLAB_{t-i} + r_{5i}LExc_{t-i} + r_{6i}LFDIGDP_{t-i} + \sigma\mathrm{dum2} + \sum_{i=1}^{q}\alpha_{1i}\Delta LMVAGDP_{t-i} + \sum_{i=1}^{q}\alpha_{2i}\Delta LEnf_{t-i} + \sum_{i=1}^{q}\alpha_{3i}\Delta LPA_{t-i} + \sum_{i=1}^{q}\alpha_{4i}\Delta LLAB_{t-i} + \sum_{i=1}^{q}\alpha_{5i}\Delta LExc_{t-i} + \sum_{i=1}^{q}\alpha_{6i}\Delta LFDIGDP_{t-i} + \varepsilon_t \dots\dots\dots\dots\dots (3.33)$$

The test for long-run relationship ($ARDL$ bounds test) for equation 3.31 is as shown in equation 3.34.

$$\left.\begin{matrix} H_0 : r_{1i} = r_{2i} = r_{3i} = r_{4i} = r_{5i} = r_{6i} = \alpha_{1i} = \alpha_{6i} = 0 \\ H_a : r_{1i} \neq r_{2i} \neq r_{3i} \neq r_{4i} \neq r_{5i} \neq r_{6i} \neq \alpha_{1i} \neq \alpha_{6i} \neq 0 \end{matrix}\right\} \dots\dots\dots\dots\dots\dots\dots (3.34)$$

The test for long-run relationship ($ARDL$ bounds test) for equation 3.32 is as shown in equation 3.35.

$$\left.\begin{matrix} H_0 : r_{1i} = r_{2i} = r_{3i} = r_{4i} = r_{5i} = r_{6i} = 0 \\ H_a : r_{1i} \neq r_{2i} \neq r_{3i} \neq r_{4i} \neq r_{5i} \neq r_{6i} \neq 0 \end{matrix}\right\} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.35)$$

Where cointegration was revealed, the $ARDL$ error correction model (ECM), which gives the speed of the adjustment from the short-run to the long-run equilibrium, was then estimated.

In estimating the effect of anti-counterfeit measures on balance of trade, the study used the Johansen cointegration test, to check for a long-run relationship among the variables used in the specified model. The study chose Johansen cointegration test for this objective because all the variables were found to be integrated of order one. The Johansen test of cointegration permits the simultaneous establishment of multiple long-run relationships. This Test was founded by Johansen (1988) and later improved by Johansen and Juselius (1994). The authors examine the presence of cointegration for a Vector Autoregressive (VAR) procedure using the likelihood ratio test. The test does not impose constraints on cointegration space (Kennedy, 2000).

The Johansen cointegration test confirms all the series under study stationarity status via the unit root test. Once all variables are established to be integrated in same order, optimal lag length is chosen by a battery of lag length criteria. A suitable model concerning deterministic components in a multi-variate arrangement is determined and also the rank of the cointegrating vectors using the likelihood ratio test is determined (Enders, 2015).

Johansen (1988) suggested trace and maximum eigenvalue likelihood ratio tests to establish the significance of the correlations. The tests are expressed as follows:

$$\beta_{trace}(s) = -N \sum_{i=s+1}^{m} \ln\left(1 - \hat{\beta}_i\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3.36)$$

$$\beta_{max}(s, s+1) = -Nln\left(1 - \hat{\beta}_{s+1}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.37)$$

Where β is estimated value of the i^{th} order eigen-value originating from long-run coefficient matrix, N represents a number of observations adopted in the study in both equations. The H_0 for $\beta trace$ statistic tests that a number of the cointegrating equations is less than or equal to s, the number of cointegrating relations. The β_{max} statistic test is a complementary way of looking at the eigenvalue. The Test's H_0 is that the number of cointegrating equations is s. The H_a states that there are $s + 1$ cointegrating vectors. If eigenvalues are far away from zero (0), $\ln(1 - \lambda i)$ and the $\ln(1 - \lambda s + 1)$ turn into significant negative consequently leading to large λ_{trace} and vital λ_{max} statistics. However, the trace statistic test is said to be more superior to the max statistic since it can be corrected for the degrees of freedom and is more robust to the kurtosis and skewness.

The mathematical illustration of the Johansen test for cointegration is shown in equation 3.38. The assumption is that three endogenous variables are stationary at first difference or integrated of order one (1). These variables are $Y_t, X_t \ and \ S_t$, of which the matrix notation for $P_t = (Y_t, X_t, S_t)$ is:

$$P_t = A_1 P_{t-1} + A_2 P_{t-2} + \cdots + A_m P_{t-m} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.38)$$

Where P_t represents an $m \times 1$ vector for endogenous variables, A_i is an $m \times m$ matrix estimate, and ε_t is a vector of error terms.

In testing for the cointegration using the Johansen cointegration test, the VAR model in equation 3.37 must be changed into a $VECM$ of form:

$$\Delta P_t = \pi P_{t-m} + \beta_2 P_{t-2} + \acute{\Gamma}_1 \Delta P_{t-1} + \acute{\Gamma}_2 \Delta P_{t-2} + \cdots + \acute{\Gamma}_m \Delta P_{t-(m-1)} + u_t \ldots \quad (3.39)$$

Where $\pi = (\sum_{t-1}^{m} \beta_t) - I_h \ \ and \ \ + \acute{\Gamma}_1 = \sum_{j-1}^{i} \beta_j - I_h$

From the $VECM$ in equation 3.38, the Johansen test of cointegration concentrates on analysing the π matrix. The matrix illustrates long-run coefficient matrix because, in the long-run, equilibrium $\Delta Y_{t-i} = 0$ (Enders, 2015).

3.7 Estimation Technique

The study sought to estimate the determinants of demand for counterfeit goods, effects of anti-counterfeit measures on performance of the manufacturing sector and the effect of anti-counterfeit measures on balance of trade. To achieve the first and second objective, the study adopted the Autoregressive Distributed Lag ($ARDL$) models. To achieve the third objective, VAR model was used. The choice of $ARDL$ model for both first model and second model was because the variables were integrated of order one and zero. The choice of VAR for the third objective was because all the variables were found to be integrated of order one.

The general $ARDL$ models originating from equations 3.26 and 3.27 are shown in equations 3.40 and 3.41, respectively. This was informed by presence of long-run relationship for model 3.32 and 3.33.

$$
\begin{aligned}
& LVCF_t \\
& = \beta_0 + b_{1i}LVCF_{t-i} + b_{2i}LPA_{t-i} + b_{3i}LEnf_{t-i} + b_{4i}LPCI_{t-i} \\
& + \beta_{5i}LFDIGDP_{t-i} + \beta_{6i}LExc_{t-i} + \beta_{7i}LCPI_{t-i} + \beta_{8i}LNOC_{t-i} + \rho\mathrm{dum1} \\
& + \sum_{i=1}^{q}\beta_{1i}\Delta LVCF_{t-i} + \sum_{i=1}^{q}\beta_{2i}\Delta LPA_{t-i} + \sum_{i=1}^{q}\beta_{3i}\Delta LEnf_{t-i} + \sum_{i=1}^{q}\beta_{4i}\Delta LPCI_{t-i} \\
& + \sum_{i=1}^{q}\beta_{5i}\Delta LFDIGDP_{t-i} + \sum_{i=1}^{q}\beta_{6i}\Delta LExc_{t-i} + \beta_{7i}\Delta LCPI_{t-i} + \beta_{8i}\Delta LNOC_{t-i} \\
& + \lambda ECT_{t-i} + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . (3.40)
\end{aligned}
$$

$$
\begin{aligned}
LMVAGDP_t = \alpha_0 &+ r_{1i}LMVAGDP_{t-i} + r_{2i}LEnf_{t-i} + r_{3i}LPA_{t-i} + r_{4i}LLAB_{t-i} \\
&+ r_{5i}LExc_{t-i} + r_{6i}LFDI_{t-i} + \sigma\mathrm{dum2} + \sum_{i=1}^{q}\alpha_{1i}\Delta LMVAGDP_{t-i} \\
&+ \sum_{i=1}^{q}\alpha_{2i}\Delta LEnf_{t-i} + \sum_{i=1}^{q}\alpha_{3i}\Delta LPA_{t-i} + \sum_{i=1}^{q}\alpha_{4i}\Delta LLAB_{t-i} \\
&+ \sum_{i=1}^{q}\alpha_{5i}\Delta LExc_{t-i} + \sum_{i=1}^{q}\alpha_{6i}\Delta LFDIGDP_{t-i} + \lambda ECT_{t-i} + v_t \dots (3.41)
\end{aligned}
$$

In the case of the third objective, the study performed an unrestricted VAR to estimate the effects of anti-counterfeit measures on balance of trade. This is because the variables were found to be integrated of order one but lacked the long-run relationship. As Cromwell *et al*., (1994) indicated, the VAR model is mainly applied in forecasting systems of interrelated series. The model is also used in the analysis of dynamic impact of random disturbances on system of variables. In these models, some variables are treated as endogenous and some as exogenous or predetermined (the exogenous plus the lagged endogenous variables). In the case of this study, three variables $rpgdp_t$rgdpt, $rgovtexp_t$ and $rdispincom_t$ are treated as endogenous.

Taking into consideration that each of VAR's equations is comprised of m lag values, for t period, the model can be written as:

$$BOT_t = \alpha_1 + \sum_{j=1}^{m} \beta_j BOT_{t-j} + \pi \mathrm{dum3} + \sum_{j=1}^{m} \rho_j LEnf_{t-j} + \sum_{j=1}^{m} \acute{\eta}_j LPA_{t-j} + \sum_{j=1}^{m} \chi_j LCPI_{t-j} + \sum_{j=1}^{m} \omega_j LEXR_{t-j} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (3.42)$$

The coefficients of VAR models are usually difficult to interpret. This is because some of the signs of the coefficients of the lagged variables may be changing across lags. This, coupled with interconnectivity of equations, could make it a challenge to observe the effect a particular variation in each variable would mean on future values of variables used in the system (Brooks, 2008). Thus, construction of impulse response functions can help in tracing the dynamic structure of VAR model (Ajilore & Ikhide, 2013).

In other words, the VAR coefficient estimates that did not make sense due to lack of theoretical anchor. However, these coefficients were used to estimate the impulse responses functions (IRF) and forecasting error decomposition. The $IRFs$ linked the current value of the error term to the current value of each independent variable. Similarly, current and preceding values of the error term are linked to current values of the independent variables. The forecast error decomposition indicated how important the error was in explaining the unexpected movements in a given variable (Stock & Watson, 2001). The $IRFs$ was instrumental to the study in tracing the effect of one-time shock to one of the innovations on current and the future values of the particular endogenous variable.

Variance decomposition is also part of structural analysis that decomposes the variance of the forecast error into the contributions from specific exogenous shocks. The Variance decomposition analysis allows partitioning the total variance in an outcome variable into several components. Such partitioning allows identifying groups of factors that explain a significant portion of the variation in dependent variable, thus helping to understand which explanatory variable explain the dependent variable most.

3.8 Post-estimation Tests

a) Serial correlation

Serial correlation is one of the econometric problems that are common in time series. It is a situation where the current error term and preceding error term are related. Mathematically, it is expressed $E(\mu_t, \mu_{t-\mathrm{j}}) = 0$; $j \neq 0$, meaning that at least some off-diagonal elements are non-zero. Serial correlation does not affect the unbiasedness of the estimates. It, however, affects the variance-covariance matrix, thus giving wrong t values. Breusch Godfrey (BG) test was used in testing for presence of serial correlation. Durbin-Watson and Breusch Godfrey tests are commonly used to test for the presence of serial correlation. However, the Durbin Watson test is an autoregressive $AR(1)$ process and, therefore, cannot reveal the presence of autocorrelation in the case $AR(p)$ process where p is 2 and above. Breusch-Godfrey test overcomes this challenge since it tests for the existence of autocorrelation in the case of the $AR(p)$ process. This study used the BG test in checking for presence of serial correlation because of its superiority over the Durbin Watson test (Wooldridge, 2016).

b) Normality Test

The study carried out a normality test using Jarque Berra test that compares the variables' skewness and kurtosis coefficient. A normality test was necessary for this study to validate the significance of the tests. The decision to carry out this test was informed by the small sample size of the used data. The null hypothesis (H_0), under Jarque Berra test, is that a variable is normally distributed. Where the data passes the normality test, then the goodness of fit of the data is guaranteed, and therefore the study would adopt the linear regression model suggested.

c) Model Stability Test

$ARDL$ model used in the study assumes that all the model coefficients remain constant across all the observations. If these coefficients change with the observations, then the model would be said to be unstable. To test for $ARDL$ model stability, the study generated and observed the plot of recursive residuals from the $ARDL$ model was developed, and the graphical plot of the $CUSUM$ was observed (Wooldridge, 2016).

3.9 Data Analysis

Several steps were involved in the analysing the data. Firstly, the study examined the descriptive statistics for all the variables in the study. The aim of examining descriptive statistics was to have a quick summary of the data so as to make sense of overall data structure. Secondly, the study performed pairwise correlation among the explanatory variables of each model. The aim of carrying out correlation was to ensure the estimates are precise by dropping variables that are highly correlated. Thirdly, the study performed diagnostic tests to ensure validity of the study results. Fourthly, the study performed regression analyses using ARDL and VAR models. The choice of

ARDL was informed by having variables that were integrated of order one and zero. The choice of VAR was informed by having variables that were integrated of order one. However, long run relationship among the variables was absent. Additional impulse response functions (IRFs) and Variance Decomposition (VD) was carried for the last objective where VAR model was used. The decision to obtain the IRFs and VD was informed by the fact that VAR may deviate from the main objective by giving many lags of the independent variables making it difficult to map the relationship between variables of interest.

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the empirical findings of the study. The empirical findings are comprised of descriptive statistics and regression analyses. To understand the magnitude of value of counterfeit, share of manufacturing in GDP, balance of payment, value of expenditure in enforcing anti-counterfeit law, value of expenditure of public awareness by the Anti-counterfeit Authority, summary statistics are presented before regressions for each objective. In its first objective, the study sought to estimate the determinants of demand for counterfeit goods. To achieve this first objective, an ARDL model was used. In its second objective, the study estimates the role of anti-counterfeit measures on manufacturing. To achieve this objective, the study uses ARDL model. The third objective of the study was to estimate the role of anti-counterfeit measures on the balance of trade. The study uses the structural VAR model in achieving the objective.

4.2 Determinants of Demand for Counterfeit Goods

The first objective sought to establish the determinants of demand for counterfeit goods in Kenya. Autoregressive Distributed lag model was adopted to evaluate factors that explain variations in the level of counterfeit goods. The logarithm of value of seized goods represented the dependent variable as it captures the level of counterfeit goods. The regressors specified in this model included two policy variables namely expenditure by the Authority on public awareness and expenditure by the Authority on law enforcement. The log per-capita income and logarithm of FDI share in GDP were included as a long run regressors to account for the economic conditions.

Exchange rate and inflation rate were introduced as exogenous regressors in the model.

4.2.1 Descriptive Statistics for Study Variables used in the Estimation of Determinants of Demand for Counterfeit Goods

Descriptive statistics for the variables used in the estimation of the determinants of demand for counterfeit goods is shown in Table 4.1.

Table 4.1: Descriptive Statistics for Study Variables used in the Estimation of Determinants of Demand for Counterfeit Goods (2010Q1 – 2020Q4)

Variables	Mean	Standard Deviation	Minimum	Maximum
Value of Counterfeit Goods in Millions of KES	68.51	90.623	2.4 (2010q1)	512.4 (2018q1)
Number of Complaints	67	59	2 (2010q1)	225 (2020q1)
Per Capita Income in KES	37,747.75	2,183.3	34,133.4 (2010q1)	43,147.1 (2020q4)
Consumer Price Index	82.14	17.02	53.64 (2010q1)	110.75 (2020q4)
Exchange rate (KES/USD)	94.50	9.29	76.49 (2010q1)	109.51 (2020q4)
Expenditure on Public Awareness in Millions of KES	1.853	2.17	0.072 (2010q1)	12.32 (2019q1)
FDI Share in GDP	0.024	0.010	0.0016 (2010q1)	0.044 (2018q1)
Expenditure on Enforcement in Millions of KES	2.357	1.77	0.27 (2010q1)	8.346 (2019q1)

Source: *Author's Computations*

From Table 4.1, it was revealed that the value of counterfeit goods ranged from KES 2.4 million during the first quarter of 2010 to KES 512.4 million during the first quarter of 2018. The lowest value of counterfeit goods seized during 2010 quarter one coincides with the period when Anti-counterfeit Authority was commencing its operations hence no much activity took place. The highest value of counterfeit goods seized during the first quarter of 2018 coincides with the period when there were multi-agency operations that resulted to more counterfeit goods being seized. This finding agrees with Republic of Kenya (2019b) report on counterfeit products that showed the counterfeit goods worth KES 1.1 billion accessed the Kenyan market since 2014. The report showed that out of these counterfeit goods, the government destroyed goods worth KES 880 million that were seized. However, the author indicated fear of continued proliferation of counterfeit goods if the situation was not controlled. It was noted the standard deviation for value of counterfeit goods was greater than its mean. According to Anti-Counterfeit Authority (2020), this linked to a period of lull when the authority was being established and a period when the authority increased number of inspectors thus leading to much seizure.

It was observed that ACA's expenditure in creating public awareness and enforcement of the anti-counterfeit law has increased over the study period. The expenditure in creating public awareness increased from KES 0.072 million during the first quarter of 2010 to KES 12.32 million during the first quarter of 2019. The expenditure on enforcement of the anti-counterfeit law ranged from KES 0.27 during the first quarter of 2010 to KES 8.346 million during the first quarter of 2019. The low expenditure on public awareness and enforcement of the anti-counterfeit law coincides with the period ACA was being established with low budgetary allocation. This is unlike in 2019 when the authority had been fully established and thus had increased budgetary allocation towards the anti-counterfeit measures. The continued increase in expenditure by ACA in its anti-counterfeit measures follows the rise in value of fake goods. The emboldening of the anti-counterfeit measures aims at stopping the proliferation of the counterfeit goods. It was noted the standard deviation for public awareness was greater than its mean. According to Anti-Counterfeit Authority (2020), this linked to a period when the authority had few public awareness officers to a period when the authority increased number of public awareness officers thus leading to more public awareness campaigns.

The value of seized goods was used as a dependent variable. Other endogenous explanatory variables included logarithm of government expenditure on enforcement, logarithm of government expenditure on public awareness, number of consumer complaints and log of per-capita income. Natural logarithm of exchange rate was introduced as exogenous variable into the model to control for external macroeconomic factor. Before carrying out the estimation, pre-estimation tests were performed to ensure the Ordinary Least Square (OLS) assumptions and time series properties are met. These tests are discussed in the following section.

4.2.2 Pre-estimation Tests Results for Study Variables used in Estimating the Determinants of Demand for Counterfeit Goods

(a) Testing for Structural Break

The study also performed Supremum Wald test to tests for structural break given that the structural break was not known. The null hypothesis stated that there was no structural break.

Table 4.2: The Supremum Wald Test Results for Study Variables used in Estimating the Determinants of Demand for Counterfeit Goods

Number of observations = 44	
Full sample: 2010q1- 2020q4	
Trimmed sample: 2011q4- 2019q2	
Estimated break date: 2018q2	
Ho: Number of structural breaks	
Test Statistic	p-value
swald 31.8542	0.0005

Source: *Author's Computations*

The Supremum Wald test statistics was 31.85 with a p-value 0.0005. The study rejected the null hypothesis (H_0) at 5 percent level of significance supporting the fact that the model had a structural break. The test estimated break date to be from the second quarter of 2018. The study, therefore, controlled for this structural break by introducing dummy variable to control for the structural break. This structural break coincides with the period when there were multi-agency operations involving ACA, Kenya Revenue Authority, Kenya Bureau of Standards, Kenya Copy Right Board and Pharmacy and Poison Board. This led to increased value of counterfeit goods as a result of increased seizures.

(b) Results for Unit Root

To avoid spurious regression results, ADF was used to check the stationarity of all the study variables. The results are shown in Table 4.3.

Table 4.3: Results of Unit Root Test for Study Variables used in Estimating the Determinants of Demand for Counterfeit Goods

Variables	**Level of Significance**	**Statistic**	**Critical value (5 percent)**	**Order of Integration**
Natural Logarithm of value of Counterfeit Goods	Level 1st Difference	-4.041 -	-2.950 -	Zero
Natural Logarithm of Consumer Price Index	Level 1st Difference	-4.661 -	-2.950 -	Zero
Natural Logarithm of FDI Share in GDP	Level 1st Difference	-5.586 -	-2.950 -	Zero
Natural logarithm of Expenditure on Enforcement	Level 1st Difference	-1.038 -4.909	-2.950 -2.952	One
Natural logarithm of Expenditure on Public Awareness	Level 1st Difference	-2.178 -4.699	-2.950 -2.952	One
Natural Logarithm of Number of Complaints	Level 1st Difference	-2.609 -9.485	-2.950 -2.952	One
Natural logarithm of Per capita Income	Level 1st Difference	-2.271 -3.936	-2.950 -2.952	One
Natural logarithm of Exchange rate	Level 1st Difference	-1.505 -5.353	-2.950 -2.952	One

Source: *Author's Computations*

From Table 4.3, it was found that the following variables were integrated at order zero: value of counterfeit goods, natural logarithm of consumer price index, natural logarithm of foreign direct investment (FDI) share in GDP. The study also discovered that the natural logarithm of enforcement expenditure, natural logarithm of public awareness expenditure, the natural logarithms of the exchange rate, the number of complaints, and the per capita income were all stationary at first difference. The ARDL model was chosen for the investigation based on this attribute of the variables. However, the study used the ARDL limits test, which is covered in the section that follows, to look into the existence of a long-term link between the independent and dependent variables.

(c) Cointegration Results

The ARDL bounds test was carried out, and the results are as indicated in Table 4.4.

Table 4.4: ARDL Bounds Test Results of Study Variables used in Estimating the Determinants of Demand for Counterfeit Goods

ARDL Bounds Test	
F-statistic	10.71
I(0) at a 5% level (95 % confidence level)	2.81
I(1) at a 5% level (95 % confidence level)	4.51

Source: *Author's Computations*

The value of seized goods, the logarithms of government spending on enforcement and public awareness, the number of consumer complaints, the natural logarithm of per capita income, and the natural logarithm of the exchange rate were found to have a long-term relationship, according to the results of the ARDL bounds test. The *F* statistic for the ARDL bounds test, which was 10.71 and bigger than I(1), which is 4.51, demonstrated this long-term association. This suggested that the study might estimate the short-run ARDL model as well as the Error Correction Model (ECM). Before performing ARDL Error Correction Model, the study performed the optimal lag length selection test.

(d) Optimal Lag Length Selection

A Bayesian Information Criterion (BIC) was used to determine the optimal combination of lags. This optimal lag selection criterion was chosen because it is more restrictive than the other 4 criteria.

Table 4.5: Optimal Lag Length Selection Results for Study Variables used in Estimating the Determinants of Demand for Counterfeit Goods

Variable	**Optimal Lag**	**BIC Value**
Log of Value of Counterfeit Goods	1	11.872*
Log Expenditure on Public Awareness	0	3.189*
Log Expenditure on Enforcement	1	1.515*
Log Per Capita Income	2	-5.142*
Log Consumer Price Index	3	-5.649*
Log Exchange Rate	2	-4.137*
Log FDI	4	-0.297*
Number of Complaints	3	10.505*

Source: *Author's Computation*

The optimal lag lengths for the variables shown in equation 3.19 were (1, 0, 1, 2, 3, 2, 4, 3). Having identified the optimal lags, the study was guaranteed of model's predictive accuracy. This is because use of few lags may result into loss of some information. On the other hand, using to many lags may add noise thus reducing accuracy.

4.2.3 Regression Results for the Determinants of Demand for Counterfeit Goods

Table 4.6 shows the ARDL regression results for model shown in equation 3.34.

Table 4.6: Regression Results for the Determinants of Demand for Counterfeit Goods

Dependent Variable: Natural logarithm of Value of Counterfeit Goods seized		
	Coefficients	**P-Value**
Error Correction Coefficient (-1)	-0.846***	0.003
Long Run Model		
Logarithm of Number of Complaints	-8.39***	0.006
Logarithm of Expenditure on Public Awareness	-3.73 *	0.074
Logarithm of Expenditure on Enforcement	-3.44**	0.019
Logarithm of Per Capita Income	-8.83***	0.002
Logarithm of FDI Share in GDP	0.33	0.822
Logarithm of Consumer Price Index	29.64	0.676
Logarithm of Exchange Rate	16.46	0.632
Short Run Model		
D. Logarithm of number of Complaints	-0.51 *	0.052
LD. Logarithm of number of Complaints	-0.52 ***	0.003
L2D. Logarithm of number of Complaints	-0.003 ***	0.007
D. logarithm of Expenditure on Public Awareness	-0.33	0.547
D. logarithm of Expenditure on Enforcement	-0.56*	0.069
D. logarithm of Consumer Price Index	-1.32	0.327
LD. logarithm of Consumer Price Index	-2.65*	0.076
L2D. logarithm of Consumer Price Index	-0.35	0.761
D. logarithm of Per Capita Income	0.71	0.332
LD. logarithm of Per Capita Income	1.02	0.133
D. logarithm of FDI to GDP Ratio	0.33 ***	0.001
LD. logarithm of FDI to GDP Ratio	0.05	0.554
L2D. logarithm of FDI to GDP Ratio	0.03	0.718
L3D. logarithm of FDI to GDP Ratio	-0.04	0.660
This structural break coincides with period when there were multi-agency operations involving ACA, Kenya Revenue Authority, Kenya Bureau of Standards, Kenya Copy Right Board and Pharmacy and Poison Board. This led to increased value of counterfeit goods as a result of increased seizures from second quarter of 2018. (D=1 for period starting from second quarter of 2018 and 0 otherwise)	0.20**	0.014
Constant	-6.57*	0.079
Observations	40	
Adjusted R^2	0.8928	
Ramsey RESET Test	0.5019	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, *D. means difference, LD. means lag one of the Difference, L2D. means lag two of the Difference.*
Source*: Author's Computation*

Post estimation test results shown in Table A1 in the Appendix showed that the model estimates in Table 4.6 met the statistical validity threshold and could be used for inferential analysis. This is evidenced by probability of Ramsey RESET of 0.5019 which is greater than 0.05. This means the null hypothesis of model is correctly specified is not rejected. The Breusch-Godfrey test was run to check for autocorrelation. The Breusch-Godfrey test probability was 0.7295, which means that the null hypothesis of no serial correlation was not rejected at the five percent significance level, indicating that there was no autocorrelation in the model. Heteroscedasticity was also tested using Arch Lagrange Multiplier $(Arch\ LM)$. The null hypothesis stated that there was no heteroscedasticity. The probability of $Arch\ LM$ was 0.7567. The null hypothesis was not rejected at 5 percent level of significance suggesting that the model did not suffer from heteroscedasticity.

To check for model stability, recursive residuals from the time series regression were acquired, and the cumulative sum of squares, or CUSUM, was produced. The graphical plot of CUSUM is displayed in Figure A1 in the Appendices. A model is considered stable if its CUSUM falls inside a significance threshold of five percent. Given that the CUSUM was found to be inside the 5 percent border, the graph demonstrated the stability of the provided model (Inclan & Tiao, 1994).

The Error correction coefficient was (-0.846), which was negative and significant. This suggests that, in the event that distortions occur, equilibrium will be reached within one period. The findings corroborate the existence of a steady, long-term relationship between the following variables: the value of counterfeit goods seized; the natural logarithm of the consumer price index; the natural logarithm of the ratio of foreign direct investment to GDP; the natural logarithm of expenditure in enforcement of the anti-counterfeit law; the natural logarithm of the expenditure in public awareness about counterfeiting issues; the number of complaints; and the natural logarithm of per capita income and the natural logarithm of exchange rate.

The number of complaints coefficient was negative (-8.39) and significant at the 1 percent significance level, according to the long-term data in Table 4.6. According to these findings, the value of counterfeit items reduces by 8.39 percent for one percent increase in complaints, all other things being equal. A closer look at the short run model reveals that, at the 5 percent significance level, the first, second and third lag coefficients of the difference in the number of complaints and lags were both negative and significant.

The findings are consistent with economic theory since the Anti-counterfeit authority will put in measures to counter counterfeit goods as customer complaints rise. This result demonstrates the importance of customers reporting counterfeit products as such complaints serve as a deterrence to those who may have wanted to demand counterfeit goods. This conclusion concurs with the Federal Republic of the USA (2022) office's assessment of markets known for being hubs for piracy and counterfeit goods. According to the report, those involved in counterfeit trade are prosecuted thus making others to stop participating in the vice. Accordingly, reporting cases of counterfeits by consumers or traders serve as a deterrent for potential traders of counterfeit goods.

Table 4.6 shows long-run results demonstrate that, at the 5 percent significance level, the coefficient of spending on public awareness of 3.73 was both negative and significant. These findings suggest that, when all other variables are held constant, a one percent increase in public awareness campaigns about counterfeiting results in a 3.73 percent drop in the value of counterfeit items. A closer look at the short run model reveals that the lagged values of public awareness spending indicate a negative but insignificant coefficient of the differenced variable at the five percent significance level. The finding shows that, at most, there is an important impact which is significant on public knowledge of counterfeit goods.

These findings are in line with earlier study by Grammich and Wilson (2020) that studied public awareness and product counterfeiting. They showed that anti-counterfeiting public awareness should focus much more on issues posed by the counterfeit products. These issues include opportunities to change buyers of counterfeit goods to buyers of genuine goods, how people can influence purchase of counterfeits, and the socio-economic characteristics of places where the counterfeit products are produced and sold throughout the world. The study's results are also in agreement with Wang (2018) which investigated the counterfeiting and market competition nexus for both genuine and counterfeit goods. The study on using comparative static model and micro-economic modelling showed that law enforcement activities such as seizure and public awareness were the most important anti-counterfeit measures. The study established that increase in expenditure on enforcement of anti-counterfeit law affects the substitutability between genuine and counterfeit products in favour of genuine goods.

Increase in public awareness campaigns that are aimed at eliminating deceptive counterfeiting, create awareness on the risk of consuming counterfeit and entrenching ethical considerations (Basu *et al*., 2015; Wu & Zhao, 2021). The authority should vehemently educate consumers on the adverse effects of consuming low-quality products, the potential danger and negative effect of counterfeiting, criminality and legal consequences of consuming counterfeit goods. Genuine producers should not only create awareness as to the quality, durability, functionality and dependability of the products but should also educate the public on how to differentiate between their products and counterfeit products. On the other hand, the government should create awareness (Biancardi *et al*., 2021; Tang *et al*., 2014, Wu & Zhao, 2021; Yao, 2006).

The study also looked into the impact of the Anti-counterfeit Authority's second measure, which is the money spent on enforcing anti-counterfeit laws, on the spread of counterfeit goods. The long run coefficient of enforcement of anti-counterfeit law was -3.44. The coefficient was significant at 5 percent level of significance. These findings suggest that, when all other variables are held constant, a one percent increase in enforcement of the anti-counterfeit law led to a decrease of the value of counterfeit items by 3.44 percent holding other factors constant. A closer look at the short run model reveals that the lagged values of public awareness spending indicate a negative and significant coefficient of the differenced variable at the five percent significance level. These findings agree with Fink *et al*., (2016) and Wang (2018), who demonstrated that enforcement actions prevent the economy's counterfeit items from proliferating. After examining the literature to determine how enforcement affected counterfeiting in underdeveloped economies, the previous study came to this result. After analysing the relationship between counterfeiting and counterfeit tactics such law enforcement actions, the subsequent study came to its conclusion. The findings, however, disagree with a Nduati (2014) study which found that Kenya's government's attempts to combat counterfeiting in relation to the enforcement of intellectual property rights, upholding standards for goods, and copyright protection were ineffective. The study investigated the role of Kenyan government anti-counterfeit measures in combating counterfeit goods using a descriptive cross-sectional study methodology.

Long run coefficient estimates show that the natural logarithm of per capita income was negative and statistically insignificant at 1 percent level of significance, meaning that per-capita income is not an important determinant of demand for counterfeit goods in Kenya. The regression results in Table 4.6 revealed that the coefficient of natural logarithm of per capita income was -8.83. The p-value suggests that this coefficient is significant. The results revealed that an increase in per capita income by one percent leads to reduction in value of counterfeit goods by 8.83 percent holding other factors constant. These results are true because increase in a country’s income could be making Kenya be aware of the consequences of the counterfeit goods, thus stop buying them and resorting to genuine products.

Foreign direct investment, inflation and exchange rate were found to be not important determinants of the value of counterfeit goods in Kenya. This was informed by coefficient of the variables having p values of more than 0.1. Specifically, the coefficient for FDI share in GDP and inflation had p values of 0.822 and 0.676, respectively. The coefficient of exchange rate had a *p* value of 0.632.

4.3 Effects of Anti-Counterfeit Measures on Performance of the Manufacturing Sector in Kenya

The second objective was to investigate the effects of anti-counterfeit measures on the performance of the manufacturing sector in Kenya. The dependent variable was the manufacturing output as a percentage of GDP. The natural logarithm of the Anti-counterfeit Authority's expenditure on raising public awareness on counterfeit goods and the logarithm of the expenditure on enforcement of the Anti-counterfeit law were the independent variables. The FDI share in GDP was one of the control variables considered in the model since foreign investors may participate in Kenya's manufacturing sector. Exchange rates were added to the model to account for external macroeconomic concerns. The ratio of the number of individuals employed in the manufacturing sector to total employment in Kenya was used to control for the contribution of employees in the sector.

4.3.1 Descriptive Statistics of Study Variables

Descriptive statistics for the variables used in the estimation of the effects of anti-counterfeit measures on manufacturing sector is shown in Table 4.7.

Table 4.7: Descriptive Statistics of Study Variables (2010Q1 – 2020Q4)

Variables	Mean	Standard Deviation	Minimum	Maximum
Labour in manufacturing to total labour ratio	0.15	0.052	0.082 (2010q1)	0.329 (2020q4)
Share of manufacturing in GDP	0.12	0.0073	0.098 (2010q1)	0.138 (2010q4)
FDI Share in GDP	0.024	0.010	0.0016 (2010q1)	0.044 (2018q1)
Exchange rate (KES/USD)	94.50	9.29	76.49 (2010q1)	109.51 (2020q4)
Expenditure on awareness in millions of KES	1.853	2.17	0.072 (2010q1)	12.32 (2019q1)
Expenditure on enforcement in millions of KES	2.357	1.77	0.27 (2010q1)	8.346 (2019q1)

Source: *Author's Computations*

From Table 4.7, it was revealed that the share of manufacturing in GDP ranged from 0.098 during the first quarter of 2010 to 0.138 during the last quarter of 2015. According to Kemboi (2023), the highest value of manufacturing share in GDP during 2015 can be attributed to increased investment in the textile sector in the Export Processing Zone (EPZ) due to the expanded market under the African Growth and Opportunity Act (AGOA). In addition, World Bank Group (2016) also links improved performance of the manufacturing sector to improved infrastructure spending and consumer demand driven growth. This finding connotes the true situation of the Kenyan manufacturing sector which has seen the sector's contribution to GDP oscillating at about 10 percent of GDP for quite some time. It is alleged that one of the causes of the sector's slow growth is increased counterfeit products. The truth about counterfeit affecting the manufacturing can be observed by a high increase from KES 2.4 million to KES 512.4 million.

However, the Anti-counterfeit Authority is seen to continuously put in effort in fighting counterfeit products as revealed by increase in expenditure on awareness about the counterfeit products from KES 0.072 million to KES 12.32 million during the study period. The Authority also increased its expenditure on enforcement of the anti-counterfeit law from KES 0.27 million in quarter one of 2010 to 8.346 million in quarter 4 of 2020. Further, it has also been shown that the share of foreign direct investment (FDI) in GDP deviated from its mean of 0.024 by 0.010. The mean of ratio of labour in the manufacturing sector to total employment was 0.15. The ratio ranged from 0.082 to 0.329 signalling an increase in the employment in the manufacturing sector during the period of study. This increase can be linked to high demand for locally manufactured goods as result of South Sudan joining East African Community (EAC) economic bloc. This may have led to increased demand for labour force in the sector (Zambakari, 2020). To ensure validity of the results, pre-estimation tests were done to ensure the OLS assumptions and time series properties are met as discussed in the following section.

4.3.2 Diagnostic Tests Results for the Effects of Anti-Counterfeit Measures on Performance of the Manufacturing Sector in Kenya

(a) Testing for Structural Break

The study also performed Supremum Wald test to tests for structural break given that the structural break was not known. The null hypothesis stated that there was no structural break (Murteira, Ramalho, & Ramalho, 2013).

Table 4.8: The Supremum Wald Test Results for Study Variables used in Estimating the Effects of Anti-Counterfeit Measures on Performance of the Manufacturing Sector

Number of observations = 44	
Full sample: 2010q1- 2020q4	
Trimmed sample: 2011q4- 2019q2	
Estimated break date: 2012q2	
Ho: No structural break	
Test Statistic	p-value
swald 43.3977	0.0000

Source*: Author's Computations*

Since the structural break was unknown, the Supremum Wald test was also carried out in the study to look for structural breaks. According to the null hypothesis, there was no structural break. With a p-value of 0.00, the Supremum Wald test statistics were 43.40. As a result, the null hypothesis was rejected at the 1 percent significance level, confirming the structural break hypothesis for the model. The test estimated break date to be from the second quarter of 2012. The study therefore controlled for this structural break by introducing dummy variable. This structural break coincides with period when there was an increase in number of inspectors and public awareness officers leading to a sharp increase in budgetary allocation to enforcement of the anti-counterfeit law. The budgetary allocation to public awareness also increased during the same time (Anti-Counterfeit Authority, 2019).

(b) Results for Unit Root

To ensure the results obtained are consistent and are not spurious, the study performed the unit root test. The ADF test was used and the results are shown in Table 4.9.

Table 4.9: Results of Unit Root Test for Study Variables used in Estimating the Effects of Anti-Counterfeit Measures on Performance of the Manufacturing Sector

Variables	Level of Significance	Statistic	Critical value (5 percent)	Order of Integration
Natural logarithm of labour in manufacturing to total ratio	Level 1st Difference	-0.159 -	-2.950 -	Zero
Natural logarithm of share of manufacturing in GDP	Level 1st Difference	-5.035 -	-2.950 -	Zero
Natural logarithm of FDI share in GDP	Level 1st Difference	-2.480 -4.406	-2.950 -2.952	One
Natural logarithm of Expenditure on Enforcement	Level 1st Difference	-1.038 -4.909	-2.950 -2.952	One
Natural logarithm of Expenditure on Public Awareness	Level 1st Difference	-2.178 -4.699	-2.950 -2.952	One
Natural logarithm of exchange rate	Level 1st Difference	-1.505 -5.353	-2.950 -2.952	One

Source: *Author's Computations*

The variables were integrated in different orders, according on the results of the unit root test. The integration of the natural logarithms of the GDP share of manufacturing was found to be of order zero. Labour in manufacturing to total labour ratio, FDI Share in GDP and natural logarithm of exchange rate, the spending on enforcement, and the expenditure on public awareness were found to be integrated of order one. Since some of the variables used in the estimation of the effect of anti-counterfeit measures on performance of the manufacturing sector were integrated of order zero while others were integrated of order one, ARDL model was adopted as the estimation technique. However, there was need to investigate possibility of cointegration among the variables. To achieve this, the study performed ARDL bounds test whose results are discussed in the following section.

(c) Cointegration Results

The ARDL bounds test was carried out, and the results obtained are as indicated in Table 4.10.

Table 4.10: ARDL Bounds Test Results for Study Variables used in Estimating the Effects of Anti-Counterfeit Measures on Performance of the Manufacturing Sector

ARDL Bounds Test	
F-statistic	10.35
I(0) at a 5% level (95 % confidence level)	2.62
I(1) at a 5% level (95 % confidence level)	3.79

Source: *Author's Computations*

The ARDL bounds test results revealed that the variables were cointegrated. This long run relationship was revealed by F-statistic, that is 10.35 for ARDL bounds test being greater than 3.79 for upper limit of the bounds test. This implied that the study could estimate both Error Correction Model (ECM) and short-run ARDL model. The bounds testing criteria for testing for cointegration was applied given that the model was devoid of autocorrelation and heteroscedasticity as shown in part (a) and (b) above (Pesaran, Shin & Smith, 2001). Meeting these conditions suggest the existence of the long run relationship amongst the study variables.

(d) Optimal Lag Length Selection

A Bayesian information criterion was used to determine the optimal combination of lags. The optimal no. of lags was (1, 1, 0, 1, 1, 4).

Table 4.11: Optimal Lag Length Selection Results for Study Variables used in Estimating the Effects of Anti-Counterfeit Measures on Performance of the Manufacturing Sector

Variable	Optimal Lag	BIC Value
Natural Logarithm of Share of Manufacturing in GDP Ratio	1	-3.405*
Natural Logarithm of Expenditure on Enforcement	1	1.515*
Natural Logarithm of Expenditure on Public Awareness	0	3.189*
Natural Logarithm of Labour in Manufacturing Sector to Total Labour Ratio	1	-5.115*
Natural logarithm of Exchange Rate	1	4.917
Natural Logarithm of FDI	4	-0.297*

Source: *Author's Computation*

Having identified the optimal lags, the study was guaranteed of model's predictive accuracy. This is because use of few lags may result into loss of some information. On the other hand, using to many lags may add noise thus reducing accuracy.

4.3.3 Regression Results for the Effects of Anti-Counterfeit Measures on Performance of the Manufacturing Sector in Kenya

Objective two sought to examine effect of anti-counterfeit measures on performance of the manufacturing sector in Kenya. The results are given in table 4.12.

Table 4.12: Effects of Anti-counterfeit Measures on Performance of the Manufacturing Sector in Kenya

Dependent Variable: Natural logarithm of the value added by the manufacturing sector to the GDP ratio		
	Coefficients	**P-Value**
Error Correction Coefficient (-1)	-1.21 ***	0.004
Long Run Model		
Natural logarithm of expenditure on public awareness	0.33 **	0.029
Natural logarithm of expenditure on enforcement	0.24 ***	0.007
Natural logarithm of FDI share in GDP	0.11 **	0.050
Natural logarithm of labour in manufacturing to total labour ratio	0.28 *	0.085
Natural logarithm of exchange Rate	1.05 ***	0.000
Short Run Model		
D. natural logarithm of the value added by the manufacturing sector to the GDP ratio	-0.02	0.933
LD. natural logarithm of the value added by the manufacturing sector to the GDP ratio	-0.37	0.103
L2D. natural logarithm of the value added by the manufacturing sector to the GDP ratio	-0.60 ***	0.004
D. logarithm of expenditure on public awareness	-0.29	0.119
D. natural logarithm of expenditure on enforcement	0.48 ***	0.004
LD. natural logarithm of expenditure on enforcement	0.22 **	0.086
L2D. natural logarithm of expenditure on enforcement	0.16	0.237
L3D. natural logarithm of expenditure on enforcement	0.30**	0.013
D. natural logarithm of labour in manufacturing to total labour ratio	0.34***	0.005
L1D. natural logarithm of labour in manufacturing to total labour ratio	0.16**	0.029
L2D. natural logarithm of labour in manufacturing to total labour ratio	0.12**	0.013
D. natural logarithm of Share of FDI Ratio to GDP	0.15**	0.012
LD. natural logarithm of share of FDI ratio to GDP	0.11***	0.005
L2D. natural logarithm of share of FDI ratio to GDP	0.08*	0.056
L3D. natural logarithm of share of FDI ratio to GDP	0.04	0.179
D. natural logarithm of exchange rate	-0.479***	0.010
Period when there was an increase in number of inspectors and public awareness officers leading to a sharp increase in budgetary allocation to enforcement of the anti-counterfeit law (D=1 for period starting from second quarter of 2012 and 0 otherwise)	-0.0099	0.827
Constant	-9.08**	0.001
Observations	40	
Adjusted R^2	0.9515	
Ramsey RESET Test	0.4670	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, *D. means difference, LD. means lag one of the Difference, L2D. means lag two of the Difference.*

Source: *Author's Computation*

Post estimation test results shown in Table A2 in the Appendix suggested that the findings illustrated in Table 4.12 were valid. This is evidenced by probability of Ramsey RESET of 0.4670 which is greater than 0.05. This means the null hypothesis of model is correctly specified is not rejected (Wooldridge, Wadu, & Lye, 2016).

To ensure current and preceding error terms were not related, the study performed Breusch-Godfrey test. The null hypothesis for this test is that there is no autocorrelation (Wooldridge, Wadu & Lye, 2016). The probability of Breusch-Godfrey test was 0.7852 implying that the null hypothesis was not rejected at 5 percent level of significance. This suggested absence of serial correlation. The study also investigated whether variance of the error term was constant or not. The study used LM test for Heteroscedasticity (Arch Effect) test. The null hypothesis for this test is that the error term is homoscedastic implying absence of heteroscedasticity (Wooldridge, Wadu, & Lye, 2016). The probability of Heteroscedasticity (Arch Effect) test was 0.7452 implying that the null hypothesis was not rejected at 5 percent level of significance. This result, therefore, suggested that the error term was homoscedastic.

To check for model stability, recursive residuals from the time series regression were acquired, and the cumulative sum of squares, or CUSUM, was produced. The graphical plot of CUSUM is displayed in Figure A2 in the Appendix. A model is considered stable if its CUSUM falls inside a significance threshold of five percent. Given that the CUSUM was found to be inside the 5 percent border, the graph demonstrated the stability of the provided model (Inclan & Tiao, 1994).

At the one percent level, the 1.21 error correction coefficient was statistically significant and negative. This suggests that, in the event that distortions occur, it takes more than one time for equilibrium to be reached. The findings indicated that the natural logarithms of the value added by the manufacturing sector to the GDP ratio, the natural logarithms of public awareness and enforcement spending, the natural logarithm of FDI share in GDP, the natural logarithm of labour in manufacturing to the total labour ratio, and the natural logarithm of exchange rate exhibit a stable long-term relationship (Wooldridge, Wadu, & Lye, 2016).

The R-squared was 0.95 was adequate as it implies that 95 percent of the variations in the growth of value added in the manufacturing sector to the GDP ratio was explained by changes in the expenditure on public awareness, expenditure on enforcement, growth in FDI share in GDP, labour in manufacturing to total labour ratio and exchange rate.

The coefficient of natural logarithm of public awareness spending on counterfeiting issues was positive and significant at the 1 percent level, in the long-run. The findings specifically indicated that the investment on public awareness of counterfeiting issues had a coefficient of 0.33. This suggested that, all else equal, a one percent increase in expenditure on public awareness campaigns on counterfeiting resulted in a 0.33 percent rise in the share of manufacturing sector's value added in GDP. Further, the short run results showed that the coefficient of natural logarithm of public awareness was insignificant. This means public awareness may not improve manufacturing sector’s output in the short run. The result on expenditure on public awareness on counterfeit products on the economy conform to Mwithiga and Kamakil (2017) study which showed that counterfeiting reduces the profitability of the manufacturing sector in Kenya. The results agree with a study by Mukasa (2020) which reported that counterfeit industry is one of the most adverse phenomena that causes stagnation of infant industries in majority of developing countries.

At the one percent significance level, the long run coefficient of the logarithm of the expenditure in enforcement of the anti-counterfeit statute was positive and significant. The results revealed that an increase in the expenditure on enforcement of anti-counterfeit law by one percent leads to increase in the value added by the manufacturing sector to the GDP ratio by 0.24 percent ceteris paribus. The short-term, the positive and significant coefficient of the first lag of the difference of the natural logarithm of enforcement expenditure at the 5 percent significance level, conforms to economic theory by associating a stronger manufacturing sector with anti-counterfeit measures. In addition, the short-term positive and significant coefficient of the third lag of difference of the natural logarithm of enforcement expenditure at the 5 percent significance level, conforms to economic theory by associating a stronger manufacturing sector with anti-counterfeit measures. The findings are also in agreement with those of a study by Mwithiga and Kamakil (2017), which found a link between Kenya's manufacturing sector and the amount spent enforcing anti-counterfeit laws.

The long-term findings reported a positive and significant coefficient for the natural logarithm of the FDI to GDP ratio. All else constant, a one percent increase in the FDI to GDP ratio causes approximately 0.11 percent rise in the share of manufacturing sector to the GDP. A statistically significant coefficient is also reported for the short run. The findings are consistent with economic theory since foreign direct investment (FDI) gives the manufacturing sector the capital, managerial expertise, technology, and entrepreneurial spirit it needs to grow its output (Jugurnath, Chuckun & Fauzel, 2016). The findings concur with the research by Idoko & Taiga (2018), which found a link between manufacturing production and foreign direct investment in Nigeria.

The findings also showed that, at the 1 percent significance level, the long run coefficient of the natural logarithm of the labour value in manufacturing to the overall labour ratio was positive and significant. In the short run equation, it was also indicated that the manufacturing share in GDP was positively and significantly impacted by the lagged values of the FDI ratio to GDP, the manufacturing labour to total labour ratio, and the exchange rate natural logarithm.

The results in Table 4.12 revealed that the coefficient of natural logarithm of labour in manufacturing to total labour ratio was positive and statistically different from zero at 5 percent level of significance. Specifically, an increase in labour in manufacturing to total labour ratio by one percent leads to an increase in the share of manufacturing in GDP by 0.28 percent, holding other factors constant. The coefficients of the short run results were also positive and statistically different from zero at 5 percent level of significance. These results conform to economic theory. According to endogenous growth theory, economic growth, which manufacturing sector contributes greatly relies on labour as compulsory factor of production (Romer, 1990). Labour is a mobile factor and brings in use other factors of production for instance capital and land. The results echo Majumder (2018) which established that changes in technology altering capital–labour ratio leads to enormous increase in production.

The long run results showed a positive relationship between natural logarithm of exchange rate and natural logarithm of the value added by the manufacturing sector to the GDP ratio. The coefficient was 1.05 and statistically significant. This implied that the value added by the manufacturing sector to the GDP ratio increases by 1.05 percent when the exchange rate depreciates by one percent, ceteris paribus. However, the short run results revealed a negative and statistically significant coefficient.

4.4 Effect of Anti-Counterfeit Measures on Balance of Trade in Kenya

The third objective sought to establish the effects of anti-counterfeit measures on balance of trade. A structural vector autoregressive model was used for analysis. The model specified in Equation 3.36 was applied for analysis.

4.4.1 Descriptive Statistics for Study Variables use in Estimating the Effects of Anti-Counterfeit Measures on Balance of Trade

Descriptive statistics for the variables used in the estimation of the effects of the anti-counterfeit measures on balance of trade is shown in Table 4.13.

Table 4.13: Descriptive Statistics for Study Variables used in Estimating the Effects of Anti-Counterfeit Measures on Balance of Trade (2010Q1 – 2020Q4)

Variables	Mean	Standard Deviation	Minimum	Maximum
Balance of trade to GDP ratio	-0.231	0.0402	-0.142 (2010q1)	-0.34 (2020q4)
Expenditure on awareness in millions of KES	1.853	2.17	0.072 (2010q1)	12.32 (2019q1)
Expenditure on enforcement in millions of KES	2.357	1.77	0.27 (2010q1)	8.346 (2019q1)
Exchange rate (KES/USD)	94.50	9.29	76.49 (2010q1)	109.51 (2020q4)
Consumer Price Index	82.14	17.02	53.64 (2010q1)	110.75 (2020q4)

Source: *Author's Computations*

From Table 4.13, it was revealed that the share of balance of trade in GDP ranged from -0.142 to -0.34. This finding connotes the true situation of the Kenyan balance of trade which has been unfavourable for several years. The worst balance of trade recorded in the last quarter of 2020 can be attributed to poor performance of the Kenyan manufacturing sector. The dismal performance has led to decrease in value of exports thus deteriorating the balance of trade. This poor performance of the Kenya's manufacturing sector can be linked to increase in counterfeit products. These products are cheap thus making Kenyan consumers to shift away from genuine products from the manufacturing industries. The closure of these industries or shift to other countries has led to continued reliance on imports thus worsening the balance of trade (Republic of Kenya, 2019a).

The expenditure on enforcement of the anti-counterfeit law ranged from KES 0.27 million to KES 8.346 million. The expenditure on public awareness ranged from KES 0.072 million to KES 12.32 million. This increase in the budgetary allocation to fighting anti-counterfeit illustrates that the counterfeit products have adverse effects on many sectors of the economy. The anti-counterfeit measures are aimed at reversing the effects of the counterfeit goods so that the manufacturing sector is revitalized. The mean of exchange rate for the study period was 94.5. The exchange rate ranged from 76.49 to 109.51. According to Republic of Kenya (2010) such increase can be partly linked to increased demand for dollars by investors who might be fleeing from uncertain currencies. Such investors believe in dollars to be safe haven. To ensure validity of the results, pre-estimation tests carried out ensured that OLS assumptions and time series properties are met as discussed in the following section.

4.4.2 Pre-estimation Tests Results for Study Variables used in Estimating the Effects of Anti-Counterfeit Measures on Balance of Trade in Kenya

(a) Testing for Structural Break

The study also performed Supremum Wald test to tests for structural break given that the structural break was not known. The null hypothesis stated that there was no structural break (Murteira, Ramalho & Ramalho, 2013).

Table 4.14: The Supremum Wald Test Results for Study Variables used in Estimating the effects of Anti-Counterfeit Measures on Balance of Trade in Kenya

Number of observations = 44	
Full sample: 2010q1 - 2020q4	
Trimmed sample: 2011q4 - 2019q2	
Estimated break date: 2015q3	
Ho: No structural break	
Test Statistic	p-value
swald 69.39	0.0000

Source: *Author's Computations*

The study carried out Supremum Wald test to check for structural break since it was not known. The null hypothesis stated that there was no structural break. The Supremum Wald test statistics was 69.39 with a p-value 0.00. The null hypothesis was thus rejected at 1 percent level of significance suggesting that the model had structural break. The test estimated break date to be from the third quarter of 2015. The study therefore controlled for this structural break by introducing a dummy variable taking value 1 for period starting from quarter 3 of 2015 and zero otherwise. This structural break coincides with the period when there was an increase in number of inspectors and public awareness officers (Anti-Counterfeit Authority, 2019). This may have resulted to increased budgetary allocation to enforcement and public awareness departments of the Anti-counterfeit Authority.

(b) Results for Unit Root

Stationarity test was conducted using Augemented Dickey Fuller test. Table 4.15 shows the Augmented Dickey Fuller stationarity test results.

Table 4.15: Results of Unit Root Test for Study Variables used in Estimating the Effects of Anti-Counterfeit Measures on Balance of Trade in Kenya

Variables	Level of Significance	Statistic	Critical value (5 percent)	Order of Integration
Balance of trade to GDP ratio	Level 1st Difference	-2.416 -6.985	-2.950 -2.952	One
Natural logarithm of expenditure on enforcement	Level 1st Difference	-2.633 -6.985	-2.950 -2.952	One
Natural logarithm of expenditure on public awareness	Level 1st Difference	-0.093 -10.386	-2.950 -2.952	One
Natural logarithm of consumer price index	Level 1st Difference	-1.814 -4.613	-2.950 -2.952	One
Natural logarithm of exchange rate	Level 1st Difference	-5.502 -6.985	-2.950 -2.952	One

Source: *Author's Computations*

The study considered ADF with drift for all variables. From Table 4.15, the results suggested that all variables taken into consideration in the study were integrated of order one (Gujarati, 2009). This attribute of the variables suggested that there might be a long-term association between them. As a result, the Johansen co-integration test was used in the study's co-integration analysis. Nevertheless, the study initially carried out the optimal lag duration selection before running this test. The part that follows goes over this.

(c) Lag Length Selection Criteria

The optimal lag length results for five criteria were obtained. These five lag length selection criteria include Likelihood Ratio (LR), FPE (Final Prediction Error), Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC) and

Schwarz Bayesian Information Criterion (SBIC). The results are shown in Table A4 in the Appendix.

The study considered one lag as suggested by SBIC test due to its restrictive nature. After determining the ideal lag duration, the research used the Johansen Co-integration test to determine whether a long-term association existed.

(d) Johansen Co-integration Test Results

The findings of the Johansen co-integration are displayed in Table A5 in the Appendices. There was no co-integration since trace statistic of 58.96 at 0 cointegrating equation was less than the critical value of 68.52. This led to failure to reject null hypothesis of having 0 cointegrating equation. This study used the unrestricted VAR estimation technique after demonstrating the lack of co-integration. The natural logarithms of the following variables were used to estimate five system vector autoregressive models: the natural logarithms of the public awareness, enforcement, and consumer price index; the exchange rate; the trade balance share in GDP; and the natural logarithm of the consumer price index. Estimates were made for the variance decomposition and impulse response function.

4.4.3 Regression Results for the Effects of Anti-Counterfeit Measures on Balance of Trade in Kenya

The third objective of study was to estimate the effects of anti-counterfeit measures on balance of trade in Kenya. The findings are displayed in Table 4.16.

Table 4.16: Regression Results on the Effects of Anti-counterfeit Measures on Balance of trade in Kenya

Dependent Variable: Balance of trade to GDP ratio		
Explanatory Variables	**Coefficient**	**P value**
Lag one of Balance of trade to GDP ratio	0.033	0.836
Lag one of the natural logarithm of expenditure on enforcement	0.0000364	0.877
Lag one of the natural logarithm of expenditure on public awareness	-0.00122***	0.001
Lag one of log consumer price index	0.0039162	0.196
Lag one of log exchange rate	-0.0022369	0.124
Strong expansion in agricultural, construction, financial, insurance sectors, wholesale, retail trade that led to higher economic growth 5.8 (D=1 for period starting from third quarter of 2015 and 0 otherwise)	0.0708641***	0.006
Constant	2.70996***	0.000
Jarque-Bera Test Results	0.98	
Observations	43	

Standard errors are in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Source: *Author's Computations*

For the model of interest, the probability of the Jarque-Bera test of normality was 0.98, meaning that the null hypothesis (H_0) of a normal distribution was not rejected. The Jarque-Bera results are shown in Table 4.16. further tests after estimation were conducted to confirm the validity of the findings. These are illustrated in Table A3 in the Appendix. The tests performed included autocorrelation and heteroscedasticity. For autocorrelation, the study performed Breusch-Godfrey test. The null hypothesis for this test is that the error terms are not serially correlated. The probability of Breusch-Godfrey test was 0.2110 implying that the null hypothesis was not rejected at 5 percent level of significance. This suggested absence of autocorrelation (Wooldridge, Wadu, & Lye, 2016). For heteroscedasticity, the LM test for heteroscedasticity (Arch Effect) test was performed. The null hypothesis for this test is that the error term is homoscedastic implying absence of heteroscedasticity. The probability of LM test for heteroscedasticity (Arch Effect) was 0.1978. This implied that the null hypothesis was not rejected at 5 percent level of significance thus suggesting absence of heteroscedasticity (Wooldridge, Wadu & Lye, 2016).

As shown in Figure A3 in the Appendix, the autoregressive graph demonstrates that all roots were inside the unit circle, indicating that the parameters were structurally stable. As a result, diagnostic results demonstrated that the model was consistent and that analysis using variance decomposition and Impulse Response Functions (IRF) was possible.

Table 4.16 shows the VAR results. The best way to interpret the VAR results is to trace the persistence of the shocks from changes in the natural logarithms of the consumer price index, the natural logarithm of enforcement expenditures, the natural logarithm of public awareness expenditures, and the natural logarithm of exchange rates to the GDP ratio of balance of trade to GDP. The study continued to extract the variance decomposition and impulse response function (IRFs) for the relationship between expenditure on public awareness and BOT. The choice of this relationship is due to statistically significant coefficient in VAR estimation. The section that follows discusses variance decomposition and IRF.

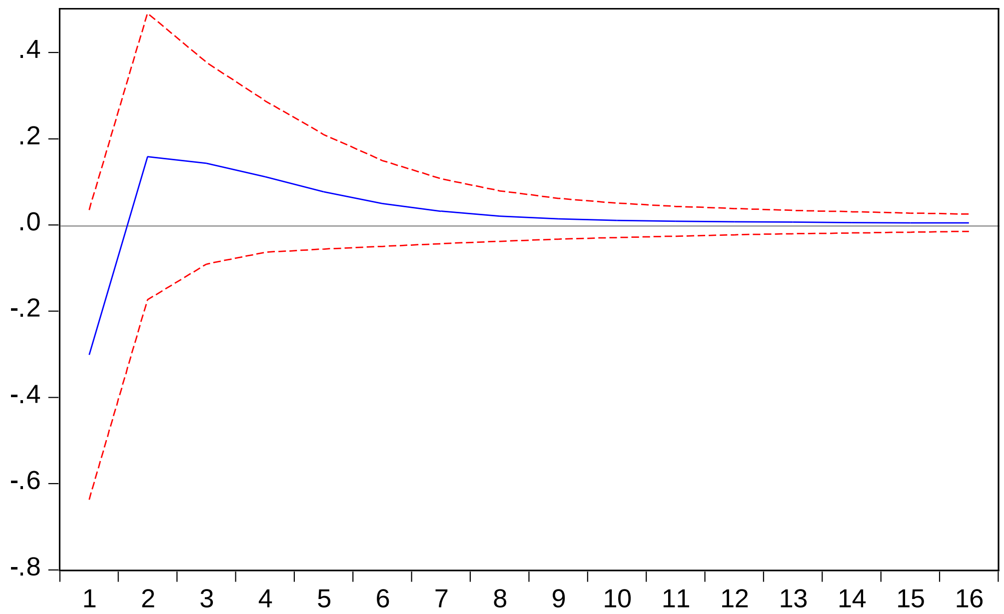

Figure 4.1: Response of Balance of Trade to Shocks on Natural Logarithm of Expenditure on Public Awareness

The results in Figure 4.1 showed that shocks to logarithm of expenditure on public awareness regarding the effects of counterfeit goods by one standard deviation increases the balance of trade for the first two periods. The balance of trade improves afterwards all the way to the 16th period. These results agree with economic theory because making the public aware of the effects counterfeit makes them to demand for genuine products. This action acts as a disincentive to the sellers of counterfeit goods making them to resort to the supply genuine products. Freeing the economy from counterfeit products attracts foreign investors in the host country's export industry thus boosting the exports. These results agree with Organization for Economic Co-operation and Development (1998) assertion that a country that fights counterfeit attract international manufacturers of sound products to manufacture them from their borders. This boosts a country's exports thus improving balance of trade. In addition, such a country may not only rely on FDI but also foreign know-how thus boosting its exports.

The decomposition of changes in balance of trade brought about by change in expenditure on public awareness is shown in Figure 4.2.

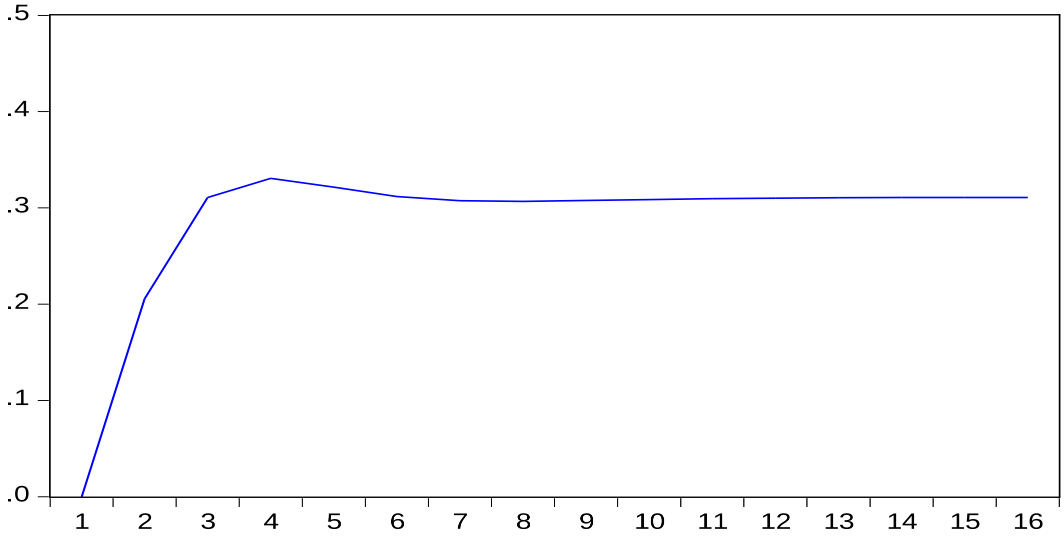

Figure 4.2: Variance Decomposition Showing Response of Changes in Balance of Trade due to Shock on Natural Logarithm of Expenditure on Public Awareness

The results in Figure 4.2 showed that approximately 0.32 percent of the forecasted error variance of changes in balance of trade is explained by a unit shock on the creation of public awareness on matters of counterfeiting. The results are consistent with the results obtained in the first and second objective which suggest that increase in expenditure on public awareness has a positive impact on the Kenyan economy as it improves balance of trade. Scorpecci (2009) noted that increase in imported counterfeit goods not only worsens the balance of trade but negatively impacts on exports as a result of its displacement effect on local production of genuine products in developing countries.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This chapter provides a summary and conclusions of the study. The chapter also provides policy implications of the study findings.

5.2 Summary

One of the main economic sectors in Kenya is the manufacturing sector. By 2030, the industry is predicted to transform Kenya into a middle-income nation and improve the trade balance. This sector did contribute to the GDP, but in 2021 its output fell from 11.16 percent in 2011 to 7.24 percent. The presence of counterfeit goods in the nation is said to be one of the factors contributing to this reduction. The manufacturing industry has experienced losses due to the prevalence of counterfeit goods. Counterfeit goods are thought to cost the industry around KES 68 billion in lost sales each year. Kenya's illicit trade was worth KES 826 billion in total in 2018.

The Kenyan government formed the Anti-counterfeit Authority to combat the spread of counterfeit goods in the country's market. As part of its anti-counterfeit measures, the Anti-counterfeit Authority has been dedicating a portion of its budget to public education and enforcement of the anti-counterfeit legislation. Studies examining the impact of the anti-counterfeit policy on the manufacturing sector's performance and the trade balance are noticeably lacking, despite the anti-counterfeit authority's best efforts. This study aimed to estimate the factors that determine demand for counterfeit goods, the effects of anti-counterfeit measures on the manufacturing sector's performance, and the trade balance. Quarterly data covering the years 2010 through

2020 were used in the study. Data used in the study was sourced from the publications of the Anti-Counterfeit Authority of Kenya, the KNBS, and the Central Bank of Kenya provided the data.

ARDL models were estimated to determine the factors that influence the demand for counterfeit goods and the effects of anti-counterfeit measures on the manufacturing sector's performance, following a series of pre-estimation tests, distributional testing, and stability tests. The effect of anti-counterfeit measures on trade balance was estimated using the Structural Vector Autoregressive model. In order to accomplish the first objective, the ARDL Bounds test was used to determine whether there was a long-term relationship between the dependent variable and the explanatory variables. The test indicated that a long-term relationship was present. This provided information for the study's error correction model estimation. At the one percent threshold, the Error Correction coefficient was significant. This indicated that in case of deviation from equilibrium, it takes more than one period to adjust back to the equilibrium.

The results showed that policy variable on expenditure on public awareness by the Anti-Counterfeit Authority and the consumer complaints in reducing counterfeit goods were important determinants of demand for counterfeit products. A unit increase in consumer complaints led to a reduction in the demand for counterfeit goods both in short run and long run. The results further revealed that an increase in expenditure on public awareness and expenditure on enforcement of the anti-counterfeit law by the Anti-counterfeit Authority led to a decrease in demand for counterfeit goods. In addition, conditions including per capita income and FDI share in GDP were found to determine counterfeit goods in Kenya.

The study added control variables to the estimating model in addition to policy variables in order to accomplish the second objective. The labour in manufacturing sector to total labour ratio, exchange rate, and the GDP share of foreign direct investment were the economic variables considered in this analysis. The error correction term indicated that it would take roughly less than a period for the equilibrium to be reached in the event of distortion in the manufacturing sector brought on by changes in the explanatory variables. The study discovered that a significant factor influencing the performance of Kenya's manufacturing sector was the policy variable related to the anti-counterfeit Authority's investment on public awareness regarding counterfeit goods and expenditure on enforcement of the anti-counterfeit law by the Anti-counterfeit Authority. This suggests that raising public awareness through investing more money and enforcing the anti-counterfeit law may boost the nation's manufacturing output. The study's findings also indicated that the ratio of foreign direct investment to GDP was a significant factor in predicting the manufacturing sector's performance over the long and short terms. This result suggested that increasing industrial production is significantly aided by foreign direct investment. Additionally, labour in the manufacturing sector to total labour ratio was found to have a positive impact on manufacturing output, in line with economic theory illustrating the importance of labour as a factor of production. Moreover, the analysis demonstrated that exchange rate depreciation affects manufacturing value added. These findings are consistent with economic theory since local production is stimulated by an increase in exchange rates, which in turn increases manufacturing output.

To meet the third objective, the study used VAR. To trace the relationship between anti-counterfeit measures and balance of trade, IRF and variance decomposition were obtained. The IRF and variance decomposition graphs for balance of trade and expenditure on public awareness showed a positive relationship. The results imply that implementation of these measures impedes proliferation of counterfeit goods, thereby improving local production. By carrying out public awareness more effectively, the Kenyan government can reduce the influx of the counterfeit goods, thus improving the country's balance of trade position.

5.3 Conclusion

From the study's findings, it was revealed that the determinants of demand for counterfeit goods in Kenya are expenditure on public awareness and enforcement of the anti-counterfeit law. The negative and significant relationship between consumer complaints and counterfeit goods underscores the crucial role of anticounterfeit measures in combating counterfeit goods. The significant and negative relationship between expenditure in public awareness, enforcement of the anti-counterfeit law and value of counterfeit goods seized pose a direct implication that anti-counterfeit measures are effective in reducing demand for counterfeit goods in Kenya.

The results for the second objective showed that expenditure in public awareness and enforcement of the anti-counterfeit law improves the manufacturing sector output. This finding implies that anti-counterfeit measures have direct benefit to the country's manufacturing sector. Further, the results for the third objective showed that expenditure in public awareness improves the balance of trade. This finding leads to crucial conclusion that effective public awareness improves balance of trade in Kenya.

5.4 Policy Implications

The government of Kenya, through the Anti-counterfeit Authority should allocate funds to give the authority the impetus of enforcing the anti-counterfeit law. This is because expenditure on the enforcement of the anti-counterfeit law was found to reduce the value of counterfeit goods seized. This is because it dis-incentivizes sellers from dealing in these counterfeit goods.

In addition, the government through the Anti-counterfeit authority needs to create an efficient and accessible channel for consumers to report counterfeit goods. These mechanisms will serve as a vital deterrent for counterfeit sellers and help in creating a self-regulating market. When consumers can easily report counterfeit products, law enforcement agencies can respond more swiftly and effectively, creating a hostile environment for counterfeiters.

The government of Kenya, through the Anti-counterfeit Authority should allocate adequate funds to enable the authority to launch public awareness and enforce the anti-counterfeit law to discourage counterfeiting of goods. This is because the results showed that enhancing anti-counterfeit measures through creation of public awareness and enforcement of the anti-counterfeit law enhances production in the manufacturing sector. Successful reduction in counterfeit goods leads to fair prices in the market. By curbing counterfeit activities, the playing field becomes more level, allowing legitimate manufacturers to compete fairly based on product quality, innovation and customer service rather than just price. In addition, successful public awareness campaigns and enforcement of the anti-counterfeit law by the anti-counterfeit authority signal seriousness of the authority in controlling counterfeit goods. Such action by government makes the consumers to trust the authenticity and quality of products. When consumers have confidence in the legitimacy of goods, they are more likely to purchase them, thereby increasing demand for genuine products manufactured by legitimate companies operating in Kenya.

The results have shown that creating public awareness about counterfeit goods affects balance of trade positively. The government through the Anti-counterfeit Authority should therefore prioritize and expand public awareness campaigns about the risks and consequences of consuming counterfeit goods. This effort could include educational programmes, media campaigns and collaboration with businesses to raise awareness among consumers and businesses about recognizing, avoiding, and reporting counterfeit goods. By doing so, the government could reduce the demand for counterfeit goods and promote the consumption of authentic domestic products. This in turn will improve the country's balance of trade by supporting legitimate local industries and reducing imports of counterfeit goods.

5.5 Contribution to Knowledge

This study makes a number of contributions. First, this study may be considered as one of the first attempt to investigate the determinants of demand for counterfeit goods in Kenya using quantitative analysis. This is unlike earlier studies, for instance, Mwithiga and Kamakil (2017) that had investigated the effect of counterfeit goods on profitability of the manufacturing sector using qualitative approach. In addition, this study may stand out as the first attempt to investigate the role of the anti-counterfeit measures deployed by ACA on manufacturing sector and balance of payment. To the best of our knowledge no earlier study had investigated the role of expenditure on public awareness with regards to counterfeit goods and expenditure on the enforcement of anti-counterfeit law on manufacturing and balance of payment.

5.6 Areas for Further Research

This study used time series data to identify factors determining value of counterfeit goods, effects of anti-counterfeit measures on the manufacturing output and balance of trade. Since the issue of counterfeit goods may involve many countries for example in East Africa, it would be good if a panel data is used.

The study concentrated on the role of anti-counterfeit measures on manufacturing output and balance of trade. It would also be useful to assess the social impact of counterfeit goods so as contribute to a fuller understanding of the issue. For example, there is need for a study investigating the effect of counterfeit goods on employment, innovation and consumer trust.

REFERENCES

Ajilore, T., & Ikhide, S. (2013). Monetary policy shocks, output and prices in South Africa: A test of policy irrelevance proposition. *The Journal of Developing Areas*, 363-386.

Ajzen, I. and Fishbein, M. (1977) Attitude–behaviour relations: A theoretical analysis and review of empirical research. *Psychological Bulletin 84* (5): 888–918.

Ajzen, I. (1991) The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes 50*: 179–201.

Alexander, S. S. (1952). Effects of a Devaluation on a Trade Balance. *Staff Papers-International Monetary Fund*, *2*(2), 263-278.

Anti-Counterfeit Authority. (2020). *The national baseline report on illicit trade in Kenya.* Nairobi: Anti-Counterfeit Authority.

Anti-Counterfeit Authority. (2019). *Anti-Counterfeit Authority Annual report.* Nairobi: Anti-Counterfeit Authority.

Anti-Counterfeit Authority. (2023). *Anti-Counterfeit Authority Annual report.* Nairobi: Anti-Counterfeit Authority.

Bahmani-Oskooee, M. and Ratha, A. (2004). Dynamics of the U.S. Trade with Developing Countries. *The Journal of Developing Areas*, 37(2), 1-11.

Basu, M. M., Basu, S., & Lee, J. (2015). Factors Influencing Consumer's Intention to Buy Counterfeit *Products. Global journal of Management and Business Research*, *15*(6), 23-35.

Beqiraj, E., Fedeli, S., & Giuriato, L. (2020). Policy tolerance of economic crime? An empirical analysis of the effect of counterfeiting on Italian trade. *European Journal of Political Economy*, *65*, 101933.

Biancardi, M., Di Liddo, A., & Villani, G. (2021). How do Fines and Their Enforcement on Counterfeit Products Affect Social Welfare? *Computational Economics*, 1-27.

Browning, E. K., & Zupan, M. A. (2020). *Microeconomics: Theory and applications*. John Wiley & Sons.

Carrasco Gutierrez, C. E., Castro Souza, R., & Teixeira de Carvalho Guillén, O. (2009). Selection of optimal lag length in cointegrated VAR models with weak form of common cyclical features. *Brazilian Review of Econometrics,* 29(1), 59-78

Ceyhan, T., & Gürsoy, S. (2021). The J-Curve hypothesis: an analysis for Turkey. *Gümüşhane Üniversitesi Sosyal Bilimler Dergisi, 12*(3), 1169-1181.

Commuri S. (2009). The Impact of Counterfeiting on Genuine-Item Consumers' Brand Relationships. *Journal of Marketing, 73*(3), 86-98.

Cowell, F. (2018). *Microeconomics: Principles and analysis*. Oxford: Oxford University Press.

Dickey, D.A. and Fuller, W. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366), 427-431.

D'Amato, I., Belvedere, V. and Papadimitriou, T. (2019). Illegitimate trade in the fashion industry: relevance and counterstrategies in the Italian context. *Journal of Business & Industrial Marketing, 34*(8), 1654-1667.

Enders, W. (2015). *Applied econometric time series*. New Jersey: John Wiley and Sons.

Federal Republic of the United States of America (2022). The United States Trade Representative 2022 report: Washington D.C: Government Printer.

Fink, C., Maskus, K. E., & Qian, Y. (2016). The economic effects of counterfeiting and piracy: A review and implications for developing countries. *The World Bank Research Observer*, *31*(1), 1-28.

Gao, Y., & Wu, Y. (2023). Regulating probabilistic selling of counterfeits. *Management Science*, *69*(8), 4498-4517.

Gentry, James W., Sanjay Putrevu, Clifford Shulltz II (2000), "Cross-Cultural and Home-Country Perspectives of IPR Infringements," in *Marketing Contributions to Democratization and Socioeconomic Development*, eds. Clifford Shultz II and Bruno Grbac, Macromarketing Conference, Lovran, Croatia.

Ghadge, A., Duck, A., Er, M., & Caldwell, N. (2021). Deceptive counterfeit risk in global supply chains. *An International Journal, 22*(2), 87-99.

Glasner, D. (2019). Say's Law and the Classical Theory of Depressions. *Available at SSRN 3401002*.

Grammich, C. and Wilson, J. M. (2020). *Knowledge Is Power: Increasing Public Awareness to Reduce Product Counterfeiting.* Northbrook: UL

Guan, W., & Rehme, J. (2012). Vertical integration in supply chains: driving forces and consequences for a manufacturer's downstream integration. *Supply chain management: An international Journal*, *17*(2), 187-201.

Gujarati, D. N. (2009). *Basic econometrics*. Delhi: Tata McGraw-Hill Education.

Haraguchi, N., Cheng, C. F. C., & Smeets, E. (2017). The importance of manufacturing in economic development: Has this changed? *World Development, 93*, 293-315.

Idoko, C. U., & Taiga, U. U. (2018). Effect of Foreign Direct Investment (FDI) On Manufacturing Output in Nigeria (1981–2016). *Advances in Social Sciences Research Journal*, *5*(5).

Inclan, C., & Tiao, G. C. (1994). Use of cumulative sums of squares for retrospective detection of changes of variance. *Journal of the American Statistical Association*, *89*(427), 913-923.

Jaffery, S. A. (2021). An Empirical Analysis to Control Product Counterfeiting in the Automotive Industry's Supply Chains in Pakistan. Technological University Dublin. DOI:10.21427/EC7E-KD93.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control*, *12*(2-3), 231-254.

Johnson, H. G. (1958). *International trade and economic growth: studies in pure theory*. Cambridge, MA: Harvard University Press.

Jugurnath, B., Chuckun, N., & Fauzel, S. (2016). Foreign direct investment & economic growth in Sub-Saharan Africa: an empirical study. *Theoretical Economics Letters*, *6*(4), 798-807.

Kabiru, J. W. (2013). *Effects of counterfeits on pharmaceutical distribution and retailing in Mombasa County*. Nairobi: University of Nairobi.

Kemboi, L.K. (2023). *AGOA and EPZ: Boosting Kenya's Export-Oriented Industrial Sector*. Nairobi: IEA.

Kennedy, P.E. (2000). On measuring the growth maximizing tax rate. *Pacific Economic Review, 5*(1): 89-91.

Kenya Association of Manufacturers. (2017). *KAM policy and sustainability report.* Nairobi: Kenya Association of Manufacturers.

Kenya Association of Manufacturers. (2019). *Manufacturing Priority Agenda.* Nairobi: Kenya Association of Manufacturers.

Kenya Association of Manufacturers. (2020). *Manufacturing Priority Agenda.* Nairobi: Kenya Association of Manufacturers.

Kwak, S. G., & Kim, J. H. (2017). Central limit theorem: the cornerstone of modern statistics. *Korean Journal of Anesthesiology*, *70*(2), 144-156.

Macharia, K. K., Gathiaka, J. K., & Ngui, D. (2022). Energy efficiency in the Kenyan manufacturing sector. *Energy Policy*, *161*, 112715.

Maina, P. N. (2020). *Influence of strategy formulation on performance of state corporations in Kenya* (Doctoral dissertation, KeMU).

Maina, R. M. (2015). *The effect of exports and imports on economic growth: empirical evidence from Kenya* (Doctoral dissertation, University of Nairobi).

Majumder, R. (2018). Technology and labour market: Insights from Indian manufacturing sector. The Indian Journal of Labour Economics, 61, 321-338.

Meeking, L. (2013). Counterfeit economy: the impacts of counterfeit goods on African society. *Africa Conflict Monthly Monitor*, *2013*(04), 8-12.

Mniwasa, E. E. (2022). Tackling the Counterfeit Goods Trade in Tanzania: Reflections on the Anti-Counterfeiting Criminal Law. *Counterfeiting and Fraud in Supply Chains*. 171-204.

Mukasa, B. (2020). The impact of counterfeit products on the growth of infant industries in low developing countries, Munich, GRIN Verlag

Murteira, J. M., Ramalho, E. A., & Ramalho, J. J. (2013). Heteroskedasticity testing through a comparison of Wald statistics. *Portuguese Economic Journal*, *12*, 131-160.

Murunga, J., Wawire, N. W., & Muriithi, M. K. (2021). Tax Revenue Productivity of Tax Reforms in Kenya. *International Journal of Economics and Finance, 13*(12), 1-42.

Mwithiga, A. & Kamakil, A. (2017). *Effects of counterfeiting on profitability of the manufacturing sector in Kenya.* Nairobi: Anti- Counterfeit Authority.

Nduati, C. W. (2014). *Measures That Can Be Taken To Fight Counterfeiting In Kenya.* Nairobi: United States International University – Africa.

Ng'ang'a, W., Chevallier, J., & Ndiritu, S. (2019). Primary balance dynamics and public debt sustainability in Kenya. Working Papers halshs-02120613, HAL.

Ngethe, H. W. (2017). *Effects of counterfeits on sales and distribution of pharmaceutical products in Nairoby county, Kenya.* Nairobi: University of Nairobi.

Norum, P. S., & Cuno, A. (2011). Analysis of the demand for counterfeit goods. *Journal of Fashion Marketing and Management: An International Journal*, *15*(1), 27-40.

Ongola, B. S. (2014). *Efficacy of anti-counterfeit laws in Kenya* (Doctoral dissertation, university of Nairobi).

Organization for Economic Co-operation and Development. (1998). The Economic Impact of Counterfeiting. Paris: OECD Publishing.

Organisation for Economic Co-operation and Development. (2007). *The Economic Impact of Counterfeiting and Piracy: Executive Summary*. Paris: OECD Publishing.

Organization for Economic Co-operation and Development. (2018). *Trade in Counterfeit Goods and the Italian Economy: Protecting Italy's intellectual property*. Paris: OECD Publishing.

Organization for Economic Co-operation and Development. (2021). *Estimates of Global Trade in Counterfeit and Pirated Products*. Paris: OECD Publishing.

Pesaran, M. H., & Shin, Y. (1995). *An autoregressive distributed lag modelling approach to cointegration analysis* (Vol. 9514). Cambridge, UK: Department of Applied Economics, University of Cambridge.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, *16*(3), 289-326.

Phau, I., & Teah, M. (2009). Devil wears (counterfeit) Prada: a study of antecedents and outcomes of attitudes towards counterfeits of luxury brands. *Journal of consumer marketing*, *26*(1), 15-27.

Phillips, T. (2007). *Knockoff: The Deadly Trade in Counterfeit Goods: The True Story of the World's Fastest Growing Crimewave*. London: Kogan Page Publishers.

Pratt, S., & Zeng, C. Y. (2020). The economic value and determinants of tourists' counterfeit purchases: The case of Hong Kong. *Tourism Economics*, *26*(1), 155-178.

Republic of Kenya. (2007). Kenya Vision 2030. Retrieved from https://vision2030.go.ke/ on 30th November, 2022

Republic of Kenya. (2010). *The Anti-Counterfeit Regulations, 2010 Arrangement of Regulations*. Nairobi: Government Printer.

Republic of Kenya. (2013). *The Economic Survey*. Nairobi: Government Printer.

Republic of Kenya. (2017). *Third Medium-Term Plan: Transforming Kenya*. Nairobi: Government Printer.

Republic of Kenya. (2019a). *Weakening of the Kenyan Shilling*. Nairobi: Government Printer.

Republic of Kenya. (2019b). *Institutions Combating Counterfeit Goods not Doing Enough to Protect Kenyans*. Nairobi: Government Printer.

Republic of Kenya. (2024). *The Economic Survey*. Nairobi: Government Printer.

Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy*, *98*(5, 71-102.

Rullani, F., Beukel, K., & De Angelis, M. (2021). Anti-counterfeiting strategy unfolded: A closer look to the case of a large multinational manufacturer. *Strategic Management Journal*, *42*(11), 2084-2103.

Ruttoh, E. (2017). *Effects of Counterfeiting on Economic Growth and Foreign Direct Investment in Kenya.* Nairobi: Anti- Counterfeit Authority.

Scorpecci, D. (2009). The economic impact of counterfeiting and piracy. In *Presentation at the conference 'Transatlantic IP Collaboration'on April* (Vol. 27, p. 2009).

Stock, James H., and Mark W. Watson. (2001). "Vector autoregressions." *Journal of Economic perspectives* 15.4: 101-115.

Tang, F., Tian, V. I., & Zaichkowsky, J. (2014). Understanding counterfeit consumption. *Asia Pacific Journal of Marketing and Logistics*, *26*(1), 4-20.

Thirlwall, A. P. (2021). Thoughts on balance-of-payments constrained growth after 40 years. In Thirlwall's Law at 40 (pp. 128-142). Edward Elgar Publishing.

Todaro, M. P., & Smith, S. C. (2020). *Economic development*. Pearson UK.

Verbeek, M. (2017). *A guide to modern econometrics*. John Wiley & Sons.

Wang, Y. (2018). Essays on market competition and law enforcement (Doctor's thesis, Lingnan University, Hong Kong). Retrieved from https://commons.ln.edu.hk/otd/37/ on 15th January, 2023

Wooldridge, J.M. (2016). *Introductory econometrics: A modern approach*. Toronto: Nelson Education.

Wooldridge, J. M., Wadud, M., & Lye, J. (2016). *Introductory econometrics: Asia pacific edition with online study tools 12 months*. Cengage AU.

World Bank Group. (2016). *Kenya Economic Update, October 2016: Beyond Resilience-Increasing Productivity of Public Investments*. World Bank.

Wu, Q., & Zhao, S. (2021). Determinants of Consumers' Willingness to Buy Counterfeit Luxury Products: An Empirical Test of Linear and Inverted U-Shaped Relationship. *Sustainability*, *13*(3), 1194.

Yao, V. W. (2006). An Economic Analysis of Counterfeit goods: The case of China. *Business and Public Administration Studies*, *1*(1), 116-116.

Zambakari, C. (2020). South Sudan in the East African Community: Prospects and Challenges for a Monetary Union and Political Federation. *Forthcoming, Zambakari, C. (2020). South Sudan in the East African Community: Prospects and Challenges for a Monetary Union and Political Federation In E. Wamboye, S. Asongu, & B. Fayissa (Eds.), Palgrave Handbook of Africa's Economic Sectors, Contemporary Opportunities, and Sustainable Development*.

APPENDICES

APPENDIX 1: Post Estimation Test Results

Table A1: Post Estimation Test Results for the Determinants of Demand for Counterfeit Goods

Test	Null Hypothesis	Prob > F/ Prob > chi2
Ramsey RESET	Model has no omitted variables	Prob > F = 0.5019
Breusch-Godfrey Test	No serial correlation	Prob > chi2 = 0.7295
Arch Test for Heteroscedasticity	No Heteroscedasticity	Prob > chi2 = 0.7567

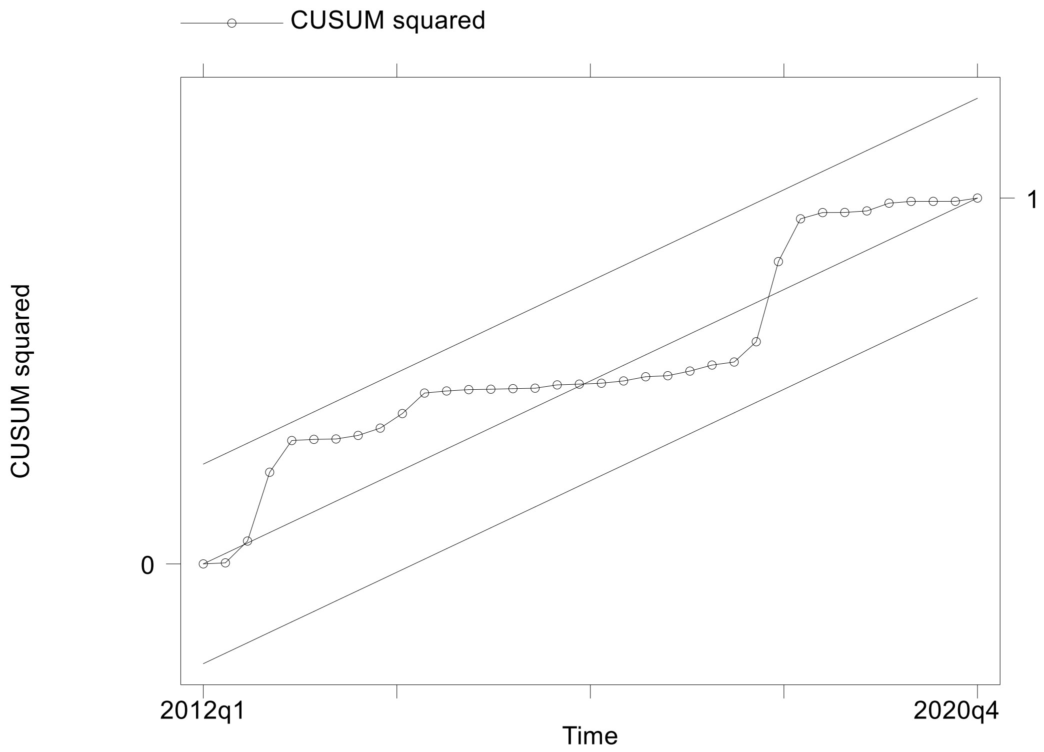

Figure A1: CUSUM of Squares Parameter Stability for the Determinants of Demand for Counterfeit Goods

Table A2: Post Estimation Test Results for the Effects of Anti-Counterfeit Measures on the Performance of the Manufacturing Sector

Test	Null Hypothesis	Prob > F/ Prob > chi2
Ramsey RESET	Model has no omitted variables	Prob > F = 0.4670
Breusch-Godfrey Test	No serial correlation	Prob > chi2 = 0.7852
Arch Test for Heteroscedasticity	No Heteroscedasticity	Prob > chi2 = 0.7450

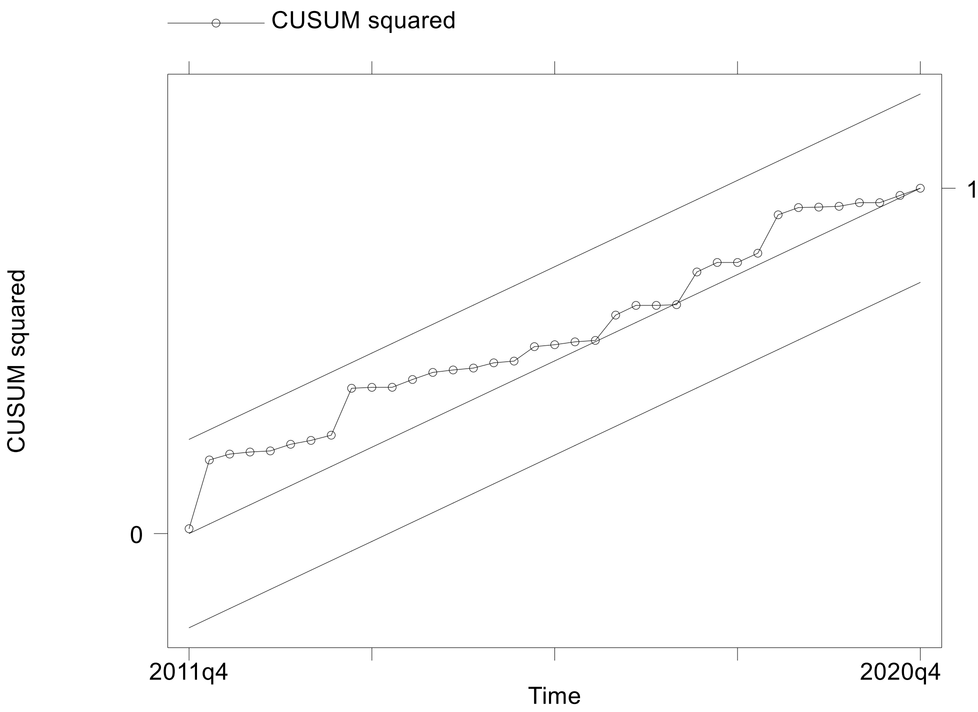

Figure A2: CUSUM of Squares Parameter Stability for the Effects of Anti-Counterfeit Measures on the Performance of the Manufacturing Sector

Table A3: Post Estimation Test Results for the Effects of Anti-Counterfeit Measures on Balance of Trade

Test	Null Hypothesis	Prob > F/ Prob > chi2
Breusch-Godfrey Test	No serial correlation	Prob > chi2 = 0.2110
Arch Test for Heteroscedasticity	No Heteroscedasticity	Prob > chi2 = 0.1978

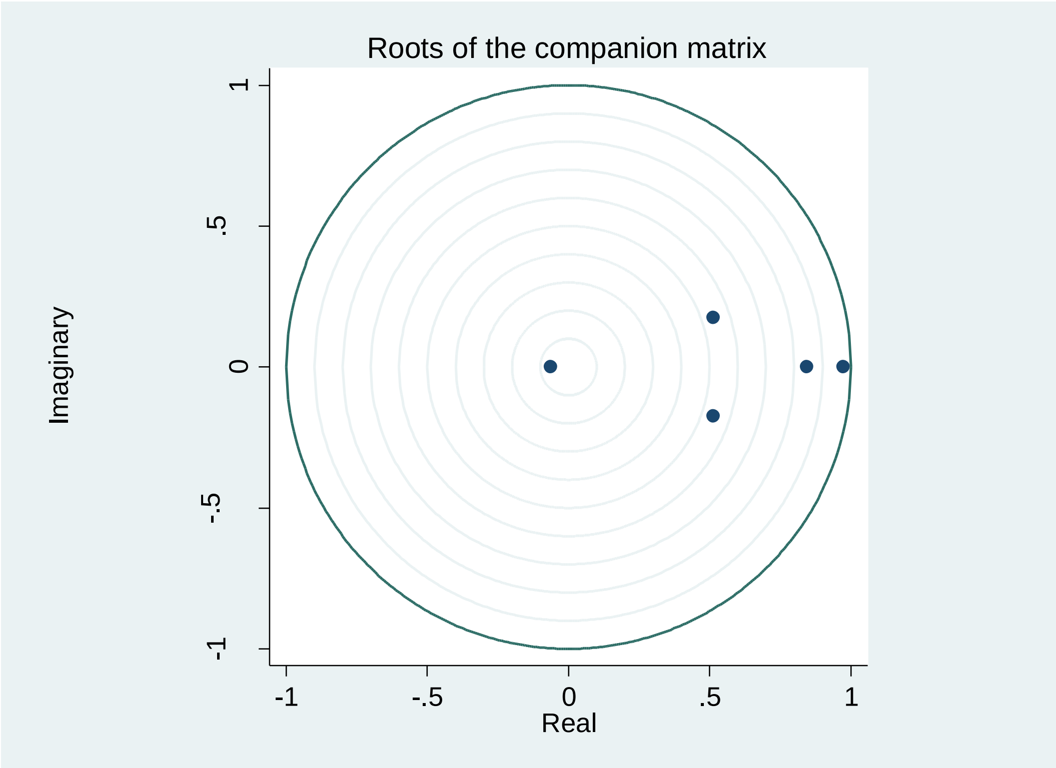

Figure A3: Invertibility Test Results for the Effects of Anti-Counterfeit Measures on Balance of Trade

APPENDIX 2: Pre-Estimation Test Results for the Effects of Anti-Counterfeit Measures on Balance of Trade

Table A4: Lag Length Selection Criteria for the Effects of Anti-Counterfeit Measures on Balance of Trade

Sample: 2011q1 - 2020q4					Number of observations = 40			
Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	72.69				2.3	-3.38	-3.30	-3.17
1	218.56	291.75	5	0.000	5.6*	-9.42*	-8.97*	-8.16*
2	236.98	36.83	5	0.060	8.3	-9.09	-8.25	-6.77
3	261.23	48.50*	5	0.003	1.0	-9.06	-7.84	-5.68
4	278.58	34.69	5	0.094	2.1	-8.67	-7.07	-4.24

Source: *Computation based on data from KNBS data*

Table A5: Johansen Cointegration Test Results for the Effects of Anti-Counterfeit Measures on Balance of Trade

Trend considered: constant Sample Size: 1971-2018			Observations = 48 Number of Lags = 1		
maximum rank	parms	LL	The eigenvalue	The trace statistic	Critical Value (5 percent)
0	3	222.05	.	58.96*	68.52
1	8	233.95	0.43	35.15	47.21
2	11	242.22	0.32	18.62	29.68
3	12	248.07	0.24	6.92	15.41
4		250.28	0.099	2.49	3.76
5		251.53	0.057		

Source: *Computation based on data from KNBS data*

APPENDIX 3: Data used in the Study

Time	VCF	NOC	PCI	PA	Enf	EXR	CPI	FDI KES B	GDP KES B	MVA KES B	LAB	BOTR
2010q1	2.43	12	57.68	23.46	26.97	76.49	53.64	1.24	786.48	77.22	0.13	-0.17
2010q2	3.43	15	61.78	31.26	37.17	78.94	53.97	2.76	767.42	86.18	0.13	-0.21
2010q3	7.85	14.9	65.26	52.49	39.27	80.93	54.31	4.87	761.16	93.66	0.13	-0.19
2010q4	8.23	16	68.13	51.38	48.87	80.58	55.20	5.24	789.25	99.65	0.13	-0.17
2011q1	16.24	17	70.38	62.00	62.47	82.24	57.42	26.41	845.68	104.16	0.13	-0.20
2011q2	20.32	18	72.01	78.28	72.16	86.12	61.07	31.59	818.33	107.18	0.13	-0.22
2011q3	27.25	19	73.03	80.19	80.22	93.01	63.28	34.80	807.48	108.71	0.10	-0.28
2011q4	32.08	11	73.43	94.90	90.24	93.87	65.80	36.02	823.75	108.76	0.13	-0.28
2012q1	29.01	15	71.01	96.94	112.67	84.14	67.10	30.62	880.80	101.52	0.14	-0.22
2012q2	32.47	21	71.06	105.06	121.88	84.12	68.26	29.74	853.43	100.92	0.13	-0.26
2012q3	42.74	20	71.37	110.01	133.71	84.28	67.31	28.72	847.71	101.17	0.10	-0.26
2012q4	57.28	21	71.94	115.24	140.38	85.58	68.11	27.58	862.40	102.25	0.11	-0.26
2013q1	60.40	19	73.83	116.90	144.68	86.72	69.84	26.14	934.35	106.69	0.12	-0.24
2013q2	61.20	15	74.51	117.05	157.58	84.61	71.24	24.81	917.59	108.45	0.10	-0.22

2013q3	65.71	16	75.04	120.19	167.58	87.26	72.02	23.42	902.36	110.05	0.09	-0.26
2013q4	67.14	23	75.40	125.77	196.74	85.91	73.17	21.97	892.52	111.48	0.12	-0.27
2014q1	68.40	24	73.21	130.22	246.99	86.33	74.57	19.81	982.92	110.34	0.08	-0.21
2014q2	68.42	25	74.21	134.40	249.37	87.25	76.25	18.50	972.76	112.41	0.09	-0.24
2014q3	67.22	25	76.02	137.95	252.54	88.24	77.45	17.39	944.09	115.29	0.10	-0.31
2014q4	71.21	26	78.64	139.16	255.89	89.88	77.69	16.48	942.42	118.97	0.11	-0.28
2015q1	72.44	27	84.93	142.92	271.05	91.52	78.91	15.52	1039.43	126.90	0.11	-0.19
2015q2	75.21	28	87.99	150.17	289.62	95.84	81.58	15.11	1026.83	130.80	0.12	-0.24
2015q3	78.51	29	90.71	157.61	300.41	102.97	82.21	15.01	1001.47	134.12	0.13	-0.21
2015q4	79.91	31	93.09	160.76	320.98	102.38	83.40	15.21	994.17	136.87	0.14	-0.17
2016q1	76.79	32	95.36	163.25	341.94	101.91	84.51	14.36	1091.75	138.38	0.13	-0.14
2016q2	80.83	34	96.94	167.16	347.66	101.04	85.95	15.71	1089.94	140.24	0.15	-0.19
2016q3	81.02	36	98.07	172.81	356.77	101.34	87.41	17.90	1053.22	141.78	0.15	-0.21
2016q4	82.51	37	98.75	173.24	360.68	101.73	88.82	20.93	1065.79	143.01	0.16	-0.20
2017q1	85.11	38	97.64	179.05	362.04	103.40	91.92	28.02	1148.68	143.22	0.16	-0.22
2017q2	86.65	40	97.96	189.45	370.48	103.36	95.22	31.46	1138.11	144.11	0.17	-0.22

2017q3	87.51	42	98.36	190.39	379.25	103.51	93.98	34.45	1099.84	144.96	0.14	-0.26
2017q4	88.38	43	98.85	198.45	389.18	103.37	93.24	37.00	1120.75	145.79	0.15	-0.23
2018q1	90.09	44	99.77	203.43	390.00	101.86	96.05	40.46	1221.62	146.11	0.16	-0.20
2018q2	100.70	45	100.29	215.45	392.94	100.76	99.02	41.59	1207.06	147.07	0.17	-0.23
2018q3	112.40	46	100.77	220.80	399.53	100.71	98.39	41.74	1171.76	148.18	0.17	-0.22
2018q4	114.67	47	101.19	250.97	411.83	101.85	98.47	40.92	1191.74	149.45	0.18	-0.22
2019q1	116.13	50	101.56	268.51	422.64	100.75	100.40	39.12	1284.86	150.88	0.19	-0.19
2019q2	119.00	52	101.88	270.54	434.63	101.30	102.99	36.34	1268.75	152.46	0.20	-0.22
2019q3	120.35	55	102.15	277.25	444.83	103.42	104.02	32.58	1239.44	154.21	0.21	-0.22
2019q4	121.34	57	102.37	289.75	445.71	102.55	105.21	27.85	1256.63	156.11	0.21	-0.24
2020q1	123.23	60	107.05	290.87	455.71	101.91	107.05	28.12	1261.21	156.75	0.23	-0.26
2020q2	127.78	63	108.45	300.00	467.51	106.49	108.45	28.35	1265.65	157.37	0.25	-0.29
2020q3	129.18	64	108.50	307.89	475.41	107.93	108.50	28.55	1269.96	157.96	0.30	-0.30
2020q4	136.59	65	110.75	328.20	487.90	109.51	110.75	28.73	1274.16	158.53	0.33	-0.34

APPENDIX 4: Research Permit

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