EXPORT INTENSITY, TOTAL FACTOR PRODUCTIVITY AND EMPLOYMENT IN KENYA'S MANUFACTURING FIRMS

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A THESIS SUBMITTED TO THE SCHOOL OF BUSINESS, ECONOMICS AND TOURISM IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN ECONOMICS OF KENYATTA UNIVERSITY.

NOVEMBER, 2025

DECLARATION

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

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DEDICATION

I dedicate this work to my beloved parents, my darling husband and our lovely children.

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ABBREVIATIONS AND ACRONYMS

AGOA	African Growth and Opportunity Act
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECOWAS	Economic Community of West African States
EU	European Union
GDP	Gross Domestic Product
KAM	Kenya Association of Manufacturers
LBE	Learning by Exporting
NEDPS	National Export Development and Promotion Strategy
NITA	National Industrial Training Authority
SADC	Southern African Development Community
SSH	Self-Selection Hypothesis
TFP	Total Factor Productivity
TFTA	Tripartite Free Trade Area
WBES	World Bank Enterprise Survey
WTO	World Trade Organization

OPERATIONAL DEFINITION OF TERMS

East Asian Miracle:	Refers to the rapid economic expansion witnessed by the East Asian economies in the late twentieth century due to the adoption of an export-led manufacturing strategy.
Export Intensity:	The percentage of a firm's overall revenue that comes from exports
Export Propensity:	Refers to whether a firm engages in exporting or not
Industrial Revolution:	The transition from an agricultural economy to a manufacturing dominated one.
Learning-by-exporting (LBE):	Refers to the performance benefits enjoyed by exporting firms.
Self-selection Hypothesis (SSH):	The tendency of highly productive firms to participate in international trade.
Total Factor Productivity (TFP):	Refers to the change in firm's overall output that is not due to changes in materials, labor and capital.

ABSTRACT

The manufacturing sector is vital in achieving industrialization of a country as evidenced by the East Asian Miracle. Kenya has pursued several industrial policies intended to boost the performance of her manufacturing sector whereby several targets have been set. By 2022, the economic output from manufacturing was targeted at 15 per cent whereas the percentage of manufactured exports in all exports was targeted at 60 per cent. However, manufacturing sector's contribution to economic output averaged 10 per cent between 2007 and 2023 and has persistently declined since 2011. Besides, from 2007 to 2023, the share of total exports made up of manufactured goods averaged 33 per cent and the share of employment in the sector has been below 14 per cent. For more policy guidance, it is imperative to understand the link between key performance indicators in the sector such as export intensity, total factor productivity and employment. This research specifically explored the firm-level determinants of export intensity and established the effect of export intensity on total factor productivity and employment in Kenya's manufacturing firms. The study utilized panel data obtained from World Bank Enterprise Surveys for the period 2007, 2013 and 2018. The two-step Heckman Sample Selection model was employed to establish the firm-level determinants of export intensity. The effects of export intensity on firm-level total factor productivity and firm employment were analyzed using the Two-Step System Generalized Method of Moments. The results indicated that export intensity was positively influenced by total factor productivity (0.0351%), foreign ownership (0.4281), firm size (0.0632%), firm age (0.0361%), human capital (0.0298%), research and development (0.0464) and negatively influenced by labor productivity (-0.0197%). The study established a positive effect of export intensity (0.2279%), labor productivity (0.4043%) and management experience (0.4459%) on firm level total factor productivity. Total factor productivity was negatively influenced by firm size (-0.2242%) and capital intensity (-0.1796%). Export intensity (0.2868%), firm age (1.7525%) and research and development (0.4562) had positive effects on firm employment while wage per worker (-0.1649%) negatively affected firm employment. Based on the study findings, firms need to focus on enhancing their total factor productivity through adoption of new technologies, innovation and inventions and investment in human capital through enrolling in specialized training programmes by the National Industrial Training Authority. Export promotion strategies such as expansion of Export Processing Zones, Special Economic Zones and participation in regional and international trade agreements ought to be intensified by the government. More so, firms may consider working closely with state agencies and corporations such as the National Research Fund and actively engage in research and development activities. This will aid them secure and utilize research and development grants, set up manufacturing incubators and register for intellectual property rights to safeguard their innovations. Given that Kenya is a labour rich country, the government and firms may consider adopting labour friendly technologies such as collaborative robotics so as to remain efficient and more productive.

CHAPTER ONE

INTRODUCTION

1.1 Background

Globally, international trade is vital to economic expansion since it allows international participants to enhance their competitiveness and multiply their output and profits across their domestic borders. Exposing firms to international trade improves their competitiveness, productivity and innovation (Kasahara & Lapham, 2013). Enhancing a country's trade performance has become necessary to improving its economic performance and this requires expanding manufacturing exports, since around 70 per cent of world exports are manufactured (World Bank, 2021). Universally, the manufacturing sector contributes significantly to economic transformation through fostering and maintaining high productivity growth, expanding job possibilities, and boosting national competitiveness via exports alongside other forms of international activities (KAM, 2022; KCCB, 2021). A vibrant manufacturing sector generates interlinkages with other sectors, promotes industrial revolution and productivity gains hence spurring economic development as evidenced by the Industrial Revolution and the East Asian Miracle (KAM, 2022; Republic of Kenya, 2012).

According to Kaldo (1996), economic theory highlights the significance of the manufacturing sector as a growth catalyst. The rise of the manufacturing sector creates positive spillover effects to other sectors via interlinkages (Kaldo, 1996). These include increased demand and absorption of products and services from other sectors in the

economy. Hence, expansion of other economic sectors and creation of job possibilities in the economy in general are realized. Kaldo (1996) argued that the manufacturing sector is vital for the transformation of economies and its productivity and growth is positively linked to the performance of other sectors in the economy. Thus, since the sector is essential for economic growth, its contribution to Gross Domestic Product (GDP) should be reasonable so as to create enough jobs for its citizens aimed at alleviating the unemployment problem and poverty in general.

One way of boosting the performance of the manufacturing sector is via exports (Bernard & Jensen, 1999). According to traditional trade theories, international trade boosts specialization within sectors based on comparative advantage leading to welfare gains whereas new trade theory argues that trade yields productivity gains due to increased product variety and economies of scale (Bernard, Jensen, Redding, & Schott, 2007). Participation in international trade also leads to increased demand for both skilled and unskilled labor (employment) due to adaptation of new production techniques from modern technology thus boosting learning by doing (Kasahara & Lapham, 2013). Due to increased economic integration, analyzing the causal connection involving exports and firms' total factor productivity (TFP) and employment is necessary especially for developing countries for the implementation of proper industrialization policies.

The linkage between trade and economic performance has been a popular subject (Charles & Richard, 2020). Mostly researchers have explored the influence of exports on the business performance mostly productivity which were commenced by (Bernard, Jensen, & Lawrence, 1995) for US manufacturing industries where exporters were

highly efficient than non-exporters. In literature, two dimensions of export behavior, namely export propensity and intensity are explored. Export propensity refers to if a firm engages in exporting or not while export intensity indicates the proportion of a firm's exports in its overall revenue. Two proposals have been developed to explain the connection of exports and firm productivity: The self-selection hypothesis (SSH) and the learning-by-exporting (LBE) hypothesis (Bernard & Jensen, 1999; Bernard, Jensen, Redding, & Schott, 2007). According to SSH, since there exist additional costs of exportation, only more productive firms participate in exporting activities. LBE implies that once firms start exporting, their performance is boosted due to diffusion of knowledge from international clients and rivals. There exists mixed and inconclusive evidence on the two hypotheses especially for developing countries.

Productivity is an important dimension of business performance in theoretical and empirical literature. Countries, sectors and firms may have the same resources but may differ in terms of their production and growth based on their levels of productivity. Sustained economic growth and development can be achieved through productivity improvements (Hall & Jones, 1999). In the eighteenth century, Adam Smith and David Ricardo, laid emphasis on productivity growth arising from specialization and participation in international trade. Productivity improvement has also been linked to "creative destruction" and enterprise renewal in the sense that firms that invest in new innovations and inventions boost their productivity and improve their chances of survival in the market (Schumpeter, 1942).

TFP enhancements alongside capital accumulation and growth in labor are important long term drivers to improved standards of living based on the arguments of neoclassical and endogenous growth theories (Solow, 1956; Swan, 1956; Arrow, 1962; Romer, 1986; Romer, 1990; Romer, 1994; Lucas, 1988).

1.1.1 Global and Regional perspectives on the Performance of the Manufacturing Sector

International trade allows countries to access the world market and expand their production and profits. In the context of globalization, enhancing a country's export performance has become necessary to improving its economic performance. This can be accomplished through expanding manufacturing exports which have more value addition as opposed to agricultural exports. More so, worlds' manufacturing exports constitute about 70 per cent of all world merchandise exports (World Bank, 2024). Figure 1.1 presents the statistics and trends of the share of manufacturing exports in total merchandise exports for the World, Sub-Saharan Africa (SSA) and the East African Community (EAC) during the period 2007-2023.

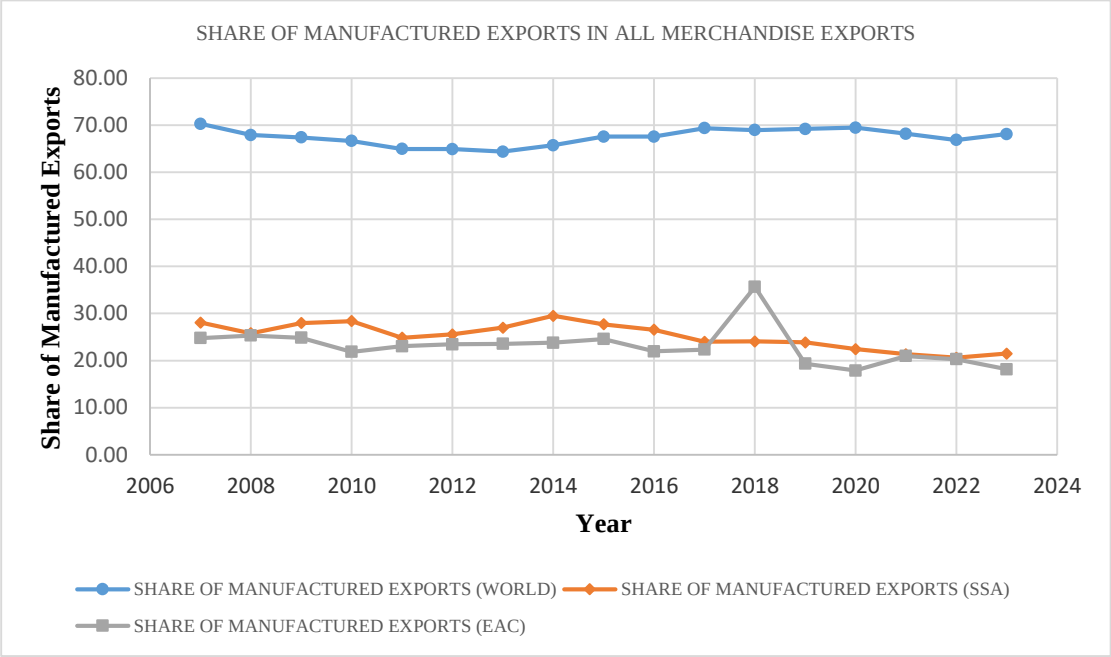

Figure 1.1: Global and Regional Share of Manufacturing Exports in all Merchandise Exports for the period 2007-2023.

Source: Author's Computations based on World Bank (2024) Data.

From Figure 1.1, the percentage of worlds' manufactured goods exported in total merchandise exports over the period 2007-2023 displayed a stable path with a value of 67.52 on average. This is an indication of the relevance of the sector in achieving industrialization via exports. SSA and EAC had an average share of manufactured exports in all exports of 25.25 and 23.04 per cent, respectively, for the span 2007-2023. These statistics imply that the share for SSA and EAC is way below the world average hence the need for improvement if the countries in these regions are to industrialize. More so, manufactured exports for SSA and EAC have been very volatile and mostly on a declining trend indicating instability. The countries in these regions need to ensure that they develop robust and stable manufacturing sectors for sustainable economic transformation.

One of the key measures of economic performance of the manufacturing sector is its contribution to Gross Domestic Product (GDP) which is an indicator of how much the sector contributes to the final output and its significance in a given country. Figure 1.2 presents the statistics on the share of manufacturing sector in GDP for the World, SSA and EAC during the period 2007-2023.

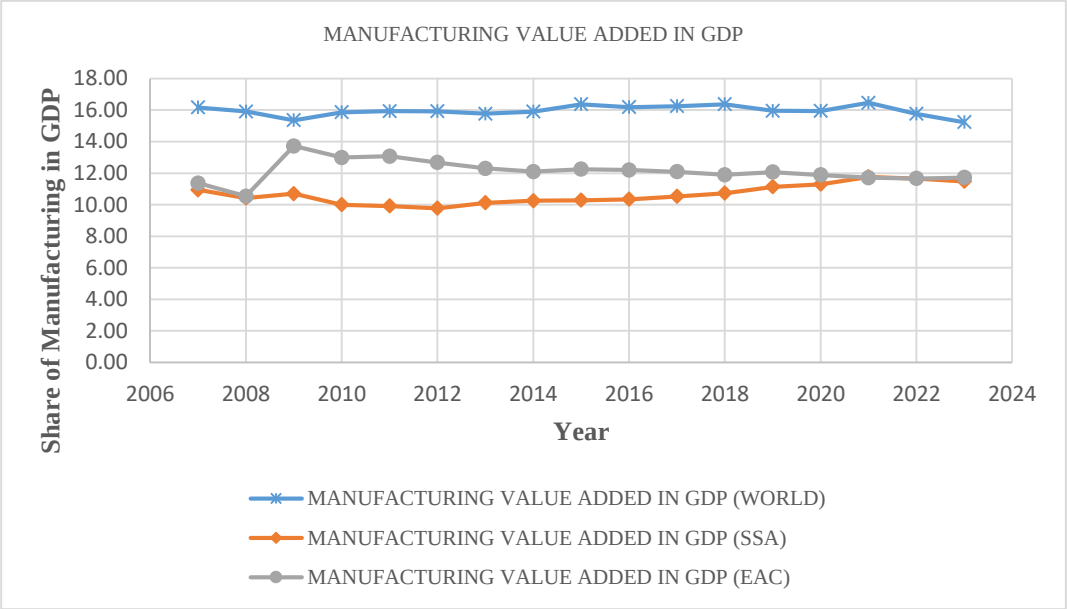

Figure 1.2: Global and Regional Share of Manufacturing Value Added in GDP: 2007-2023

Source: Authors Computations based on World Bank (2024) Data.

Figure 1.2 indicates that the sector's value added in GDP for the period 2007-2023 was on average 15.96, 10.67 and 12.13 per cent for the World average, SSA and EAC, respectively. This indicates the sector's low share globally. A share of 15.96 per cent for the world average indicates that the manufacturing sector contributes less than a quarter of the worlds' GDP despite its importance in economic transformation. More so, comparing the sectoral shares of SSA (10.67) and EAC (12.13) to the world average, the

contribution of the manufacturing sector for these regions are below the world average and yet many countries in these regions have not achieved industrialisation.

From the East Asian miracle among others, developing countries may consider focusing on having a stable and robust export-led manufacturing sector with an increasing share in GDP in order to industrialize (KAM, 2022). Nevertheless, these countries have followed a de-industrialization path that deviates from agriculture to services sector without much focus on the manufacturing sector as depicted by a high and an increasing service sector's share in GDP. This trend is illustrated on Figure 1.3.

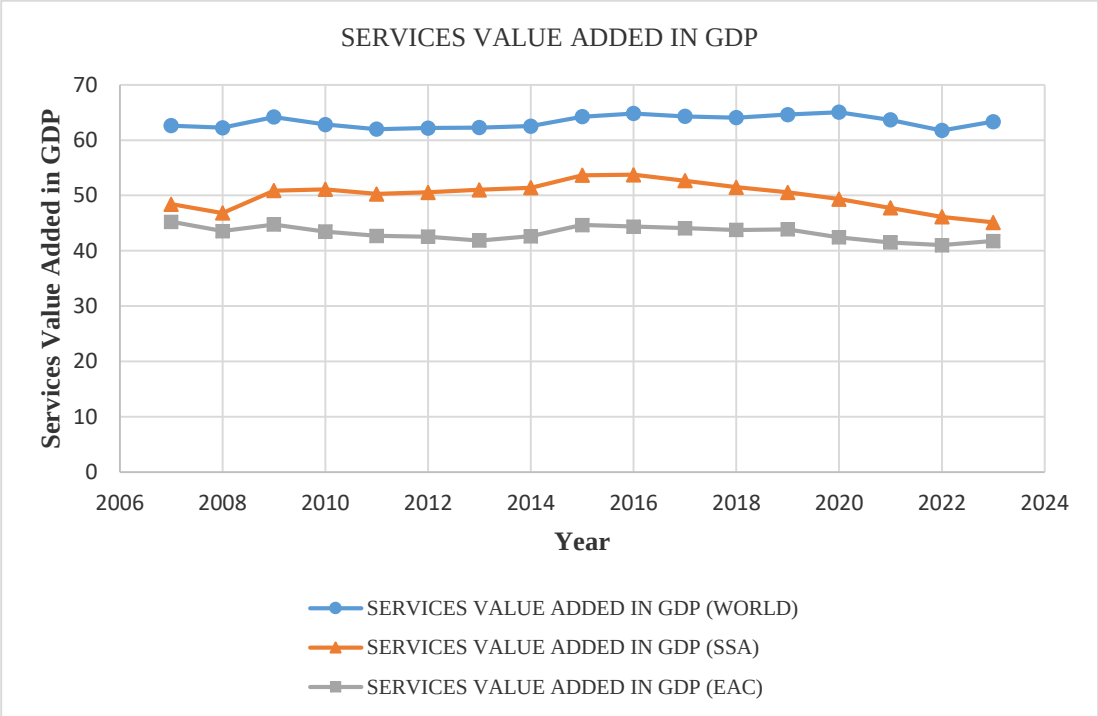

Figure 1.3: Global and Regional Share of Services Value Added in GDP for the period 2007-2023.

Source: Author's Calculations based on World Bank (2024) Data.

From Figure 1.3, the average share of services in GDP for the world average was 63.34 per cent for the period 2007-2023 compared to an average manufacturing share in GDP of 15.96 per cent presented on Figure 1.2 This implies that services contribute almost two-thirds of the world GDP compared to manufacturing sector which contributes less than a quarter of worlds' GDP. For SSA and EAC the average share for services in GDP for the same period was 50.06 and 43.19 per cent, respectively. This is against a manufacturing share of 10.67 and 12.13 per cent, respectively as presented on Figure 1.2. An increasingly dominant services sector over the manufacturing sector is an indication of premature deindustrialization and this is a policy concern for developing countries who are yet to industrialize.

Another important dimension of the performance of the manufacturing sector is employment generation. Unemployment is a key concern in many economies globally thus the need for job creation in the manufacturing sector given that the sector yields positive multiplier effects to other sectors and the entire economy (Kaldo, 1996). Figure 1.4 presents the percentage of total employment in industry for the World, SSA and EAC for the period 2007-2023.

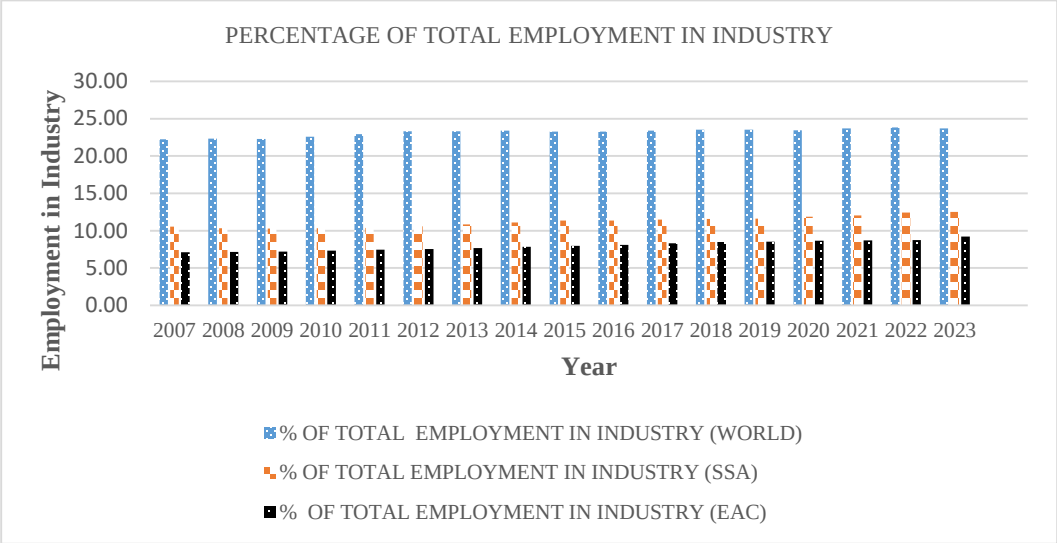

Figure 1.4: Global and Regional Employment Shares for Industry during the period 2007-2023.

Source: Author's Computations from World Bank (2024) Data.

From Figure 1.4, the percentage of total employment in industry globally was on average about 23.18 per cent for the period 2007-2023 indicating that industry created almost a quarter of all jobs in the world. For SSA, the percentage of industry jobs was on average 11.22 and that of the EAC countries was about 8.00 on average. The statistics imply that globally, contrary to expectations, the industrial sector has not employed a large proportion of the workforce. The statistics for SSA and EAC reveal that the industrial sector employs just under half of the individuals working in the field worldwide. Additionally, the statistics reveal that the employment shares in industry have almost been stagnant globally.

Given that the manufacturing sector is a key constituent of the industrial sector, the statistics on Figure 1.4 suggests that the manufacturing sector has not provided sufficient

jobs in the African continent where the unemployment problem is a pertinent issue. Africa is also characterized by high poverty levels which may be exacerbated by the unemployment problem. Thus, policy guidance on the same is required to address the low level of employment generation in the manufacturing sector for the unemployment problem to be mitigated, especially in Africa. This will also aid in the achievement of Sustainable Development Goal (SDG) 8 which targets to "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all."

1.1.2 The Manufacturing Sector's Role and Performance in Kenya

For emerging nations, like Kenya, seeking to raise their income levels and reduce poverty, industrialisation continues to be their best chance (KAM, 2024). Almost every instance of significant, quick, and long-term economic growth in contemporary times has been linked to industrialisation, namely the expansion of manufacturing output (Rodrick, 2011). Industrialisation drove tremendous expansion in southern Europe throughout the 1950s and 1960s, as well as in East and Southeast Asia around the 1960s (Rodrick, 2011). Kenya's desire to pursue industrialisation stems from the reality that the nation requires rapid and steady economic expansion in order to significantly reduce impoverishment. This calls for exploiting the full potential of the manufacturing sector.

The creation of lucrative employment and the provision of subsistence for the youth who join the labour field annually constitutes one of Kenya's biggest concerns at the moment. Manufacturing has the potential to create numerous employment opportunities for

workers of all abilities across the board. The manufacturing sector additionally serves as an avenue for the emergence and expansion of the global middle class by creating jobs, increasing income, and improving accessibility to products and services (KAM, 2024). The government acknowledges the significance of the manufacturing sector in fostering growth in the economy by encouraging and facilitating productivity, increasing job opportunities, and improving the nation's competitiveness in export markets (Republic of Kenya, 2024).

In Kenya and other developing countries, the manufacturing sector, due to its strong interlinkages with other sectors, is key to the achievement of stable and sustainable economic transformation compared to agriculture and service sectors (KAM, 2019; KAM, 2021). The sector is crucial in achieving and sustaining the 10 per cent growth in the economy as per the *Kenya Vision 2030* (Republic of Kenya, 2007). For this to be achieved, a developed and a robust manufacturing sector is required as emphasized in the Kenya's Big Four Agenda (KAM, 2018). Therefore, it is important to improve the sector's productivity, competitiveness and performance in general since a thriving manufacturing sector translates to improved economic growth in a country.

Among many others, promotion of international trade, specifically exports, has been prioritized for the development of a robust manufacturing sector in Kenya. Nevertheless, export performance in the sector has been below expectations and set targets. The average share of manufactured exports in all exports was about 32.37 per cent for the period 2007-2023 in Kenya (World Bank, 2024). This share falls short of the targeted 60 per cent as per the National Exports Development and Promotion Strategy (NEDPS)

by the government of Kenya (Republic of Kenya, 2017). Moreover, according to the World Bank Enterprise Survey (WBES) of 2018, the number of manufacturing firms engaging in exporting activities have been decreasing as evidenced by a declining ratio of exporting firms to total firms surveyed from 52 per cent in 2013 to 45 per cent 2018. KAM's 2022-2027 manifesto also aims at increasing exporting activities by manufacturing firms in Kenya for better performance.

Additionally, the manufacturing sector is anticipated to contribute over 15 per cent to GDP according to the *Kenya Vision 2030.* An increasing share of manufacturing in GDP is an indication of increased level of industrialization of a country (KAM, 2019). However, this sector has experienced sluggish performance based on its contribution in GDP which has stagnated at around 10 per cent as opposed to the targeted 15 per cent by the year 2027 and 20 per cent by the year 2030 as per the *Kenya vision 2030* and the bottom-up economic transformation agenda (BETA). The agricultural and services sectors have been dominant in terms of sectoral shares in GDP as presented on Figure 1.5.

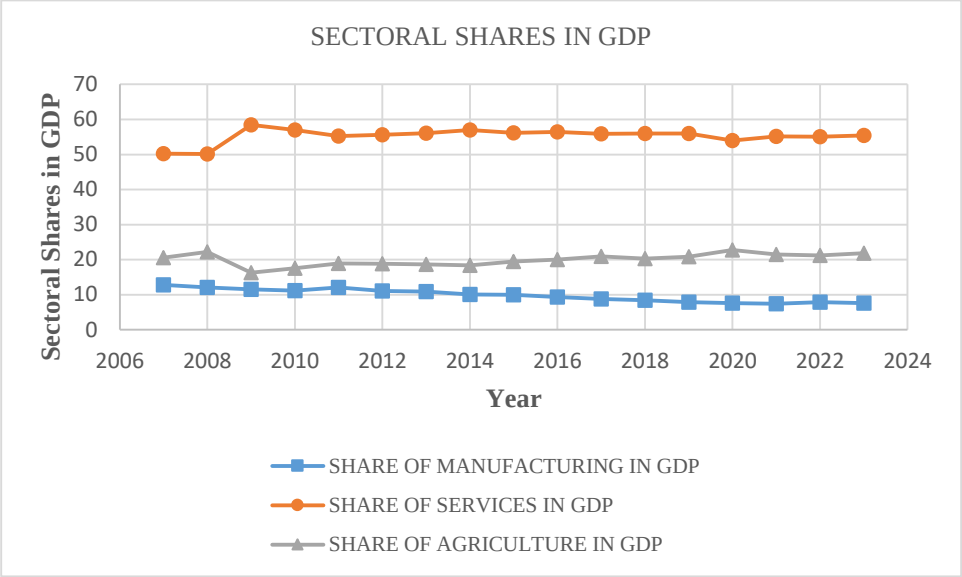

Figure 1.5: Sectoral Shares in GDP for Kenya: 2007-2023.

Source: Author's Computations from Economic Surveys and World Bank (2024).

From Figure 1.5, manufacturing had a varying contribution to GDP of roughly 10 per cent with the highest value of 12.79 per cent witnessed in 2007 and the lowest value being 7.20 in 2021. Nevertheless, this share has persistently declined from 12.79 per cent in 2007 to 7.60 per cent in 2023, an indicator of deindustrialization (KAM, 2022). Besides, the share of agriculture in GDP was 20 per cent while that of services was 55.26 per cent, on average. This implies that services sector contributes the highest share of the GDP which is also an indication of premature de-industrialization. Manufacturing has the least share at an average of 10 per cent hence it is imperative to boost the share of manufacturing sector in GDP for Kenya to industrialize by the year 2030.

The manufacturing sector is also key in the provision of productive and sustainable jobs since it has the highest employment multiplier (Rodrick, 2011). However, the

employment statistics reveal that the sector lags behind in terms of creation of jobs compared to other key sectors like agriculture and services. Figure 1.6 presents the percentage of total employment in industry, agriculture and services for Kenya for the period 2007-2023.

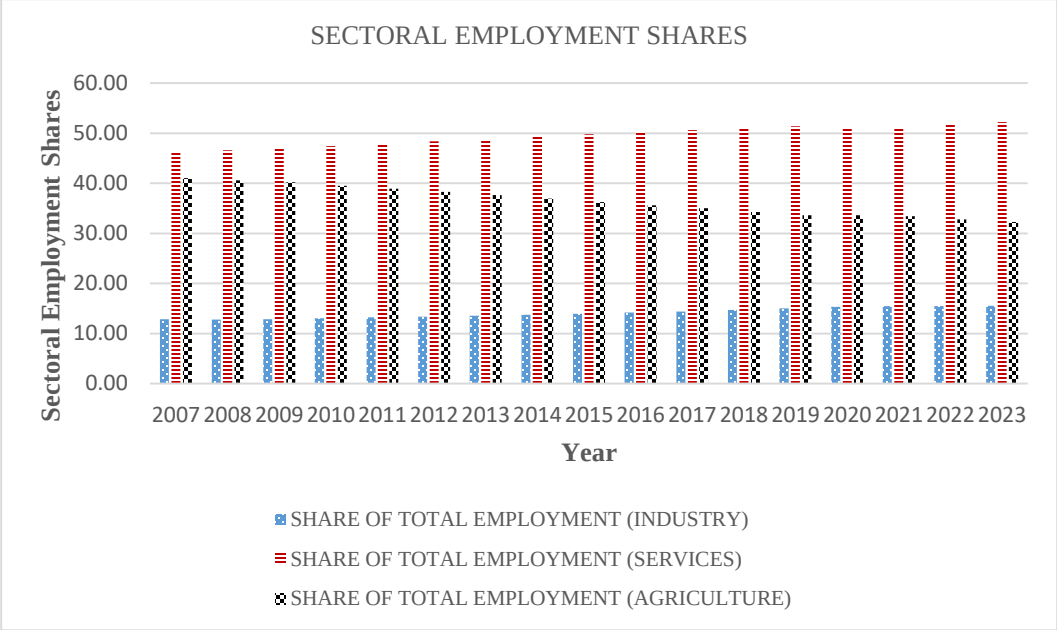

Figure 1.6: Sectoral Employment Shares in Kenya for the period 2007-2023

Source: Authors Calculations from World Bank (2024) Data

Figure 1.6 indicates that the percentage of total employment from industry was 14.09 for the period 2007-2023 on average. Given that the manufacturing sector is just a portion of the industrial sector, based on these statistics, its share of employment was less than 14 per cent. On the other hand, agriculture and services had an average percentage of total employment of 36.47 and 49.44, respectively. Thus, services sector is the dominant employer, followed by agriculture with manufacturing producing the least percentage of jobs. If the manufacturing sector is to realize its vital role of providing sustainable and

productive jobs as per the *Kenya Vision 2030*, this trend may need to be counteracted given that unemployment is a major macroeconomic problem in Kenya and many developing economies.

Kenya's economy is heavily reliant on the manufacturing sector for the achievement of industrialization. The sector significantly affects job creation, exports and GDP (KAM, 2022). Figure 1.7 represents the combined statistics of Kenya's manufacturing sector performance in terms of contribution to GDP, exports and employment.

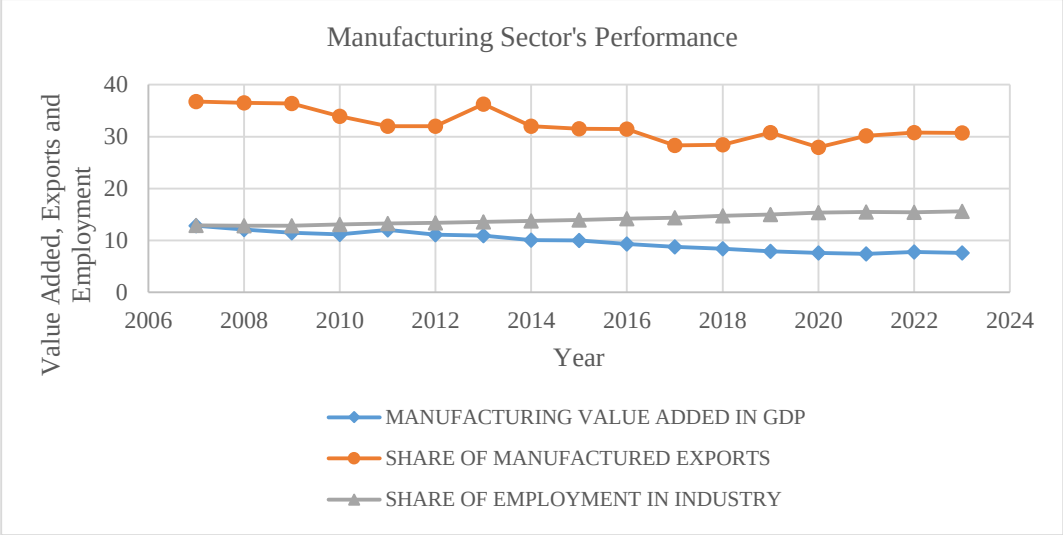

Figure 1.7: Manufacturing Value Added in GDP, Share of Exports in all Merchandise Exports and Share of Employment in Kenya for the period 2007-2023

Source: Authors Calculations from Economic Surveys and World Bank (2024) Data

Manufacturing sector's contribution to total economic activity is reflected in the manufacturing value added in GDP, which has been about 10 percent, on average for the period 2007-2023 as shown on Figure 1.7. Additionally, the competitiveness of Kenya's

manufacturing sector in international markets is demonstrated by a larger percentage of manufactured exports in total merchandise exports, which supports diversification of the economy and foreign exchange revenues. The statistics on Figure 1.7 reveal that the percentage of manufactured exports in all merchandise exports has been about 32.37 per cent for the period 2007-2023 (World Bank, 2024).

Furthermore, manufacturing growth, exports and employment are closely related since increased production capacity and export-oriented manufacturing generate increased employment opportunities, bolstering livelihoods and lowering unemployment (KAM, 2022). Figure 1.7 shows that employment share in the manufacturing sector has been below 14 percent given an average share of employment in industry of 14.09 percent for the period 2007-2023. All the statistics presented imply that the manufacturing sector is below the set targets in terms of exports, contribution to GDP and employment thus necessitating policy interventions to improve manufacturing competitiveness and job creation.

More so, Figure 1.7 does not establish a clear connection or trend among manufactured exports, contribution to GDP and employment. There is thus the need to explore the issue further especially using firm level data to clearly establish the connection of exports and several indicators of firm performance such as employment and productivity in the manufacturing sector. This was the main objective of this study.

1.1.3 Policy Initiatives in Kenya's Manufacturing Sector Since Independence

1.1.3.1 The Import Substitution Policy

Import Substitution (IS) policy was an industrialization strategy by Kenya in the early years of independence (1963-1970s) which was aimed at achieving rapid industrial growth, easing the pressures on balance of payment, boosting productivity and realization of high-income employment (Republic of Kenya, 2012). However, due to its capital-intensive nature, IS did not create much employment opportunities. It was also characterized by strict protection policies which caused inefficiencies in the domestic industry, opposition of exports and an inward-looking attitude. This caused major balance of payment problems in 1970-1971 due to its high import content which was aggravated by the 1973 oil crisis. In response, the government intensified tariffs and import licensing which led to annual growth of above 25 per cent on average in the sector between 1971 and 1973. In the late 1970s the coffee boom increased Kenya's exports substantially though by 1980, the coffee prices had reduced as well as the gains from trade. The breakdown of the East African Community (EAC) in 1977 and the second oil crisis in the late 1970s exacerbated the problem (Chege, Ngui, & Kimuyu, 2014).

In general, the IS approach was heavily weighted against exports. The IS drive was impeded by little local demand and export promotion attempts were hampered by declining productivity growth and an unstable macroeconomic environment. Furthermore, IS restricted domestic industry competition, causing industries to function as monopolies, earning large profits at the cost of the consumers (Chege, Ngui, & Kimuyu, 2014). As a result, industries became inefficient and the goods produced lost

competitiveness in the international markets due to their substandard quality. Industries discovered that producing for the heavily protected home market was more lucrative, ushering in an 'anti-export bias' (Republic of Kenya, 1994).

The nation experienced a significant foreign exchange crisis, requiring more intervention, including adopting more stringent import licensing techniques, additional tariffs, and widespread price regulations Such regulations weakened incentives for exports substantially, resulting in a decrease in the proportion of manufactured exports from 15.40 per cent in 1976 to 11.32 per cent in 1981.

1.1.3.2 Structural Adjustment Programmes (SAPs)

In response to issues raised regarding inefficiencies generated due to the IS strategy, the structural adjustment programs (SAPS) were implemented in the 1980s with the intent to, among other things, increase competitiveness and eliminate surplus capacity in the industrial sector. SAPs mainly focused on rationalizing import tariffs, removal of administrative controls, elimination of price controls, changing the structure of state corporations and liberalization of exchange rates and interest rates (Swamy, 1994). These comprised the elimination of price restrictions, a greater freedom of imports via elimination of permits, and the restructuring of tariff systems. The publishing of a session paper on Economic Management for Renewed Growth also triggered a comprehensive reworking of policies and the institutional architecture (Republic of Kenya, 1986).

The initiatives outlined in this sessional report were designed to address the issues associated with earlier IS policies. The administration also promised to eliminate all

burdensome import restrictions and tariffs. In 1993, there was abolishment of import licensing whereas in 1994, all price controls were removed where Kenya was deemed to be an open economy (Swamy, 1994). Despite these achievements, the industrial sector was still inward oriented, heavily reliant on imports, capital-intensive and incapable of creating additional employment opportunities for the increasing labor force (Republic of Kenya, 1994).

Contrary to the proposed transition towards an outward-looking export approach, the actual outcome was a continued prejudice against exports (Republic of Kenya, 1994). Kenyan exporters were inhibited from embarking on export expansion initiatives due to prohibitive tariffs and cumbersome regulatory processes. Finally, industries demonstrated negative attitudes that hampered an effective endeavor to enhance manufacturing exports. Consequently, the percentage of manufactured exports in all exports stagnated at about 11 per cent between 1981 and 1987. This called for a major policy shift towards export orientation.

1.1.3.3 Export Oriented Policies

Between 1986 and 1996 the government initiated the restructuring of the industrial sector through export-oriented policies (Republic of Kenya, 1994). With greater internal economic freedom in the course of the 1980s and 1990s, additional policies were implemented to improve the performance of industrial enterprises domestically and globally. These policies were majorly aimed at improving the economy's efficiency and competitiveness, increasing production for exports, increasing the industrial sectors

foreign exchange earnings as well as catalyzing investments in the private sector (Republic of Kenya, 1994). To achieve its goals, the government deepened trade liberalization policies and introduced export promotion strategies such as: "Manufacture Under Bond (MUB); Export Compensation Scheme; Export Processing Zones (EPZ); Export Promotion Programme Office (EPPO) and Tax Remission for Exports Office (TREO)" (Republic of Kenya, 2012).

These platforms attempted to encourage export-oriented production via an organized system of reductions in tariffs and an array of economic enticements, particularly initiatives encouraging exports. Another reform affecting the industrial sector was the repealing of price regulations in 1994. Due to inherent flaws in its execution, the government disbanded the Export Compensation Scheme in the 1993/94 budget (Were & Kayizzi-Mugerwa, 2009). In order to attract international investors, the Export Processing Act of 1996 established the Export Processing Zones Authority, whose effect was initially limited. Nevertheless, in sum, export promotion policies were highly successful since they led to an expansion in manufactured exports from an average share of 11 per cent in the 1980's to about 26.14 per cent for the period 1990-2000.

1.1.3.4 New Millennium Policies

Since the year 2000, more key reforms in policy have taken place, with substantial ramifications for Kenya's growth in manufacturing and trade. In 2000, the United States (US) government implemented African Growth and Opportunity Act (AGOA), allowing African countries to export textiles and apparel free of duty and without quotas for

imports. Kenya joined AGOA immediately after its implementation and this significantly boosted the EPZs. Kenya's export growth was enhanced further through the revival of the EAC and increased involvement in Common Market for Eastern and Southern Africa (COMESA).

Since 2000, policy reforms have been outlined in several blueprints including: The Poverty Reduction Strategy Paper; the Economic Recovery for Wealth Creation and the *Kenya Vision 2030*. The *Kenya Vision 2030* takes the center stage since it incorporates the suggestions and recommendations of the previous documents. The aim of the *Kenya Vision 2030* is to establish a broad, resilient, and successful manufacturing sector with the sector being key in achieving industrialization (Republic of Kenya, 2007). This vision will be accomplished via focusing on domestic, regional and international markets (Republic of Kenya, 2007).

Numerous export-oriented policies in Kenya have been implemented such as establishment of export processing zones, special economic zones, industrial parks, and industrial clusters. The government unveiled the Big Four Agenda in 2017, an economic pillar aimed at transforming Kenya's economy and assisting the nation in achieving Vision 2030 where the manufacturing sector was a key sector of focus. According to the Big Four Agenda, the manufacturing sector has the highest potential for job creation and contribution to GDP relative to other sectors. The agenda targeted increasing the sector's percentage in GDP to 15 per cent in 2022 from 8.4 per cent in 2017 and boosting export performance and employment in the sector (KAM, 2018).

In the same year, the National Exports Development and Promotion and Strategy (NEDPS) was launched with the mandate of promoting global and regional trade. It targeted increasing exports of manufactured goods by 31 per cent per year on average and increasing the percentage of all exports that are manufactured from 33 per cent to 60 per cent over the period 2018 to 2022 (Republic of Kenya, 2017). It also targets to increase the share of exporting firms in Kenya's manufacturing sector. To achieve this, Kenya has prioritized trade promotion especially through national trade commitments at the "World Trade Organization (WTO), East African Community (EAC), Common Market for East and Southern Africa (COMESA), Tripartite Free Trade Area (TFTA) between EAC, African Continental Free Trade Area (AfCFTA), East African Community-European Union Economic Partnership Arrangement, African Growth and Opportunity Act (AGOA) among others" (Republic of Kenya, 2017).

Additionally, as a component of the Kenya Kwanza's manifesto, the Bottom-Up Economic Transformation Agenda (BETA) was formally introduced on June 30, 2022. With a key focus of economic inclusion, the agenda seeks to improve industrial growth, empower small enterprises, and generate employment possibilities via specific investments and regulatory changes. Through focused actions, the agenda aims to increase productivity in the manufacturing sector, generate employment, and raise Kenya's level of competitiveness internationally via manufactured exports. BETA seeks to increase the contribution of manufacturing sector in GDP to 20 percent by the year 2030.

More so, BETA aims at expanding Special Economic Zones (SEZs) and Export Processing Zones (EPZs) so as to attract foreign direct investment (FDI) and boost manufactured exports. This has been catalysed by the establishment of new Special Economic Zones (SEZs) in key areas including Wajir, Narok, and Isiolo to boost value addition in sectors like leather processing. Additionally, strengthening of existing EPZs in Mombasa, Nairobi, and Athi River is underway with additional EPZs and SEZs coming up. Kenya hopes to boost manufacturing sector's GDP contribution, generate employment, and improve export competitiveness by expanding and promoting SEZs and EPZs. However, economic resilience and permanent industrial expansion will depend on how well these policies are implemented.

In order to improve Kenya's export prospects and encourage viable trade expansion, the Kenya Association of Manufacturers (KAM) is concentrating on a Route to Market (RTM) strategy for the 2025–2027 timeframe. By empowering small and medium enterprises and assisting them in overcoming trade restrictions and aligning with the changing needs of the international market, this strategy emphasises inclusion and digitisation. Additionally, KAM supports the establishment and expansion of EPZs and SEZs as avenues of export expansion and employment creation. To improve competencies and productivity in the manufacturing sector, KAM launched the Kenya Manufacturing Academy, which offers specialised training for capacity building as facilitated by the National Industrial Training Authority (NITA). Generally, KAM promotes regulations that promote industrial growth, competitiveness, and resilience in line with the broader economic goals such as BETA and the *Kenya Vision 2030*.

In sum, it is evident that the Kenyan government has formulated and implemented policies intended to increase the effectiveness and performance of the manufacturing sector for economic transformation. Nevertheless, as discussed in section 1.1.2, the set targets regarding exports, contribution to GDP and job creation in the sector are yet to be realized thus the need for further research and policy guidance on the issue. It is thus crucial to understand the connection between exporting and firm performance in Kenya's manufacturing sector for proper policy guidance. The current study explored the determinants of export intensity in Kenya's manufacturing sector. Given the poor trends in the performance of Kenya's manufactured exports, understanding the determinants of export behavior by firms is of great significance for proper policy formulation. With this information, policy makers are able to understand the proper incentives to implement in order to enhance manufactured export performance. The study also aimed at analyzing the influence of exporting on firm level TFP and employment. This is also of importance to policy makers given that the policy focus has been export promotion.

1.2 Statement of the problem

Globally, as evidenced by the Industrial Revolution and the East Asian Miracle, the manufacturing sector contributes significantly to economic growth and development through fostering and maintaining productive growth, expanding job opportunities, and improving nations' competitiveness by trading abroad (KAM, 2021). The East Asian countries were able to transform their economies through an export led manufacturing strategy. Most countries, including Kenya, have also adopted export promotion strategies in the manufacturing sector for economic transformation. By 2022, the *Kenya Vision*

2030 sought to increase manufacturing sector's GDP contribution to 15 per cent (KAM, 2019). Additionally, the bottom-up economic transformation agenda targets a 20 percent contribution of manufacturing sector in GDP by the year 2030.

The National Export Development and Promotion Strategy targeted manufactured exports to account for 60 per cent of all exports by 2022 (Republic of Kenya, 2017). However, despite the government efforts, the set targets have not been achieved given that by 2023, the sector's share in GDP was 7.60 per cent and has been on a persistently declining trend since 2011 pointing towards premature deindustrialization. Manufactured exports comprised 33 per cent of total exports from 2007 to 2023 on average (World Bank, 2024). More so, the manufacturing sector has created the least share of jobs compared to services and agriculture sectors and yet it is one of the key sectors expected to generate productive and sustainable employment opportunities, given the unemployment problem in Kenya.

KAM's 2022-2027 manifesto aims at increasing export participation and intensity of manufacturing firms in Kenya. Kenya targets to attain an industrialized state by the year 2030 with the manufacturing sector being vital towards the realization of this. Nevertheless, the manufacturing sector has exhibited poor performance regarding contribution to GDP, exports and employment whereby the set targets have not been realized. Considering the significance of the manufacturing sector for the industrialization process and the concerted efforts by the government towards export promotion, for further policy guidance, it is important to analyze the connection between exporting, firm productivity and employment which the current study pursued.

Several studies exist on this subject in Kenya broadly (Okado, 2013; Bresnaham, Coxhead, Foltz, & Mogues, 2016; Matiy & Matundura, 2019; Chebor, 2020; Esaku, 2020). Most studies focus on establishing the determinants of firms export participation (Okado, 2013; Matiy & Matundura, 2019; Chebor, 2020) with very few focusing on analyzing the influence of exporting on firms' productivity (Bresnaham, Coxhead, Foltz, & Mogues, 2016; Esaku, 2020). More so, information is scanty regarding the effect of exporting on employment. Additionally, the methodologies applied by these studies do not sufficiently cater for the endogeneity problem in the subject. The present research sought to contribute to the existing corpus of literature by bridging the identified gaps through introducing the Heckman Sample Selection model, dynamic panel models, incorporating other dimensions of firm performance such as employment and using a rich panel data set from the World Bank Enterprise Surveys for the periods 2007, 2013 and 2018.

Therefore, the purpose of the study was to establish the firm-level determinants of export intensity and to analyze the effect of export intensity on firms' total factor productivity and employment by Kenya's manufacturing firms.

1.3 Research Questions

This study sought to address the questions below:

(i) What are the firm-level determinants of export intensity in Kenya's manufacturing firms?

(ii) What is the effect of export intensity on firm-level total factor productivity in Kenya's manufacturing firms?

(iii) What is the effect of export intensity on firm-level employment in Kenya's manufacturing firms?

1.4 Research Objectives

The general objective of the study sought to establish the firm level determinants of export intensity and the effect of export intensity on total factor productivity and employment in Kenya's manufacturing firms.

The specific objectives of this study include:

(i) To establish the firm-level determinants of export intensity in Kenya's manufacturing firms.

(ii) To analyze the effect of export intensity on firm-level total factor productivity in Kenya's manufacturing firms.

(iii) To determine the effect of export intensity on firm-level employment in Kenya's manufacturing firms.

1.5 Significance of the Study

The study is very timely given the country's vision to transform Kenya in to an industrialized state by the year 2030. A lot of attention has been diverted to the manufacturing sector for economic transformation especially through the *Kenya Vision 2030.* This study therefore provides information on the link among exporting, firm

productivity and firm employment. With this information, the Ministry of Trade, Investments and Industry is able to implement the right policies to boost manufactured exports to counteract the ongoing subpar performance of the sector in general.

More so, from the study findings, the Ministry of Trade, Investments and Industry, the Ministry of Cooperatives and Micro, Small and Medium Enterprises (MSME) Development and the Kenya Association of Manufacturers (KAM) can implement proper policies regarding export promotion. This will boost the performance of the sector for the achievement of the set targets and may aid thwart the de-industrialization path. The study will also enable scholars and researchers to isolate knowledge gaps and identify areas of further study to add more value to the area of study. The study will not only help in making informed decisions to enhance the performance of the manufacturing sector in Kenya alone but also in related countries.

1.6 Scope of the Study

This study was conducted for a representative sample of firms in Kenya's manufacturing sector based on the information collected from the World Bank Enterprise Surveys (WBES) for the periods 2007, 2013, and 2018.

1.7 Limitations of the Study

The study utilized WBES panel data for the period 2007, 2013 and 2018. Whereas this is a reliable and credible data source, several limitations were experienced. First, the data was last updated in 2018, posing some time restrictions. Nevertheless, the available data

set captured the ongoing trends in the manufacturing sector. Second, the panel data was unbalanced and the time dimension of the panel was relatively short (3) posing some methodological challenges. This was addressed by utilizing appropriate methodologies for unbalanced and short panel data. Overall, despite the

few challenges faced, appropriate approaches were utilized to obtain unbiased and reliable results.

1.8 Organization of the study

This thesis is presented in four chapters. The study background is presented in Chapter One. The review of relevant literature is presented in Chapter Two while Chapter Three provides the methodology adopted to realize the objectives. Chapter Four presents a discussion of the study's empirical findings while Chapter Five gives the summary and policy recommendations drawn from the study findings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The theoretical and empirical review of the relevant literature that guided the study is presented in this chapter. A summary of the reviewed literature is presented at the end of the chapter.

2.2 Theoretical Literature Review

To guide this study, theoretical literature discussion concentrates on the relevant Traditional and New Trade Theories. These theories include the Traditional Trade Theories: Mercantilism; Absolute advantage theory; Comparative advantage theory; Heckscher-Ohlin-Samuelson theory and the New Trade and 'New' New Trade Theories mainly focusing on propositions put forth by Krugman (1979) and Melitz (2003).

2.2.1 Traditional Trade Theories

2.2.1.1 Mercantilism

Mercantilism was developed in the sixteenth and seventeenth centuries. It is associated to Thomas Mun, Jean-Baptiste and Antonio Serra. However, Adam Smith (1776) popularized the term Mercantilism when he first published his book, 'The Wealth of Nations'. The basic argument is that a nation should aim at maximizing its wealth through one-way trade with other countries. According to this theory, exports should be

encouraged while imports should be discouraged. This is because, according to the theory, net exports account for a nation's wealth and as such, the government should implement policies aimed at encouraging exports and discouraging imports in the form of subsidies and taxes, respectively. During the 1700s, gold and silver were the medium of exchange hence exports were preferred since they helped secure gold while imports were dismissed since they led to loss of gold. Nations with abundant gold were considered wealthy.

For the nations to accumulate more wealth, they had to implement policies that restricted imports, encouraged exports and focused on domestic accumulation of wealth. Undervaluation of currency aimed at making exports more competitive, government subsidy for industry and protectionist policies like import tariffs are mercantilism policies in today's world. According to Mercantilism, countries should expand exports since they fuel national wealth. As such, export intensity can be viewed as firm's contribution to country's trade performance. In line with the mercantilist theory of exporting as a source of national dominance, enterprises that export significantly are frequently seen as vital resources for economic growth. Many developing nations, like Kenya, use export promotion incentives including tax refunds, export credit, and EPZs, much like mercantilist governments did when they stepped in to encourage exports through barriers and subsidies. The goal of these interventions is to improve firm performance and competitiveness, reflecting the mercantilist focus on strategic trade policy.

Regardless of the application of some aspects of mercantilism in the modern economy, it is viewed as a selfish policy since it promotes a one-way transaction ignoring

enhancement of world trade with only one country reaping the benefits of trade. It leads to inefficiencies especially due to the state monopolies, corruption and retaliation measures by other countries. Nevertheless, this theory provides useful insights to the current study on the importance of exporting on the performance of a firm based on the argument that encouraging exports may lead to better performance. Additionally, the theory discusses the importance of government intervention in promoting firms' exports. Therefore, the current study borrowed the arguments of mercantilism to understand the firm level determinants of export intensity and the effect of exporting on firm performance.

2.2.1.2 Absolute Advantage Theory

This theory was put forth by Adam Smith (1776). It contends that a nation ought to focus on manufacturing goods that it can produce more cheaply or efficiently than others. This theory assumes: two trading partners, two commodities, unrestricted trade, perfect competition; one input (labor) which is perfectly mobile within a country and immobile between the countries. Adam Smith argued that a nation's value is gauged based on the products and services offered to its citizens, not by its gold reserves.

According to Adam Smith, countries should specialize in producing and exporting commodities that incur the least cost and import those that are highly expensive to produce compared to other countries. Following this strategy, both countries would reap the benefits of trade. He advocated for free trade and production of commodities based on absolute advantage. This theory emphasizes on specialization based on absolute

advantage for enhanced production and productivity by countries. As such, trading countries will both benefit from international trade and the nations' wealth would increase. At the firm level, firms that possess absolute advantage in terms of cost and productivity tend to export more thus enhancing international competitiveness. Additionally, these firms scale faster thus creating more employment opportunities.

However, this theory has been criticized on the basis of the assumptions and also on what would happen when a nation possesses an absolute advantage across all of its products or none of them. For instance, the theory assumes more efficient firms export more ignoring some other aspects that may influence firms' exports such as trade logistics, regulatory limitations and frictions regarding market access. Additionally, the theory ignores relative opportunity costs and ignores firm heterogeneity which influence export behavior and firm performance.

Regardless, the arguments of this theory guided the current study on the link between firm productivity and export intensity that arises from specialization based on absolute advantage. This is because, absolute advantage aligns with higher TFP, indicating efficient input utilization. Firms with superior production technologies, skilled labor, or organizational capabilities often demonstrate export leadership and resilient growth. Hence the theory was relevant in exploring the link between firm level TFP and export intensity.

2.2.1.3 Comparative Advantage Theory

This theory was put forth by David Ricardo in 1817 whose assumptions are: two trading countries, one input (labor), no transport costs and unrestricted trade. Comparative advantage refers to a nation's capacity to create a particular commodity while bearing less opportunity cost compared to another nation. It suggests that a nation ought to concentrate and specialize in creating and exporting commodities with which it enjoys a comparative edge over competing nations, while importing commodities for whom it possesses a relative cost disadvantage.

It contends that a nation may optimize its own economic prosperity via concentrating on the creation of commodities and amenities which it can generate fairly efficiently and promote international effectiveness through its involvement in open trade. According to this theory, trade is mutually beneficial. At the firm level, firms will produce and export more of the products produced at a lower relative cost. This specialization may also enhance firm level TFP which in turn boosts export intensity. More so, with specialization, firms scale their production creating more job avenues.

Nevertheless, the assumptions of this theory pose some limitations to this theory. For instance, factors of production are not perfectly mobile across sectors contrary to the assumptions of the theory. Additionally, firm heterogeneity is not addressed yet in reality firms differ significantly in productivity, innovation capacity, and export behavior. However, this theory provided theoretical foundations on the role of TFP on firm's export behavior. As argued by the theory, highly productive firms may have cost advantages

hence comparative edge in export markets. This implies that the theory points towards a connection between TFP and export intensity which was relevant to the current study.

2.2.1.4 Heckscher-Ohlin-Samuelson (H-O-S) Theory of International trade

Also called factor proportion theory, the H-O-S theory was put forth by Eli Heckscher (1919) and Bertil Ohlin (1933) and extended by Paul Samuelson and Stolper in 1941. It is based on the following assumptions: No transportation costs or trade barriers; perfect competition; constant returns to scale; two countries; variable factor intensities; similar technology across countries; two inputs (labor and capital) and homogenous tastes in both countries. The H-O-S theory is a two-country, two-factor, two-good theory which assumes that different factor intensities affect production processes while factor abundancies affect countries trading decisions. It consists of the following: The Heckscher-Ohlin (H-O), the Stolper-Samuelson, the factor-price equalization and the Rybczynski theorems (Heckscher, 1919; Ohlin, 1933; Stolper & Samuelson, 1941).

According to the H-O theory, trade is influenced by nations' factor-endowments whereby a capital-rich country will export capital-intensive goods and import labor-intensive goods. Conversely, a labor-rich country will export labor-intensive goods and import capital-intensive goods. It builds on comparative advantage by emphasizing relative factor endowments. The Stolper-Samuelson theorem argues that a cost increase of the capital-intensive good yields a rise in the capital cost and a decline in the wage rate. Similarly, a cost increase of the labor-intensive commodity leads to a wage rate increase and a decrease in rental price. When a country engages in international trade, the real

return and demand of its abundant factor rises, while the real return and demand of its scarce factor declines. Thus, for a labor-intensive country, according to H-O-S theory, the labor-intensive good's price and output will rise as a result of exporting which yields a hike in labor demand, employment and the wage rate.

The factor-price equalization theory asserts that involvement in international trade causes output prices to equalize, which then causes factor prices across the nations to equalize. According to the Rybczynski theorem, a rise in a nation's factor endowment generates a reduction in the production of the commodity that scarcely utilizes that input while increasing production of the good that utilizes that factor heavily. This suggests that an increase in labor causes a decline in the production of capital-rich commodities and a rise in the manufacturing of products which need a lot of labor and are exported. According to Ricardo and H-O-S theories, free trade, was considered as the path to global prosperity.

With free trade, export expansion stimulates demand for new or existing products, promotes optimization of economies of scale, and accelerates embracing innovative manufacturing processes. The export increase could be due to disparities in productivity, relative autarky prices or variations in countries' factor intensity and abundance. As such exporting firms increase their production and performance in general. However, the H-O-S theory was criticized by Wassily Leontief in 1953 who asserts that despite being a country with a high capital intensity, U.S. exports required less capital compared to U.S. imports (Leontief, 1953). More so, the H-O-S theory did not address the determinants and effects of trade among relatively homogeneous countries, with similar industries and sectors characterized by product differentiation rather than homogeneous products.

Nevertheless, the arguments of the H-O-S theory are applicable to the current study. The arguments can be used to explain the determinants of export intensity, in this case, factor endowment. The H-O-S model suggests that firms in Kenya ought to concentrate on labour-intensive manufactured exports so as to leverage on affordable local raw materials and low-cost labour for a competitive edge in international markets. According to the H-O-S theory factor endowments, productivity, scale economies, foreign ownership, Research and Development, trade agreements and logistics influence the capacity of a firm to export. Additionally, exporting firms may experience productivity improvements, employment growth as well as wage adjustments as a result of exposure to international markets. Due to the relevance of H-O-S theory in this subject, the study therefore adopted this theory to explain the determinants of export intensity and the effect of export intensity on firm employment and productivity.

2.2.2 New Trade and 'New' New Trade Theories

Paul Krugman pioneered a series of international trade models known as New Trade Theory (NTT) in the late 1970s and early 1980s. The theory assumes: Imperfect markets, economies of scale and product differentiation. It emphasizes the importance of network effects and increasing returns to scale. Contrary to the arguments of the traditional trade models, NTT suggests that international trade primarily occurs between nations that share similar factor endowments, structural characteristics, and levels of development. To describe international commerce, traditional trade models depended on variations in factor endowment or productivity. NTT showed that trade flows between similar

countries can be driven by increasing returns, without differences in factor endowments and productivity (Krugman, 1979).

Trade enables the nations to enjoy greater economies of scale. NTT among other contributions describes the possibility of the presence of intra-industry exchange. Krugman (1979) enhanced the traditional theories by incorporating imperfect markets, economies of scale and product differentiation in his analysis of trade. As such, exporting firms are able to produce a wide variety of goods for exports due to product differentiation and economies of scale. Hence, according to NTT, regardless of homogenous tastes, technology and factor abundance, countries can engage in trade and boost firm's performance contrary to the opinion of the traditional trade theories. Moreover, the government plays a crucial role in promoting international trade via policies such as subsidies and tariffs.

Melitz (2003) extended Krugman's (1979) model and came up with the 'new' new trade theory (NNTT). NNTT incorporated the aspect of firm level productivity differences and focused more on the firms rather than sectors in understanding the relationship between global trade and firm productivity (Melitz, 2003). Since entry in to new export markets is very costly, only efficient firms are able to enter these markets and reap the benefits there of. This is the self-selection hypothesis (SSH). Some businesses in the same sector struggle to compete internationally, while others succeed based on their attributes. Melitz (2003) incorporated the concept of firm heterogeneity along with the suppositions of scale economies, product differentiation and imperfect competition.

Government policies towards promoting free trade would result to shifting funds and market dominance from less efficient to more efficient enterprises. As a result, firm's productivity and performance in general would be boosted through trade and the inefficient and non-productive firms would eventually exit the market. Survival and exit from the markets consequently affect firm employment as exiting firms or poorly performing firms are forced to lay off their workers. On the other hand, those that survive, may expand or maintain their work force thus affecting firm employment. With the reallocation of resources, there will be self-selection into export markets by highly productive firms and productivity would increase for exporting firms.

NNTT as well as NTT are improvements of the traditional trade theories since they incorporate the concept of trade among homogeneous countries. More so, they relax the assumptions of the traditional trade theories by incorporating firm heterogeneity, scale economies, product differentiation and imperfect competition in the analysis for improved plausibility. According to NNT and NNTT, firm level productivity and other firm characteristics such as size, age and ownership may influence firm level export intensity through the self-selection effect. Additionally, exporting affects firm productivity and employment through the learning effect.

Export intensity is the proportion of the firm's sales that is exported:

$$XINT_i = \frac{EXP_i}{Y_i} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . (2.1)$$

Where $XINT_i$ is the export intensity for firm i, EXP_i represents the export sales by firm i and Y_i is firm $i's$ total sales.

Given the following Cobb-Douglas production function:

$$Y_i = A_i K_i^a L_i^{1-a} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (2.2)$$

Where: Y is output, K and L are capital and labor inputs, respectively, A represents total factor productivity (TFP) and a and $1 - a$ representing the output elasticities of capital and labor, respectively. i denotes the representative firm.

Based on the arguments of NNTT, due to the existence of sunk costs (F_x), the highly productive firms have a higher probability of exporting. The profit function for an exporter can be presented as:

$$\pi_i^x = P_i^x Y_i^x - wL_i^x - rK_i^x - F_x \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (2.3)$$

Where: P_i^x is the price of exported goods, Y_i^x is the exported output, w is the wage rate, r is the cost of capital and F_x is the sunk cost. Thus, based on SSH, highly productive firms are more likely to export, thus export intensity is positively influenced by firm level TFP as follows:

$$XINT_i = f(A_i) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (2.4)$$

Consequently, the learning by exporting (LBE) hypothesis argues that exporting affects firm’s total factor productivity as well as employment. Therefore:

$$A_i = f(XINT_i) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \quad (2.5)$$

Where, firms with high export intensity are expected to experience faster growth in TFP. And:

$$EMP_i = f(XINT_i) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \quad (2.6)$$

Where: EMP_i is firm employment. Ideally, higher export intensity boosts labour demand, thus employment, because exporting enterprises require additional labour to fulfil global demand.

Due to their relevance, the current study borrowed the arguments of the NNT and the NNTT to establish the determinants of exporting whereby the theories point out TFP as a main promoter of exports. In addition, the NNT and NNTT were employed by the present research to analyze the influence of exporting on firm productivity and employment whereby, the theories argue that exporting positively affects enterprise success.

2.3 Empirical Literature Review

Bernard and Jensen (1999) analyzed the relationship between export participation and performance (productivity, wages, employment and survival) of United States of America’s manufacturing firms utilizing Census data for 1984-1992. The study analyzed exporting impact on employment, wages, and productivity using Ordinary Least Squares (OLS). The effect of exporting on plant survival was analyzed using a probit model whereas a linear probability model was utilized to assess the impact of business

productivity on export propensity. The models considered the following variables: TFP; employment; labor productivity; wage; number of shipments, capital per employee and production wage. The findings of this study supported the SSH and mixed findings regarding the LBE hypothesis. The results indicated that exporting resulted to higher wages, higher employment and survival levels with no influence on firm's productivity. This study provided useful insights on the connection between exporting and business performance. However, the use of OLS for panel data in the existence of endogeneity may cause biased outcomes. The present study improved the methodology used by Bernard and Jensen (1999) by using the two-step Generalized Method of Moments (GMM) estimation technique to cater for endogeneity problems when analyzing the influence of foreign trade on business success in the Kenyan context.

Lööf, et al. (2007) analyzed how global trade affected the performance of Swedish manufacturing enterprises using data from Swedish customs office for the period 1997-2004. Controlling for firm attributes while using different indices of enterprises' engagement in international commerce, export and import productivity premiums were estimated. The Generalized Least Square Estimator (GLS)'s random effects specification and GMM were used to calculate the labor productivity's sensitivity to various trade variables while controlling for industry and time-specific effects and firm factors including capital, size and ownership. The results from the two estimations indicated that exporting and importing improved firm's labor productivity. The current study borrowed the methodology adopted by this study (GMM) and contributed to literature by exploring other dimensions of firm performance such as TFP and employment in the case of Kenya.

Bigsten and Gebreeyesus (2009) examined the relationship between productivity and exports for Ethiopian manufacturing firms for the period 1996-2004. A Probit model was estimated to test the SSH with a dummy for export status being the dependent variable while TFP was the explanatory variable. Other variables included: capital intensity, wage, labor cost, output per head, value added per head, firm size, firm age and state ownership. The analysis on the learning effects from exporting was conducted by utilizing one-step system GMM with labor productivity, TFP, employment, capital intensity and average wage being the main performance measures. Controls for firm size, firm age, export experience, state ownership, industry and year were incorporated. The endogeneity concerns were addressed using instrumental variables and matching analysis. The results supported the SSH and the LBE hypothesis. The methodology adopted by the reviewed study was very appropriate in addressing endogeneity issues regarding exports and firm productivity. The current study utilized the same methodology to account for the endogeneity problem for the case of Kenya's manufacturing firms with adjustments such as using a continuous variable for export participation such as export intensity instead of export propensity to overcome the limitations of a dummy variable. The current study also utilized the two-step system GMM which produces more efficient estimates than the one-step system GMM in this case.

Yang and Mallick (2010) examined the relationship between exporting and business success in China over the period 2000-2002. The study analyzed both the SSH and the LBE hypothesis by employing propensity score matching (PSM) approach. The study considered several dimensions of performance including: TFP, sales, labor productivity,

profits and employment. Control variables comprised of firm attributes such as firm age, capital intensity including regional, sector and year dummies. Using the difference-indifference estimator, the study results indicated that Chinese exporting firms had significantly higher performance measure, specifically TFP, sales, labor productivity and employment prior to entry in the foreign markets. The findings supported both the SSH and the LBE hypothesis. The reviewed study adopted the matching technique which is very key in controlling for selection bias in this subject. However, due to reverse causality, the current study therefore utilized a dynamic panel approach to test the LBE hypothesis which sufficiently addresses any endogeneity concerns.

Bbaale (2011) using World Bank's panel survey data explored the link between exporting and firm-level productivity in Uganda's manufacturing firms between 2000 and 2002. The SSH was estimated using both probit and logit models whereas to evaluate the LBE hypothesis, a panel generalized least squares (GLS) estimator was utilized. Firm attributes such production level, materials, management, sales, age, ownership, location, source of startup financing, industry, capital, export status and labor were taken into account. Both of the hypotheses were supported by the findings. The study under consideration was important in examining the connection between exports and productivity in developing nations. However, the methodology adopted needed to be improved so as to cater for endogeneity among some key variables which the current study undertook by introducing sample selection models and dynamic panel models. More so, the current study incorporated export intensity, TFP and firm employment in the analysis which are very key in the manufacturing sector in Kenya.

Haider (2012) analyzed the connection between exporting and TFP in Indian manufacturing sector for the period 1991-2004. TFP, capital, revenue, and labor cost were the major firm characteristics of interest. To test the SSH, the Ordinary Least Squares (OLS) estimation was utilized. The findings indicated that exporters had considerably unique characteristics and outperformed non-exporters with regard to productivity, revenue, capital assets, and unit labor expenses. The LBE hypothesis was tested using PSM approach. The results indicated that exporting did not enhance firms' TFP. However, exporters experienced increased capital accumulation and sales after entering the foreign markets. Thus, the study provided evidence for the SSH but the overall LBE hypothesis evidence was not significant. The methodology adopted by this study was vital in addressing the selection bias arising from the subject. Nevertheless, to address the issue of reverse causality, a dynamic panel data model was utilized. Additionally, firm employment was analyzed given that unemployment is a pertinent issue in Kenya.

Okado (2013) tested the SSH for Kenya's manufacturing firms for the period 1992-2003. Firm characteristics and location characteristics were incorporated in the analysis. To account for the endogeneity problem, the Two-Stage Least Squares (2SLS) and Heckman sample selection models were utilized in the estimation. The study findings supported the SSH. The study made commendable effort to account for endogeneity issues in the analysis. The current study borrowed the methodology (Heckman sample selection model) adopted by the reviewed study in analyzing the firm-level determinants of export intensity but updated the data set to capture current aspects. However, the use of the 2SLS has its own limitations especially on the choice of valid instruments. The current study

therefore deviated from this approach and employed the two-step System GMM, which utilizes internal instruments when analyzing the influence of export intensity on enterprise success.

Cebeci (2014) analyzed the impact of the destination of exports on the productivity, employment, and salaries of Turkish manufacturing firms for the period 2005-2010. Based on firm attributes such as industry, location, firm size, wages, TFP, capital intensity, government aid and R&D intensity, a combination of PSM and difference-in-differences (DID) methods were employed for the analysis. The analysis revealed that export entrance was positively and persistently related to firms' TFP and employment. On the other hand, exporting had a relatively lower lagged effect on wages. More so, exporting to high-income destinations positively influenced firm wages and TFP. In contrast, both low-income and wealthy export destinations yielded comparable positive and significant effects on firm employment. The reviewed study provided vital evidence on the role of export destinations on the learning effects from exporting using a reasonable technique that controls for selection bias (PSM). Regardless, to properly account for reverse causality, the current study utilized the two-step system GMM to test the learning effects from exporting in Kenya's manufacturing sector.

Fonchamnyo (2014) explored the determinants of export propensity and intensity of manufacturing firms in Cameroon using a logit and a tobit model, respectively. The explanatory variables of interest were firm size, wage, human capital, firms' turnover, firm age, experience, power outages, capital intensity, new vintage capital and insecurity. The results for export propensity indicated that firm size, human capital, vintage capital,

turnover and age positively affected firms' decision to export while capital intensity negatively influenced export propensity. The results for the determinants of export intensity were close to those of export propensity with firm size, human capital, turnover, firm age and experience positively affecting export intensity. Power outage, capital intensity and insecurity negatively influenced export intensity. This study provided evidence on the determinants of export performance for manufacturing firms in Cameroon. Nevertheless, TFP was not incorporated in the analysis and endogeneity concerns were not addressed in the methodology adopted. Thus, the current study, while incorporating TFP, analyzed the determinants of export intensity and accounted for selection bias by employing the Heckman Sample Selection model. In addition, the learning effects from exporting were also estimated using dynamic panel models.

Bresnahan et al. (2016) examined how increased trade freedom affected productivity growth in Ghana, Kenya and Tanzania for the period 1991-2000. The effect of export participation on firm-level TFP was estimated using fixed effect models which included output, funding, resources, additional resources, labor, foreign ownership, and export destinations as control variables. The findings for Kenya supported SSH with no evidence of LBE. This study provided useful insights regarding exporting and TFP. However, employing static panel models in this subject was not appropriate given that endogeneity problem is a concern. As such, the current study revamped the methodology used to examine the influence of exports on TFP using the two-step system GMM that addresses the endogeneity problem while using a different measure of export performance (export

intensity). Additionally, firm employment was analyzed for better policy guidance given the unemployment crisis in Kenya.

Reis and Forte (2016) analyzed the role of industry attributes on export intensity for Portuguese manufacturing firms. The study utilized panel data obtained from the firms' balance sheets for the period 2008-2010. The study estimated both a pooled OLS and a fixed effect model. The explanatory variables of interest were capital intensity, research, labor productivity, export orientation and concentration, firm size, age and year dummies. The study findings indicated that labor productivity and firm size positively affected export intensity while industry concentration levels and export orientation negatively influenced export intensity. The use of static models to analyze the determinants of export intensity in this case suffered some drawbacks since it does not account for sample selection bias in this subject. Hence sample selection models are more appropriate in this regard which the current study utilized for more reliable results.

Vu et.al (2016) analyzed the link between exporting and productivity of Vietnamese manufacturing firms for the period 2005 and 2007. The SSH was tested using a dynamic random effects probit model whereby the export dummy was regressed on its first lag and TFP while controlling for firm age, firm size, capital intensity, trade relationship, average wage, innovation as well as urban and ownership dummies. The results provided evidence of SSH. Among the control variables, firm size, trade relationship and ownership dummies had positive effect on export propensity. The learning effect from exporting was estimated using fixed effect instrumental variable estimation and the study findings indicated that the learning effect was not significant. Firm size and average wage had a

statistically positive effect on TFP. The reviewed study made a commendable effort in addressing the endogeneity problem in this subject by utilizing dynamic models and instrumentals variables. The current study followed a relatively similar approach with little divergence by employing the Heckman Sample Selection model to address sample selection bias as well as employing dynamic panel models to control for endogeneity when analyzing the learning effects from exporting. Additionally, export intensity and firm employment were incorporated in the analysis for value addition.

Abbey et.al (2017) analyzed the influence of exporting on employment for manufacturing firms in Ghana for the period 2013-2015. The study adopted the Hausman Taylor estimator; Heckman's selection model; Difference model; fixed effects model and random effects model. The variables of interest were employment (dependent variable), export dummy or export intensity (explanatory variable) and controls such as wage, sales, firm age, foreign direct investment, assets and union density. Using the export dummy as the explanatory variable, the results from all the model specifications reported a positive effect of exporting on firm employment thus supporting the LBE hypothesis. Using export intensity as the explanatory variable, the LBE hypothesis produced mixed results. This study adopted measures to account for endogeneity issues arising from selection bias by adopting the Heckman Sample Selection Model. The current study adopted the same methodology to test the SSH. In addition, the two-step system GMM estimation techniques were employed to test the LBE hypothesis.

Krammer et. al (2018) established the determinants of export propensity and intensity by firms in Brazil, Russia, India and China for the period 2015. Institutional environment

was represented by: political instability; competition from the informal sector and corruption. Firm attributes were measured by: Skilled workers; managerial expertise and technological capabilities. Firm size, firm age, foreign ownership, public ownership, work force quality as well as country and industry dummies were also utilized. To account for selection bias, the analysis was conducted using the Heckman two-stage estimation procedure. The findings pointed that export propensity was positively influenced by: firm age; firm size; foreign ownership; competition and political instability. On the other hand, firm size, firm age negatively influenced export intensity while technological capabilities and skilled workers positively influenced export intensity. Despite the importance of TFP in the subject, it was not incorporated in the reviewed study. The current study included TFP in the analysis to capture its importance.

Kreuser & Newman (2018) analyzed the determinants of TFP for manufacturing firms in South Africa for the period 2010-2013 using an OLS regression. The results indicated that the positive determinants of TFP were: firm size; firm age; R&D expenditure; tax incentives; capital-labor ratio; firm exports and firm imports. The study made commendable efforts on providing the determinants of TFP. However, analyzing the determinants of TFP using OLS was not appropriate since OLS does not address endogeneity concerns in the analysis. Thus, the current study addressed the endogeneity in analyzing the determinants of TFP using the two-step GMM estimation technique for more reliable results. Additionally, labor productivity, management experience and human capital were also incorporated in the analysis since they are more likely to influence firm level TFP.

Seleem and Zaki (2018) analyzed the determinants of TFP in the Middle East and North Africa region using 2013-2014 WBES firm-level data and macroeconomic data obtained from Word Development Indicators for the same period. An OLS regression analysis was employed to establish the response of TFP to firm attributes and macroeconomic variables. The findings indicated that state ownership, foreign ownership, female management and formal registration positively impacted TFP at the firm level. At the macro level, TFP was negatively impacted by high taxes and increased cost of borrowing. On the other hand, high tariffs positively affected TFP. The reviewed study provided useful insights on the micro and macro determinants of TFP. However, endogeneity concerns were not addressed in analyzing the determinants of TFP. Thus the current study addressed the endogeneity issues by analyzing the determinants of TFP using the two-step system GMM estimator for dynamic panel models for Kenya's case.

Whang (2019) analyzed the effect of exporting on firm employment for Korean manufacturing firms for the period 2000-2014. Using firm employment as the dependent variable, a dynamic panel model was specified to control for endogeneity with independent variables comprised of: wages; domestic demand; exports; capital intensity and firm size. Controls for industry and time were incorporated using dummy variables and the estimation was conducted using the difference GMM estimator. The results provided affirmation of a favorable influence of exporting and domestic demand on firm employment. On the other hand, higher wages and increased capital intensity negatively affected employment at the firm level. This study addressed the endogeneity issue appropriately by the use of a dynamic panel model. However, to avoid data loss arising

from differencing, the current study employed the two-step system GMM estimation technique instead of the difference GMM in the case of Kenya.

Chebor (2020) examined the firm-level determinants of growth of exports in Kenya's manufacturing sector using three waves of panel data (2007, 2013 and 2018) from WBES. The analysis was conducted using the 2SLS technique to cater for possible endogeneity and heterogeneity. The individual firm characteristics analyzed were age, size, innovation, human capital and foreign ownership. Based on the findings, firm size, foreign ownership, skilled human capital and innovation had a favorable influence on export intensity. However, TFP was not analyzed under the factors influencing exports yet in literature, according to SSH, TFP influences exporting behavior. Furthermore, the influence of exports on firm success was not analyzed. The current study utilized the same data set and contributed to the existing literature by: incorporating TFP in the analysis and utilizing the Heckman Sample Selection model due to the challenge of obtaining valid instruments under the 2SLS technique. More so, the influence of export intensity on enterprise performance was analyzed utilizing dynamic panel models to take care of endogeneity concerns.

Esaku, (2020) analyzed the effect of trade liberalization on productivity growth in Kenya's manufacturing sector for the period 1992-1999 using data obtained from the World Bank's Regional Program on Enterprise Development (RPED). The estimation was conducted using OLS, Fixed Effect and quantile regression while controlling for firm age, size and ownership status. The research findings for all the methods indicated that increased trade liberalization increased firm and industry productivity. This research

offered evidence concerning the importance of freer trade in the manufacturing sector through productivity enhancement. However, the OLS and Fixed Effect models do not control for endogeneity hence the need for the instrumental variables' estimation techniques which the current study employed. More so, the dataset used was not updated (1992-1999) hence the need for the most current data set to capture recent developments while incorporating other dimensions of firm performance which the current study implemented.

Kiendrebeogo (2020) tested the LBE hypothesis and the SSH for Egyptian manufacturing firms for the period 2003-2008. Both hypotheses were tested using the matching approach. The SSH was tested through comparing productivity between exporters and non-exporters in the current period, one year prior to commencement of exporting incorporating control variables. The controls included employment, wage, firm age, research, financial health, location and industry dummies. In contrast, to test the LBE hypothesis, post-entry productivity differences between current exporters and non-exporters who did not engage in exporting during the first year of entry was estimated. The results did not support SSH but were in favor of the LBE hypothesis. The study employed matching techniques to account for endogeneity problems arising from sample selection. Nevertheless, the current study addressed sample selection bias by employing the Heckman sample selection model. More so, the LBE hypothesis was extended to capture firm employment and was tested using dynamic panel data models to account for reverse causality.

Dvouletý & Blažková (2021) explored the firm-level and sectoral variation in TFP for firms in Czech Republic for the period 2000-2019. The study first estimated TFP using OLS estimation technique after which the determinants of TFP were explored. A regression analysis was conducted using OLS and the GLS technique using the estimated TFP and other firm attributes. The results established a quadratic (U-shaped) influence of firm age on TFP. Firm size had mixed effects on TFP. The study estimated TFP and analyzed its determinants without a proper methodology to address endogeneity problem. More so, export intensity was not incorporated in the reviewed study despite its importance in literature. Therefore, the current study addressed this endogeneity problem by estimating TFP using the LP (2003) technique to control for endogeneity. More over the determinants of TFP were estimated using a dynamic panel model which takes care of endogeneity. Additionally, export intensity was incorporated in the analysis so as to test the LBE hypothesis.

Dong and Zhou (2022) investigated the modifying impact of business ownership on the influence of innovation on export outcomes for Chinese manufacturing enterprises during the period 2000-2007. The dependent variable was export intensity while the explanatory variable of relevance was innovation outputs. The role of ownership on the effect of innovation on export intensity was analyzed using two moderators: foreign ownership and state ownership. A pooled OLS regression indicated that innovation and foreign ownership positively affected export intensity while state ownership negatively affected export intensity. The modifying effect of state ownership on innovation was positive while that of foreign ownership was negative. Firm size, TFP and international openness

had positive effects on export intensity while firm age, financial leverage, marketing capability and tangible resources had negative effects on export intensity. For robustness checks a tobit and instrumental variable regression was conducted that provided similar results. The use of instrumental variables was appropriate in accounting for endogeneity problems in the subject of interest. However, analyzing the determinants of export intensity independently using static panel data models does not account for sample selection bias hence the need for sample selection models which the current study utilized.

Camino-Mogro et.al (2023) analyzed productivity disparities among exporters and non-exporters in Ecuador's manufacturing sector for the period 2007-2018. The firms were categorized in to two broad categories: innovative industries and less innovative industries. The variables of interest were: gross revenue, TFP, capital stock, foreign intermediates, domestic intermediates, exports, wages, firm size and age. Region, state and location dummies were also incorporated in the analysis. The SSH was tested using OLS while the DID technique was used for evaluation of the LBE hypothesis. The results supported both the SSH and the LBE hypothesis. The study accounted for selection bias using matching techniques. Nevertheless, the current study used the Heckman sample selection model to analyze the firm-level determinants of export intensity. In addition, dynamic panel models were utilized to explore the LBE hypothesis for manufacturing firms in Kenya.

Naidoo (2023) explored the link between innovation, exports, and creation of jobs for South African manufacturing enterprises for the period 2010-2016. The association of exporting success and innovation was examined using system GMM to control for

endogeneity. Export intensity was regressed on previous values and innovation intensity alongside various controls such as profitability and capital stock. The findings revealed a strong link between innovation and export operations. The effect of innovation and export intensity on firm employment was analyzed using the Heckman Sample Selection model. The findings revealed a favorable direct influence of R&D on employment, whereas the indirect effect via exports was adverse. Firm age and scale also had a favorable and considerable impact on firm employment growth. The study adopted an appropriate methodology to address the endogeneity concerns in this subject. Thus, the current study employed the same methodology in the context of Kenya's manufacturing firms.

2.4 Overview of Literature

According to the Heckscher-Ohlin-Samuelson (H-O-S) theory, countries export commodities that rely significantly on resources that are locally available while importing items that rely strongly on resources that are locally scant. The H-O-S theory states that a number of important factors pertaining to productivity, trade liberalisation, and factor endowments have an effect on firm-level export intensity. Additionally, based on factor abundance and intensity, exporting firms are able to boost their TFP and employment through specialization which enhances efficiency and competitiveness. On the other hand, NNTT supports both the SSH and the LBE hypothesis. According to SSH, firm level TFP is a key driver of firms' export intensity alongside other firm attributes such as firm size, age, capital intensity, foreign ownership, research and development, human capital and management experience. Consequently, exporting firms are able to experience

enhanced TFP and employment opportunities as argued by the LBE hypothesis. Due to their relevance, the H-O-S and the NNTT anchored the current study.

The reviewed empirical studies provide evidence on the SSH whereby TFP is the key determinant of firms' export decision alongside the aforementioned firm attributes (Bigsten & Gebreeyesus, 2009; Haidar, 2012; Okado, 2013; Dong, Kokko, & Zhou, 2022; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023). Nevertheless, the evidence on the LBE hypothesis is mixed in the sense that some studies established positive learning effects (Bigsten & Gebreeyesus, 2009; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023; Kiendrebeogo, 2020) while others did not find any significant learning effect from exporting (Bernard & Jensen, 1999; Grazzi, 2012; Haidar, 2012; Vu, Holmes, Tran, & Lim, 2016). Other than export intensity, firm level TFP and employment are influenced by firm characteristics such as labor productivity, wages, capital intensity, age, size, ownership, human capital and management quality.

From the review, most of the studies on exporting and firm performance are for developed or other countries with less focus on Kenya. It is also evident that the endogeneity problem is a concern in this subject. Several measures have been put forth by a number the reviewed studies to address the endogeneity concern. The first approach is the use of instrumental variables estimation techniques such as the GMM (Bigsten & Gebreeyesus, 2009; Loof, Andersson, & Johansson, 2007; Naidoo, 2023; Whang, 2019) or 2 Stage Least Squares (Chebor, 2020; Okado, 2013; Vu, Holmes, Tran, & Lim, 2016). Another set of studies accounted for selection bias by employing either sample selection models (Abbey, Gyeke-Dako, & Oduro, 2017; Krammer, Strange, & Lashitew, 2018) or

matching techniques (Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023; Cebeci, 2014; Haidar, 2012; Kiendrebeogo, 2020; Yang & Mallick, 2010).

The rest of the reviewed studies employed static panel data models which do not control for the endogeneity problem in the analysis (Bernard & Jensen, 1999; Bbaale, 2011; Bresnaham, Coxhead, Foltz, & Mogues, 2016; Dong, Kokko, & Zhou, 2022; Dvouletý & Blažková, 2021; Fonchamnyo, 2014; Esaku, 2020; Kreuser & Newman, 2018; Reis & Forte, 2016). It is evident that most of the reviewed studies adopted inappropriate methodologies regarding the endogeneity issue in the subject. Moreover, the existing literature for Kenya points towards scanty information on effect of exporting on firm employment. Literature on this is important given that unemployment is a major macroeconomic problem in Kenya. More so, some studies do not incorporate TFP in the analysis and yet it is a key factor in literature while others measure TFP by employing Ordinary Least Squares technique (OLS) which yields biased results due to endogeneity issues.

Thus, this research addressed the identified gaps via: using the Levinsohn and Petrin (2003) TFP estimation approach; incorporating firm employment in the analysis; utilizing the Heckman Sample Selection model when analyzing the firm-level determinants of export intensity and estimating the learning effects from exporting by employing the two-step system GMM estimation technique.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The methodology adopted by the study is discussed here. The discussion begins with a presentation of the study's research design and the theoretical framework employed. The empirical models employed by the study are specified as well as the estimation techniques that were utilized for the given objectives. The variables of interest are also discussed as well as the source of the study data. Lastly, a data analysis plan incorporating all the relevant diagnostic tests is done.

3.2 Research Design

A non-experimental panel research design was utilized to fulfill the stated objectives. This was the most suitable and valid design for the study since the aim was to investigate the causal connection of export intensity, firm level TFP and employment (Reio, 2016). It also allows for the establishment of causal relationships among variables which the current study sought to estimate. The design was also relevant in this context since the variables were not under the researcher's control (Reio, 2016). The design made it possible to analyze the link between exporting, TFP and employment for Kenya's manufacturing firms. The endogeneity issues in the subject were addressed by utilizing dynamic panel data models.

3.3 Theoretical Framework

3.3.1 Firm-Level Determinants of Export Intensity in Kenya's Manufacturing Firms

The first objective of the investigation was to explore firm-level attributes that influence export intensity by Kenyan manufacturing enterprises. According to New Trade Theory (NNT) and 'New' New Trade Theory (NNTT) alongside empirical evidence, the choice to export is made in light of level of profits derived from export markets (Krugman, 1979; Bernard & Jensen, 1999; Bernard & Wagner, 2001; Melitz, 2003). A firm that seeks to maximize profits bases its decision to export on the degree of anticipated current and future income from exporting (Bernard & Jensen, 1999; Bernard & Wagner, 2001). Equation (3.1) presents the firm's profit optimization problem. Let q_{it}^{*} denote the profit maximizing output level by the firm. Under the one period case with zero entry (sunk) costs, the firm's profits are given as follows:

$$\pi_{it}(X_t, Z_{it}) = p_t . q_{it}^{*} - c_{it}(X_t, Z_{it}|q_{it}^{*}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where the p_t is the price of exports; $c_{it}(.)$ is the variable production cost of q_{it}^{*}; X_t denotes exogenous factors affecting firm's profits; Z_{it} represents firm-specific characteristics that might influence export decision such as productivity, firm ownership, firm size, labor composition and product mix. If predicted profits are positive, a firm will export as shown by the solution to equation (3.1) below:

$$Y_{it} = \begin{cases} 1: if\ \pi_{it} \geq 0 \\ 0: if\ \pi_{it} < 0 \end{cases} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

Where the firm's export status in period t is Y_{it}. Extending equation (3.1) to multiple periods yields:

$$\pi_{it}(X_t, Z_{it}) = E_t(\sum_{s=t}^{\infty} \delta^{s-t}[\, p_s . q_{is}^* - c_{is}(X_s, Z_{is}|q_{is}^*)]) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.3)$$

Where δ denotes the discount rate. The solution to the multiple period case is identical to the one period case as shown in equation (3.2). With the introduction of sunk costs (S), the firm's profits under the single period case are:

$$\tilde{\pi}_{it}(X_t, Z_{it}, Y_{it-1}) = p_t . q_{it}^* - c_{it}(X_t, Z_{it}|q_{it}^*) - S.(1 - Y_{it-1}) \ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

Where Y_{it-1} is the prior period's firm's export status. If the firm exported during the prior period, $(Y_{it-1} = 1)$, it will not incur sunk costs in the current period. Thus, in period t, the firm will optimize from exporting if $\tilde{\pi}_{it} > 0$. Due to sunk costs, exporting today will affect the probability of a firm to export in the succeeding periods. The firm therefore chooses a chain of output levels, $\{q_{is}^*\}_{s=t}^{\infty}$, that will optimize the present and discounted future profits:

$$\pi_{it} = E_t\left(\sum_{s=t}^{\infty} \delta^{s-t}[\, \tilde{\pi}_{is} Y_{is}]\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

The value function (V_{it}) is expressed as follows:

$$V_{it} = max\big(\tilde{\pi}_{it} . [q_{it}^* > 0] + \delta E_t(V_{it+1}|q_{it}^*)\big) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.6)$$

Where $E_t(V_{it+1})$ is the firm's expected value function from exporting in the succeeding period. In period t a firm will find it optimal to export if the payoffs from exporting outweigh the costs incurred as shown in equation (3.7).

$$p_t.q_{it}^* + \delta[E_t(V_{it+1}|q_{it}^* > 0) - E_t(V_{it+1}|q_{it}^* = 0)] > c_{it} + S.(1 - Y_{it-1}) \ldots.(3.7)$$

Where: $p_t.q_{it}^*$ is the firm's total revenue, the term in the square brackets of the left-hand side represents the net expected value to the firm from exporting and the right-hand side represents the total cost of exporting to the firm (comprised of variable production costs and sunk costs).

Let $\hat{\pi}_{it} = p_t.q_{it}^* + \delta[E_t(V_{it+1}|q_{it}^* > 0) - E_t(V_{it+1}|q_{it}^* = 0)] \ldots\ldots\ldots\ldots\ldots\ldots$ (3.8)

Thus equation (3.7) gives the firm's export decision as follows:

$$Y_{it} = \begin{cases} 1: if\ \hat{\pi}_{it} > c_{it} + S.(1 - Y_{it-1}) \\ 0: \text{Otherwise} \end{cases} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.9)$$

Based on equation (3.9), a firm will export if it expects positive profits. From equation (3.9) and following empirical evidence the decision to export can be presented as follows (Bernard & Jensen, 1999; Bernard & Wagner, 2001):

$$Y_{it} = \begin{cases} 1: if\ \beta X_{it} - S.\ \ (1 - Y_{it-1}) + \varepsilon_{it}\ > 0 \\ 0: \text{Otherwise} \end{cases} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.10)$$

Where X_{it} is a vector of business traits influencing export decision such as productivity, firm ownership, firm size, human capital, capital per employee, research and development, firm age and management quality and ε_{it} is the residual.

Based on equation (3.10) the export intensity function can be generally expressed as:

$$XINT_{it} = f(X_{it}) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots .. \dots (3.11)$$

Where $XINT_{it}$ is firms' export intensity in period t and X_{it} denotes a vector of firm traits influencing export behavior notably TFP, age, size, ownership, concentration of capital, research and management quality as used in vast literature (Bernard & Jensen, 1999; Bernard & Wagner, 2001; Bernard, Jensen, Redding, & Schott, 2007; Bigsten & Gebreeyesus, 2009; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023).

3.3.2 Effect of Export Intensity on Firm-Level Total Factor Productivity in Kenya's Manufacturing Firms

The study's second objective was to investigate the influence of export intensity on firm's TFP. This objective was anchored on the LBE hypothesis as put forth by the NNTT. Based on the LBE hypothesis, firms that engage in exporting activities are able to experience TFP improvement due to the exposure to international markets. When firms are exposed to international markets, they become more efficient, adopt modern technologies and become more innovative so as to remain competitive. Therefore, the LBE hypothesis argues that exporting affects firm's TFP. Hence:

$$A_i = f(XINT_i) \dots \dots \dots \dots \dots \dots \dots .. \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (3.12)$$

Where, A_i is firm level TFP and $XINT_i$ is export intensity by a firm.

The study first estimated firm level TFP before analyzing equation (3.12). TFP was approximated using firm theory, which describes how organizations produce output using a specific collection of resources and capabilities. The Solow Residual technique was employed to estimate firm level TFP based on the following production function:

$$Y_{it} = A_{it} K_{it}^{\beta_k} L_{it}^{\beta_l} M_{it}^{\beta_m} \quad \text{(3.13)}$$

Where: i and t are the subscripts for firm and time, respectively. Firm's output is represented by Y_{it}. Capital, labor and materials are denoted by K_{it}, L_{it}, and M_{it}, respectively with their respective output elasticities β_k, β_l and β_m. A_{it} denotes TFP.

Linearizing the function gives the variables in their natural logarithm form as:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + \varepsilon_{it} \quad \text{(3.14)}$$

And:

$$\ln(A_{it}) = \beta_0 + \varepsilon_{it} \quad \text{(3.15)}$$

Where: β_0 is firm's efficiency. ε_{it} is the residual term decomposed into an observable (v_{it}) and unobservable (u_{it}^q) component (Van Beveren, 2012). Therefore:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + v_{it} + u_{it}^q \quad \text{(3.16)}$$

Denoting $w_{it} = \beta_0 + v_{it}$ which measures TFP of the firm using equation (3.16), (3.16) can be rewritten as:

$$y_{it} = \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + w_{it} + u_{it}^q \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.17)$$

Nevertheless, OLS estimates from (3.16) are biased due to endogeneity issues (Van Beveren, 2012). The solution to this was proposed by Olley and Pakes (OP) (1996) and Levinsohn and Petrin (LP) (2003). They propose the use of a proxy for unobserved productivity (Levinsohn & Petrin , 2003). The proposed proxies are intermediate inputs and investment for LP (2003) and OP (1996), respectively. The LP (2003) is more practical since not all firms have non-zero investment values. For the LP (2003) approach, the material demand function is:

$$m_{it} = m(k_{it}, w_{it}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.18)$$

Inverted as:

$$w_{it} = w(k_{it}, m_{it}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.19)$$

Substituting (3.19) into (3.17) yields:

$$y_{it} = \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + w(k_{it}, m_{it}) + u_{it}^q \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.20)$$

Given that:

$$\emptyset_{it}(k_{it}, m_{it}) = \beta_k k_{it} + \beta_m m_{it} + w(k_{it}, m_{it}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.21)$$

Equation (3.20) can be expressed as:

$$y_{it} = \beta_l l_{it} + \emptyset_{it}(k_{it}, m_{it}) + u_{it}^q \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.22)$$

Equation (3.22) is thus estimated via OLS to yield β_l and $\emptyset$. β_l gives the coefficient estimate for the labor input while $\emptyset$ is the combined coefficient for capital and material. In order to obtain the individual coefficient estimates for material and capital, (β_m and β_k), respectively, the next step involves acknowledging that the projected future productivity follows a Markov process whereby the expected future productivity is expressed as a function of the present value and unexpected innovations in productivity (ξ_{it}). Hence:

$$w_{it} = E[w_{it}|w_{it-1}] + \xi_{it} \quad (3.23)$$

In order to estimate the coefficients β_m and β_k two-moment conditions are required. The first one is:

$$E\left[\left(\xi_{it} + u_{it}^{q}\right)k_{it}\right] = 0 \quad (3.24)$$

Equation (3.24) implies that after productivity innovations, capital does not change within the same period. The second moment condition implies zero correlation between material demand during the subsequent timeframe and productivity increase in the present as follows:

$$E\left[\left(\xi_{it} + u_{it}^{q}\right)m_{it-1}\right] = 0 \quad (3.25)$$

Following equations (3.21-3.25), LP (2003) recommended that:

$$E[y_{it+1} - \beta_l l_{it+1}] = \beta_0 + \beta_m m_{it+1} + \beta_k k_{it+1} + E[w_{it+1}|w_{it}] \quad (3.26)$$

Denoting $w_{it} = \beta_0 + E[w_{it+1}|w_{it}]$ and based on equation (3.21), equation (3.26) becomes:

$$E[y_{it+1} - \beta_l l_{it+1}] = \beta_m m_{it+1} + \beta_k k_{it+1} + f(\emptyset_{it} - \beta_m m_{it} - \beta_k k_{it}) + \xi_{it} + u_{it}^{q} \quad (3.27)$$

Estimation of equation (3.27) gives consistent estimates for β_m and β_k. Lastly, firm's TFP is computed as a residual as follows:

$$A_{it} = y_{it} - \widehat{\beta_k} k_{it} - \widehat{\beta_l} l_{it} - \widehat{\beta_m} m_{it} \quad (3.28)$$

The firm level TFP was estimated using equation (3.28) following the LP (2003) approach after which the influence of export intensity on TFP was analyzed. From equation (3.12), firm level TFP is a function of export intensity as follows:

$$A_{it} = f(XINT_{it}) \quad (3.29)$$

According to the LBE hypothesis based on the NNTT, exporting boosts firms' performance especially in terms of productivity improvements (Melitz, 2003). More so, empirical literature puts forth that other than export intensity, firm level TFP is influenced by firm attributes such as foreign ownership, size, age, human capital, research and development, capital intensity and management quality (Bernard & Jensen, 1999; Bernard & Wagner, 2001; Bernard, Jensen, Redding, & Schott, 2007; Bigsten & Gebreeyesus, 2009; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023).

Therefore, equation (3.29) can be extended to capture the aforementioned firm attributes as follows:

$$A_{it} = f(XINT_{it}, Z_{it}) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \quad (3.30)$$

Where Z_{it} represents a vector of firm characteristics that may influence TFP.

3.3.3 Effect of Export Intensity on Firm-Level Employment in Kenya's Manufacturing Firms

The third objective of the research was to explore the influence of export intensity upon firm-level employment. To address this objective, the theoretical framework was based on the Heckscher-Ohlin-Samuelson (H-O-S) theory, NTT and NNTT. Based on the H-O-S theory, for a labor-intensive country, participation in international trade will increase the price, production and exports of the labor-intensive good. Conversely, if a capital-intensive country participates in international trade, it will experience increased price, output and exports of the capital intensive good. Given that Kenya is a labor-intensive country, participation in international trade will enhance its labor-intensive exports. Consequently, demand for labor (employment) and the wage rate are expected to increase.

The NTT and NNTT argue that once exporters manage conquer foreign markets, they may experience performance improvements in terms of TFP, employment and wages. This is because international markets expand their market and technology access hence the need for more production. Generally, increased production requires more labor for

the labor-intensive country hence employment increases. Thus, from the arguments of H-O-S, NNT and NNTT theories, firm-level employment (EMP_{it}) is affected by international trade participation (export intensity in this case) as follows:

$$EMP_{it} = f(XINT_{it}) \quad (3.31)$$

Incorporating firm characteristics that may affect firm-level employment other than export intensity, such as labor productivity, wage, human capital, capital per employee, firm ownership and firm age from existing literature (Bernard & Jensen, 1999; Vogel & Wagner, 2010) yields:

$$EMP_{it} = f(XINT_{it}, W_{it}) \quad (3.32)$$

Where W_{it} is the aforementioned list of firm attributes that may influence firm-level employment.

3.4 Empirical Models

3.4.1 Firm-Level Determinants of Export Intensity in Kenya's Manufacturing Firms

The factors influencing export behavior could have been achieved by modelling equation (3.10) for a binary dependent variable (export participation) or a continuous dependent variable (export intensity) and estimating the two models separately. However, since export propensity and intensity are dependent due to self-selection in to export markets, they cannot be modelled separately (Heckman, 1979; Okado, 2013). More so, export

intensity is a share variable hence it takes a value between zero and one. Share variables are common fractional response variables (Wagner, 2001). Employing the Ordinary Least Squares (OLS) technique to analyze a fractional response variable leads to inconsistent results since the predictions from the model may not lie within the (0,1) interval as well as biased marginal effects (Papke & Wooldridge, 1996; Schwiebert, 2018).

This limitation can be overcome using fractional probit or logit models introduced by Papke and Wooldridge (1996) who proposed specifying only the conditional mean of the fractional response variable. Let y represent export intensity with x representing the collection of explanatory variables, the conditional mean is thus expressed as:

$$E(y|x) = G[x'\beta] \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3.33)$$

Where $G[.]$ is a bounded function either a logistic or normal cumulative distribution function. Papke and Wooldridge (2008) put forth a panel data specification of equation (3.33) as follows:

$$E(y_{it}|x_{it}, \alpha_i) = \phi[x_{it}\beta + \alpha_i] \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. (3.34)$$

Where α_i represents the individual specific effect, ϕ is a logistic or normal cumulative distribution and the remaining variables are as previously defined.

From equation (3.4), firms self-select into exporting based on their attributes and this leads to self-selection bias which is not accounted for by the fractional probit or logit models (Faria, Rebelo, & Gouveia, 2020). More so, since export intensity can only be observed for exporting firms, sample selection bias arises. This implies that, when

analyzing the export intensity model, there is need to cater for the fractional nature of the variable and selection bias. Heckman (1979) noted that sample selectivity happens when the choice of participants into the sample under study is non-random. Thus, eliminating non-exporters and assessing export intensity independently using just exporters may result in selectivity bias.

Consider the following model proposed by Heckman (1979) to rectify this sample selection bias:

$$y_{it}^{*} = x_{it}'\beta + u_{it} \quad (3.35)$$

$$z_{it} = 1(w_{it}'\gamma + \varepsilon_{it} > 0) \quad (3.36)$$

$$y_{it} = z_{it}y_{it}^{*} \quad (3.37)$$

Where y_{it}^{*} denotes a latent dependent variable, z_{it} is an observed binary variable (selection equation) in this case indicates the firm's export status i.e. exporters ($z_{it} = 1$) and non-exporters ($z_{it} = 0$) and y_{it} is the observed dependent variable (export intensity) and it is observed when $z_{it} > 0$. The observed explanatory variables are presented by vectors x_{it} and w_{it} with corresponding parameters β and γ. The error terms are denoted by μ_{it} and ε_{it} which are assumed to follow a conditional bivariate normal distribution.

Based on equations (3.35) and (3.36), y_{it} is observed when $z_{it} = 1$ and this happens when:

$$\varepsilon_{it} > -w_{it}'\gamma \quad (3.38)$$

The probability that y_{it} is observed is:

$$\Pr(\varepsilon_{it} > -w'_{it}\gamma) = 1 - \phi(-w'_{it}\gamma) = \phi(w'_{it}\gamma) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.39)$$

Equation (3.39) holds by symmetry of the standard normal distribution. Where Pr denotes probability and ϕ is the cumulative density function of the standard normal distribution. Given the conditional mean of the observed dependent variable y_{it} as:

$$E(y_{it}|y_{it}\ observed) = E(y_{it}|\ z_{it} = 1) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.40)$$

Substituting equation (3.38) yields:

$$E(y_{it}|y_{it}\ observed) = E(y_{it}|\ \varepsilon_{it} > -w'_{it}\gamma) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.41)$$

Substituting equation (3.35) produces:

$$E(y_{it}|y_{it}\ observed) = x'_{it}\beta + E(\mu_{it}|\varepsilon_{it} > -w'_{it}\gamma) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.42)$$

Therefore:

$$E(y_{it}|y_{it}\ observed) = x'_{it}\beta + \rho\sigma_{\mu}\frac{\emptyset(w'_{it}\gamma)}{\phi(w'_{it}\gamma)} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.43)$$

Where ρ is the correlation between the errors of equations (3.35) and (3.36), σ_{μ} is the variance of the error term in the main equation (3.35), $\emptyset$ is the probability density function of the standard normal distribution and $\frac{\emptyset(w'_{it}\gamma)}{\phi(w'_{it}\gamma)}$ denotes the inverse Mills ratio (IMR) according to Heckman (1979).

The Heckman sample selection model jointly estimates the export participation and export intensity models by estimating and incorporating the inverse Mills ratio into the regression equation to eliminate bias, resulting in unbiased findings. The Heckman model relies on distributional assumptions of the residuals or imposition of appropriate exclusion restrictions. Satisfaction of either of the two conditions and implementation of the two-step procedure for the Heckman model leads to reliable estimates within the limited interval (0,1) even in the case of fractional response outcome variables (Schwiebert, 2018). The exclusion restriction involves having an additional explanatory variable (instrument) on the selection equation (3.36) which is excluded from the main equation (3.35).

Therefore, the study adopted the Heckman (1979) two-step sample selection model in analyzing the firm-level determinants of export intensity by estimating equations (3.35), (3.36) and (3.37) while incorporating explanatory variables such as TFP, firm age, firm size, foreign ownership, capital intensity, human capital, research and management quality as defined on equation (3.11). In addition, dummy variables for year, industry and region were incorporated in the models to obtain the following empirical models:

$$y_{it}^{*} = x_{it}'\beta + \delta D_{it} + IMR_{it} + u_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.44)$$

$$z_{it} = 1(w_{it}'\gamma + \theta D_{it} + \varepsilon_{it} > 0) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.45)$$

$$y_{it} = z_{it}y_{it}^{*} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.46)$$

Where D_{it} is a vector of year, industry and region dummies, IMR_{it} is the inverse mills ratio and the remaining variables are as defined in equations (3.35), (3.36) and (3.37). The Heckman two-step sample selection procedure adopted by the study involved estimating equation (3.45) first using a probit model after which the inverse mills ratio (IMR) was computed. The second stage involved estimating equation (3.44) while incorporating the IMR to account for the sample selection bias.

Therefore, in order to achieve the first objective on the firm level determinants of export intensity by manufacturing firms in Kenya, equations (3.44), (3.45) and (3.46) were estimated using the two steps described in the preceding paragraph.

3.4.2 Effect of Export Intensity on Firm-Level Total Factor Productivity in Kenya's Manufacturing Firms

The second objective aimed at analyzing the influence of export intensity on firms' TFP. To accomplish this, equation (3.30) was converted into logarithms to obtain a linear estimable function while incorporating the lagged dependent variable to account for endogeneity as follows (Bigsten & Gebreeyesus, 2009; Vogel & Wagner, 2010):

$$lnTFP_{it} = \alpha_0 + \alpha_1\, lnTFP_{it-1} + \alpha_2 lnXINT_{it} + \beta lnZ_{it} + \delta D_{it} + \omega_i + \varepsilon_{it} \quad \ldots \ldots (3.47)$$

Where ln denotes the natural logarithm of the corresponding variable, D_{it} represents industry, ownership and time dummies, ω_i represents the firm-specific effect, ε_{it} is the residual and Z_{it} is a vector of firm attributes influencing TFP standard in literature

including foreign ownership, firm size, firm age, human capital, research and development, capital intensity and management quality. This dynamic specification followed the model by (Bigsten & Gebreeyesus, 2009).

A dynamic model violates strict exogeneity because the lagged dependent variable tends to be correlated with the residual (Anderson & Hsiao, 1981; Arellano & Bond, 1991). Due to the violation of the exogeneity assumptions, employing static panel data estimation techniques may yield inconsistent results (Anderson & Hsiao, 1981; Arellano & Bond, 1991). According to Anderson and Hsiao (1981), this endogeneity issue can be solved by utilizing instrumental variables (IV). However, Arellano and Bond (1991), Arellano-Bover (1995) and Blundell and Bond (1998) introduced the Generalized Method of Moments estimator (GMM), utilizing a comparable set of internal instruments which is more efficient compared to the Anderson and Hsiao (1981) estimator (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998). Therefore, to address the endogeneity issue, the study adopted the two-step system GMM (2SYSGMM) estimator for equation (3.47) following the approach by (Roodman, 2006).

3.4.3 Effect of Export Intensity on Firm-level Employment in Kenya's Manufacturing Firms

This objective was achieved by converting equation (3.32) using natural logarithms as follows (Van Ha & Tran, 2017):

$$lnEMP_{it} = \beta_0 + \beta_1 lnXINT_{it} + \vartheta lnW_{it} + \gamma D_{it} + \omega_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.48)$$

Where: $lnEMP_{it}$ is the natural logarithm of firm employment, $lnXINT_{it}$ is the natural logarithm of export intensity, lnW_{it} is the natural logarithm of labor productivity, capital intensity, wage, human capital, firm age and management quality, ω_i denotes firm-specific effect, ε_{it} is the residual, D_{it} represents three dummy variables for ownership, time and industry.

Just as in the case of TFP in objective two, the employment model specified on equation (3.48) is prone to the endogeneity problem resulting from persistence of employment behavior alongside sample selection bias, measurement error bias, simultaneity bias and omitted variable bias. To address the endogeneity issue, equation (3.48) was modified to a dynamic model by incorporating the lagged value of employment (EMP_{it-1}) as follows:

$$lnEMP_{it} = \beta_0 + \beta_1 lnXINT_{it} + \beta_2 lnEMP_{it-1} + \beta_3 lnZ_{it} + \beta_4 D_{it} + \omega_i + \varepsilon_{it} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots .. \dots (3.49)$$

Equation (3.49) was estimated using the 2SYSGMM estimator as proposed by (Roodman, 2006).

3.5 Definition and Measurement of Variables

The definition and measurement of the variables employed by the study to achieve the three objectives are described in Table 3.1.

Table 3.1: Definition and Measurement of Variables

Variable	Definition	Measurement
Export Propensity	Used to refer to whether a firm engages in exporting or not.	A dummy variable taking a value of 1 for exporters and 0 for non-exporters.
Export Intensity	The percentage of a firm's overall revenue that comes from exports	Measured as a ratio of a firm's export sales to its overall annual sales.
Export Experience	The total number of years that a firm has exported since it was established.	Number of Years.
Total Factor Productivity	It is the change in a firm's overall output that is not due to changes in materials, labor, or capital.	Computed using the Levinsohn-Petrin (LP) estimation technique. Estimated using capital, labor and materials expressed as an index.
Firm-Level Employment /Firm Size	The level of utilization of labor for productive activities by an enterprise.	Measured by the total number of workers employed by an enterprise.
Wage per Worker	Labor costs per employee incurred by a firm within a year.	The total wages, salaries and bonuses paid to workers divided by the total number of workers, expressed in Kenya Shillings per annum.
Capital	The total amount of financial resources required in the production process.	The replacement of all machinery and equipment expressed in Kenya Shillings.
Capital Intensity	Capital per employee of firms in the production process during a specific time period.	The ratio of capital to the number of workers.
Labor Productivity	It represents value added per worker.	Total sales minus intermediate inputs divided by the number of workers.
Firm Age	How long the firm has been in operation.	A firm's total number of years of existence.
Human Capital	The availability of skilled personnel in an enterprise.	The percentage of trained workers in a firm.
Firm Ownership	The legal possession status of a firm (domestic or foreign).	Expressed as a dummy variable, 1 if a firm has foreign ownership, else 0.
Research and Development (R & D)	The method used by businesses to gather information in order to develop new products or innovate so as to improve their current goods and services.	Expressed as a dummy variable, 1 if a firm participates in R & D, else 0.
Manager's Experience	The level of experience of the top manager.	The top manager's cumulative years of work experience.
Material	Cost of raw materials and intermediate goods employed by a firm	Measured in Kenya Shillings.
Energy Cost	Annual total cost of electricity incurred by a firm	Measured in Kenya Shillings.
Revenue	Total value of a firm's annual sales	Measured in Kenya Shillings.
Foreign Inputs	The percentage of foreign inputs in all inputs employed by a firm	Expressed as a percentage.

Source: Authors definitions from study data for the periods 2007, 2013 and 2018

3.6 Data Types and Sources

The research utilized unbalanced panel data obtained from the World Bank Enterprise Surveys (WBES) for manufacturing firms covering the periods 2007, 2013 and 2018. The World Bank obtains information from registered firms in the manufacturing and services sectors using a questionnaire and interviews in order to understand key firm characteristics and the business environment for policy guidance. In this case the sector of interest was the manufacturing sector. This panel was the latest available data from World Bank since the surveys for Kenya are conducted after every five years and no updates had been made up to the point when the study results were reported. The panel comprised of three time periods (T=3) for the years 2007, 2013 and 2018. Stratified sampling technique based on firm size, sub-sector and region was employed to collect the data. The sample was representative and comprised of 99, 225 and 158 manufacturing firms in the years 2007, 2013 and 2018, respectively after cleaning the data.

3.7 Data Analysis

3.7.1 Data Cleaning and Classification of Firms

The WBES provided the panel data obtained from the three waves of the surveys 2007, 2013 and 2018. Since the emphasis of the research was the manufacturing sector, all enterprises belonging to the services sector were dropped. The data had been coded based on several classifications including firm size, sub-sectors and region. For firm size, the firms were categorized into three categories as shown on Table 3.2.

Table 3.2: Firm Classification by Size

Number of Workers	Classification
5-19 Workers	Small Firms
20-99 Workers	Medium Firms
100 and above Workers	Large firms

Source: Author's classification from WBES data (2007, 2013, 2018)

The study reported the classifications as per the study data not as per the formal classifications. For the small and medium firms, the classifications per the study data were slightly different from the formal classifications. Small firms employed 5-19 workers, medium firms had 20-99 workers with large firms employing 100 and more workers. The firms were also broadly categorized into four different sub-sectors within the manufacturing sector as presented on Table 3.3.

Table 3.3: Firm Classification by Sub-sector

Industry Sampling Sector	Frequency	Percent	Cumulative
Food	156	32.37	32.37
Textiles and Garments	71	14.73	47.10
Chemical, Pharmaceutical, and Plastic	53	11.00	58.09
Other Manufacturing	202	41.91	100.00
Total	482	100.00	

Source: Author's computations from WBES data (2007, 2013, 2018)

Other manufacturing featured the highest scale of firms at 202, followed by food at 156 while Chemical, Pharmaceutical, and Plastic had the least number of firms at 53. The panel data utilized comprised of three waves (2007, 2013 and 2018) as presented on Table 3.4.

Table 3.4: Number of Firms per Year of Survey

Year of Survey	Frequency	Percent	Cumulative
2007	99	20.54	20.54
2013	225	46.68	67.22
2018	158	32.78	100.00
Total	482	100.00	

Source: Author's computations from WBES data (2007, 2013, 2018)

Table 3.4 shows that 99, 225 and 158 firms were sampled in 2007, 2013 and 2018, respectively. After data cleaning, the study was left with seven sampling regions as presented on Table 3.5.

Table 3.5: Statistics on Sampling Region

Sampling Region	Frequency	Percent	Cumulative
Mombasa	83	17.22	17.22
Kirinyaga	11	2.28	19.50
Kiambu	12	2.49	21.99
Nakuru	64	13.28	35.27
Kisumu	30	6.22	41.49
Nairobi	256	53.11	94.61
Central Region	26	5.39	100.00
Total	482	100.00	

Source: Author's computations from WBES data (2007, 2013, 2018)

From Table 3.5, according to the WBES data, Nairobi had the highest proportion of the sampled firms at 53.11 per cent due to its vast and intense commercial activities relative to the other regions, followed by Mombasa and Nakuru at 17.22 and 13.28 per cent, respectively while Kirinyaga had the least percentage of sampled firms at 2.28 per cent.

Before analyzing the data, necessary diagnostic tests were performed on the models for each objective.

3.7.2 Diagnostic Tests and Model Estimation

The study's first objective was estimated using equations (3.44), (3.45) and (3.46) by employing the Heckman sample selection model. Equations (3.47) and (3.49) were estimated to realize objective two and three, respectively by utilizing the 2SYSGMM estimator. For all the models, relevant diagnostic tests were performed which included Multicollinearity test as a pre-estimation test whereas post-estimation diagnostic tests comprised of Model Specification Test, Heteroscedasticity Test, Hausman Test and Over identifying restrictions test.

3.7.2.1 Multicollinearity Test

The multicollinearity test was conducted using the variance inflation factor (VIF) and 1/VIF statistics. VIF values exceeding 10 and 1/VIF values below 0.1 indicate high levels of multicollinearity that needs to be addressed (Kutner, Nachtsheim, & Neter, 2004). Mostly this is addressed by dropping one of each of the highly collinear variables until the problem is solved.

3.7.2.2 Regression Specification Error Test

To ensure that the models were correctly specified, the study employed Ramsey regression specification error test (RESET) under the null hypothesis of a correctly specified model (Ramsey, 1969). The model is correctly specified if the probability value of the F-statistic is greater than 0.05 (Ramsey, 1969).

3.7.2.3 Heteroscedasticity Test

The modified Wald test for group wise heteroscedasticity was employed to check the variance of the residuals under the null hypothesis of homoscedasticity (Greene, 2012). A probability value of the Chi-square statistic greater than 0.05 indicates constant variance (Greene, 2012). In the presence of heteroscedasticity, the robust option can be applied to obtained robust standard errors (Greene, 2012; Wooldridge, 2012).

3.7.2.4 Hausman Test for Model Selection

The Hausman Test was employed to choose between the Fixed effect and the Random effects models. The fixed effect model is preferred if the probability value of the Chi-square statistic is less than 0.05 (Hausman, 1978).

3.7.2.5 Over Identifying Restrictions Test

Since the study employed models that utilize instrumental variables, the validity of the instruments had to be checked for the estimates to be deemed reliable. For the Generalized Method of Moments (GMM) estimation technique, the study employed the Sargan-Hansen test of over identifying restrictions under the following hypotheses: H_0: Over identifying restrictions are valid (if $p > 0.05$) and H_1: Over identifying restrictions are not valid (if $p < 0.05$) (Sargan, 1975; Hansen, 1982).

3.7.2.6 Serial Correlation Test

For the instruments to be deemed reliable, there should be no serial correlation of order 2 and higher. The absence of second order serial correlation is indicated by an insignificant AR (2) statistic.

CHAPTER FOUR

EMPIRICAL FINDINGS AND DISCUSSION

4.1 Introduction

The findings and discussions of the study's empirical results are presented in this chapter. First, descriptive statistics were used to understand the variability of the study variables. Following that, multiple models were estimated, each addressing a distinct goal of the study, diagnostic tests were performed, and the results were presented alongside a full discussion of the findings.

4.2 Descriptive Statistics

This section provides metrics of central tendency as well as dispersion for the research variables. The analysis is categorized in two sections. The first section captures the summary statistics for the continuous variables while the tabulation of the discrete variables is presented in the second section.

4.2.1 Summary Statistics for the Continuous Variables

This section discusses the summary statistics for all the continuous variables that were used in the study to achieve the specific objectives. The study utilized firm level panel data obtained from the World Bank's Enterprise Surveys (WBES) for the periods 2007, 2013 and 2018. This information is presented on Table 4.1

Table 4.1: Summary Statistics for Continuous Variables

Variable	Measurement	Mean	Median	S.D.	Min	Max	Skewness	Kurtosis
Export Intensity	% of Total Sales Exported	0.19	0	0.30	0	1	1.72	4.74
Total Factor productivity	Index	8.40	8.50	3.30	0	17.47	-.74	4.96
Revenue	Million Kenya Shillings	1213.74	78.29	7431.88	0	120000	12.35	174.25
Capital	Million Kenya Shillings	710.85	10	9224.22	0	200000	21.04	454.03
Material	Million Kenya Shillings	344.84	10	2146.01	0	36000	12.05	176.11
Energy Cost	Million Kenya Shillings	22.97	0.65	171.10	0	3500	17.95	357.68
Firm Employment	Total Number of Workers	204.17	50	572.47	0	8000	8.25	93.06
Firm Age	Number of Years since Establishment	32.37	30	18.7	0	103	.82	3.64
Wage Per Worker	Million Kenya Shillings	0.49	0.13	2.58	0	35	11.2	135.54
Human Capital	% of workforce that received training	23.45	1	35.67	0	100	1.28	3.03
Management Experience	Manager's years of working experience	19.73	20	11.98	1	60	0.51	2.52
Foreign Inputs	% of inputs in all inputs sourced internationally	31.69	20	35.42	0	100	.72	2.03
Export Experience	Years of export operation	10.59	0	15.71	0	80	1.61	5.24
Labor Productivity	Million Kenya Shillings	5.05	1.25	28.51	0	600	19.09	395.67
Capital Intensity	Million Kenya Shillings	12.09	21.92	229.00	0	5000	21.53	468.96

N = Number of Observations = 482; S.D. = Standard deviation; Min = Minimum value and Max = Maximum value.

Source: Author's computations from WBES Data (2007, 2013, 2018).

Export intensity, measured as the share of a firm's exports in total sales, had a mean value of 0.19 and a standard deviation of 0.3 implying high dispersion from the mean. The mean value of 0.19 implies that the sampled firms in the manufacturing sector exported an average of 19 per cent of their total sales within the study period. This was an indication of a low export share for the sampled firms in the sector. Export intensity had a maximum value of 1 (for firms that exported all their sales) and a minimum value of 0 for non-exporters. With reference to a skewness of zero and kurtosis of 3 for a standard normal distribution, based on the skewness and kurtosis of 1.72 and 4.74, respectively, export intensity was positively skewed and mildly leptokurtic.

The average firm-level total factor productivity (TFP) was 8.40 with a standard deviation of 3.30 implying low variation from the mean. TFP was slightly negatively skewed with a value of -0.74 compared to a zero-skewness value of a normal distribution. Based on the kurtosis of 4.96, with reference to a value of 3 for a standard normal distribution, TFP was mildly leptokurtic implying that it had a slightly peaked curve. Revenue, Capital, Material and Energy cost had median values of 78.29, 10, 10 and 0.65 million Kenya Shillings, respectively. Based on their standard deviations of 7431.88, 9224.22, 2146.01 and 171.10, respectively, they were highly dispersed from their mean values due to their sensitivity to economic shocks. Their skewness and kurtosis values indicated that they were all leptokurtic and positively skewed.

Firm employment, represented by the total number of workers employed by a firm, had a median value of 50 implying that, half of the sampled firms employed less than 50 workers and the other half employed more than 50 workers. Firm employment was highly

volatile as indicated by a standard deviation of 572.47. This was attributed to the fact that firms in all size categories (small, medium and large) were incorporated in the sample. For the sampled firms, the largest firm employed 8,000 workers within the study period. With a skewness of 8.25 and a kurtosis of 93.06, firm employment was positively skewed and leptokurtic. The average age of the sampled firms in the sector was 32 years with a standard deviation of 18.70 implying less variability. The oldest firm was 103 years old. The skewness of 0.82 and kurtosis of 3.64 were very close to a normal distribution.

Wage per worker had a median value of 0.13 million Kenya Shillings per annum. This implied that half of the workers earned less than 130,000 Kenya shillings per annum meaning that most of the workers in the sampled firms earned the minimum wage of about 10,000 per month for semi-skilled workers. Based on the standard deviation, wage per worker exhibited a very high dispersion from the mean. This meant that some workers earned extremely high wages (management) while others earned low to average wages which matches the reality in many sectors in Kenya. Wage per worker also exhibited positive skewness and a leptokurtic distribution.

Human capital had a mean value of 23.45 indicating that, for the sampled firms, only 23.45 per cent of the workers received formal training within the study period, on average. The statistics reveal that the firms in the manufacturing sector need to put more efforts regarding training of workers so as to boost their performance. With a standard deviation of 35.61 the variability from the mean was high implying that the level of formal training of workers differed greatly across firms. Human capital was also moderately skewed (1.28) with a normally peaked curved based on a kurtosis of 3.03. Foreign inputs,

measured by the percentage of raw materials of foreign origin had a mean value of 31.69 and a standard deviation of 35.67. This meant that, on average, the sampled firms utilized 31.69 per cent of foreign inputs. The skewness and kurtosis statistics implied that foreign inputs had a nearly symmetric distribution.

Export Experience was on average 10.59 years. The most experienced firms in the sector had been exporting for 80 years with non-exporters having 0 years of exporting experience. Export experience had moderate volatility with a standard deviation of 15.71. It was also positively skewed (1.61) and leptokurtic (5.24). Labor productivity, measured as the value added per worker had a median value of 1.25 million Kenya Shillings with a very high dispersion from the mean. This implied that the sampled firms employed workers of different skills and productivity levels. Based on the skewness (19.09) and kurtosis (395.67), labor productivity curve was positively skewed and leptokurtic.

Capital intensity had a median value of 21.92 million Kenya Shillings for the study period with a very high dispersion from the mean. This high dispersion meant that the levels of capital intensity for the sampled firms in the manufacturing sector differed significantly. It also exhibited positive skewness and had a highly peaked curve. Overall, based on the descriptive statistics, most of the untransformed continuous variables did not have a normal distribution. As such, before conducting the regression analysis, all the continuous variables were transformed to natural logarithm form to achieve a symmetrical distribution.

4.2.2 Frequency Distributions for Discrete Variables

The study employed several discrete variables which included: export propensity, foreign ownership and research and development (R&D). Export propensity was presented as a dummy variable = 1 for exporters and 0 for non-exporters. In the regression analysis, non-exporters were used as the base category. Foreign ownership was presented as a dummy variable = 1 for foreign-owned firms and 0 for domestic firms hence domestic firms were used as the base category.

R&D was presented as a dummy variable = 1 for firms that had developed and introduced a new product in the market within the study period and 0 otherwise. The reference category was the firms that had not developed and introduced a new product in the market. Table 4.2 presents the frequency distributions for the three dummy variables.

Table 4.2: Export Propensity, Foreign Ownership and R&D Statistics

Variable	Metric	Frequency	Percent
Export Propensity	Non-Exporters	247	51.24
	Exporters	235	48.76
Foreign Ownership	Domestic Firms	437	90.66
	Foreign Firms	45	9.34
R&D	Non-Researchers	167	34.65
	Researchers	315	65.35

Source: Author's computations from WBES data (2007, 2013, 2018)

Table 4.2 indicates that exporters accounted for 48.76 per cent of the total sampled firms in Kenya's manufacturing sector, on average. This implies that on average, almost half of the firms exported their output to international markets and the other half concentrated on the domestic market only. Domestic firms accounted for 90.66 per cent while the

foreign firms comprised of 9.34 per cent of the total sampled firms within the study period. Out of the total sampled firms, 65.35 per cent developed and introduced a new product in the market while 34.65 per cent did not. This implied that a high proportion of the sampled firms developed and introduced new products in the market which signifies the importance of research in the sector.

4.3 Results on the Estimation of Total Factor Productivity

The first goal of the study was to establish the firm-level determinants of export intensity by manufacturing firms in Kenya. From theoretical and empirical literature, one of the key drivers of export propensity and intensity of firms is total factor productivity. Before establishing the determinants of export behavior by firms, the study first estimated TFP. As discussed in chapter three, the study estimated TFP using the Solow residual approach following the Levinsohn and Petrin (LP) (2003) technique. Ordinary Least Squares (OLS) estimates were also presented for comparison purposes.

The results are presented on Table 4.3.

Table 4.3: Production Function Estimation Results

	Estimation Technique			
	OLS		LP (2003)	
Variable	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**
lnlabor	0.7439***	0.000	0.7461***	0.006
lncapital	0.1041***	0.003	0.1197***	0.003
lnenergycost	0.4216***	0.000	0.3463***	0.000
Sum (Returns to Scale)	1.2696		1.2121	
Wald Test of Constant Returns to Scale (CRTS)	-		Chi-square statistic = 0.92 P-value = 0.3365	

*** p < 0.10, ** p < 0.05, *** p < 0.01. ln denotes the natural logarithm of the variable**
Source: Author's computations from WBES data (2007, 2013, 2018).

From Table 4.3, for both the Ordinary Least Squares and Levinsohn and Petrin estimators, the output elasticities of all the inputs were all positive and statistically significant. The OLS estimate for labor was downward biased. This suggested that labor was negatively linked with productivity shocks (Levinsohn & Petrin , 2003). For the given data set, the coefficient of capital estimated using OLS was lower than that of the LP approach. This implied that capital was inversely connected to productivity shocks and as a result, the capital parameter estimates in OLS estimation were biased downwards. This is consistent with (Levinsohn & Petrin , 2003). The signs of all factor elasticities were positive thus economically reasonable. This implied that, ceteris paribus, an increase in any of the inputs resulted to increased output.

For the two estimators, the sum of the coefficients implied increasing returns to scale. However, the Wald statistic confirmed that the sum of the coefficients was not statistically different from constant returns to scale. For the LP (2003) approach, it is impossible to

restrict the sum of the coefficients to one hence the interpretation was based on the Wald test. Due to the OLS bias, the study estimated TFP using the LP (2003) approach whose results are presented on Table 4.4.

Table 4.4: Average Total Factor Productivity by Year of Survey

	Summary of Average TFP		
	Mean	**Std. Dev.**	**Frequency**
Year of Survey			
2007	8.26	0.98	99
2013	8.50	3.87	225
2018	8.34	3.38	158
Average Total	8.40	3.30	482

Source: Author's computations from WBES data (2007, 2013, 2018)

From Table 4.4, firm level TFP averaged between 8.50 and 8.26 during the study period. This value indicates that the firm's actual output was 8 times what the inputs alone would predict. This means that the firms leveraged their inputs far better than the average implying high efficiency. The average firm-level TFP varies with study, nation and estimating technique. However, a value of 8 is an indicator of exceptional efficiency potentially driven by adoption of advanced technology, quality management, international trade, location and upgraded infrastructure among many others. For instance, Camino-Mogro (2022) established that Ecuadorian manufacturing firms that both exported and imported had average TFP values around 8.9, estimated using the LP method (Camino-Mogro, 2022).

The firms experienced slightly improved TFP between 2007 and 2013 from 8.26 to 8.50, respectively. However, TFP slightly declined from 8.50 in 2013 to 8.34 in 2018. Additionally, the statistics reveal that TFP has been almost stagnant over the years. This productivity decline and stagnation is an indicator of reduced efficiency and could have been attributed to misallocation of resources, limited technological uptake, mismanagement, trade and market challenges, regulatory and infrastructure barriers and limited diversification (Cusolito & Cirera, 2016). There is therefore need to understand why firms have not been able to realize consistent TFP improvements. One way to explore this is by first understanding the relevant determinants of TFP at the firm level which the current study analyzed.

The study explored the effect of export intensity on firm level TFP. Table 4.5 presents the t-test statistics for differences between firm level TFP for exporters and non-exporters.

Table 4.5: Average Total Factor Productivity by Export Status

Group	Mean TFP	Std. Dev	Observations	T-Statistic	P-Value
Non-Exporters	8.09	3.56	247		
Exporters	8.71	2.99	235	2.08	0.04

Source: Author's computations from WBES data (2007, 2013, 2018)

Table 4.5 indicates that exporters have a higher average TFP than non-exporters. Based on the t-statistic (2.08) and the p-value (0.04), the null hypothesis that there is no significant difference in the mean TFP of exporters and non-exporters is rejected. This implies that exporters are more productive than non-exporters.

4.4 Diagnostic Test Results

The first goal of the study involved analyzing the firm-level determinants of export intensity. This was achieved by employing the two-step Heckman sample selection model alongside a Tobit model and a Fractional Probit model for comparison purposes. This analysis required several pre-estimation and post-estimation diagnostic tests. One of the pre-estimation diagnostic tests involved checking the distribution of the variables incorporated in the probit model since it assumes a normal distribution. Most of the untransformed variables were not normally distributed. After performing a logarithmic transformation on the variables, the normality assumption was met. Another pre-estimation diagnostic test involved a multicollinearity test which was conducted using Variance Inflation Factor (VIF) statistics. The results indicated that the model did not suffer from multicollinearity since the VIF values were less than 10 and 1/VIF values were greater than 0.1 for each variable as presented on Table A1 in Appendix I.

Post estimation tests involved a model specification test which was conducted using the Ramsey Regression Specification Error Test (RESET) under the null hypothesis of a correctly specified model. The results indicated that the model was correctly specified since the probability value of the F-statistic was greater than 0.05 as shown on Table A2 in Appendix I. Another post estimation tests involved heteroscedasticity test which was conducted using the modified Wald test for group wise heteroscedasticity and the results indicated the presence of heteroscedasticity given that the probability value of the Chi-square statistic was less than 0.05 as presented on Table A4 in Appendix I. This was corrected by bootstrapping the standard errors (Cameron & Trivedi, 2005).

The second objective aimed at analyzing the effect of export intensity on firm level total factor productivity while the third objective of the study analyzed the effect of export intensity on firm level employment. These objectives were analyzed using dynamic panel data models estimated using the two-step system generalized method of moments estimation technique (2SYSGMM) to control for endogeneity. Static models were also estimated for comparison purposes. Since the static models were presented just for comparison purposes, the relevant diagnostic tests that were performed in this case were: Heteroscedasticity test and the Hausman test to choose between the fixed effects and the random effects models. The results indicated that the random effects model was appropriate for the second objective while the fixed effect model was preferred for the third objective as shown on Table A3 in Appendix I. The model suffered from heteroscedasticity based on the modified Wald test for group wise heteroscedasticity results presented on Table A4 in Appendix I. This was corrected by computing robust standard errors.

For the dynamic panel data model, since the model relies on the use of instruments, two necessary tests are usually performed. The first one is the Hansen over identifying restrictions test aimed at testing the validity (exogeneity) of the instruments used. The Hansen over identifying restrictions test was conducted and the results as presented on Table A5 indicated that the instruments were valid since the probability value of the Hansen Statistic was greater than 0.05. The second test involves checking for second order serial correlation using the AR (2) statistics. However, given that the study employed a relatively short (T=3) and unbalanced panel, it was impossible to obtain the

AR (2) statistics. Testing for higher order serial correlation requires a longer panel. Regardless, this was not a major issue since very short panels are less susceptible to serial correlation. Nevertheless, the study relied on robust standard errors. Overall, the diagnostic tests and the remedies applied confirmed the validity of the models utilized, hence the results were deemed reliable.

4.5 Empirical Results

The findings of the study, based on the three specific objectives are presented here.

4.5.1 Results on the Firm-Level Determinants of Export Intensity in Kenya's Manufacturing Firms

To analyze the firm-level determinants of export intensity, the study estimated equations (3.44), (3.45) and (3.46). This was achieved by first estimating the export intensity equation (3.44) using a Tobit model and a fractional probit model after which the two-step Heckman sample selection model was estimated and the results for the three models were all reported. However, the study relied on the estimates from the two-step Heckman sample selection model since it corrects for sample selection bias. The results from the estimation of the three models are presented on Table 4.6.

Table 4.6: Regression Results on the Firm-Level Determinants of Export Intensity in Kenya's Manufacturing Firms

Variables Dependent Variable: Export Intensity	Tobit	Fractional Probit	Heckman Sample Selection Model
Total Factor Productivity (TFP)	0.0488***	0.0904**	0.0351***
	(0.0158)	(0.0430)	(0.0126)
Foreign Ownership Dummy (FO)			
Foreign	0.7811***	1.3153**	0.4281**
Base: Domestic	(0.2123)	(0.5943)	(0.1730)
FO*TFP	-0.0703***	-0.1180*	-0.0342**
	(0.0223)	(0.0624)	(0.0173)
Firm Size	0.0849***	0.1472***	0.0632***
	(0.0196)	(0.0444)	(0.0206)
Firm Age	0.0498	0.0804	0.0361**
	(0.0316)	(0.0718)	(0.0176)
Human Capital	0.0347***	0.0778***	0.0298***
	(0.0119)	(0.0269)	(0.0084)
Labor Productivity	-0.0252**	-0.0455	-0.0197**
	(0.0112)	(0.0287)	(0.0086)
Material	0.0027	0.0053	0.0025
	(0.0041)	(0.0103)	(0.0023)
Energy Cost	0.0108	0.0188	0.0096*
	(0.0073)	(0.0170)	(0.0051)
Year Dummy			
Year=2013	0.1145**	0.3048**	0.0996***
	(0.0581)	(0.1277)	(0.0285)
Year=2018	-0.0250	-0.0313	-0.0004
Base: 2007	(0.0656)	(0.1508)	(0.0293)

R&D Dummy			
R&D	0.0595	0.0882	0.0464*
Base: Non-Researchers	(0.0489)	(0.1231)	(0.0274)
Industry Dummy			
Food	-0.0315	-0.0056	-0.0103
	(0.0609)	(0.1242)	(0.0296)
Textiles and Garments	0.0334	0.0531	0.0491
	(0.0738)	(0.1397)	(0.0387)
Chemical, Pharmaceutical, and Plastic	0.1009	0.1191	0.0756*
Base: Other Manufacturing	(0.0753)	(0.1516)	(0.0417)
Inverse Mills Ratio	-	-	0.1445**
			(0.0645)
Constant	-1.0058***	-2.9362	-0.7188***
No. of Observations	Left-Censored=247	482	Left-Censored=247
	Uncensored=235		Uncensored=235
Wald: Chi^2	148.83***	235.91***	876.54***
Pseudo R^2	-	0.1863	-

Robust Standard Errors on Parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: Authors Computations from study data

The dependent variable was not transformed to logarithmic form while the independent continuous variables were transformed to natural logarithmic form yielding a level-log model. The results presented on Table 4.6 were consistent across all the three models. However, the coefficients had different magnitudes across the models. Above all, the coefficient of the inverse mills ratio in the Heckman model was positive and statistically significant indicating presence of sample selection bias thus validating the Heckman sample selection model. Therefore, the discussion of the study findings was based on the results obtained from the two-step Heckman sample selection model.

The coefficient of total factor productivity (TFP) was positive and statistically significant. The coefficient had a value of 0.0351 which implied that a percentage increase in firms' TFP resulted to 0.000351 units increase in firms' export intensity on average, holding all other factors constant. This meant that firms with higher levels of TFP exported a larger share of their total sales hence the need to improve firm-level TFP. The positive effect of TFP on firms' export intensity can be explained by the concept of sunk costs. Since there exist huge entry costs (sunk costs) in to export markets, only more productive firm can overcome these costs and enter international markets (Roberts & Tybout, 1997). Once they enter these markets, if they maintain or improve their productivity levels, the highly productive firms have the capacity to produce and export more compared to the less productive firms. These results are consistent with existing vast empirical evidence on the effect of TFP on export behavior of manufacturing firms such as (Bigsten & Gebreeyesus, 2009; Haidar, 2012; Okado, 2013; Dong, Kokko, & Zhou, 2022; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023).

The coefficient of foreign ownership was positive and statistically significant. A value of 0.4281 implied export intensity was on average 0.4281 more for foreign owned firms compared to domestic firms all else being equal. This can be associated with preeminence of foreign firms in terms of information access, marketing networks, managerial expertise, access to superior technology and financial resources in general than enhance their export performance (Krammer, Strange, & Lashitew, 2018; Dong, Kokko, & Zhou, 2022). These results are consistent with Okado (2013) for Kenya; Chebor (2020) for Kenya and Dong and Zhou (2022) for China.

The study incorporated an interaction term between TFP and foreign ownership to capture the moderating effect of foreign ownership on the effect of TFP on export intensity. The results indicated that the coefficient was negative and statistically significant with a value of -0.0342. This result can be associated with the mechanism in which firms are able to improve their export intensity by improving their TFP. Since TFP is one of the main firm-level determinants of export intensity, foreign owned firms already experience higher TFP internally compared to domestic counter parts. As such domestic firms have more room for improvement in terms of enhancing their TFP and export intensity compared to foreign firms. These results are in line with Dong and Zhou (2022) for Chinese manufacturing firms.

In line with existing theoretical and empirical evidence, the coefficient for firm size was positive and statistically significant. With a value of 0.0632, a percentage increase in the number of workers increased export intensity by 0.000632 units on average, ceteris paribus. This can be associated to the economies of scale advantages that large firms

enjoy and are thus able to produce and export a larger share of their sales. More so, large firms are highly capital intensive, can afford advanced technology, possess intangible assets such as patents and goodwill thus enjoy competitive advantage compared to small firms in international markets. These results support existing empirical evidence on the same such as (Fonchamnyo, 2014; Reis & Forte, 2016; Chebor, 2020; Dong, Kokko, & Zhou, 2022; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023).

The coefficient for firm age was positive and statistically significant with a value of 0.0361. This implied that, holding other factors constant, a percentage increase in firm age led to an increase in export intensity by 0.000361 units on average. This could be associated with the increased experience in the international markets which is directly proportional to the firms' age. Older firms are more experienced hence they have more knowledge and connections regarding the markets thus they may enjoy higher international market shares compared to inexperienced younger firms. As a result, they produce more for exports. The positive relationship between firm age and export intensity corroborates the existing empirical literature (Bernard & Jensen, 1999; Bernard, Jensen, Redding, & Schott, 2007; Bigsten & Gebreeyesus, 2009; Kiendrebeogo, 2020).

The coefficient for human capital was positive and statistically significant. A value of 0.0298 implied that a percentage increase in the share of trained workers in a firm increased export intensity by 0.000298 units, all else being equal. The positive relationship between human capital and export intensity implies that firms possessing exceptional human capital can gain some competitive advantages, which are vital in boosting export performance. The results are in line with (Fonchamnyo, 2014; Mulliqi,

Adnett, & Hisarciklilar, 2019; López Rodríguez & Serrano Orellana, 2020; Mubarik, Devadason, & Govindaraju, 2020).

The coefficient for labor productivity was negative and statistically significant with a value of -0.0197. This implied that a percentage increase in labor productivity resulted to 0.000197 units decrease in export intensity. As such, labor productivity was inversely related to the firm's export intensity. The existing literature on this is mixed in the sense that the relationship could be either positive or negative and in some cases insignificant (Guner, Lee, & Lucius, 2010; Pham, 2015; Reis & Forte, 2016; Jakšić, Erjavec, & Cota, 2019). Economic theory suggests that workers get paid according to the value of their marginal productivity, whereby an increase in the value of the marginal product of labor translates to increased wages. Following this argument, an increase in labor productivity leads to an increase in wages.

The effect of this is mixed in the sense that on one hand, improved labor productivity allows enterprises to increase production, labor demand and wages. However, it could also result to a decrease in the units of labor required to produce the same level of output thereby lowering labor demand. In this case, if the firms are able to pay the highly productive workers based on their productivity, then the firm can maintain or even increase its output and consequently its export intensity by employing fewer productive workers. However, if the firm cannot afford to pay and maintain these productive workers, this may lead to exit of productive workers from the firms consequently reducing firm employment and export intensity.

As expected, the coefficient for R&D was positive pointing towards high export intensity for research-oriented firms. However, it was weakly significant at 10 percent. The coefficient had a magnitude of 0.0464 implying that firms that engaged in research and development had a 0.0464 higher share of exports in total sales on average compared to those who did not engage in research, ceteris paribus. Engaging in research activities promotes innovation and inventions which lead to introduction of new or high-quality products in the market which are more likely to enter international markets. As a result, research-oriented firms become more efficient and competitive thus export a higher share of their sales. These findings support existing empirical evidence on the effect of research and development on export intensity (Rialp-Criado & Komochkova, 2017; Benfratello, Bottasso, & Piccardo, 2022).

The 2013-year dummy coefficient was positive and statistically significant with a value of 0.0996. This meant that, in 2013, the firms' share of exports in total sales was 0.0996 more compared to the value in 2007, on average, holding other factors constant. This could be attributed to the economy recovery strategies that were put in place to spur the economy after the 2007-2008 post-election violence.

The study incorporated an industry dummy which comprised of four sub-sectors within the manufacturing sector. These were Food, Textiles and Garments, Chemicals, Pharmaceutical and Plastic and Other manufacturing. According to the WBES data, the other manufacturing sub-sector comprised of the other sub-sectors in the manufacturing sector other than the aforementioned. Export Intensity in the Chemical, Pharmaceutical, and Plastic sub-sector was 0.0756 more than that of other manufacturing sub-sector. This

could be attributed to increased regional demand for agrochemicals and industrial inputs with target markets comprising of the East African Community, Common Market for Eastern and Southern Africa and the African Continental Free Trade Area at large.

4.5.2 Results on the Effect of Export Intensity on Firm Level Total Factor Productivity in Kenya's Manufacturing Firms

The second aim of the study was to analyze the effect of export intensity on TFP for manufacturing firms in Kenya. This was achieved by estimating the dynamic panel data model presented on equation (3.47) using the two-step System Generalized Method of Moments (2SYSGMM) estimation technique. Static panel data models were also estimated for comparison purposes. The regression results based on the static and dynamic panel data models are presented on Table A6 in Appendix II.

Both the dependent variable (total factor productivity) and independent variables were in natural logarithmic form hence the estimated coefficients were interpreted as elasticities. The study findings from the static and dynamic models were consistent in terms of the signs of the coefficients. However, the results differed in terms of the magnitude of the coefficients as well as the statistical significance of the coefficients. From the results presented on Table A6 in Appendix II, the lagged value of TFP was moderately significant at 10 percent level of significance. This implied that TFP was influenced by its lagged value hence the dynamic specification was warranted. Additionally, the coefficient was negative implying that TFP displayed mean reverting behavior or convergence.

As such the study relied on the findings obtained from the dynamic panel data model. The short run and long run results based on the 2SYSGMM estimation technique are presented on Table 4.7.

Table 4.7: Regression Results on the Effect of Export Intensity on Firm-Level Total Factor productivity

Variables	**2-Step System GMM**			
Dependent Variable: Total Factor Productivity (TFP)	**Short-Run Coefficients**		**Long-Run Coefficients**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**
First Lag of TFP	-0.1145*	0.0750	-	-
Export Intensity	0.2608**	0.1298	0.2279**	0.1129
Firm Size	-0.2567**	0.1245	-0.2242**	0.1120
Capital Intensity	-0.2056***	0.0233	-0.1796***	0.0255
Firm Age	0.0309	0.3003	0.0270	0.2631
Labor Productivity	0.4627***	0.0534	0.4043***	0.0658
Management Experience	0.5104*	0.2896	0.4459*	0.2520
Foreign Ownership Dummy: *Base: Domestic*			-	-
Foreign	0.7727	0.7413		
Year Dummy: *Base: 2007*			-	-
Year=2018	-0.3467	0.3693		
Industry Dummy: *Base: Other Manufacturing*				
Food	0.3616	0.4470	-	-
Textiles and Garments	-0.8007	0.5385		
Chemical, Pharmaceutical, and Plastic	0.5397	0.5218		
Constant	7.0337***	1.4583	-	-
No. of Observations	257	-	-	-
Hansen Statistic (P-Value)	0.292	-	-	-
Number of Instruments	30	-	-	-

***** p<0.01, ** p<0.05, * p<0.1**
Source: Authors calculations based on study data

The coefficient of export intensity was positive and statistically significant in the short-run (SR) and in the long-run (LR). Respective values of 0.2608 and 0.2279 meant that, a

percentage increase in export intensity led to 0.2608 and 0.2279 percentage increase in firms' TFP on average in the SR and LR, respectively, all else being equal. Hence export intensity and firm level TFP exhibit an inelastic relationship. Export intensity had a slightly higher positive effect on firm level TFP in the short run (0.2608) than in the long run (0.2279). This could be based on the argument that the learning effects from exporting may increase or diminish over time based on the firm's ability to innovate and invent new techniques for the introduction of new products in the market in order to attract more clients and benefits as well as the persistence of the firm's export behavior (Love & Máñez, 2019).

The positive effect of exporting on firms' TFP is in line with the LBE hypothesis which argues that exporting improves firms' productivity, although empirical evidence on the LBE hypothesis is mixed (Bernard & Jensen, 1999; Grazzi, 2012; Haidar, 2012; Vu, Holmes, Tran, & Lim, 2016; Love & Máñez, 2019). The LBE hypothesis contends that selling on overseas markets should boost firm productivity via two key mechanisms. On one side, the larger worldwide market access fosters the utilization of economies of scale, while on the other hand, international interactions promote the development of skills via information and technological ripple effects, thus boosting firms' productivity. The findings of the study are in line with vast empirical evidence including (Bigsten & Gebreeyesus, 2009; Abbey, Gyeke-Dako, & Oduro, 2017; Whang, 2019; Kiendrebeogo, 2020; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023).

Among the control variables, the coefficient of firm size was negative and statistically significant in the SR and LR. Coefficient values of -0.2567 and -0.2242 implied that an

expansion in the number of workers by one per cent resulted to a 0.2567 and 0.2242 percentage decrease in firm's TFP on average in the SR and LR, respectively, ceteris paribus. Thus, the relationship between firm size and TFP was inelastic. The evidence on the relationship between firm size and firm TFP is mixed with most studies establishing a positive effect of firm size on firm level TFP such as Kreuser et. al (2018) for South Africa and Dvouletý, Blažková (2021) for Czech Republic and Macharia et.al, (2022) for Kenya. Other studies support a negative relationship between firm size and TFP such as (Deshmukh & Pyne, 2013; Seker & Saliola, 2018).

The negative effect of firm size on TFP could be attributed to the argument that small enterprises have adaptable, non-hierarchical systems that can lead to increased efficiency. They also may be able to discover dedicated employees and reward or compensate them with greater ease than larger firms, thus boosting the firm's productivity. In addition, over the years, the Kenyan government has implemented several policies aimed at supporting Micro, Small and Medium Enterprises (MSMEs) which may have translated to improved productivity and performance by MSMEs. More so, the manufacturing sector in Kenya is dominated by Micro, Small and Medium Enterprises MSMEs hence their improved performance is translated to the overall sector.

In the SR and LR, the coefficient for capital intensity was negative and statistically significant with values of -0.2056 and -0.1796, respectively. This implied that a percentage increase in capital intensity led to 0.2056 and 0.1796 percentage decrease in firm's TFP in the SR and LR, respectively, ceteris paribus. Therefore, TFP and capital intensity had an inelastic relationship. This was contrary to several empirical results in

which capital intensity positively affected firms' TFP such as (Yang & Mallick, 2010; Haidar, 2012; Kiendrebeogo, 2020; Dong, Kokko, & Zhou, 2022; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023).

However, the results can be explained based on the findings of Fonchamnyo (2014) for Cameroon manufacturing firms where capital intensity negatively influenced export intensity. Due to the labor-intensive nature of the manufacturing sector in Kenya, firms are able to hire affordable labor which cuts down their production costs and improves their efficiency. As such, the labor-intensive firms are able to enjoy higher TFP compared to capital intensive firms. The findings corroborate existing evidence (Fonchamnyo, 2014; Linh, 2021).

The coefficient for labor productivity was positive and statistically significant with values of 0.4627 and 0.4043 in the SR and LR. These findings implied that, on average, a percentage increase in labor productivity led to an increase in firms' TFP by 0.4627 and 0.4043 per cent in SR and LR, respectively, holding all other factors constant. Hence labor productivity and firm's TFP exhibited an inelastic relationship. These findings supported the evidence provided by Shen et. al (2020) for China (Shen, Yue, Sun, & Guo, 2020). This could be attributed to the argument that firms with highly productive workers are more efficient and are more likely to employ highly skilled workers as well as consistently upgrade the skills of their existing workers. Consequently, the firms become more efficient and innovative thus boosting their TFP.

Both in the SR and LR, the coefficient for management experience was positive and statistically significant with estimated values of 0.5104 and 0.4459, respectively. This meant that, on average, all else being equal, a percentage increase in the top manager's years of experience increased firm's TFP by 0.5104 and 0.4459 percent in the SR and LR, respectively. Thus, the relationship was inelastic. This positive relationship could be linked to the quality of decisions made by experienced managers in terms of the choice of workers, factors of production as well as updated and advanced production techniques. The results are in line with the findings of Lihn, 2021 and Macharia, et.al, 2022.

4.5.3 Results on the Effect of Export Intensity on Firm Employment in Kenya's Manufacturing Firms

The third objective of the study was to analyze the effect of export intensity on firm employment for manufacturing firms in Kenya. This was analyzed by employing both static and dynamic panel data models. The static models were estimated using the OLS estimation technique and the fixed effect model. The dynamic model was estimated using the 2SYSGMM estimation technique. The regression results for both the static and dynamic models are presented on Table A7 in Appendix II. Both firm employment and its explanatory variables were estimated using their natural logarithmic transformations hence the estimated coefficients were interpreted as elasticities.

From the results presented on Table A7 in Appendix II, the coefficient of the lagged dependent variable was statistically significant implying that firm employment exhibited

persistent behavior. This justified the dynamic specification of the model hence the study relied on the results obtained from the 2SYSGMM estimator.

Table 4.8 presents the results for the short run and long run coefficient estimates for the 2SYSGMM estimator.

Table 4.8: Regression Results on the Effect of Export Intensity on Firm Employment

Variables	Two-Step System GMM			
Dependent Variable: Firm Employment	**Short Run Coefficients**	**Std Error**	**Long Run Coefficients**	**Std Error**
First Lag of Firm Employment	0.4182**	0.2024	-	
Export Intensity	0.1668**	0.0752	0.2868**	0.1387
Capital Intensity	-0.0038	0.0130	-0.0066	0.0227
Firm Age	1.0195**	0.3953	1.7525**	0.7108
Firm Age^2	-0.1415**	0.0695	-0.2433*	0.1296
Labor Productivity	-0.0245	0.0297	-0.0420	0.0466
Wage per worker	-0.0959**	0.0456	-0.1649***	0.0626
Wage per worker^2	0.0075*	0.0041	0.0130**	0.0064
Foreign Ownership Dummy: *Base Domestic*				
Foreign	0.5738	0.4000	-	-
R&D Dummy: *Base: Non-Researchers*				
R&D	0.4562**	0.1796	-	
Year Dummy: *Base: 2007*			-	-
Year=2018	0.0409	0.1427		
Industry Dummy: *Base: Other Manufacturing*				
Food	-0.0292	0.1957	-	-
Textiles and Garments	-0.2293	0.2663		
Chemical, Pharmaceutical, and Plastic	-0.0340	0.2521		
Constant	0.0271	0.6882	-	
No. of Observations	257		-	
Hansen Statistic (P-Value)	0.175		-	
Number of Instruments	30		-	

***** p<0.01, ** p<0.05, * p<0.1**

Source: Authors Computations from study data

The coefficient for export intensity was positive and statistically significant, both in the short run (SR) and long run (LR). With a magnitude of 0.1668 and 0.2868, respectively, a percentage increase in export intensity led to 0.1668 and 0.2868 percentage increase in firm employment on average in the SR and LR, respectively, ceteris paribus. Therefore, the relationship between export intensity and firm employment was inelastic. The results implied that firms that exported a higher share of their exports experienced growth in the number of workers employed, with the effect being higher in the LR than in the SR. This could be because, once firms enter the export markets, they have to establish or conquer stable markets or clients for their produce first which may take a while. Hence in the SR, the number of workers may increase at a slower rate. However, once the firms establish stable markets for their produce, they can confidently employ more workers in the LR.

These results support the LBE hypothesis whereby the learning effects from exporting could be associated to reduced inefficiency of firms due to more competition, exposure to new innovations and technologies, or economies of scale generated by wider markets among others. In addition, given that Kenya's manufacturing sector is dominated by labor intensive technologies, for firms to produce more output for exports, they have to hire more labor. These results support existing empirical evidence (Bigsten & Gebreeyesus, 2009; Abbey, Gyeke-Dako, & Oduro, 2017; Whang, 2019; Kiendrebeogo, 2020; Camino-Mogro, Ordeñana-Rodríguez, & Vera-Gilces, 2023).

The SR and LR coefficient for firm age was positive and statistically with a magnitude of 1.0195 and 1.7525, respectively. These values meant that, on average, an increase in firm age by one percent led to an increase in firm employment by 1.0195 and 1.7525

percent in the SR and LR, respectively, all else being equal. Therefore, firm age and firm employment had a highly elastic relationship with a larger elasticity in the LR than in the SR. This may be attributed to the experience and information that firms gain regarding the markets as they keep operating over a period of time. With more experience, firms are able to discover new markets, products and production techniques which may need additional workers compared to start ups. The results are in line with (Yazdanfar & Salman, 2012; Yazdanfar & Öhman, 2015; De Lange, Van der Heijden, Furunes, De Lange, & Dikkers, 2021).

In most empirical literature, firm employment and firm age exhibit a non-linear relationship usually captured by introducing a square term for the age variable. The coefficient for the squared age variable was negative and statistically significant in the SR. The negative sign provided evidence of the decreasing marginal effect of age on firm employment represented by an inverted U curve. With a coefficient estimate of -0.1415, beyond a certain threshold of firm age, an increase in firm age by one percent led to a decline in firm employment by 0.1415 percent on average, ceteris paribus. The results were also consistent in the LR. The findings are consistent with Esaku (2020) who established a declining trend in job creation as firms ages over time. This could be explained by the fact that in the long run, all the gains from expansion may have been exhausted by the firms hence no need for additional workers. Some firms even find themselves laying off redundant workers.

The coefficient for wage per worker was negative and statistically significant in the SR and LR with respective values of -0.0959 and -0.1649. This implied that, on average, a

percentage increase in wage per worker yielded a 0.0959 and 0.1649 percentage decrease in firm employment in the SR and LR, respectively, ceteris paribus. Hence the relationship between wages and firm employment was inelastic. The negative effect of wages on firm employment can be associated with substitution effects in the sense that, holding other factors constant, as wages increase, employing labor becomes expensive thus forcing firms to substitute labor for other inputs. Consequently, firm employment reduces. These results are consistent with Were (2007) for Kenya and Whang (2019) for South Korea.

The coefficient for the squared wage per worker variable was positive and weakly significant in the SR. A value of 0.0075 meant that, beyond a certain level, as wage per worker increased further by one percent, this would result to 0.0075 percentage increase in firm employment, on average holding other factors constant. The findings were also similar in the LR. This implied that as wages increase further, firms are able to attract more workers whom if absorbed leads to an increase in firm employment. This can result from more skilled workers been drawn in to the labor force as wages increase to their expectations (efficiency wage) which consequently increases firm employment.

R&D had a positive coefficient which was statistically significant. The estimated coefficient had a value of 0.4562 which meant that, on average, firms that had introduced new products in the market experienced 0.4562 higher employment levels in the SR, ceteris paribus compared to the firms that had not. The positive effect of R&D on job creation could be attributed to the success of new products in the market. When firms introduce new products and succeed in the market, they improve their market share and

sales, which in turn may prompt them to hire more labor to cater for the increased demand of their products. These findings corroborate existing literature such as (Dachs, Hud, Koehler, & Peters, 2017; Avenyo, Konte, & Mohnen, 2019; Crespi, Tacsir, & Pereira, 2019).

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This chapter summarizes the study, provides conclusions and implications for policy based on the findings of the study. The contribution to literature as well as areas for future research are also discussed.

5.2 Summary

International trade has enhanced countries' potential to extend and enhance their economic operations while also developing their manufacturing sectors through improved firm performance. Since independence, Kenya has implemented policies geared towards industrialization for a robust manufacturing sector. Raising the economic output from manufacturing to 15 percent and achieving a 60 percent share of manufactured exports by 2022 were some of the main targets for the manufacturing sector for productivity improvement and job creation.

However, the sector's overall performance has been dropping, as evidenced by its economic contribution, which has averaged roughly about ten percent from 2007 to 2023 and has steadily dropped from 12.79 percent in 2007 to 7.60 percent in 2023, indicating deindustrialization. Furthermore, from 2007 to 2023, manufactured goods accounted for 33 percent of overall exports, falling short of the targeted 60 percent. Regarding employment, compared to services and agricultural sectors, manufacturing sector has

created the least share of jobs. This is despite its importance in the creation of productive and sustainable employment opportunities.

For the realization of the *Kenya Vision 2030,* these trends need to be counteracted. It was therefore vital to explore the relationship between export intensity, firm level TFP and firm employment since Kenya's policy focus has been on export promotion. The findings from the study would help enrich the literature and policy on export-led industrialization strategy. Specifically, the study analyzed the firm-level determinants of export intensity by manufacturing firms in Kenya; established the effect of export intensity on firm's TFP and firm employment for Kenya's manufacturing firms.

To achieve these objectives, three empirical models were estimated by utilizing panel data obtained from World Bank Enterprise Survey data (WBES) conducted in 2007, 2013, and 2018. TFP was first estimated employing the LP (2003) approach. Afterwards, the study employed the two-step Heckman Sample Selection model to analyze the firm-level determinants of export intensity by Kenya's manufacturing firms. To analyze the effect of export intensity on firm's TFP and firm employment, the two-step System Generalized Method of Moments (2SYSGMM) estimator was employed.

Regarding the firm-level determinants of export intensity, the regression results indicated that an increase in firm level TFP resulted in increased export intensity. This was consistent with the Self-Selection Hypothesis (SSH) and existing empirical evidence. Other positive firm-level determinants of export intensity were foreign ownership, firm size, firm age, human capital and research. Export intensity was found to be negatively

influenced by labor productivity. Additionally, the study established a positive effect of export intensity on firm level TFP as per the Learning by Exporting (LBE) hypothesis. Other positive determinants of firm level TFP were labor productivity and management experience with firm size and capital intensity yielding negative effects.

The study also established a positive effect of export intensity on firm level employment. Other than exporting, firm employment was positively influenced by firm age and research while it was negatively influenced by wage per worker. Moreover, the study established that firm employment had a non-linear relationship with firm age and wage per worker. The study's findings were validated by existing empirical and theoretical work.

5.3 Conclusions

The study findings lead to two main conclusions. First, Total Factor Productivity (TFP), foreign ownership, firm size, firm age, human capital and research are key positive firm-level determinants of export intensity in Kenya's manufacturing firms. Hence, to achieve the set targets regarding export promotion, it is imperative to keenly focus on these variables. Additionally, the positive effect of firm level TFP on export intensity supports the Self-Selection Hypothesis.

Second, export intensity has a positive effect on firms' TFP and firm employment which supports the Learning by Exporting hypothesis. This means that the export promotion strategies in place are not in vain and should be encouraged to further improve firm performance. More so, the negative influence of capital intensity on firms' TFP implies

that, in this context, employing a scarce factor intensely inhibits firm's TFP. It is therefore important for firms to employ the abundant factor more intensely, labor in this case, for better performance, given that Kenya is a labor abundant country.

5.4 Policy Implications

Several policy implications can be drawn from the study findings. First the study identified Total Factor Productivity as a key driver of export intensity for Kenya's manufacturing firms. This implies that the government needs to support manufacturing firms in terms of TFP enhancement. This can be achieved through government support on the invention and adoption of new technologies and investment in human capital. Since new technology is very costly, firms need government support to realize this. The Ministry of Cooperatives and Micro, Small and Medium Enterprises (MSME), the Ministry of Trade, Investments and Industry and the National Treasury and Economic Planning may work together with the management of firms and pool resources aimed at supporting manufacturing firms to invent and adopt new technologies for productivity enhancements. Firms also need skilled workers to work with these new technologies, hence the need to invest in human capital. This can be achieved through training of workers as discussed in the next paragraph.

The results indicate a positive effect of human capital on firm's export intensity, hence training workers is crucial in terms of the firm's performance. Therefore, it is important for firms to work with the relevant arms of government: The Ministry of Trade, Investments and Industry in collaboration with the National Industrial Training Authority

(NITA) and the Kenya Association of Manufacturers (KAM) to equip their workforce with the relevant skills. Manufacturing firms should take advantage of the training programmes offered by NITA. To do this, the firms need to be motivated and empowered to facilitate their registration with NITA, identify relevant training programmes and apply for training grants and subsidies. Additionally, firms' management ought to ensure that their firms are members of KAM so as to benefit from the technical, management and specialized training programmes under the manufacturing academy. As such there would be a decrease in the skills mismatch caused by a lack of industry-specific abilities or competencies and consequent performance improvements in the manufacturing sector.

The results pointed out that foreign-owned firms exported a higher share of their sales compared to domestic firms. From existing empirical evidence, foreign firms have an upper hand compared to domestic firms regarding capital intensity, availability of foreign inputs, connections to foreign markets and advanced technologies among others. Hence, a conducive business environment is necessary to encourage foreign investors in order to reap these benefits and provide positive spillovers to the domestic firms. Domestic firms can also partner with foreign entities. More so, domestic firms need more support from the government to overcome the sunk costs involved in successfully penetrating and surviving in international markets so as to boost their export performance. The domestic firms may work closely with the government to acquire more information regarding international markets and advertise their products internationally. This can be achieved by continuous consultations of firms' management with the Ministry of Cooperatives and MSMEs and Ministry of Trade, Investments and Industry in collaboration.

Based on the positive effect of firm size on export intensity established by the study, the government, through the Ministry of Cooperatives and Micro, Small and Medium Enterprises (MSME) and Ministry of Trade, Investments and Industry needs to support MSMEs to grow and graduate into large enterprises. The government can help MSMEs access affordable finance, develop industrial parks and special economic zones with affordable infrastructure, offer tax incentives to MSMEs in the manufacturing sector and generally provide a conducive policy and regulatory environment for MSMEs to thrive.

Over the years, the Kenyan government has laid a lot of emphasis on an export-led industrialization strategy. The study found evidence of export-led growth whereby exporting enhanced firms' TFP and employment. This implies that, the Kenyan government is on the right track in terms of supporting an export-led industrialization policy. Therefore, based on the study findings, the Ministry of Trade, Investments and Industry needs to continue and scale up the implementation of policies aimed at promoting exports such as the expansion of export processing zones, special economic zones and export financing and incentives among others. More so, to enhance market access and achieve economies of scale, firms need to focus on home, regional, and international markets. This may be enhanced through active involvement of Kenya in regional and international trade agreements especially the African Continental Free Trade Area (AfCFTA) among others.

The study established a negative effect of capital intensity on firms' TFP. These results support the Heckscher-Ohlin (Factor Proportions) theory which argues that trade between countries is influenced by their factor-endowments. A capital-rich country will produce

and export more capital-intensive goods while a labor-rich country will produce and export more labor-intensive goods. Given that Kenya is a labor-rich country, it will be more economical for Kenya to produce more labor-intensive goods for exports compared to capital-intensive goods. Therefore, firms should invest in labor-intensive production techniques which will utilize the abundant labor resource in the country and enhance their performance. This calls for the adoption of labor-friendly technologies such as collaborative robotics and digital manufacturing tools, among others.

The National Research Fund (NRF), in collaboration with the National Treasury and Economic Planning and the Ministry of Cooperatives and MSMEs can work hand in hand with the management of firms to provide resources to manufacturing firms aimed at boosting research activities. This is drawn from the positive effect of research on firm employment and export intensity. Participation in research leads to new inventions and innovations such as development of new products which enhance firm performance in general. The government through NRF and relevant agencies can facilitate provision of R&D grants, subsidized loans for research firms, establishment of industrial research parks and scaling up manufacturing incubators. It is also necessary for the researchers to work closely with the Kenya Industrial Property Institute (KIPI), the Kenya Copyright Board (KECOBO), Kenya Plant Health Inspectorate Services (KEPHIS) and the Anti-Counterfeit Agency (ACA) and ensure that intellectual property rights are assigned to the right parties and protected to ensure that the inventors benefit from their inventions and are encouraged to pursue more research.

5.5 Contribution to Knowledge

This study advances current comprehension regarding firm level determinants of export intensity and how exporting influences firm performance, especially in the Kenyan context. It applies both New-New Trade Theory (NNTT) and the Heckscher-Ohlin-Samuelson (H-O-S) Theory, to empirically demonstrate determinants of export intensity and how exporting firms outperform non-exporters in terms of TFP and employment. By conducting firm-level analysis and integrating metrics like TFP, employment, labour productivity, capital intensity, human capital and R&D, the study transcends aggregate-level analysis. Additionally, it fills in methodological voids in earlier research by using econometric tools to reduce endogeneity issues and guarantee reliable causal interpretations.

By assessing institutional support strategies which improve firm export competitiveness, this study also adds to policy debates. It focuses on how TFP and firm heterogeneity influences firms' export intensity. Additionally, it provides evidence of the importance of export promotion on firm performance and the country in general. The results provide useful advice for enterprises looking to expand globally, highlighting the importance of TFP enhancement, R&D, and human capital investment for firm success. This research enhances scholarly discussions and offers data-driven recommendations for policymakers and corporate executives looking for long-term export-driven prosperity by addressing the gap between academic views and industry facts.

5.6 Areas for Further Research

The current study analyzed both the Self Selection Hypothesis and the Learning by Exporting Hypothesis for manufacturing firms in Kenya. This analysis can be extended to other sectors especially the services and agriculture sectors since they are also key in the economy. This can help understand the dynamics of the subject across different sectors. In addition, the scope can be extended to incorporate other countries maybe in the East African Community or Africa, if possible, based on data availability.

Data availability and accessibility especially at the firm level on this subject is a pertinent issue. With availability of data, the scope can be extended to incorporate more periods to capture more dynamics of this subject over time. In addition, future studies can look into the effect of exporting on other dimensions of firm performance such as profitability and wages.

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APPENDICES

Appendix I: Diagnostic Test Results

Table A1: Multicollinearity Test results on the Firm-Level Determinants of Export Intensity

Variables	VIF	1/VIF
Total Factor Productivity	5.959	.168
Firm Employment	1.659	.603
Firm Age	1.233	.811
Human Capital	1.245	.803
Labor Productivity	7.978	.125
Material	2.165	.462
Energy Cost	2.78	.36
Foreign Ownership	1.113	.898
Year=2013	2.175	.46
Year=2018	2.198	.455
Research	1.159	.863
Textiles and Garments	1.425	.702
Chemicals Pharmaceuticals and Plastics	1.369	.731
Other Manufacturing	1.569	.638
Mean VIF	2.144	

VIF: Variance Inflation Factor

Source: Author's Computations from study data

Table A2: Results of the Ramsey Regression Specification Error Test (RESET)

Model	F-statistic	P-value
Firm-Level Determinants of Export Intensity	1.35	0.2601

Source: Author's computations from study data

Table A3: Results on Hausman Test for Model Selection

Model	Chi-square statistic	P-value
Effect of Export Intensity on Total Factor Productivity	17.945	0.459
Effect of Export Intensity on Firm Employment	66.15	0.000

Source: Author's computations from study data

Table A4: Results for Modified Wald Test for Group wise Heteroscedasticity

Model	Chi-square statistic	P-value
Firm-Level Determinants of Export Intensity	1.2e+34	0.000
Effect of Export Intensity on Total Factor Productivity	2.9e+59	0.000
Effect of Export Intensity in Firm Employment	4.7e+34	0.000

Source: Author's computations from study data

Table A5: Hansen Over Identifying Restrictions Test Results

Model	Chi-square statistic	P-value
Effect of Export Intensity on Total Factor Productivity	14.13	0.292
Effect of Export Intensity in Firm Employment	19.91	0.175

Source: Author's computations from study data

Appendix II: Regression Results

Table A6: Regression Results on the Effect of Export Intensity on Firm-level Total Factor productivity

Variables	Model/Estimation Technique		
Dependent Variable: Total Factor Productivity	**Ordinary Least Squares**	**Random Effects**	**2-Step System GMM**
First Lag of Total Factor Productivity	-	-	-0.1145*
			(0.055)
Export Intensity	0.0927	0.0927	0.2608**
	(0.162)	(0.159)	(0.046)
Firm Size	-0.1472	-0.1472*	-0.2567**
	(0.112)	(0.066)	(0.040)
Capital Intensity	-0.2011***	-0.2011***	-0.2056***
	(0.000)	(0.000)	(0.000)
Firm Age	0.0130	0.0130	0.0309
	(0.938)	(0.929)	(0.918)
Labor Productivity	0.4622***	0.4622***	0.4627***
	(0.000)	(0.000)	(0.000)
Management Experience	0.2166	0.2166	0.5104*
	(0.168)	(0.119)	(0.079)
Foreign Ownership Dummy (FO)			
Base: Domestic			
Foreign	0.9499***	0.9499***	0.7727
	(0.013)	(0.008)	(0.298)
Year Dummy			
Base: 2007			
Year=2013	-1.0927***	-1.0927***	-
	(0.000)	(0.000)	
Year=2018	-1.0542***	-1.0542***	-0.3467
	(0.000)	(0.001)	(0.349)
Industry Dummy			
Base: Other Manufacturing			
Food	0.0565	0.0565	0.3616
	(0.824)	(0.822)	(0.419)
Textiles and Garments	-0.5760*	-0.5760*	-0.8007
	(0.058)	(0.057)	(0.138)
Chemical, Pharmaceutical, and Plastic	-0.0256	-0.0256	0.5397
	(0.945)	(0.941)	(0.302)

Constant	7.5846*** (0.000)	7.5846*** (0.000)	7.0337*** (0.000)
No. of Observations	482	482	257
Wald: Chi^2	-	655.90***	-
R-Squared	0.5862	0.5862	-
Adjusted R-Squared	0.5700	-	-
Hansen Statistic (P-Value)	-	-	0.292
Number of Instruments	-	-	30

P-Values in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Source: Authors calculations based on study data

Table A7: Regression Results on the Effect of Export Intensity on Firm Employment

Variables	Model/Estimation Technique		
Dependent Variable: Firm Employment	**Ordinary Least Squares**	**Fixed Effects**	**2-Step System GMM**
First Lag of Firm Employment	-	-	0.4182**
			(0.040)
Export Intensity	0.2273***	0.0674*	0.1668**
	(0.000)	(0.099)	(0.027)
Capital Intensity	0.0007	0.0004	-0.0038
	(0.939)	(0.964)	(0.769)
Firm Age	0.5401**	0.5241**	1.0195**
	(0.039)	(0.050)	(0.011)
Firm Age^2	-0.0324	-0.0509	-0.1415**
	(0.507)	(0.379)	(0.043)
Labor Productivity	0.0139	0.0014	-0.0245
	(0.411)	(0.904)	(0.411)
Wage per worker	-0.1101***	-0.0188	-0.0959**
	(0.001)	(0.442)	(0.037)
Wage per worker^2	0.0124***	0.0027	0.0075*
	(0.000)	(0.264)	(0.067)
Foreign Ownership Dummy (FO)			
Base: Domestic			
Foreign	0.0418	-0.3797*	0.5738
	(0.867)	(0.081)	(0.153)
Research Dummy			
Base: Non-Researchers			
Research	0.5541***	0.0894	0.4562**
	(0.000)	(0.463)	(0.012)
Year Dummy			
Base: 2007			
Year=2013	-0.5680***	-0.3600***	-
	(0.001)	(0.007)	
Year=2018	-0.5775***	-0.2753*	0.0409
	(0.001)	(0.080)	(0.775)
Industry Dummy			
Base: Other Manufacturing			
Food	0.1656	-0.2507	-0.0292
	(0.229)	(0.380)	(0.881)
Textiles and Garments	0.0200	-0.3912	-0.2293

	(0.915)	(0.244)	(0.390)
Chemical, Pharmaceutical, and	0.0873	-0.1867	-0.0340
Plastic	(0.614)	(0.497)	(0.893)
Constant	1.8484***	3.0939***	0.0271
	(0.000)	(0.000)	(0.969)
No. of Observations	482	482	257
F-Statistic	14.18***	3.24***	-
R-Squared	0.2842	0.1800	-
Adjusted R-Squared	0.2630	-	-
Hansen Statistic (P-Value)	-	-	0.175
Number of Instruments	-	-	30

P-Values in parentheses: *** p<0.01, ** p<0.05, * p<0.1
Source: Authors Computations from study data

Appendix III: Approval of Research Proposal

KENYATTA UNIVERSITY
GRADUATE SCHOOL

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P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School

DATE: 24th July, 2023

TO: Dorothy N. Kimolo
C/o Department of Applied Economics
KENYATTA UNIVERSITY

REF: K96/CTY/33054/2015

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board at its meeting 12th July, 2023 approved your Ph.D. Research Proposal entitled "International Trade Participation and Firm Performance in Kenya's Manufacturing Sector".

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision Tracking and Progress Report Forms. The Forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your thesis before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.
By copy of this letter, the Registrar (Academic) is hereby requested to grant you substantive registration for your Ph.D. studies.

Thank you.

JOHN M. ODONGI
FOR: EXECUTIVE DEAN, GRADUATE SCHOOL

c.c. Chairman, Department of Applied Economics
Registrar (Academic) Att; Mr. Richard Chweya

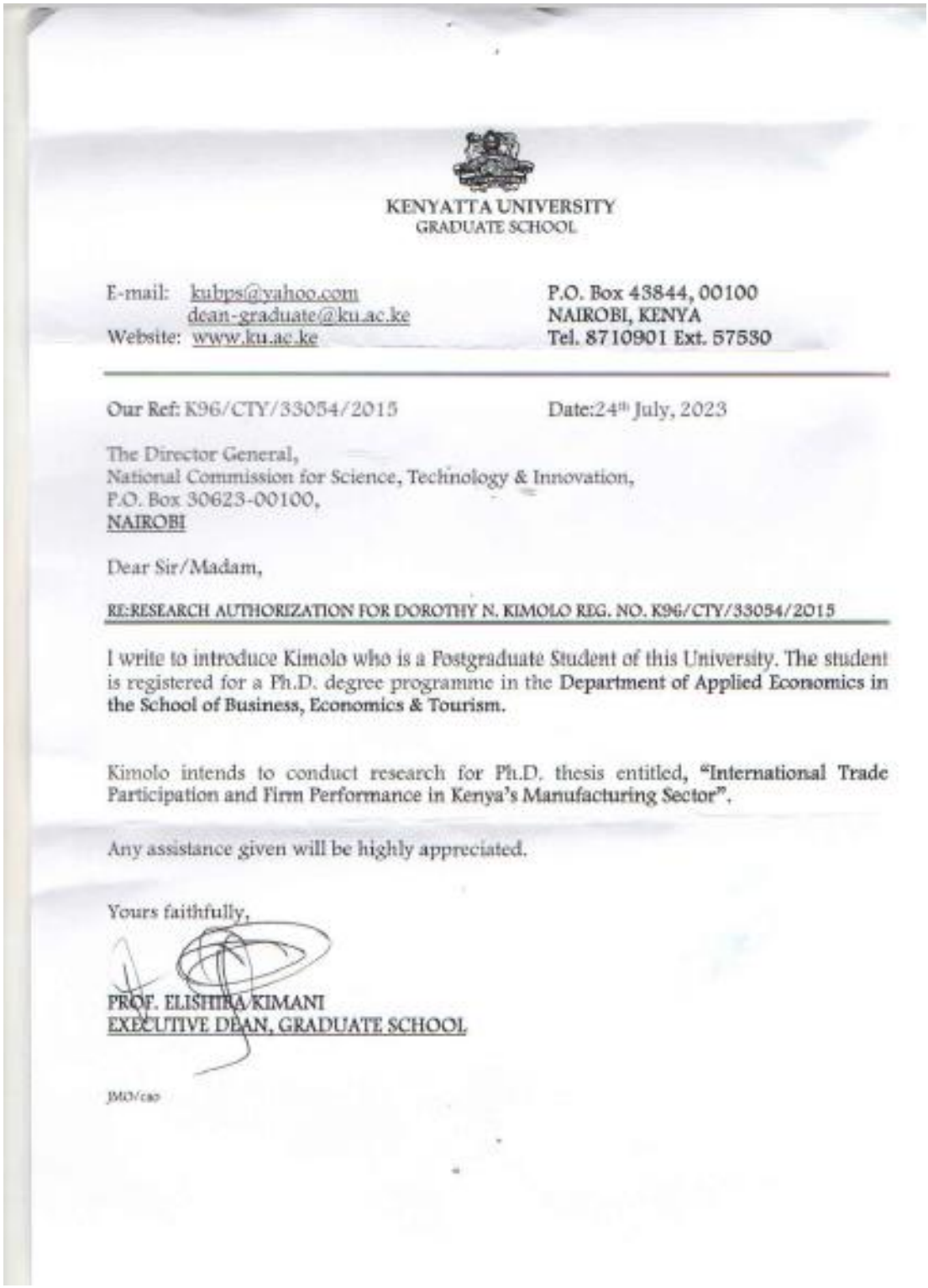
Supervisors:

1. Dr. Jennifer Njaramba
C/o Dept. of Econometrics & Statistics
Kenyatta University

2. Dr. Laban Chesang
School of Business
Daystar University
C/o Dept. of Applied Economics
Kenyatta University

JMO/cao

Appendix IV: Research Authorization



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Our Ref: K96/CTY/33054/2015 Date:24th July, 2023

The Director General,
National Commission for Science, Technology & Innovation,
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

RE:RESEARCH AUTHORIZATION FOR DOROTHY N. KIMOLO REG. NO. K96/CTY/33054/2015

I write to introduce Kimolo who is a Postgraduate Student of this University. The student is registered for a Ph.D. degree programme in the **Department of Applied Economics in the School of Business, Economics & Tourism.**

Kimolo intends to conduct research for Ph.D. thesis entitled, **"International Trade Participation and Firm Performance in Kenya's Manufacturing Sector".**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
EXECUTIVE DEAN, GRADUATE SCHOOL

JMO/cao

Appendix V: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 367671

Date of Issue: 18/October/2024

RESEARCH LICENSE

This is to Certify that Miss...DOROTHY NGINA KIMOLO of Kenyatta University, has been licenced to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: International Trade Participation and Firm Performance in Kenya's Manufacturing Sector for the period ending : 18/October/2025.

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