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Assessment of Firm Level Drivers of Productivity and Competitiveness in the Tanzania Enterprise Sector

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ASIP	Annual Survey of Industrial Production
CFTA	Continental Free Trade Area
CIP	Census of Industrial Production
EAC	East Africa Community
FDI	Foreign Direct Investment
FSDT	Financial Sector Deepening Trust
FYDP	Five Year Development Plan
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GEM	Grounding Enterprises Market
ICT	Information and Communication Technology
IMF	International Monetary Fund
ISO	International Organisation for Standardisation
ITU	Innovation and Technology Upgrading
MNO	Mobile Network Operators
MSME	Micro, Small and Medium Enterprises
NBS	National Bureau Statistics
NFIF	National Financial Inclusion Framework
NIS	National Innovation System
OLS	Ordinary Least Squares
RTA	Regional Trade Agreements
SME	Small and Medium Enterprise
SSA	Sub Saharan Africa
TDV	Tanzania Development Vision
TES	Tanzania Enterprise Survey
TFP	Total Factor Productivity
TIC	Tanzania Investment Center
TRA	Tanzania Revenue Authority
ULC	Unit Labor Cost
URT	United Republic of Tanzania
VAPW	Value Added Per Worker
VIF	Variable Inflation Factor

WBES	World Bank Enterprise Survey
WPW	Wage per Worker

EXECUTIVE SUMMARY

The main objective of this study is to provide comprehensive mapping and empirically determine the drivers of competitiveness and productivity of the Tanzanian enterprise sector. The purpose is to identify a set of appropriate policy measures to enhance realisation of the various private sector development policy objectives. To achieve these objectives, the study utilized the recently available Tanzania Enterprise Survey (TES) dataset for 2022 to provide the needed data for the analysis. Availability of the dataset is a notable achievement in addressing the gaps in the existing/previous firm level datasets as it provides comprehensive information on Tanzania's enterprise sector with a representative sample of 1,872 firms covering Tanzania Mainland and Zanzibar.

The methodology used for carrying out the study involved a number of analytical aspects/steps. First, we conducted a mapping of the enterprise sector to enhance our understanding of the firm characteristics, distribution across administrative regions and sectors. As a result, unlike most of the existing surveys that suffers limited coverage of the enterprise universe; it was possible to distinguish these characteristics while comparing firms of different size, activities/sectors and legal status. Secondly, we used descriptive analysis to identify and estimate different indices or measures of productivity and competitiveness, thereby providing complete information on the current status/levels of productivity and competitiveness across the entire enterprise sector. The results set a baseline upon which future surveys of similar scale can be compared. Finally, we undertook empirical analysis to identify the drivers of firm productivity and competitiveness. To complement the discussion of results, the analysis was concluded by identifying priority key sectors and critical policy issues for enhancing productivity and competitiveness of the enterprise sector in Tanzania.

Some findings emanating from the analysis can be summarised as follows. First, consistent with findings in other previous studies, the Tanzania enterprise sector is comprised of heterogeneous firms with different characteristics (size, sector and location among others). As a result, the level of productivity and competitiveness is significantly driven by firm characteristics, including firm size, exporting, formal and gender status. The identified determinants of productivity/competitiveness show that the enterprise sector is quite heterogeneous with significant differences such that the one-size fits all approach cannot be effective in policy measures to develop/promote the enterprise sector. Exporting firms are associated with relatively higher wages but also create more value addition than non-exporters. Due to their informal nature, small firms are associated with low level of wages (low ULC) which does not necessarily mean they are more competitive, since they face relatively low value added. Although the Government is keen to promoting women economic empowerment and entrepreneurship, the share of women owned businesses is less than a quarter of all enterprises, majority of which are in tourism, mining and quarrying and agriculture sectors. Furthermore, compared to their male counterparts, women owned enterprises pay lower wages and create lower value added.

Secondly, Tanzanian enterprise sector has a very low level of exporting both in terms of a dismal number of exporters (15.9% of total enterprises) and even the few exporting firms export only a small proportion of total sales (4.2%). This means that the enterprise sector is largely domestic market oriented, implying limited success of the export promotion

initiatives. Related to this, the analysis confirms, perhaps like in most other Sub-Sahara African economies, that informality and small size are a dominant feature of the Tanzanian enterprise sector. This fact suggests that, enterprise productivity and competitiveness is held back by the vicious circle of low capacity and weak entrepreneurship skills. The vice versa is also true that the more formal and larger firms are associated with much bigger capacity, hence higher levels of productivity and competitiveness and higher exporting incidence. The dichotomy leads to a competing demand for policy action to support growth of small/informal firms as well as augment the competitiveness of the large formal firms. The assertion does not mean that small/informal firms are not productive or competitive. Indeed, previous work on Tanzania has shown existence of small/informal firms with features of productive/competitive firms with significantly growth of employment (see Diao, et al. 2018).

Thirdly, productivity and competitiveness differs markedly across sectors, presumably driven by firm characteristics and nature of activities. Some sectors are identified as significant drivers of the overall levels of productivity/competitiveness and others less so. Construction, Financial and insurance, and Wholesale and retail sectors are top in the list, followed by Transportation, Manufacturing, and Utilities (water and electricity). On the contrast, the Public sector, ICT and creative industry are bottom in the list. This ranking needs to be interpreted with caution since all the sectors are important in their own right. For instance, it is not surprising that the Public sector is identified as the most unproductive/uncompetitive sector compared to financial sector that is dominated by private enterprises.

Fourthly, consistent with findings from the literature, the results show that the level of productivity and competitiveness is an increasing function of capital intensity. The descriptive analysis shows that overall, the level of investment is low across the enterprise sector (less than 10% of sales revenue) and that firms spend more on capital investment (e.g. equipment and machinery) compared to other forms of investment such as training and R&D. However, it is surprising to note that the sectors with a relatively high share of investment in sales are not the sectors with top most levels of productivity and competitiveness, presumably reflecting the nature of activity (capital intensive sectors) more than the performance of such enterprises. For instance, equipment and machinery forms a large part of investment spending (as share of sales) for heavy utility (electricity and water) and ICT sectors, which is necessary but not sufficient condition for enhancing productivity and competitiveness.

Fifth, the study also assessed progress made in addressing business environment challenges, given the notable initiatives made by the Government and results from previous surveys. The results indicate that some challenges are persistent, notably around taxation (especially for large firms), access to finance (especially for MSMEs) and electricity (especially for the manufacturing sectors). Clearly, the initiatives made by the Government including introduction of online payments systems (digitalisation), rural electrification programs and financial inclusion strategies have made notable progress in alleviating these challenges. However, business environment appears to have deteriorated on other areas including transportation, access to land, corruption, business licensing and permits, crime/theft and disorder; and labour regulations and inadequately educated work force.

Clearly, the study contributes to the discussion about private sector development strategy for Tanzania for which a number of policy implications can be drawn, including the critical need for the Government to (i) promote enterprise development, including measures to

address challenges of low capacity, high level of informality and low level of entrepreneurship; (ii) carry out overarching reforms to address systemic business environment challenges within the framework of Blueprint; (iii) adopt more aggressive strategies or programs for encouraging/supporting firms participation in international trade to enhance capacity of Tanzania in harnessing the opportunities in the Regional Trade Agreements and the African Continental Free Trade Area (AfCFTA) agreement.

Finally, the study identified a couple of areas for further research, including the need to (i) investigate how to address the issue of size and informality in promoting enterprise development; (ii) undertake a detailed sector specific research to understand the scope for promoting optimal levels of productivity and competitiveness in particular sectors, so as to provide more insight on the policy actions needed to unlock their potential; and (iii) undertake more specific study on behaviour of firms, challenges and prospects for exporting may generate useful insights to improve effectiveness of the export promotion strategies.

1.0 INTRODUCTION

1.1 Background

Since the shift towards a more market-oriented economy, the private sector in Tanzania has played an increasingly important role in the country's economic development. Indeed, Tanzania has recently embarked on her third Five Year Development Plan (2021/22-2025/26) – FYDP III which focuses on enhancing industrial and export competitiveness to increase productivity in manufacturing (URT, 2021). Clearly, the private sector is an important element of the plan in that majority of the strategic interventions outlined in the plan is directly aimed towards the private sector development, and in which it is expected to play a critical role in implementation.

However, successful implementation and realisation of the various private sector development policy objectives depends to a large extent on effective mapping and assessment of the enterprise sector in order to understand its structure/composition, the challenges affecting its growth and the appropriate remedial policy measures to address them. Clearly the private sector landscape in Tanzania includes various actors and the universe of the enterprise sector of different sizes, sector, types and forms, producing goods or services in exchange for commercial and financial benefits.

As noted in the third Five-Year Development Plan (URT, 2021), the enterprise sector in Tanzania is constrained by several challenges including: pervasive informality, weak legal and regulatory framework and unfavourable business environment which confounds key functional features of private sector operations such as enhancing the registration of property, easing access to credit, protecting minority investors, paying taxes, trading across borders, and enforcing contracts; thus affecting productivity and competitiveness. These challenges have been compounded by the lack of comprehensive data covering the universe of the enterprise sector in Tanzania for assessing the impact of government policy interventions in addressing them and designing appropriate and effective remedial measures to support increased growth. As it will be explained in the later sections, the existing datasets on enterprise sector for Tanzania are less comprehensive with different gaps.

In recognition of such challenges REPOA conducted a comprehensive nation-wide survey of the enterprise sector in Tanzania (mainland and Zanzibar) dubbed the *Tanzania Enterprise Sector* survey 2022 *(TES 2022)*. Unlike previous/existing surveys, the TES 2022 covered more activities/sectors and collected more updated information on firms in the enterprise sector. The survey was completed in early 2023. This paper examines productivity and competitiveness of firms in the enterprise sector in Tanzania using TES 2022.

1.2 Research Problem

Existing studies on productivity and competitiveness of enterprise sector in Tanzania mostly rely on primary data with relatively small scope/sample in terms of the number of firms, sectors and regions covered - while others have relied on existing secondary firm level data such as World Bank Enterprise Surveys (WBES) 2006-2013, the Annual Survey of Industrial

Production (ASIP) 2008-2016, Census of Industrial Production (CIP) 2013 and Micro Small and Medium Enterprise (MSME) baseline survey 2010. However, each of those dataset has different gaps. For instance, on the one hand, the MSME baseline survey apparently left out Large Enterprises given the focus on micro, small and medium enterprises. On the other hand, the ASIP dataset covers formal firms from small to large size thus omitting micro enterprises. More importantly, the ASIP only covers firms operating in manufacturing, mining, electricity and water sectors; while the WBES only focuses on the manufacturing and services sectors. Most importantly, the highlighted datasets are largely dated.

Beginning 2016, Tanzania adopted unwavering policy drive for industrialisation as stipulated in the second Five Year Development Plan (FYDP II), but has since 2021 shifted emphasis on productivity and competitiveness in the subsequent FYDP III. This implies the need for comprehensive assessment of competitiveness and productivity issues of the Tanzania's enterprise sector. Such assessment is currently not available. Key issues of focus include mapping the enterprise sector and identifying drivers of competitiveness and productivity to support growth of the private sector. Such analysis requires a more detailed and comprehensive dataset that covers all activities of the economy.

1.3 Objective

The main objectives of this study are two folds. The first objective is to provide comprehensive mapping of the enterprise sector in Tanzania, including to identify its structure/composition, challenges and prospects for growth. The second objective is to empirically determine the drivers of competitiveness and productivity of the Tanzanian enterprise sector in order to identify a set of appropriate remedial policy measures to enhance realisation of the various private sector development policy objectives.

1.4 Organisation of the Paper

This paper consists of six chapters including this introductory chapter. Chapter two presents the literature review, while chapter three presents the methodology. Chapter four chapter three presents the results, including the mapping of the enterprise sector, the indices of productivity and competitiveness, and findings from the empirical analysis of the drivers of firm productivity and competitiveness. Chapter five discusses selected issues identified from the empirical analysis; and finally, chapter six concludes by highlighting key messages and implications for policy.

2.0 LITERATURE REVIEW

There is ample literature on firm competitiveness and productivity. One common observation from this set of literature is that, there are multiple indicators used to measures firm productivity and competitiveness (partly owing to variety of approaches and models for assessing competitiveness). In measuring productivity, some studies use single while others use multiple factor productivity indicators. On the one hand, common indicators of productivity include value added per worker/capital, output per worker/capital and sales per worker (see Amutabi and Wambungu, 2020; Danquah and Sen, 2021; Krugman, 1994). On the other hand, studies focusing on competitiveness have used market share, volume of manufacturing index, financial performance indicators (Return on Equity/Assets/Sales) and market expansion (see Damiyano et al, 2012; Lalinksy, 2013; Liargovas and Skandalis, 2010; and Kahyarara, 2013).

Below is a review of a few previous studies, aimed at understanding established measurement and drivers of firm productivity and competitiveness so as to inform methodology of the current study. The review provides insights on how different approaches have been applied to determine findings for different countries, thereby providing analytical context for the case study of Tanzania. For example, Amutabi and Wambungu (2020) used value added per worker to measure firm productivity by using the World Bank enterprise survey (WBES) dataset. The study found that capital intensity, employee wage, high school education, and managers' experience impacted positively and significantly on labour productivity while tax burden and power outages significantly decreased labour productivity across all firms.

Damiyano et al. (2012) similarly used the WBES data to examine the cause and remedies to manufacturing competitiveness for Zimbabwe. The study concluded that, reducing transaction costs, growing exports, improving electricity supply and FDI play key role in enhancing Zimbabwe's manufacturing competitiveness. Using firm level survey dataset, Liargovas and Skandalis (2010) found that use of loan, exporting, location, size and management competence significantly affect firm competitiveness. Furthermore, the findings showed that firm decisions on such key issues as location and investments play key role in influencing the level of competitiveness.

Another important feature in the literature is association of productivity and competitiveness for which some studies have used the two as synonymous while others analyse them as different issues. Indeed, some firm performance studies show that the two concepts are positively related (Caves and Barton, 1990; Nickell, 1996) in that that the more competitive firms are the more efficient they are and vice versa. Note that, one of the early conceptual definition of competitiveness focused on costs of production, where a competitive firm is defined as the one with lower cost of production. Such studies emphasised that measurement of competitiveness should consider productivity (Aiginger et al, 2013). Following, studies focusing on firm level productivity are also meant to understand drivers of firm competitiveness. Below we review a sample of such studies to understand different results for different countries.

Using cross sectional datasets, Mawejje and Okumu (2018) and Rath (2006) found that fixed assets investment and average labour wage have a positive impact on labour productivity; while Heshmati and Rashidghalam (2018) found that capital intensity has an insignificant effect on labour productivity among Kenyan manufacturing and service firms. Mensah (2016) finds a significant and robust negative effect of power outages on firm-level productivity among 15 SSA countries. The poor business environment has also been associated with reduced productivity and growth among formal African firms (see Arnold et al, 2008; Dethier et al, 2011; Eifert et al, 2008 and Ishengoma and Kappel, 2011). The high tax rate was found to affect negatively on firm productivity among Ugandan enterprises (Mawejje & Okumu, 2016). Nagler and Naude (2014) find a decline in labour productivity for firms located in rural areas, highlighting the role of proximity to infrastructural amenities in enhancing productivity.

A number of empirical studies have also been conducted to understand the role of innovation and technology upgrading on firm productivity and competitiveness. This focus arises from the widely established consensus that innovation enhances labour productivity (see Adegboye and Iweriebor, 2018; Griffin, et al, 2006; Organisation for Economic Cooperation and Development, 2009). Despite the consensus, empirical evidence in the developing economies varies significantly across countries. For instance, in EAC, Chowdhury and Wolf (2003) found that that innovation (proxied by ICT) dampens labour productivity among SMEs in the East Africa Community (EAC) region. On the other hand, the study by Heshmati and Uwitonze (2016) reveals that innovative firms boast of a competitive advantage over the non-innovative firms. Okumu and Buyinza (2018) rather find a neutral relationship between a firm's engagement in any kind of innovation and labour productivity *ceteris paribus*.

Furthermore, firm level studies show that the determinants of firm competitiveness depend on the indicator used to measure it. For example, in assessing determinants of competitiveness of Slovak firms, Lalinsky (2013) estimated different indicators of competitiveness including profitability, market share, labour productivity and exports, which appears to have different results. For instance, having a foreign management was found to have a significant effect on exports and labour productivity but no effect on return on asset and market share. The cost of energy was found to have negative effect on market share and return on asset but no effect on labour productivity and exports.

For Tanzania, a few existing studies are less comprehensive, mainly due to limited availability of data covering the entire enterprise sector, and others are more qualitative or specific in approach. A few examples are in order. Fasha and Itika (2021) estimated competitiveness of textile firms operating in Dar es Salaam and Morogoro regions using Grounding Enterprises Market (GEM) model which is an improvement on Potter's Diamond Model of Competitiveness. The study found that, privately owned firms had a competitive advantage as opposed to public owned firms. Kahyarara (2013) analysed the impact of market Competition on the performance of Tanzanian manufacturing sector. The study measured competition using the Hirschman-Herfindahl Index – HH, which indicated that a one percent increase in competition results into 0.4% increase in productivity. Based on panel data analysis, the results indicate a positive correlation between firm specific characteristics and firm performance.

Mboya and Kazungu (2016) analysed the drivers of firm's competitiveness in the Textile and Apparel Industry in Tanzania using data collected from 204 firms in Dar es Salaam, Mwanza and Arusha regions. The results showed that value chain management, core competencies, competition, availability of alternative products and barriers to entry are statistically significant factors explaining the competitiveness of firms operating in the textile and apparel industry in Tanzania. Aikaeli (2012) reviewed the literature on the drivers of SMEs competitiveness in Tanzania. The study found that the factors affecting competitiveness of SMEs in Tanzania include: investment climate impediments, inadequate innovation, poor infrastructure and high transaction cost. Other identified bottlenecks include information asymmetry, shortages and/or insufficient supply of factors of production and the poor economies of scale. Goedhuys et al (2008) examined the determinants of productivity in the Tanzanian manufacturing firms using investment climate survey 2003 dataset. The study found that such factors as ISO certification, education of managers and foreign ownership have positive impact on firm productivity. Notably, our study uses Tanzania Enterprise Survey dataset (TES) 2022 which covers the universe of sectors in Tanzania, making it possible to explore other sectors beyond manufacturing and agriculture.

3.0 METHODOLOGY

This section presents methodology used in the assessment of the productivity and competitiveness of the enterprise sector, comprised of the descriptive and empirical analyses based on TES 2022 dataset. Ahead of presenting the analytical framework, we firstly elucidate on the conceptual framework.

3.1 Conceptual Framework

Historically, the term competitiveness is used primarily to draw attention to the cost position of firms or countries (also called cost competitiveness). However, the literature has criticised the focus on costs as being too narrow at both conceptual and policy levels (Aiginger, 2006). The main argument is that the level of absolute cost of a firm does not decide the survival of firms or the health of an economy, but should be set in relation to productivity. The profitability of firms and the ability of an industry to sell internationally are not limited by costs (since productivity could be high amidst high prices). Following, the broader definition that focuses on costs and productivity was advanced, including such indices as Unit Labour Costs (which is adopted for this study).

Nonetheless, other definitions of competitiveness emerged to include the processes that lead to a favourable cost or productivity position and the opportunities to sustain or improve it (also called quality competitiveness). Quality competitiveness covers evaluation of the sources of competitiveness of firms and countries as well as their future prospects. Competitiveness in this sense is about processes and abilities. Another relatively recent set of definition focuses on outcomes rather than inputs (costs and productivity) and capabilities. Outcome competitiveness was initially defined to reflect trade or current account balances, with deficit countries judged to be uncompetitive. However, the importance of the external-balance benchmark subsequently declined as it was observed that fast-growing countries tend to have trade deficits. Furthermore, some countries' large surpluses were sometimes seen as the result of politically-motivated prevention of currency appreciations. As the focus on current account deficit continued, it was realised that balancing the current accounts is not the ultimate aim of society. The ultimate aim of an economy should be to enable high and rising incomes, to provide employment opportunities and to improve living conditions. This leads to new definition of outcome competitiveness as provided by European Commission. Fundamental assessments of outcomes thus began with GDP per capita as the main indicator of outcome competitiveness. Employment and unemployment indicators were then added to the analysis.

From the foregoing, the current study aims to examine the two concepts as one set of closely related and critical issue affecting firm performance, hence growth of the enterprise sector in Tanzania. Below we outline on the indices for measuring them.

3.2 Measuring Firm Productivity and Competitiveness

3.2.1 Measuring Productivity

Productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input used for its production. However, the literature on productivity contains different productivity measures where the choice depends on the purpose of analysis and availability of data. Broadly, productivity measures can be classified as single factor productivity measures i.e., relating a measure of output to a single measure of input - or multifactor productivity measures i.e., relating a measure of output to a bundle of inputs.

Single factor productivity measures include output or value added per worker or capital (see OECD, 2001), while multiple factor productivity use such measures as total factor productivity (see OECD, 2001). Indeed, each approach has its own strengths and weaknesses. For instance, while single factor productivity measures are easy to measure, they represent only partial assessment. Conversely, Multiple factor indices provide relatively more accurate estimates of productivity although its measurement is relatively more complex and may require a significant amount of data. Given the pros and cons of each type and availability of TES 2022 dataset, this study uses two indicators of firm productivity i.e., Value Added per Worker (VAPW) and Total Factor Productivity (TFP). Our selection of the two measures follows the practice in the literature. The selected variables are measured as follows:

VAPW was calculated as the difference between total sales and costs of intermediate inputs divided by total number of employees of a firm.

The total factor productivity (TFP) is estimated based on the following Cobb Douglas production function:

$$Q = AL^{\alpha}K^{\beta} \quad \text{..... (1)}$$

Where Q is the total output, L is the number of workers (labour force) and A is the index of TFP. Applying logarithm on both sides of Equation 1, we obtain Equation 2:

$$lnQ = lnA + \alpha lnL + \beta lnK \quad \text{..... (2)}$$

Rearranging Equation 2 we express TFP as:

$$lnA = lnQ - \alpha lnL - \beta lnK \quad \text{..... (3)}$$

3.2.2 Measuring Competitiveness

According to the literature, measures of competitiveness are broadly categorised into four approaches depending on the objectives, context and data availability. These include: Macroeconomic Approach, Business Strategist Approach, Technology and Innovation Approach; and the Composite Index Approach.

The macroeconomic perspective is based on the strength of the exchange rate as a necessary instrument for achieving internal and external balance. An appreciation of the real

exchange rate is associated with a loss in a country's international competitiveness, while a depreciation of the real exchange rate implies an improvement.

Unlike the macroeconomic approach, the Business Strategy approach hinges on a business strength perspective that was mainly advocated by Porter (1990) in addressing issues of rivalries between firms. In his "Diamond Model" theory, he identified four interrelated factors necessary for sustaining competitiveness, namely: (i) firm strategy, structure and rivalry, (ii) demand conditions, (iii) related supporting industries and (iv) factor conditions (key factors that are created e.g., skilled labour, capital and infrastructure). In the model, the government acts as facilitator creating the environment that enables firms to increase productivity and become more competitive.

The Technology and Innovation approach is rooted in industrial competitiveness in that it emphasizes the role of FDI, learning and R&D in fostering competitiveness. It accentuates the role that enterprises must play in importing technology and the ability to learn it. The innovation and learning process necessitate interactions among different institutions within the National innovative system (NIS). The approach is based on costs and prices, but more vitally on the capacity of firms to use technology to improve quality and performance. Examples of measures under this perspective include the market share indicators (e.g. country's exports to the World export, or region) and the Manufacturing Export Competitiveness Index (see Vignes and Smith, 2005).

Finally, the composite index approach combines several indicators related to competitiveness into one index. This allows for a much broader measurement of national competitiveness (Vignes and Smith, 2005). One such index is called the Global Competitiveness Index (GCI) which is compiled by the World Economic Forum and publishes the Global Competitiveness Report. The GCI measures the capacity of the national economy to achieve sustained economic growth over the medium term. The aggregation of GCI comprises three main components; these are technological capacity, the quality of public institutions and quality of the macroeconomic environment. Despite their usefulness for identifying weaknesses in different sectors of the economy and formulating relevant policies to address them, the formulation of composite indices have been criticized on lack of theoretical foundation, inconsistent methodology or simply too broad a measure of competitiveness. More importantly, the approach may be suitable for multi-country comparative analysis but less so for a firm level analysis like the current study.

From the four approaches, the choice of the approaches to use in measuring competitiveness is not straight forward, and may largely depend on the objective and availability of data. For instance, the measures of competitiveness used in most previous studies do not follow the lines of the above broad approaches rather rely on selected indicators within them, such as exports, market share and financial performance. More importantly, there is a lack of general agreement of a standard definition (Siudek and Zawojska, 2014). Nonetheless, most of the previous studies have used exports, market share and financial performance indicators to measure firm competitiveness. These measures are more related to output of the firm i.e., export and market share relates goods and services being sold while financial indicators such as profit depend on sales.

To complement such earlier studies we have focused on input costs particularly wages. Essentially, we want to assess how competitive firms are on the basis of labour costs and in relation to what the labour produces, that is, the unit labour cost (ULC). It should be noted though that ULC is only a measure of cost competitiveness focusing on labour costs. This means that other costs such as capital costs are not included despite being an important factor of production. However, information on other factors such as capital, electricity is not reported by many firms and is not available in the TES 2022 dataset. It is in this context that our study uses the unit labour cost (ULC) as our main measure of competitiveness given availability of the data (TES, 2022). As noted earlier, this measure is favourable to the study objective, i.e. assessment of drivers of firm level productivity and competitiveness.

Formally, a unit labour cost (ULC) is defined as the ratio of labour compensation to labour productivity, i.e., the labour costs incurred for each unit of output produced. That is:

$$ULC = \frac{W_n}{Q_i/H_i} \quad \text{..... (4)}$$

Where W_n is the Nominal Wage per worker; Q_i is the Gross Value Added in industry i and H_i is the number of hours worked or number of workers in industry i.

3.3 Empirical Analysis of Drivers of Firm Productivity and Competitiveness

Generally, the analytical framework aims to identify firm characteristics and other factors associated with high or low level of productivity and competitiveness using the TES 2022. The model used for empirical analysis is a general formulation that is commonly used to examine firm level determinants of productivity and competitiveness. The model is expressed as:

$$Ln\, Y_i = \gamma + \sum_{i=1}^{n} \alpha X_i + \varepsilon_i \quad \text{..... (5)}$$

Where LnY_i is an indicator of firm productivity (i.e., TFP and VAPW), or measure of competitiveness (i.e., ULC); X_i is a vector of factors affecting firm productivity/competitiveness including individual firm characteristics and other factors as listed in Table 1. The model (equation 5) is estimated using simple Ordinary Least Square (OLS) technique which is often used in studies that use cross sectional data such as the current one. Table 1 provides a more elaborate description of the explanatory variables.

Table 1: Description of Explanatory Variables

Variable name (label)	Measurement
Firm age (age)	The number of years a firm has been operating
Firm size (large)	This is a dummy variable with values 1 if a firm is large and 0 if a firm is MSME.
Location of the firm (region)	This is the region the firm is located
Sector (sector)	This refers to the sector the firm is operating
Exporting (export)	This is a dummy variable with values 0 if a firm does not export (imports or exports or both) and 1 if a firm exports
Access to loan (loan)	This is a dummy variable with values 0 if a firm has not obtained a

	loan and 1 if a firm obtained a loan
Capital intensity (cap_int)	This is the ratio of capital to total number of employees
Having business and strategic plan (docc)	This is a dummy variable with values 0 if a firm does not have a business and/or strategic plan and 1 if a firm has a business and/or strategic plan
Participation in Linkage with other firms (linkage)	This is a dummy variable with values 0 if a firm does not participate in linkage with other firms and 1 if a firm participates in linkage with other firms
Foreign ownership (fdi)	This is a dummy variable with values 0 if a firm is not owned by foreign investor and 1 if a firm is owned by a foreign investor
Operating informally (informal)	This is a dummy variable with values 1 if a firm operates informally i.e., does not have or did not process formal business documentation and 0 if a firm does not operate informally
Innovation and Technology Upgrading (ITU)	This is a dummy variable with values 0 if a firm has not made any innovation or technology upgrading in the previous 5 years and 1 otherwise
Providing training (train)	This is a dummy variable with values 0 if a firm does not provide training and 1 if a firm provides training
Experiencing power outages or insufficient supply of water (outage)	This is a categorical variable with values 0 if a firm has experienced neither power outages nor insufficient supply of water, 1 if a firm has experienced only power outages, 2 if a firm has experienced only water shortages, and 3 if a firm has experienced both power outages and water shortages during 2021/22.
Technology transfer (transfer)	This is a categorical variable with values 0 if a firm has never experienced technology transfer, 1 if a firm has experienced technology transfer from suppliers, 2 from FDI firms operating locally, 3 from hiring employees who previously worked in FDI firms, 4 from hiring foreign expatriates and 5 from main customers visiting firm's production facilities.

Source: Author compilation 2023.

Finally, as will be clarified in the discussion of results, we conducted several tests to examine reliability and consistency of the empirical results. These include Ramsey RESET test for model specification to check if the regression model is correctly specified; omitted variable test (Ramsey 1969) and the variable inflation factor[1] (see Chatterjee and Hadi 2012) to check for correlation in the regression.

3.4 Data: The Tanzania Enterprise Survey - 2022

As noted earlier, the study uses the Tanzania Enterprise Survey (TES) dataset for 2022. The survey was conducted on a nationally representative sample of 1,872 firms covering the universe of enterprises sector in Tanzania. According to the TES documentation report, the sample was selected using stratified random sampling, in which three levels of stratification were used: activity/sector, establishment size, and region. The stratification ensured acceptable level of precision for estimates within size (small, medium, and large) at the different levels of regional and sectors stratification. The survey covered all the

[1] VIF is a measure of the amount of multicolinearity in regression analysis. It is an estimate of how much the variance of a regression coefficient is inflated due to multicolinearity.

Administrative regions of Tanzania Mainland and Zanzibar. The sampling framework was obtained from National Bureau Standards (NBS) for Tanzania Mainland and Office of Chief Government Statisticians (OCGS) for Zanzibar. Table 2 shows the structure of the dataset by sector and size.

Table 2: Structure of the TES 2022 Dataset

Sector	Small	Medium	Large	Total	*Structure*
Agriculture, forestry and fishing	129	10	17	**156**	*8.3%*
Manufacturing	281	7	78	**366**	*19.6%*
Mining	15	2	5	**22**	*1.2%*
Electricity, A/C supply and Water supply	2	0	1	**3**	*0.2%*
Construction	8	3	3	**14**	*0.7%*
Wholesale and retail trade; repairs	636	1	156	**793**	*42.4%*
Transportation and storage	39	0	15	**54**	*2.9%*
Tourism	156	1	43	**200**	*10.7%*
Information and communication	4	0	1	**5**	*0.3%*
Financial and insurance activities	60	1	11	**72**	*3.8%*
Professional	12	0	2	**14**	*0.7%*
Public administration and services	13	4	1	**18**	*1.0%*
Education and Human health	72	1	33	**106**	*5.7%*
Arts, entertainment and recreation	6	0	0	**6**	*0.3%*
Other service activities (mention)	39	1	3	**43**	*2.3%*
Total	**1472**	**31**	**369**	**1,872**	*100.0%*
Structure	***57.5%***	***28.2%***	***14.3%***	***100%***	

Source: TES 2022 dataset.

4.0 RESULTS: FIRM LEVEL DRIVERS OF PRODUCTIVITY AND COMPETITIVENESS IN TANZANIA

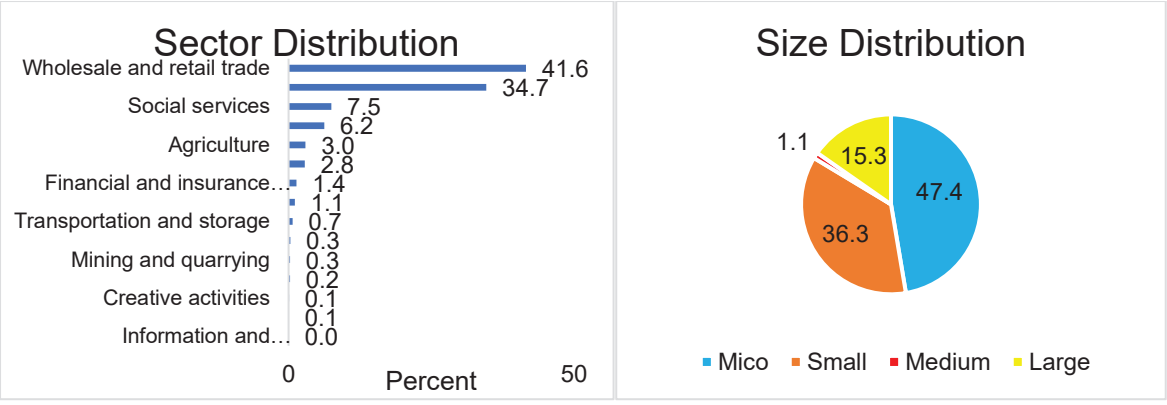
Generally, the analytical framework outlined above aimed at identifying firm characteristics and other factors associated with high or low level of productivity and competitiveness using the TES 2022. This chapter presents results of the analysis, in three complementary steps. First, we used the TES datasets to provide a clear mapping of the enterprise sector for Tanzania. This is important given its novelty including comprehensive coverage of the enterprise sector; to understand the key features of the enterprise sector as such features may complement our understanding of the firm productivity and competitiveness. Secondly, we present results of the descriptive analysis, basically providing the current status "situational analysis" or levels of productivity and competitiveness in the Tanzania Enterprise sector using TES 2022. The dataset provides information on different issues affecting enterprise productivity and competitiveness, including firm characteristics (e.g. size, ownership, location, legal status etc.), sector/activities, production costs, business environment, firm linkages to mention a few. Third and final step we present results of the empirical analysis, aimed at determining the firm level drivers of productivity and competitiveness.

4.1 Mapping of the Tanzania Enterprise Sector

4.1.1 The Structure of Tanzania Enterprise Sector

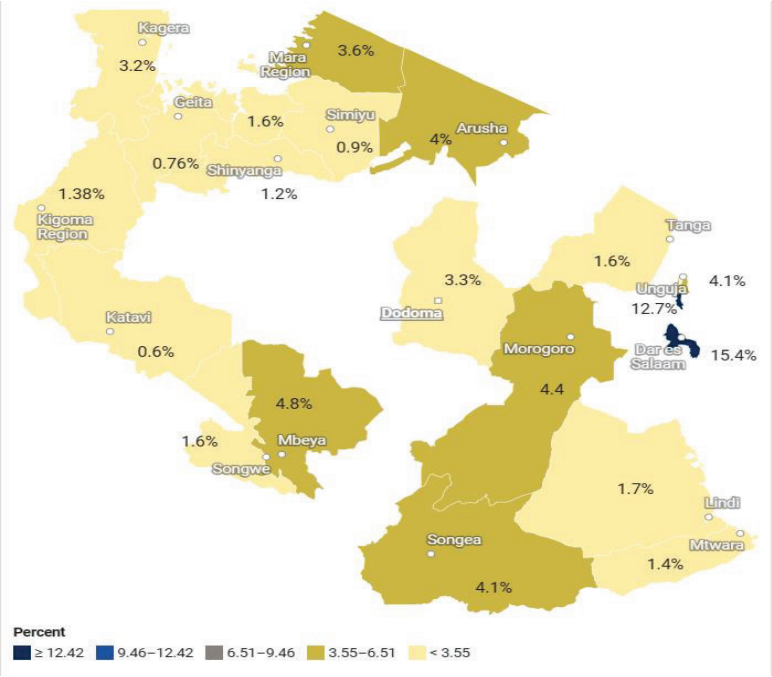
From the analysis of TES 2022 dataset (Figure 1), the dominant economic activities in the Tanzania enterprise sector include wholesale and retail trade activity, followed by manufacturing, social services (education, health and social work), tourism and agriculture. The least dominant activities include information and communication, utilities (electricity and water); and creative activities (arts, entertainment and recreation). Majority (over 80%) of firms are the micro, small and medium enterprises (MSMEs) employing between 1 and 99 employees while large firms accounts for only 15.3% of all firms in the enterprise sector. This point to the existence of a large informal sector in Tanzania; a feature confirmed in other literatures (see URT, 2021 and Diao et al, 2018). Figure 2 shows the distribution of the enterprise sector by region. Clearly, Dar es Salaam, Zanzibar, Mbeya and Morogoro are the dominant regions with highest concentration of enterprises, compared to Katavi, Geita, Kigoma and Mtwara with lowest concentration.

Figure 1: The Structure of Enterprise Sector (Sector and Size Distribution)



Source: Author analysis of TES 2022 dataset.

Figure 2: Distribution of Enterprise Sector by Region: Top 10 and Bottom 10 Performers



Source: Author analysis of TES 2022 dataset

4.1.2 Ownership Structure

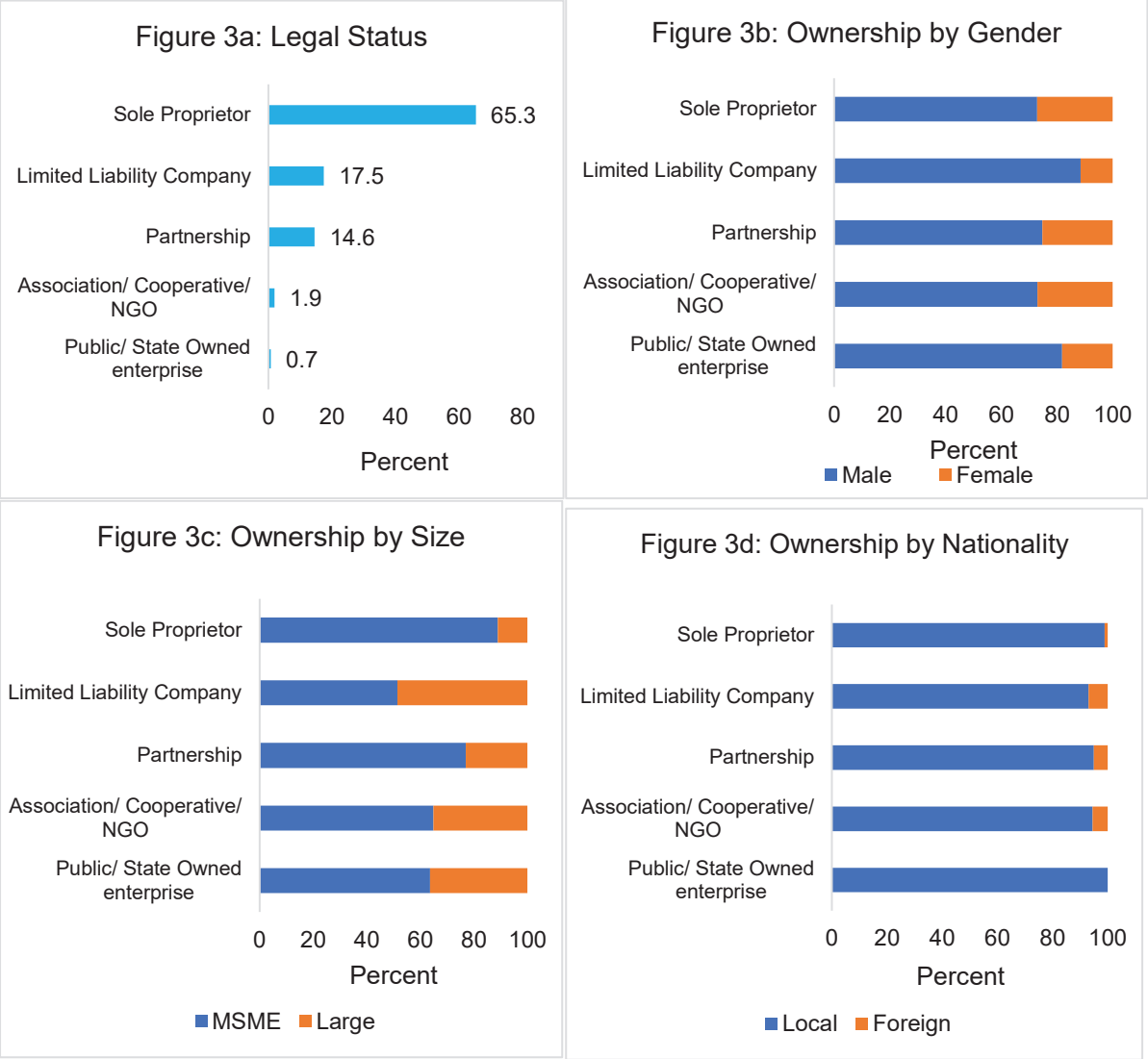
The TES 2022 dataset provides information on ownership structure of firms. From Figure 3, we observe that most common forms of firm legal ownership is sole proprietorship (65.3%) followed by Limited Liability Company (17.5%) and Partnerships (14.6%). The dominance of sole proprietorship ownership reflects the large share of micro and small firms (also reported in other previous firm surveys). The analysis of TES 2022 data further shows that, majority of businesses in the enterprise sector are owned by males (76.1%), and overwhelming majority of sampled firms are locally owned where foreign owned firm constitute only 3.2%.

Given the policy focus on empowerment of special interest groups, TES 2022 dataset provides information for disaggregating gender across the range of 16 sectors/activities. The resulting distribution is shown in Figure 4. Notably, women ownership is more present in tourism, mining and agriculture activities – and is completely absent in information and communication, creative sector (arts, entertainment and recreation) and public utilities sectors (electricity, water, transport and storage activities). These results signify presence of gender biased occupational choices, but more importantly that it varies by sector.

Furthermore, owing to the importance of FDI (foreign ownership) in the Tanzania economy (job creation, technology transfer etc.), Figure 4 presents the extent of FDI footprint across different sectors. Results show utilities (electricity and water[2]) sectors have highest presence of FDI firms, followed by the ICT, agriculture and manufacturing sectors, while construction, mining, creative and professional services sectors have least presence of FDIs.

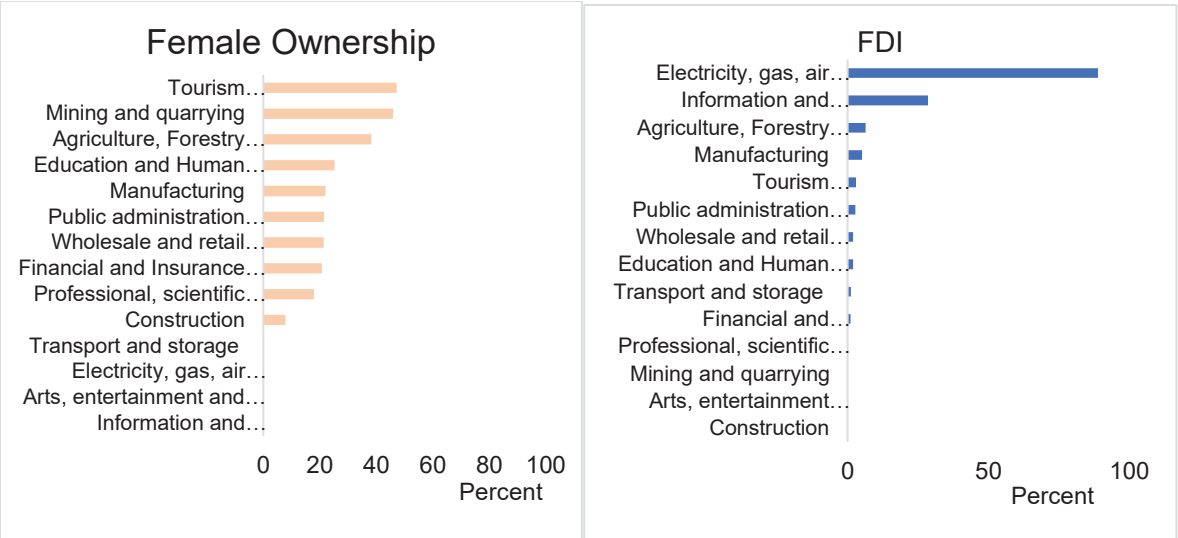
2 All surveyed firms in electricity and water sector engaged in production of gas.

Figure 3: Ownership Structure in the Tanzania Enterprise Sector



Source: Author analysis of TES 2022 dataset

Figure 4: Distribution of Female Ownership and FDIs across different sectors

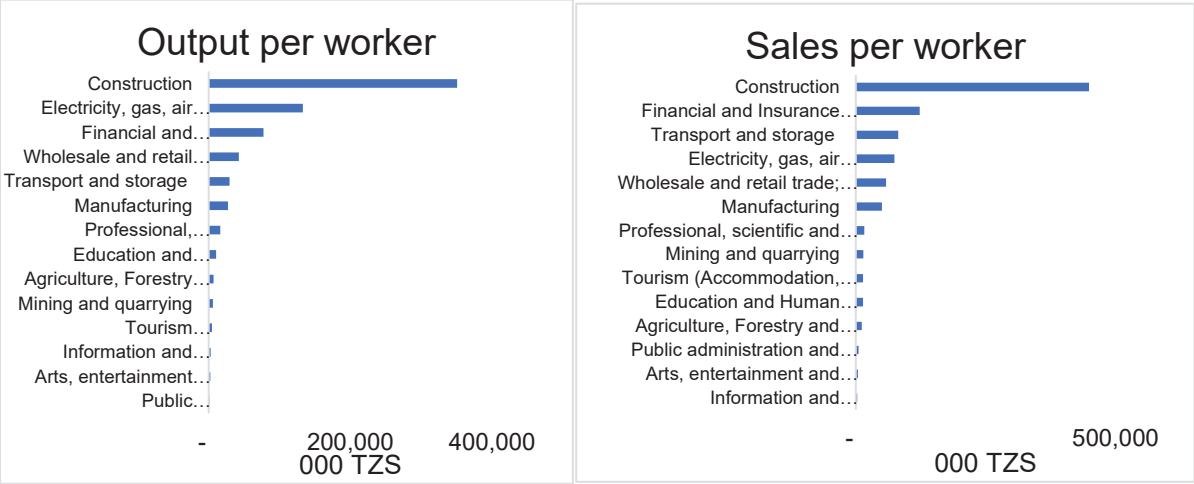


Source: Author analysis of TES 2022 dataset

4.1.3 Production and Sales

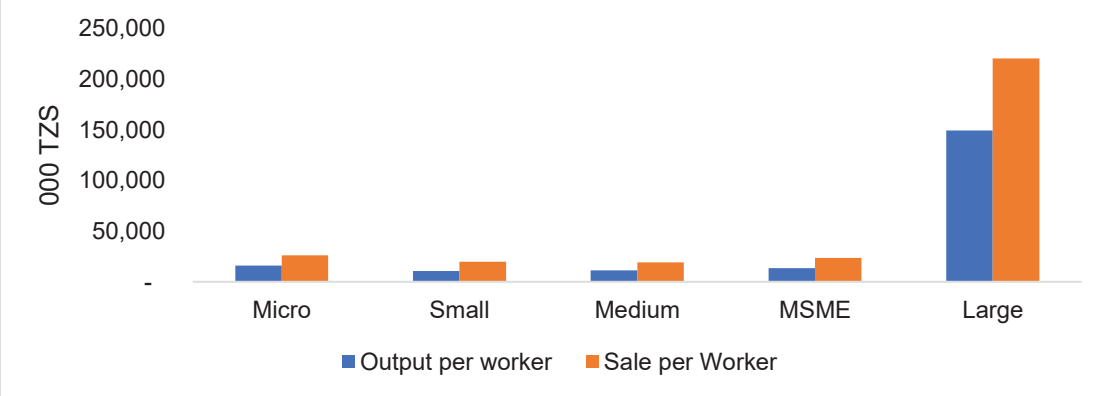
Although all the enterprises conduct various production and sales activities, obtaining detailed information on such activities is limited as most firms are less willing to disclose true volume and values of their businesses in fear of undue tax implications. As a result, TES dataset does not provide value of total production. However we use production costs as a proxy of production. To account for variation in firm size, we estimated production per worker and sales per worker across the sectors as shown in Figure 5. Apparently, due to premium factor, sales per worker exceed output per worker in all sectors except for electricity and water activities (presumably reflecting high incidence Government subsidy). The top 5 sector with the highest output per worker are consistently also the top 5 sectors with the highest sales per worker. These sectors are construction, electricity and water, financial and insurance, wholesale and retail and transport and storage. In terms of firm size, large firms had about 10 times higher average output and sales compared to MSMEs (see Figure 6) – owing to their higher production and marketing capabilities in absolute and relative terms compared to MSMEs (most of which are informal).

Figure 5: Average Output and Sales across different sectors



Source: Author analysis of TES 2022 dataset

Figure 6: Average Output and Sales by Firm Size



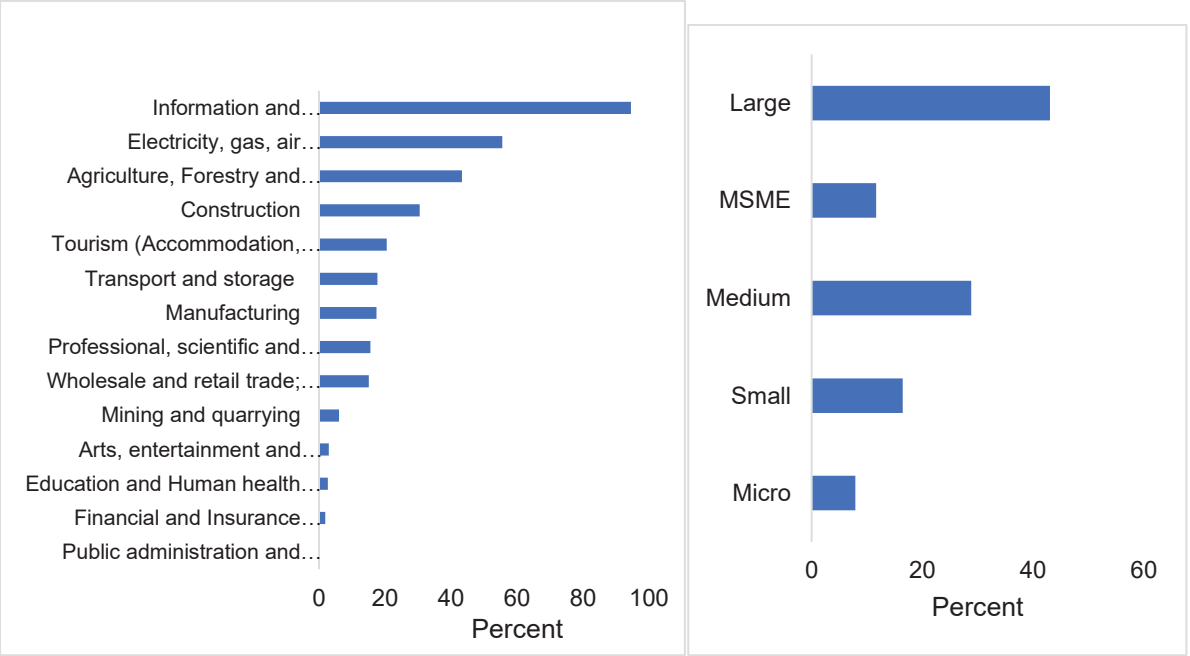
Source: Author analysis of TES 2022 dataset

4.1.4 Exporting Status

While some firms sell part or entire volume of their produce to foreign markets, others are more or less focused on the domestic market. Again, given the policy imperative on building export competitiveness, the TES 2022 dataset provided the vital information to show extent of exporting across sectors for the sampled firms. The results shown in Figure 7 shows that the proportion of exporting firms in the enterprise sector is quite low (15.9%) relative to other comparable economies. Exporting firms are dominant in the ICT, electricity and water, agriculture, construction and tourism sectors (on average exporting more than 30% of the output), compared with sectors with few exporting incidence, including arts, social services (education and human health), financial and insurance and (apparently) public administration services sectors (on average exporting less than 5% of output). In terms of size, the large scale enterprises have the highest proportion of exporting incidence, consistently followed by medium sized, small and finally micro enterprises. Clearly this distribution is not surprising, and is consistent with the general firm performance literature (see Wagner, 2001; Bernard et al, 2014).

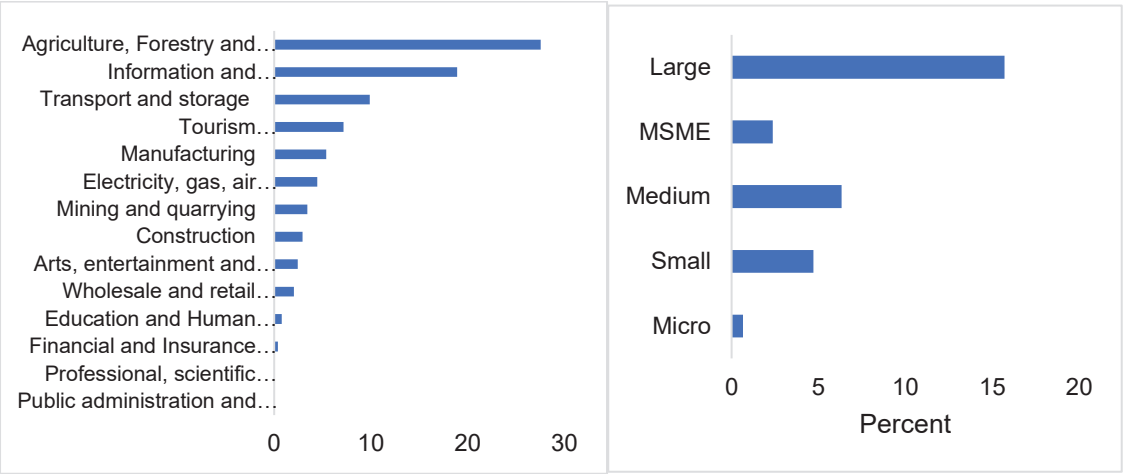
Furthermore, the results show that the share of firm exports in total sales is low (averaging 4.2%) in the enterprise sector (see Figure 8). That is, the exporting firms, despite being few in proportions (15.9%), exports only a dismal (less than 5%) of their total production while selling 95% of the production to the domestic market. Clearly, these figures are not inspiring given the immense efforts being mobilized to promote participation of Tanzania in the African Continental Free Trade Area (AfCFTA). Distribution of exporting firms by sector shows that agriculture, ICT, transport and storage, tourism and manufacturing had the highest average share of exports in sales, compared with social services, financial, professional services, and scientific and public administration services sectors with the lowest.

Figure 7: Presence of Exporting firms in different activities and categories of firm size



Source: Author analysis of TES 2022 dataset.

Figure 8: Significance of Exports in sales (by Sector and Firm size)



Source: Author analysis of TES 2022 dataset

4.1.5 Investment Status

The TES 2022 asked enterprises to indicate their expenditure on four types of investment, namely: capital (machinery and equipment), training, research and development (R&D) and, innovation and technology upgrading (ITU). To avoid spurious interpretation associated with absolute figures, we estimated the share of investment in sales for each of the four types across the different sectors. Notably, as shown in Table 3, certain firms and sectors spend more on certain form of investment than others.

Overall, enterprises appear to invest more on machinery and equipment (6.9%) followed by innovation and technology upgrading (6.1%), while spending on training and R&D is relatively low (respectively 0.4% and 0.3%). Electricity and water tops as the sector with largest spending on capital (followed by agriculture, education and health), while somewhat surprisingly, construction spending the least (0.1%). In the case of innovation and technology upgrading, ICT leads with 39.8% of the sales followed by agriculture and trade; while construction, electricity and water spending the least. The investment on training is dismal, with ICT at least spending 1.5% and the rest less than 1% or no investment at all. On R&D expenditure, the leading sector is financial and insurance services (7.6%) followed by ICT (2.3%), while the remaining sectors spend less than 1%, with mining at the bottom with no investment.

From the information in Table 3, it appears that firms operating in ICT, agriculture and wholesale and retail invest more on innovation and technology upgrading while firms operating in social services sectors have greater appetite for investing in training. Firms operating in financial, ICT and professional services spend more on R&D than in other forms of investment.

A larger part of the pattern of investment by firms reflects the nature of the activities. For instance, the high capital spending for electricity and water sectors is because the sample also covered firms that operate in gas production which require heavy machinery and equipment. The high share of investment in innovation and technology upgrading for firms

in the ICT sector reflects its high affinity for technology and innovation (see Welfens, 2008). Similarly, the high spending on training for the ICT and social services sectors relates to the problem of low level of ICT skills in the Tanzania labour market that require frequent training (see URT, 2021[3]). While firms in agriculture sector seem to spend more on capital and innovation/technology upgrading, they spend very little on training and R&D compared to other sectors. In terms of firm size, Figure 9 shows that, large firms spend more on capital and innovation upgrading compared to MSMEs while MSMEs spend more on training than large firms.

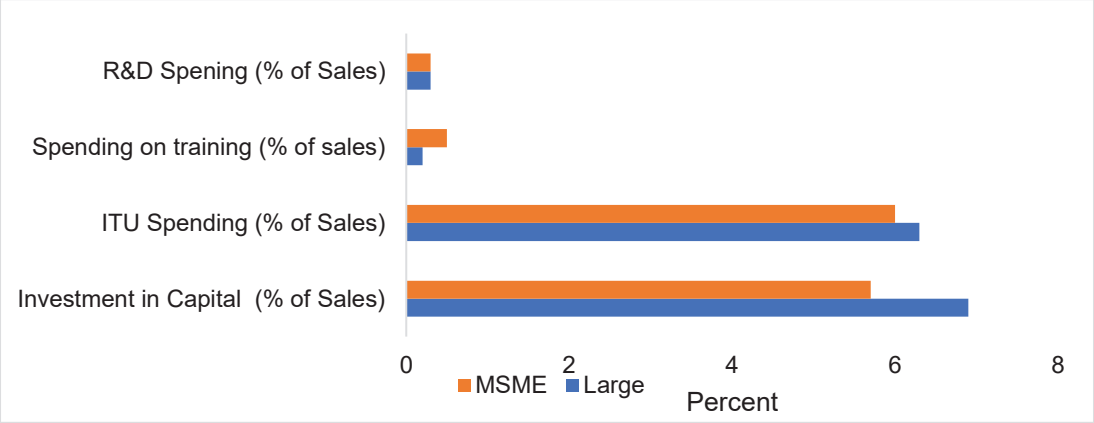
3 TAIC 2021- REPORT Editable File (ictc.go.tz)

Table 3: Firm Investment Spending by Sector

Sector	Share of investment in capital in Sales	Sector	Share of ITU Spening in Sales	Sector	Share of spending on training in sales	Sector	Share of R&D Spening in Sales
Electricity and Water	35.7	Information and Communicatic	39.8	Information and Communicatic	1.5	Financial and Insurance	7.6
Agriculture	10.4	Agriculture	9.0	Education and Human health	0.9	Information and Communicatic	2.3
Education and Human health	10.2	Wholesale and retail	8.2	Construction	0.8	Professional	0.7
Wholesale and retail	9.7	Manufacturing	7.6	Manufacturing	0.3	Tourism	0.3
Manufacturing	7.2	Transport and storage	6.7	Tourism	0.2	Transport and storage	0.2
Information and Communicatio	6.4	Tourism	5.5	Wholesale and retail	0.1	Manufacturing	0.2
Transport and storage	6.3	Education and Human health	5.3	Financial and Insurance	0.1	Wholesale and retail	0.2
Tourism	3.6	Financial and Insurance	2.8	Transport and storage	0.1	Construction	0.1
Financial and Insurance	1.4	Electricity and Water	2.6	Electricity and Water	0.000	Education and Human health	0.1
Construction	0.1	Construction	1.4	Agriculture	0.000	Mining and quarrying	0.050
						Agriculture	0.002

Source: Author analysis of TES 2022 dataset.

Figure 9: Investment by Firm Size

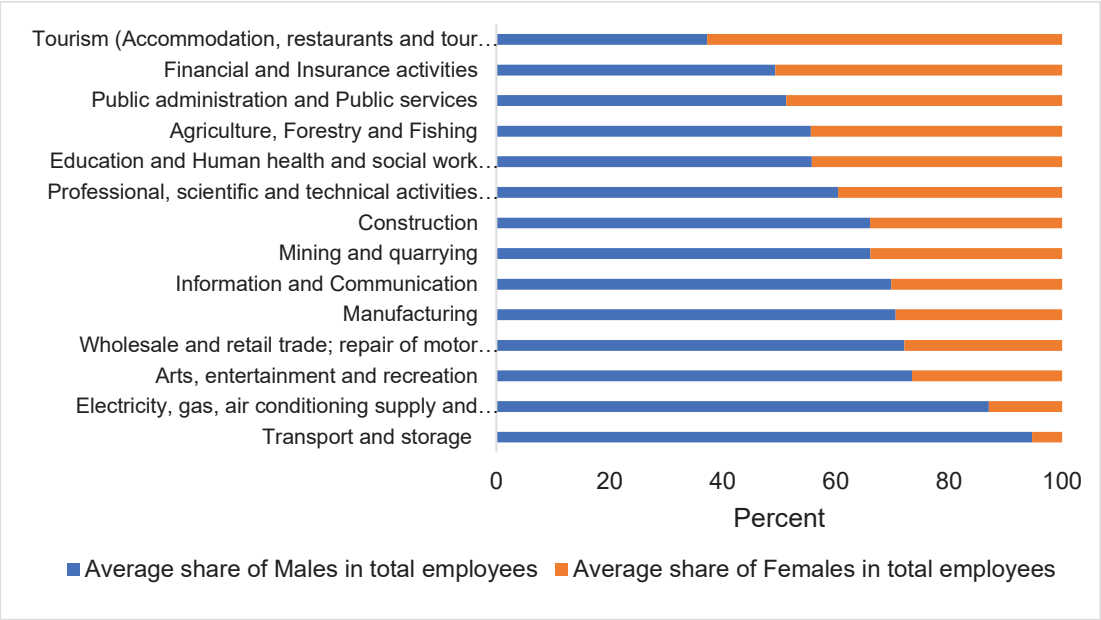


Source: Author analysis of TES 2022 dataset

4.1.6 Employment

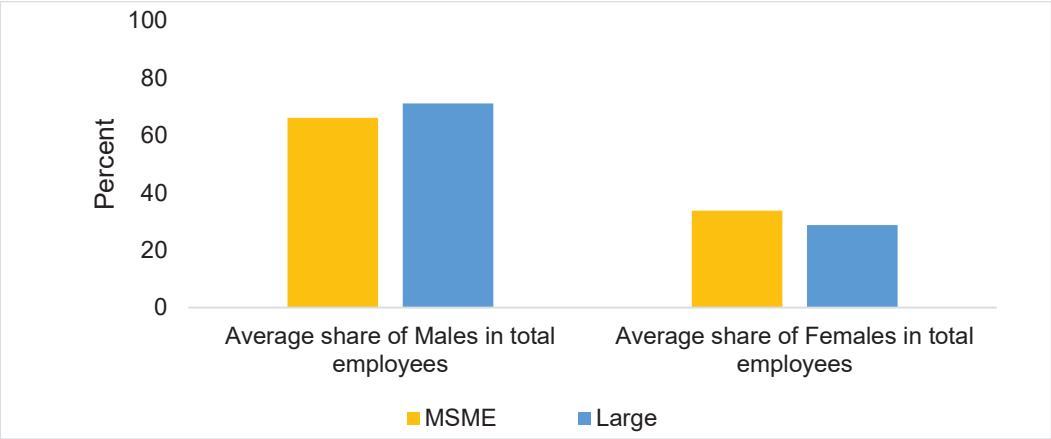
Clearly, employment creation is one of the major objectives for promoting enterprise sector. The sampled enterprises in the TES 2022 employed a total of 31,934 people, majority of which (62.4%) are men compared to women (37.6%). Distribution of employment by sector and gender is shown in Figure 10, and by size in Figure 11. Men are highly employed in transport and storage, electricity and water, arts and entertainment, wholesale and retail and manufacturing sectors – while women are more employed in tourism, finance and insurance, public administration, agriculture and social sectors. In terms of size, there is higher presence of men employees in medium sized and large enterprises while female employees are dominant in small sized and micro enterprises. Overall, men employees are dominant in large firms and female employees in MSMEs.

Figure 10: Distribution of employees by gender and sector



Source: Author analysis of TES 2022 dataset.

Figure 11: Distribution of employees by size and gender



Source: Author analysis of TES 2022 dataset

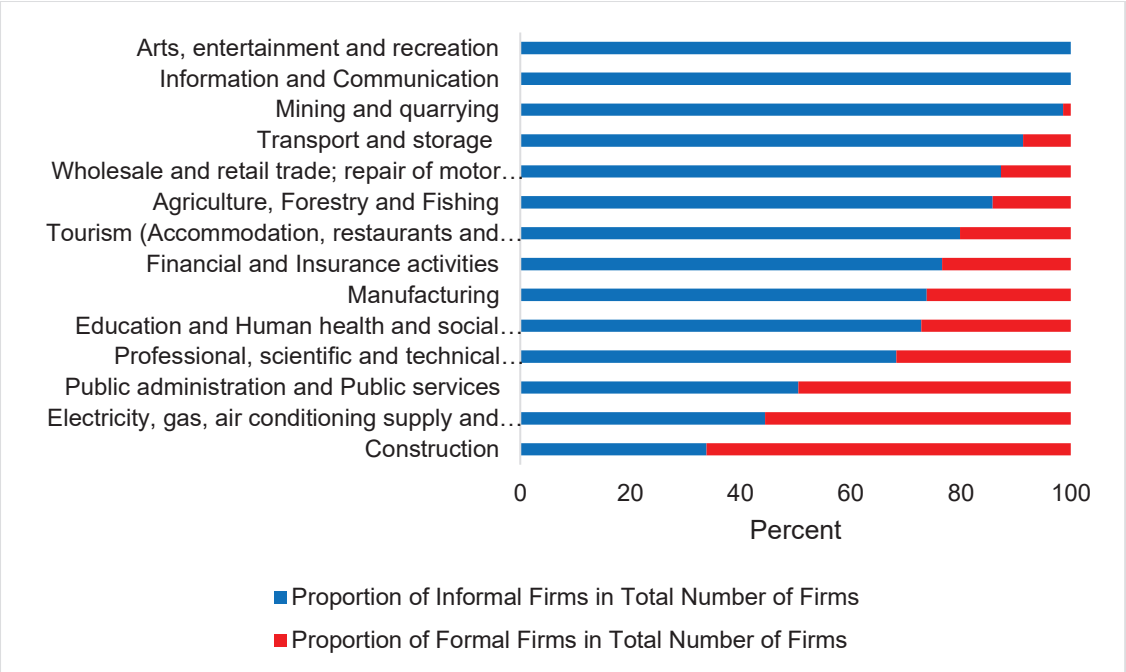
4.1.7 Level of Formalisation

Our estimation of the level of formalisation of firms in the enterprise sector in Tanzania is based on the definition of informal firms in Tanzania sourced from Tanzania Informal Sector Survey 2019 report (see URT, 2020). According to the report, informal firms includes *"enterprises owned by individuals or households that are not constituted as separate legal entities independent of their owners, have no complete set of accounts, produce some of their goods for sale and their employment size is below five (5) employees"*. Following that definition, and considering the available information in TES 2022 dataset, informal firms are those that either (a) have less than 5 employees or (b) are sole proprietorship or (c) do not have audited financial statements. Using the outlined definition, the analysis of TES 2022 dataset shows that informal firms constitute 80.3% of all firms in the enterprise sector while, formal firms constitute the remaining 19.7%.

The distribution of both types of firms across sectors is shown in Figure 12. Clearly, informality is pervasive in creative (arts, entertainment and recreation), ICT, mining, transport, wholesale and retail and agriculture sectors where informal firms constitute more than 80% on average. On the other hand, sector that have highest proportion of formal firms include construction, utilities (electricity and water) and public administration services where on average, 50% or more of firms are legally registered and operated.

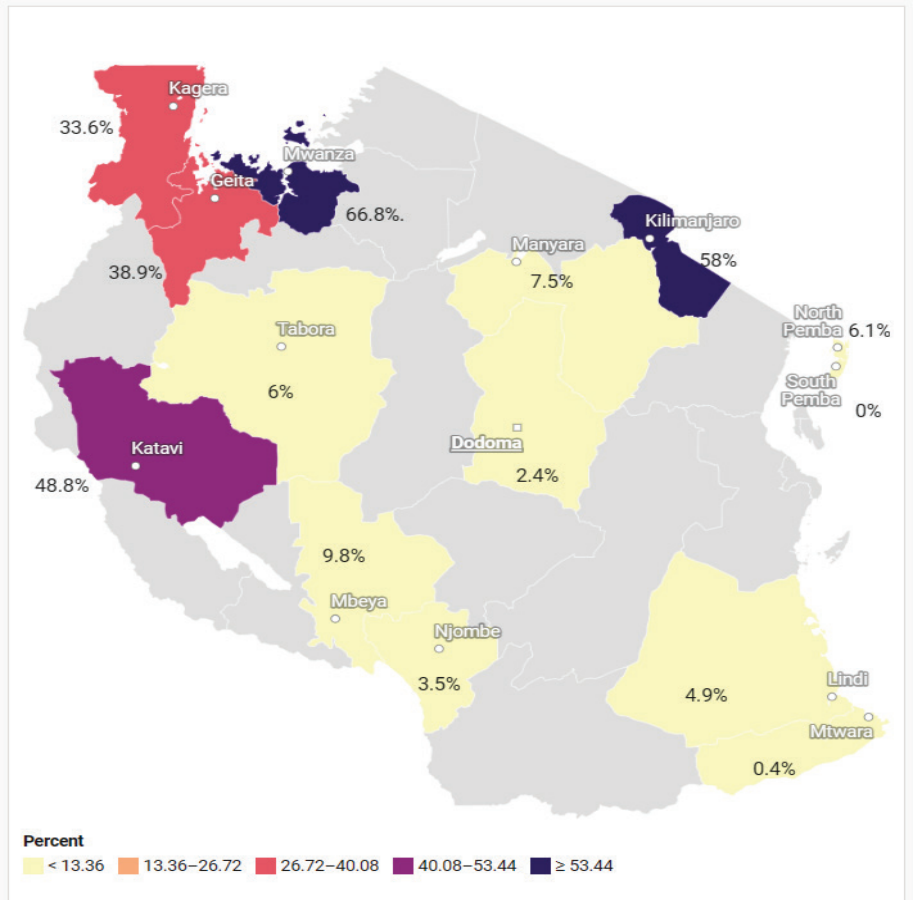
Since TES covered all administrative regions, it is possible to present spatial distribution of formal status of firms as shown by Figure 13. Clearly, Mwanza, Kilimanjaro, Katavi, Geita and Kagera have the highest share of formal firms compared to other regions while South Pemba, Mtwara, Dodoma, Njombe, Lindi, Tabora and Northern Pemba has the lowest share of formal firms, implying that the share of informal establishments in those regions is very high.

Figure 12: Distribution of Formal and Informal Firms across Sectors



Source: Author analysis of TES 2022 dataset

Figure 13: Spatial Distribution of Firms by Formal status

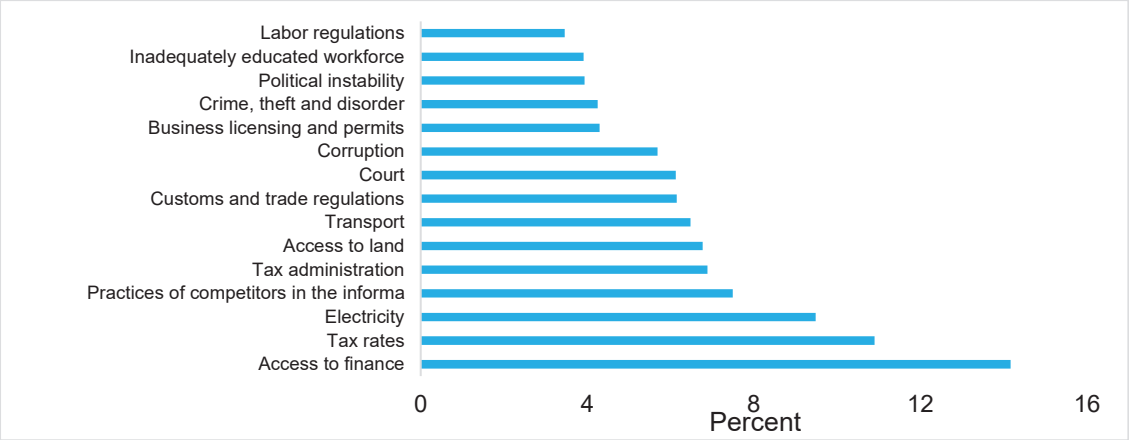


Source: Author analysis of TES 2022 dataset

4.1.8 Business Environment Challenges

The literature has identified business environment as one of the key factors that contribute to firm performance and overall country development (Batra and Stone, 2008). The TES 2022 enquired about the various business environment challenges faced by firms in their operations. As it can be observed in Figure 14, access to finance, tax rates and electricity were the top 3 challenges faced by Tanzanian firms in the enterprise sector in 2021 while political instability, inadequately educated workforce and labour regulations were the least severe challenges.

Figure 14: Business Environment Challenges by sector[4]



Source: Author analysis of TES 2022 dataset

We further assessed the severity of business environment challenges[5] across different sectors by identifying top three business environment challenges that face firms in each sector. The results are presented in Table 4. Clearly the results show variation in severity in terms of ranking but remain consistently the same type of challenges across sectors, i.e. taxation, access to finance and electricity. A few exceptions include court services for the financial sector and ICT sectors, access to land for ICT sector, customs and trade regulations for transport and creative sectors and business licensing for the mining sector.

Table 4: Top three Business Environment Challenges in each Sector

Sector	Challenge 1	Challenge 2	Challenge 3
Agriculture, Forestry and Fishing	Tax Rates	Tax adminstration	Practices of competitors
Information and Communication	Courts	Access to Finance	Access to Land
Construction	Tax rates	Tax adminstration	Access to Finance
Arts, entertainment and recreation	Access to Finance	Electricity	Customs and Trade regulations
Electricity and Water	Electricity	Access to Finance	Inadequately educated work force
Financial and Insurance	Access to Finance	Tax rates	Courts
Manufacturing	Access to Finance	Electricity	Tax rates
Mining and quarrying	Tax rates	Access to Finance	Business Licensing
Professional, scientific and technical	Tax rates	Access to Finance	Tax adminstration
Public administration and Public services	Access to Finance	Tax rates	Practices of competitors
Education and Human health and social work activiti	Access to Finance	Tax rates	Access to Land
Tourism	Tax rates	Access to Finance	Electricity
Wholesale and retail trade	Access to Finance	Tax rates	Courts
Transport and storage	Access to Finance	Customs and Trade regulations	Electricity

Source: Author analysis of TES 2022 dataset

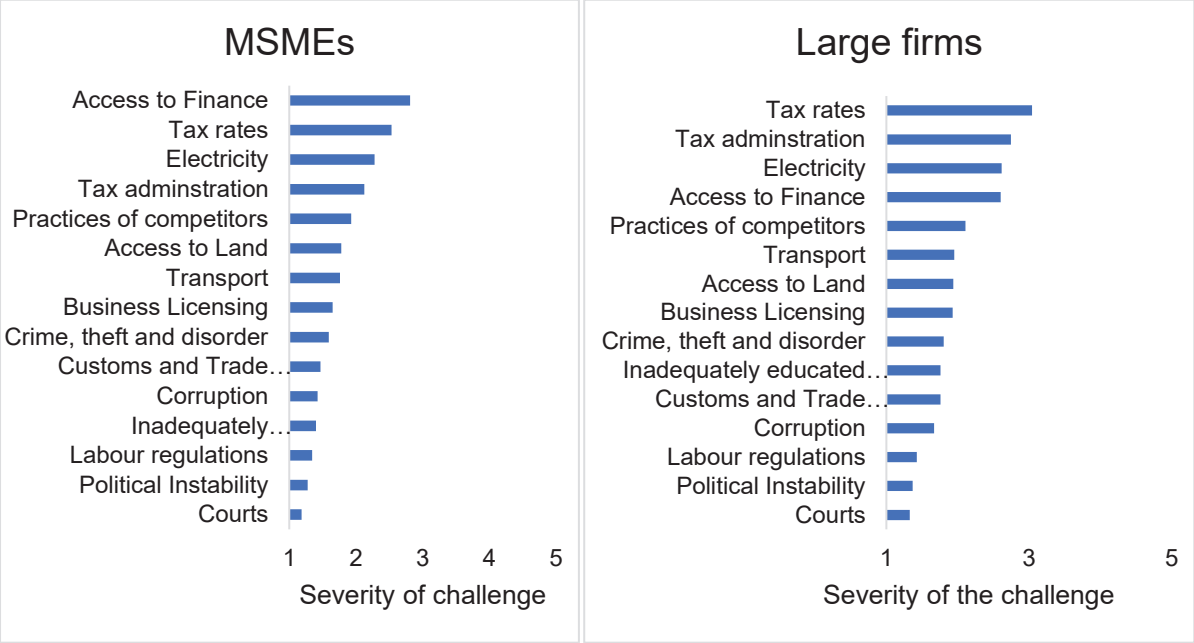
In terms of firm size (see Figure 15), access to finance is reported as the most severe challenge among MSMEs, a finding also common in most previous studies on firm performance in Tanzania (see Kweka and Sooi, 2020; URT, 2021) and elsewhere (see Schiffer and Weder, 2001). Tax rates is identified to be more severe challenge to large firms compared to small firms and this maybe because large firms are operate formally and pay

4 The figure shows the proportion of firms identifying presented challenges as a percent of total number of firms

5 Firms were asked to identify the severity of business environment challenges on a scale of 1 (not an obstacle) to 5 (very severe). We estimate the average severity of each challenge across sectors and identify top 3 challenges for each sector.

taxes which is not the case for most MSMEs. Furthermore, electricity stands out as a more severe challenge among large firms compared to MSMEs. Although corruption and inadequate workforce appears to be less of a challenge/concern to majority of enterprises (especially MSMEs), a few aspects are worth noting, including the challenge on courts services, political instability and labour regulations.

Figure 15: Severity of Business Environment Challenges by Firm Size



Note: Severity of the challenge is measured in scale where 1-No obstacle, 2-Minor obstacle, 3-Moderate obstacle, 4-Major obstacle, 5-Very severe obstacle

Source: Author analysis of TES 2022 dataset.

4.2 Estimates of Firm Productivity and Competitiveness

This section reports the estimates of firm level productivity and competitiveness from the descriptive analysis aimed at understanding the current performance by different firm characteristics among other factors. Note that, the results account for sample weights so that we can make inference to the population. We begin by presenting estimates of Wage per Worker (WPW), Value Added per Worker (VAPW), Total Factor Productivity (TFP) and Unit Labour Costs (ULC) for firms in the enterprise sector (Table 5). Note that we use the estimates to rank sectors from the highest to the lowest estimate *t* across each variable.

Table 5 reports average estimates of WPW, VAPW, TFP and ULC. Note that although the TES dataset is available in 2022, the information refers to year 2021. From the Table, Construction sector recorded the highest WPW followed by electricity and water supply and transportation and storage. On the other end, Arts and entertainment and mining recorded the lowest WPW. Construction, financial and insurance and transport and storage created the highest VAPW (each more than TZS 70 million) while arts and entertainment, public administration and ICT had the lowest VAPW (each below TZS 5 million).

Generally, the high wage (paying) sectors such as construction, transport and storage, and finance and insurance appear to create the highest value addition and have the highest TFP

estimates. Further, the low paying sectors such as mining and quarrying, arts and entertainment, ICT, public administration and services also generated the lowest VAPW and had the lowest TFP estimates. This shows that there is a positive correlation between WPW and VAPW. Indeed, the correlation between WPW and VAPW is positive and significant (estimated at 52.3%). The result demonstrates the importance of value addition and hence the need to promote high value addition activities in order to increase worker incomes and reduce poverty.

Table 5: ULC, WPW, TFP and VAPW for Enterprise subsectors 2021

Sector	WPW (Mil Tshs)	Sector	VAPW (Mil Tshs)	Sector	TFP	Sector	ULC
Construction	27.100	Construction	355.000	Construction	31.305	Information & communication	1.485
Electricity & Water supply	11.900	Financial and insurance	120.000	Financial and insurance	19.531	Electricity & Water supply	1.301
Transportation & storage	4.285	Transportation & storage	72.100	Transportation & storage	7.584	Public administration & services	0.482
Financial and insurance	3.273	Manufacturing	34.700	Wholesale and retail	4.910	Education and Human health	0.438
Agriculture	2.855	Wholesale and retail	33.900	Manufacturing	4.489	Transportation & storage	0.360
Wholesale and retail	2.791	Electricity & Water supply	18.900	Tourism	3.221	Arts, entertainment & recreation	0.191
Education and Human health	2.150	Professional, scientific	13.500	Electricity & Water supply	2.146	Manufacturing	0.170
Manufacturing	1.796	Tourism	13.100	Mining	2.138	Professional, scientific	0.145
Professional, scientific	1.790	Education and Human health	10.300	Professional, scientific	1.615	Tourism	0.141
Tourism	0.731	Mining	10.100	Agriculture	1.450	Construction	0.135
Public administration & services	0.694	Agriculture	7.769	Education and Human health	1.389	Wholesale and retail	0.134
Other service activities	0.589	Other service activities	5.510	Other service activities	0.675	Other service activities	0.119
Information & communication	0.544	Arts, entertainment & recreation	2.324	Public administration & services	0.356	Financial and insurance	0.067
Arts, entertainment & recreation	0.440	Public administration & services	1.510	Arts, entertainment & recreation	0.283	Agriculture	0.056
Mining	0.286	Information & communication	1.241	Information & communication	0.154	Mining	0.037

Source: Author analysis of Tanzania Enterprise Survey Dataset 2022

Some sectors appear to be associated with low ULC implying higher level of competitiveness. These include mining and quarrying, agriculture, financial and insurance activities; while those that have high ULC hence low level of competitiveness include ICT, electricity and public administration activities. Clearly, the observed performance in ULC depends on performance of WPW and VAPW given that the former (ULC) is a product of the latter (ratio of WPW to VAPW). Furthermore, there appears to be a general relationship between these measures. For instance, two of the five sectors that recorded the lowest WPW are also associated with the lowest ULC (e.g. mining and quarrying). On the other hand, electricity and water which was one of the top paying sectors was also among the sectors with the highest ULC and the vice versa, i.e. the sectors with lowest wages (i.e. lowest WPW) are associated with the lowest ULC (e.g. mining and quarrying), implying that they are more competitive.

One caveat regarding the relationship between ULC and WPW is the firm size, where small size firms have the lowest average ULC as they, apparently, incur relatively low labour costs compared to medium and large-scale firms. Note that the small firms constitute the highest share (over 90%) of the sampled firms, presumably explaining the low ULC levels observed in Table 5. However, while the size factors generally correspond with WPW and ULC across the entire enterprise sector, some few exceptions stand out. For instance, ICT sector recorded low estimate in both VAPW and WPW and had the highest ULC (least competitive) than any other sector. Construction sector recorded the highest WPW but was among the six sectors with the lowest ULC reflecting its high VAPW.

In addition to their sectoral variations, it is important to understand whether these measures of productivity differ significantly across the different firm characteristics. We therefore estimated ULC, VAPW, TFP and WPW based on different firm characteristics including size, nature of operation, gender of the main owner and by exporting status. The results are reported in Table 6, which show that exporting firms are associated with lower ULC, hence more competitive compared with non-exporting firms. In addition, exporting firms are associated with higher levels of productivity (higher TFP estimates) implying that they create higher value added (VAPW) and pay higher wages (WPW) relative to non-exporting firms. This is consistent with the general literature which shows that exporting firms are likely to be more competitive because they are more exposed to modern knowledge/technology and benefits from the competitive international markets (Goodwin and Pierola, 2015).

In terms of firm size, small firms are associated with lowest ULC estimates (followed by large firms) while the medium size firms have the highest estimates. This is somewhat surprising as one would expect large size firms to be more competitive than small firms. One clear explanation could be the fact that since most small firms are informal, they face low labour costs as they do not pay income tax and other employee benefits. Indeed, the data shows that informal firms account for 66% of all small firms, compared to 30% of large firms. Furthermore, on average, small firms spend 8 times less on wages compared to large firms.

In addition, comparison of formal vs. informal firms indicate that firms operating formally are associated with higher levels of ULC compared to those that operate informally. Indeed, unlike most formal enterprises, informal firms often employ workers with low levels of education and skills (see Danquah et al, 2021) that attract relatively low wages. As expected, large size firms are associated with higher levels of WPW, TFP and VAPW compared to small and medium firms reflecting their formal status and higher production capacity. Finally, the results show that firms owned by women have slightly lower ULC compared to firms owned by men, implying that women owned businesses pay less wage and are associated with lower TFP and less value addition than those owned by men.

Table 6: Estimated ULC, WPW and VAPW based on firm characteristics

Firm characteristic		ULC	WPW (Mil TZS)	VAPW (Mil TZS)	TFP
Exporting status	Non exporting	0.18	2.05	32.40	4.44
	Exporting	0.13	5.65	53.20	8.24
Employment size	Small	0.17	1.38	17.00	2.62
	Medium	0.22	1.61	15.00	2.49
	Large	0.19	8.81	138.00	17.38
Nature of Operation	Formal	0.20	3.19	43.70	4.85
	Informal	0.16	1.81	26.40	1.14
Gender of the owner	Male	0.18	2.48	35.70	4.92
	Female	0.16	1.47	18.60	2.77

Source: Author analysis of Tanzania Enterprise Survey Dataset 2022.

4.3 The Drivers of Firm Productivity and Competitiveness

So far, we have used the TES dataset to measure productivity and competitiveness. This has provided us with the estimate of the level of competitiveness and productivity of Tanzanian firms at one point in time. Following, this section reports results of the empirical analysis of factors determining the level of productivity and competitiveness in the Tanzanian enterprise sector. Identification of the drivers of productivity and competitiveness is key for informing a set of policy measures for supporting firms to become more productive and competitive. Recall that, consistent with most previous empirical studies, we adopted a linear econometric model to investigate the relationship between productivity/competitiveness and a number of factors including firm characteristics. The model was estimated using OLS techniques. The regression results are reported in Tables 7 and 8 for regression estimates of the entire sample and for the manufacturing sector sample respectively. For convenience, we only report results for significant variables in the different specifications.

Table 7 shows that some variables are significant in all or one/some of the indicators (VAPW, TFP and ULC). Likewise, some variables are significant in the standard regression and others in the sample weights regressions or in both. For instance, exporting (export), access to credit (loan), capital intensity (lncap_int), having a business plan (docc), and operating in some sectors appears to be generally significant drivers across all the three indicators. A 1% increase in capital intensity is associated with 5.3% increase in VAPW and 1.3% fall in ULC. However, once we account for sample weights, the productivity effect of capital intensity declined to 3.4% while the competitiveness effect (ULC) becomes insignificant. Understandably, higher capital intensity means higher capital to labour ratio which helps to increase productivity and competitiveness.

Table 7: Regression results of determinants of Firm Productivity and Competitiveness

Variables	(1) lnvapw	(2) lnvapw (W)	(3) lnTFP	(4) lnTFP (W)	(5) lnulc	(6) lnulc (W)
lncap_int	0.0531***	0.0336***	0.00476	-0.017	-0.0131*	-0.00995*
	(0.00653)	(0.00664)	(0.00655)	(0.0663)	(0.00690)	(0.00622)
lnage	0.104**	0.0632	0.101*	0.0708	-0.0272	0.00698
	(0.0526)	(0.0518)	(0.0528)	(0.0510)	(0.0568)	(0.0715)
export	0.254*	0.142**	0.247*	0.251**	-0.1926**	-0.124**
	(0.140)	(0.066)	(0.140)	(0.125)	(0.091)	(0.054)
large	0.485***	0.561***	0.461***	0.493***	0.0981	0.0358
	(0.165)	(0.153)	(0.166)	(0.151)	(0.137)	(0.183)
docc	0.501***	0.504***	0.493***	0.538***	-0.241**	-0.455*
	(0.104)	(0.0990)	(0.104)	(0.0974)	(0.112)	(0.233)
ITU	0.174	0.0985	0.178	0.0750	-0.355***	-0.269*
	(0.141)	(0.131)	(0.142)	(0.131)	(0.124)	(0.140)
informal	-0.437***	-0.354**	-0.430***	-0.378**	-0.213	-0.331
	(0.138)	(0.158)	(0.138)	(0.157)	(0.156)	(0.204)
linkage	0.353***	0.235*	0.350***	0.252**	0.125	0.401***
	(0.105)	(0.118)	(0.105)	(0.117)	(0.110)	(0.132)
loan	0.209**	0.208**	0.208**	0.212**	-0.0543**	-0.170**
	(0.0896)	(0.0998)	(0.0900)	(0.0979)	(0.0270)	(0.086)
tech transf						
FDI tech_transf	0.304*	0.271*	0.306*	0.268*	0.0231	-0.0552
	(0.179)	(0.145)	(0.201)	(0.146)	(0.170)	(0.297)
ForExpat tech tran	0.186	0.486**	0.086	0.552**	0.045	0.412
	(0.191)	(0.227)	(0.101)	(0.232)	(0.091)	(0.376)
utility						
insuf_wat_sup	-0.0407	-0.667***	-0.0116	-0.676***	0.201	0.317*
	(0.291)	(0.221)	(0.293)	(0.213)	(0.329)	(0.171)
sector						
w/sale and retail	0.392***	0.235	0.407***	0.185	-0.401***	-0.294*
	(0.110)	(0.173)	(0.110)	(0.171)	(0.116)	(0.152)
agri, fores & fish	-0.795***	-1.164***	-0.804***	-1.12***	-0.126	-1.084
	(0.221)	(0.333)	(0.223)	(0.312)	(0.218)	(0.699)
edu & hum healt	-0.328	-0.278	-0.333	-0.261	0.571***	0.304
	(0.206)	(0.188)	(0.206)	(0.185)	(0.203)	(0.235)
Region variable added						
Constant	4.42***	4.92***	-1.069***	-0.534	-1.768***	-2.04***
	(0.361)	(0.322)	(0.362)	(0.317)	(0.347)	(0.408)
Observations	1,155	1,155	1155	1155	1,155	1155
Population	N/A	56,913.069	N/A	56,913.069	N/A	56,913.069

Variables	(1) lnvapw	(2) lnvapw (W)	(3) lnTFP	(4) lnTFP (W)	(5) lnulc	(6) lnulc (W)
R-squared	0.325	0.484	0.283	0.478	0.117	0.230

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author analysis of Tanzania Enterprise Survey Dataset 2022

Firms that have a business/strategic plan (docc) are close to 50% higher in VAPW and TFP and 24.1% lower ULC compared to those that do not; estimates which increase when we account for sample weights in the analysis. The result may be picking the firms that are formal in nature, for which a business strategy plays a crucial role in performance (Gibus and Kemp, 2003).

Exporting firms are associated with 25.4% and 24.7% higher VAPW and TFP respectively; and 9.3% lower ULC compared to non-exporting firms. The positive role of exporting in enhancing firm productivity and competitiveness is consistent with results in other studies (e.g. Mengistae and Pattillo, 2004; and McGregor et al, 2013). Furthermore, access to loan and utility (water) are observed to be significant drivers of productivity. Firms accessing loans are associated with 20.9% and 20.8% higher VAPW and TFP and 5.4% lower ULC compared to those that do not have access loan; while firms facing water shortage have 66.7% and 67.6% lower VAPW and TFP and have 31.7% higher ULC compared to those that do not face water shortage respectively. This shows the significant role of business environment in enhancing firm productivity and competitiveness, which is also consistent with results in the previous empirical studies (see Lall and Mengistae, 2005; Ezenekwe 2020).

The results also show significant variation by sector, where the nature of firms' activity influence the level of productivity and competitiveness. For instance, firms operating in wholesale and retail trade and repair works are associated with higher VAPW and TFP and lower ULC compared to firms in the other sectors. However, once we account for sample weights in the analysis the incremental productivity effect (VAPW and TFP) of operating in whole sale and retail sector against manufacturing disappears while the competitiveness effect remains. Firms operating in agriculture, forestry and fishing sector are 79.5% and 80.4% lower in VAPW and TFP compared to firms operating in manufacturing sector. The literature identifies agriculture sector in Tanzania with low level of productivity (URT 2021). Furthermore, firms operating in education, human health and social work activities are associated with 57.1% higher ULC (lower levels of competitiveness) compared to firms operating in manufacturing sector.

The remaining variables are significant in one of the indicators. For instance, firm age is (older firms are) associated with higher VAPW and TFP, presumably reflecting the fact that a firm tends to learn and acquire more capacity over time. Consistent with the findings on exporting, firms that have greater participation in international trade are associated with higher levels of productivity. Large size firms are 48.5% and 46.1% more productive with higher VAPW and TFP compared to small firms, and the effect increases when we accounted for sample weights. Indeed, the significance of size reflects firm's ability to use modern technologies in production, participate in international trade and acquire higher capital-intensive production technologies among other advantages.

The above results largely reflect the formal nature of firms, whereby, operating informally is associated with 43.7% and 43% less VAPW and TFP compared to operating formally. Diao et al (2018) identified similar features among firms operating in the informal sector in Tanzania. Firms experiencing technology transfer from FDI firms are 30.4% and 30.6% higher in VAPW and TFP compared to those that did not experience any form of technology transfer, underscoring the fundamental role of technology in determining the long-term development of a firm (Zhong, 2022). Given the critical importance of the manufacturing sector, we report empirical results for the entire sample and separately for the manufacturing sector sample. Clearly, Tanzania has been putting more effort on the development of manufacturing sector as a way to promote industrialisation and sustainable development and ultimately reach middle income status (see TDV 2025 and URT, 2021). Notably, the manufacturing sector has different subsectors compared to other sectors, and it covers over a third (34.7%) of the sampled firms in the TES 2022. Recognising such importance, we replicate the estimation specifically for the Manufacturing sector sample to compare with the foregoing analysis of the entire sample. The results are reported in Table 8.

Overall, the results are mostly similar except for some few cases. The technology transfer variables (that were insignificant in the all sectors regression) became significant determinants of firm productivity and competitiveness for the manufacturing firms. In particular, firms experiencing technology transfer from foreign expatriates have 84.6% and 62.3% higher VAPW and TFP compared to those that do not experience any form of technology transfer. Firms experiencing technology transfer from employees that previously worked in FDI firms have about 1.2 times lower ULC compared to those that did not experience any form of technology transfer.

Furthermore, unlike the preceding overall results, foreign ownership (fdi) is a significant driver of productivity in the manufacturing sector. This may reflect the significant degree of FDI presence in the manufacturing compared to the overall sectors. Correspondingly, productivity effect of technology transfer from FDI firms is greater in the manufacturing sector (more than 100%) compared to the entire enterprise sector (approximately 30%). Similar to results in the descriptive analysis, firms operating informally have lower ULC and lower VAPW compared to those that operate formally. Finally, women owned enterprises are associated with higher ULC compared to male owned enterprises in the manufacturing industrial sector. Indeed, previous studies (see Hallward-Driemeier, 2013 and Campos and Gasier, 2017) show that women owned firms in SSA have lower performance and lower productivity compared male owned firm and such differences can be attributed to differences in size, sector and level of investment on areas that can improve productivity and competitiveness such as ITU (see Barasa, 2020).

Table 8: Determinants of Firm Productivity and Competitiveness in the Manufacturing Sector

Variables	(1) lnvapw	(2) lnvapw (W)	(3) lnTFP	(4) lnTFP (W)	(5) lnulc	(6) lnulc (W)
lncap_int	0.0431***	0.0348***	-0.00517	-0.0166	-0.0101	-0.0147
	(0.0152)	(0.0122)	(0.0152)	(0.0123)	(0.0126)	(0.00954)
export	0.294*	0.192**	0.287*	0.301**	-0.243**	-0.164**
	(0.160)	(0.096)	(0.161)	(0.152)	(0.099)	(0.078)
female	-0.452	-0.454*	-0.446	-0.485*	0.490*	0.267
	(0.283)	(0.261)	(0.283)	(0.267)	(0.252)	(0.263)
large	0.639*	0.700***	0.611*	0.789***	0.0532	0.106
	(0.344)	(0.218)	(0.346)	(0.211)	(0.271)	(0.244)
docc	0.356	0.306*	0.348	0.342*	-0.412*	-0.232
	(0.247)	(0.170)	(0.247)	(0.169)	(0.243)	(0.258)
fdi	0.657*	1.231***	0.644*	1.305***	-0.280	-0.0724
	(0.359)	(0.363)	(0.360)	(0.371)	(0.463)	(0.155)
informal	-0.512*	-0.559**	-0.503*	-0.570**	-0.831**	-0.244
	(0.302)	(0.255)	(0.302)	(0.254)	(0.348)	(0.259)
loan	0.467**	0.465**	0.468**	0.470**	0.0398	0.117
	(0.185)	(0.182)	(0.186)	(0.183)	(0.177)	(0.102)
Tech Transf						
From FDIs	1.119**	0.580*	1.120**	0.571*	-0.173	-0.276
	(0.474)	(0.325)	(0.477)	(0.325)	(0.283)	(0.357)
From For Expatr	0.440	0.846*	0.523*	0.623*	0.0319	0.0619
	(0.521)	(0.460)	(0.271)	(0.471)	(0.102)	(0.460)
From FDI employee	0.689	0.989	0.711	0.998	0.862	-1.172***
	(0.574)	(0.674)	(0.7001)	(0.654)	(0.799)	(0.410)
Region variable added						
Constant	4.48***	5.33***	-1.009	-0.0357	-2.010***	-2.436***
	(0.722)	(0.587)	(0.724)	(0.586)	(0.767)	(0.818)
Observations	283	283	283	283	283	283
Population	N/A	26,417.128	N/A	26,417.128	N/A	24,432.699
R-squared	0.364	0.512	0.340	0.539	0.257	0.356

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author analysis of Tanzania Enterprise Survey Dataset 2022.

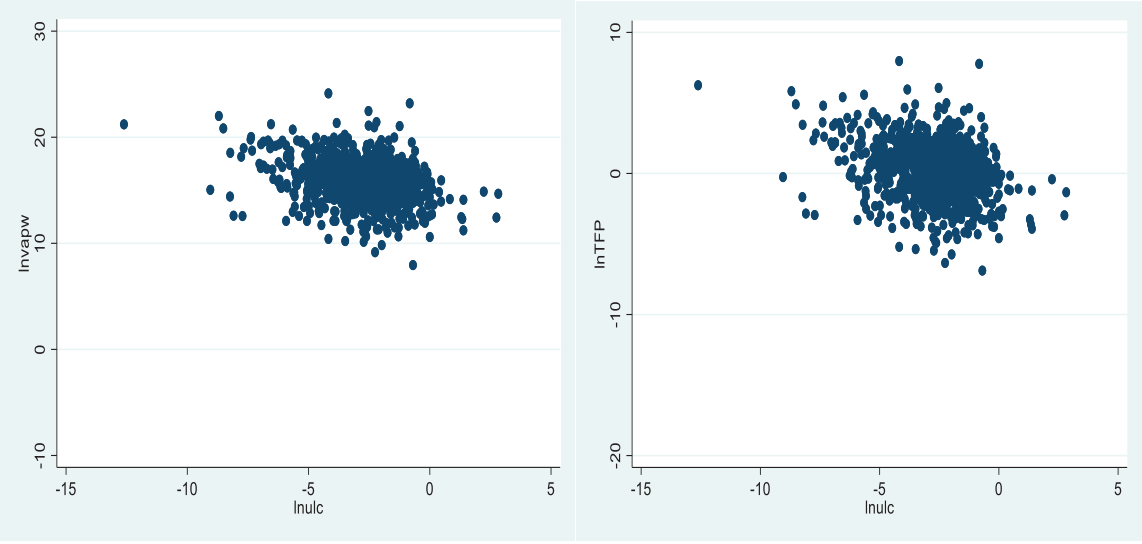
5.0 DISCUSSION OF KEY ISSUES EMANATING FROM ANALYSIS

This chapter identifies and discusses priority sectors and key policy issues for enhancing productivity and competitiveness in the Tanzania's enterprise sector. The empirical analysis showed the following factors as significant drivers of firm productivity and competitiveness: (i) exporting (ii) access to loan (iii) capital intensity, (iv) having a business and strategic plan, (v) operating in certain sectors i.e., wholesale and retail and (vi) access to credit; and (vii) reliability of utility. To substantiate these findings, we undertook further analysis to identify key sectors for enhancing increased productivity and competitiveness in the Tanzanian enterprise sector. Furthermore, from these factors, we selected three key issues for further discussion/analysis, owing to their fundamental role in the development of the Tanzania Enterprise sector. These are: investment (capital intensity), business environment challenges and exporting.

5.1 Priority Sectors for Enhancing Productivity and Competitiveness

To identify the key sectors for enhancing increased productivity and competitiveness, we firstly undertook a correlation analysis through a scatter plot to confirm a close association between productivity and competitiveness. Figure 16 shows that, from the TES 2022 dataset, the correlation of productivity and competitiveness measures can be corroborated. It is observed that firms with high TFP or VAPW have lower ULC. This implies that high levels of productivity are associated with higher levels of competitiveness.

Figure 16: Scatter plot of Firm Productivity (VAPW/TFP) and Competitiveness (ULC)

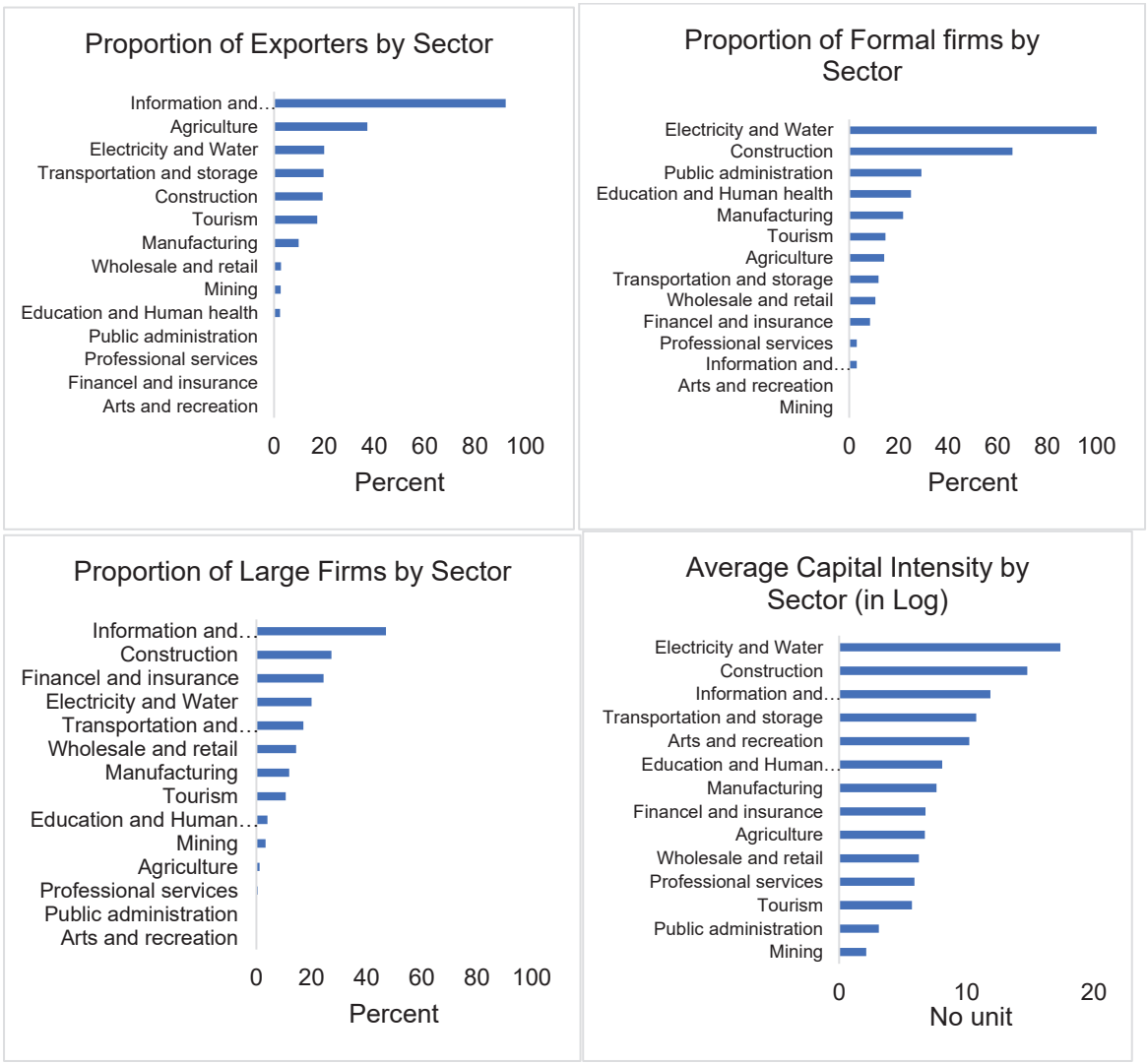


Source: Author analysis of TES 2022

Following, using the results of the empirical analysis, we undertook ranking of sectors by the four main drivers of productivity and competitiveness levels, namely: exporting, formality, size and capital intensity (investment). The results are shown in Figure 17. The ranking shows that five sectors emerged as robust drivers of productivity and competitiveness in the Tanzanian enterprise sector. These include (in the order of magnitude): construction, ICT,

utilities (electricity and water), transport and storage and manufacturing. On the other hand, public administration and services, arts and entertainment, mining and professional services appear to be bottom in the weakest performers in enhancing firm productivity/competitiveness.

Figure 17: Ranking Sectors by Four Strong Drivers of Productivity and Competitiveness



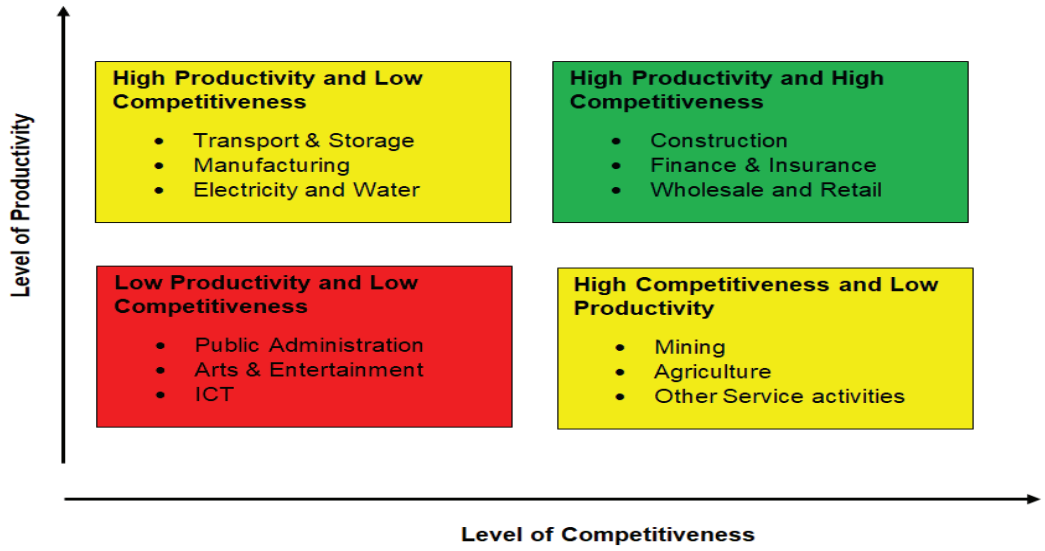
Source: Author analysis of TES 2022

To corroborate the findings, we ranked the sectors according to the actual estimates of the productivity and competitiveness indicators discussed in the descriptive analysis. Firstly, we separately ranked the sectors (from top to bottom) according to the productivity estimates, on the one hand and competitiveness estimates on the other. We then sampled the top 5 out of the highest and lowest ranking in each category to identify the common sectors in both groups, while retaining the sectors that are only selected for each group. The process resulted to identifying top three sectors in each category, which are presented in the following matrix Figure 18 with four quadrants differentiated by traffic colour codes.

Each quadrant is important in its own right, but the most important one is the common quadrant is the green colour quadrant of sectors with High Productivity and High Competitiveness levels. These are Construction, Financial and insurance, and Wholesale and retail sectors. Following, two yellow coloured quadrants command similar weight each presenting top sectors in one of the two metrics. First are sectors that are associated with high levels of productivity but low levels of competitiveness. These include Transportation & storage, Manufacturing, and Utilities (electricity & water supply). Second are sectors that are

associated with high levels of competitiveness but low levels of productivity. These include Mining, Agriculture, and Other service activities. Final set of sectors are in the red quadrant of low levels of both productivity and competitiveness. These sectors include Public administration & services, Arts, entertainment & recreation and ICT.

Figure 18: Ranking Sectors by Four Strong Drivers of Productivity and Competitiveness



Source: Author analysis of Tanzania Enterprise Survey Dataset 2022

The results show that, some of these priority sectors are related with firm characteristics. For instance, the mapping exercise showed that transport and storage, construction and manufacturing sectors have either high proportion of exporting firms or have high average share of exports in total sales or both. Furthermore, construction, manufacturing and finance and insurance activities have higher proportion of formal firms than average proportion of formal firms. Sectors with high levels of productivity and competitiveness (e.g. construction and manufacturing) are also among the top 5 sectors with highest average employment in the TES dataset. However, while agriculture, mining and public administration and public services have high employment potential, their performance in productivity and competitiveness is low. Other key drivers of competitiveness include Access to credit, firm linkages, technology and innovation upgrading and access to electricity and water.

5.2 Selected Priority Policy Issues

We selected three key policy issues for further discussion/analysis, owing to their fundamental role in the development of the Tanzania Enterprise sector. These are: investment, business environment, and exporting as discussed below.

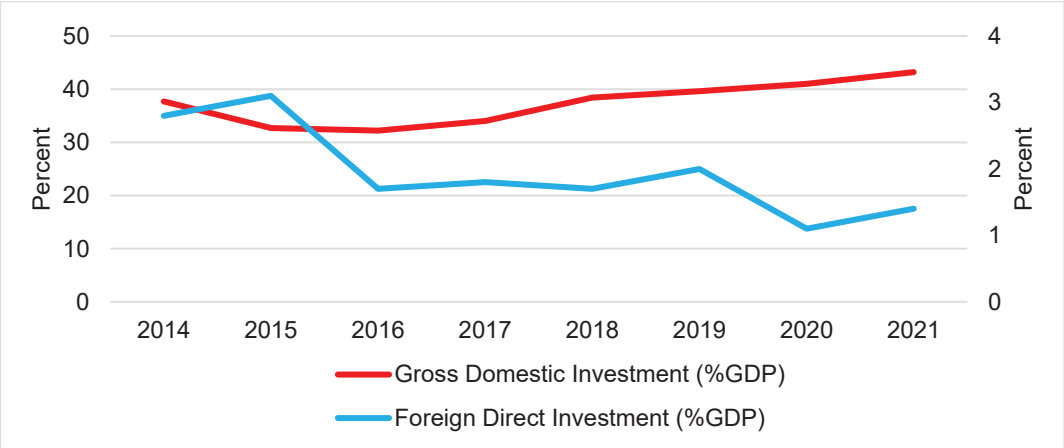
5.2.1 Investment

Clearly, investment improves production processes through acquiring new machines/equipment, training workers, and spending on R&D to spur innovation and help firms improve products and find new markets. Public investment schemes such as

construction transport and communication infrastructure can enhance connectivity and access to markets, improve access to utility services and ultimately improve productivity and competitiveness. FDI has positive benefits in terms of increasing contestability of host markets, improving the performance of local industry and lowering prices. FDI also contributes directly to the competitiveness of local firms by being the vehicle by which they penetrate international production and marketing networks. Furthermore, technology transfer from FDI reduces the X-inefficiency of the domestic firms and improves productivity of the local firms (See Gorg and Greenway 2004; Smeets 2008).

Recognizing the importance of investment, the GoT has been implementing various reforms to attract investments including joining Regional Trade Agreements (RTA) such as Economic Partnership Agreement, African Continental Free Trade Area (AfCFTA), formulation of Special Economic Zones, creating regional investment guides, improving transport and communication infrastructure and implementing Blueprint of economic reforms to create an attractive business environment in Tanzania. Figure 19 shows the trend of gross domestic investment and FDI inflows in Tanzania between 2014 and 2021. Notably, the share of gross domestic investment (or gross capital formation) in total GDP has been increasing from 37.6% in 2014 to 43% in 2021, mainly due to the implementation of favourable policies for private sector development. The net FDI inflows (% GDP) generally declined during 2014-2015 period followed by gradual recovery post 2016. In line with this trend, the 2023 World Investment Report reported that while FDI flows to Tanzania increased from USD 938 million in 2017 to USD 1.1 billion in 2022, they have not recovered to pre-2015 levels.

Figure 19: Annual Gross Domestic Investment and FDI Inflows for Tanzania



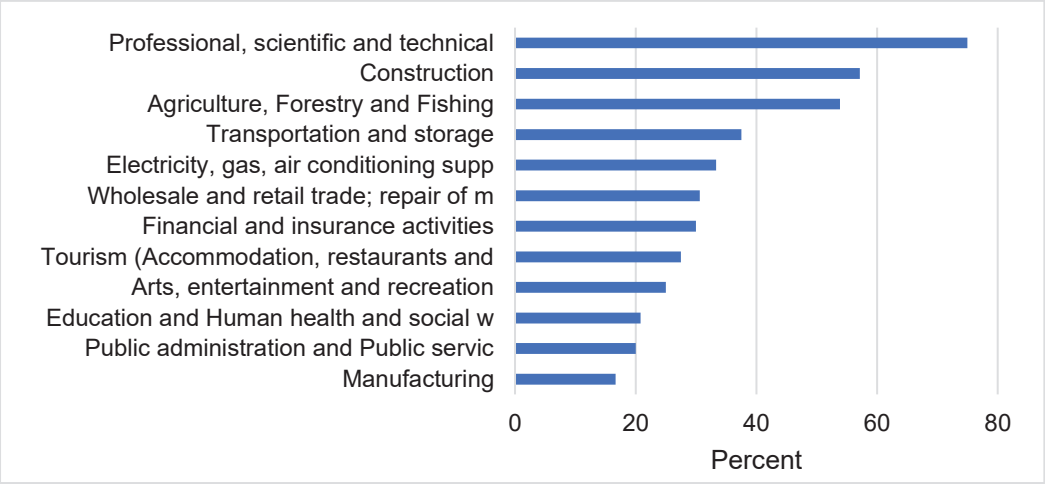
Source: World Bank Development Indicators 2022.

The biggest challenges to investment in Tanzania (as reported by Investors) include difficulty in hiring foreign workers, reduced profits due to unfriendly and opaque tax policies, increased local content requirements, regulatory/policy instability, lack of trust between the GoT and the private sector, and mandatory initial public offerings (IPOs) in key industries. In particular, the regulatory environment appears unfavourable to investors, including the new regulations in the mining sector in 2017 that led to renegotiation of the mining contracts. The annual survey of mining and exploration companies conducted by Fraser Institute in 2017 found that Tanzania's investment attractiveness ranking dropped from 59th in 2016 to 78th in 2017 (Stedman and Green, 2019).

However, the current Government administration has resolved to address these hurdles in lieu of the new Investment policy. Indeed, the GoT is keen to improve business environment and attract more investors both domestic and foreign. In May 2018, the government adopted the Blueprint for Regulatory Reforms to improve the business environment and attract more investors. The reforms, which were developed as a collaborative effort between the Ministry of Industry, Trade and Investment and the private sector, seek to improve the country's ease of doing business through regulatory reforms and to increase efficiency in dealing with the government and its regulatory authorities. The official implementation of the Business Environment Improvement Blueprint started in 2019, though there have been little tangible changes. A new Business Facilitation Act aimed at implementing key actions from the Blueprint is pending adoption by Parliament.

Clearly the extent to which the FDI benefits local enterprises depends on factors internal or external to the firm. However, for technological upgrading to happen, the FDI firm has to have sufficient technological capacity, and that strong linkages have to exist between local firms and FDI (e.g. forward and backward linkages through buying and selling). Such linkages would promote technology transfer and innovation to local firms through learning by doing, and through the labour movement. Indeed, our empirical analysis showed that there are significant productivity gains from learning from FDI firms particularly in the manufacturing sector. The TES 2022 dataset show that firms that have experienced knowledge transfer from FDI firms are more present in professional, construction, transportation and storage sectors (see Figure 20).

Figure 20: Proportion of firms that have learned from FDIs[6]



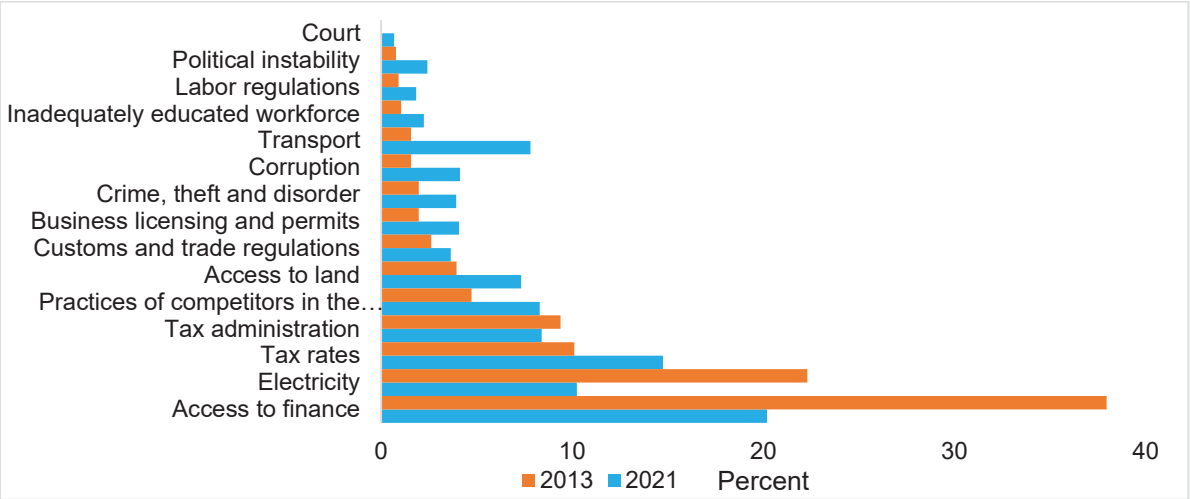
Source: Author analysis of Tanzania Enterprise Survey Dataset 2022

5.2.2 Business Environment

6 Note that the proportion estimates in Figure 18 were calculated as the number of firms experiencing knowledge transfer from FDI in sector *i* divide by total number of firms that have experienced technology transfer in that particular sector (rather than total firms experiencing technology transfer). This was done as such because of the variations in number of firms across sectors.

In the literature, business environment is considered as one of the critical factors contributing to firm performance and overall country development (Farole et al, 2017; Batra and Stone, 2008). Indeed, business environment provides the framework where firms interact, trade, and compete, including the basic legal structure, human capital or agglomeration economies. Similarly, our results have shown that business environment factors such as access to reliable utility and finance/loans are important drivers of firm productivity. As it can be observed in Figure 21, access to finance, tax rates and electricity were the top 3 business environment challenges faced by firms in 2021. Emerging question is whether and to what extend have these challenges changed overtime. To do such a comparative analysis, we compared the challenges reported by firms in the past enterprise surveys using the World Bank Enterprise Survey (WBES). Since the WBES covers only the manufacturing and services sectors, we only compare firm responses in those sectors for year 2013 and 2021.

Figure 21: Business Environment Challenges among firms in Manufacturing and Services



Source: Author analysis of WBES 2013 and TES 2022 Datasets

On the one hand, Figure 21 shows improvement of business environment in only three areas: electricity, access to finance and tax administration, i.e., these areas are identified by a lower proportion of firms in 2021 than in 2013. This is not surprising given the improvements made by the Government, including introduction of online systems for tax payments and implementation of financial inclusion frameworks. Access to electricity increased over the past decade from 7% in 2011 to 37.7% in 2020, one of the fastest access expansion rates in Sub-Saharan Africa (World Bank, 2022). This rapid increase is attributed to the strong commitment and support for the rural electrification expansion programs, the introduction of a petroleum levy to finance rural energy Authority; and reductions in connection fees (World Bank, 2022).

Access to finance has improved dramatically following Tanzania relentless initiatives to support financial inclusion through the Financial Inclusion Framework (NFIF) since 2013 (NFIF 2014-2016), now in its third phase. The NFIF focused on addressing the fundamental barriers to financial inclusion and leveraged the mobile money revolution facilitated by technologically driven delivery channels (e.g. mobile network operators – MNOs). The recently released FINSCOPE report on financial inclusion shows that, the number of adults excluded financially has fallen to 6.4 million in 2023 from 7.8 million in 2017. The reduction is mainly caused by increased proximity to access points, increased ownership of national identification numbers and increased mobile phone ownership. Consequently, formal financial inclusion among adults, has increased from 65% in 2017 to 76% owing mainly to the rise in the use of mobile money and banking services (FSDT, 2023).

On the other hand, Figure 21 shows that business environment has worsened in several areas, most notably transportation, tax rates, access to land, corruption, business licensing and permits, crime/theft and disorder, political instability, labour regulations and inadequately educated work force. Surprisingly, transportation has worsened despite the government's efforts to improve both road and railway infrastructures across the country, presumably reflecting the recent global fuel price rise that translated to high transportation costs.

5.2.3 Exporting

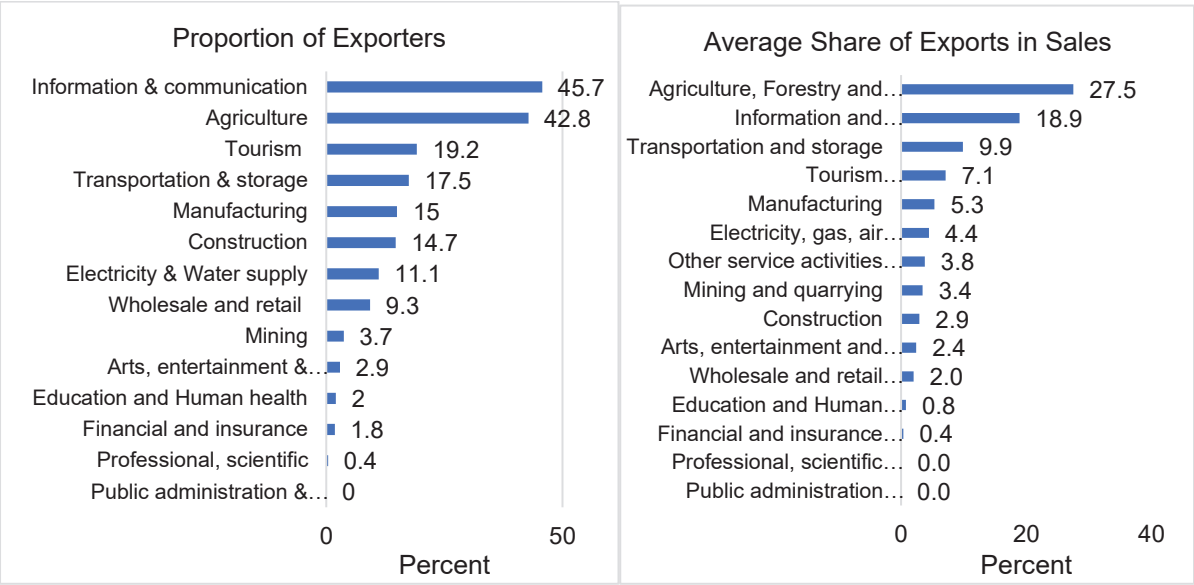
The literature has consistently shown that exporting firms are more productive and competitive than non-exporting firms where the differences arise due to two main factors (see Bernard and Jensen 1999; Bernard and Wagner 1997). First, exporting firms represent self-selection of firms that are capable of incurring additional costs of selling goods to foreign markets (transportation, distribution, market access costs etc.), and improving performance. Secondly, firms participating in international markets are exposed to more intense competition, hence the need to invest in innovation and technology upgrading.

The results of our empirical analysis are strongly consistent with finding in the literature. Nonetheless, since most policies to support productive enterprises are channelled through the sectors, it is interesting to find out which sectors are more export intensive in Tanzania. This question is also important in the context of the emerging opportunities to tap the continental export market now that Tanzania is one of the State Parties in the AfCFTA agreement. As shown in Figure 22, exporters are highly present in ICT, agriculture, tourism, transport and storage and manufacturing sectors. In terms of the size of exports, agriculture sector had the highest average share of exports in sales followed by ICT, transport and storage, tourism and manufacturing sectors.

As noted earlier in section 4.1, the general firm participation in export markets and the average share of exports in sales are generally low. To recap, based on the TES 2022 data, only 15.9% of firms in the enterprise sector in Tanzania are exporters and the average share of exports in total exports amounted to 4.1%. The low level of export participation may be explained by several factors. These include, unfavourable business environment (Aikaeli, 2012; Mpunga, 2016; Mkenda & Rand, 2020), supply side constraints (Mhando, 2009; Pasape, 2018), low level of skills (Juma & Said, 2016), and difficulties related to market access (Mbago, 2013; Kazimoto, 2014). Others are lack of information to locate and analyse foreign market, inability to find foreign customers, inability to identify and explore foreign business opportunities, lack of product promotion and inadequate information (Mori & Munisi, 2012).

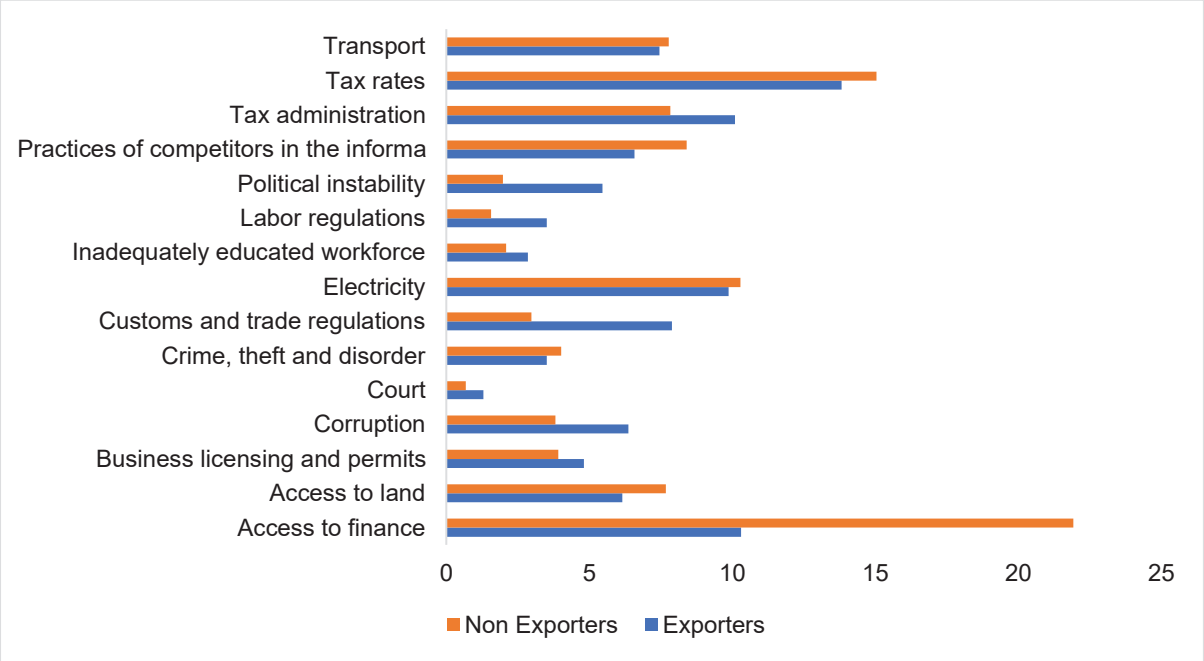
Note that, in addition to the general business environment challenges, exporting firms also face several exceptional challenges as identified in the TES 2022 data (see Figure 23). These include customs and trade regulation (border and market access challenges), political instability (in the destination markets) and labour regulation (challenges in hiring foreign experts). From the TES 2022, a relatively higher proportion of exporters (24%) revealed that they hired foreign experts compared to 3% for non-exporters. Access finance is less problematic to exporters than non-exporters as the former tend to have higher financial capacity than the latter. In addition, access to land and tax rates is more problematic to non-exporters than exporters.

Figure 22: Proportion of Exporters and Average Share of Exports (in Sales) by Sector



Source: Author analysis of Tanzania Enterprise Survey Dataset 2022

Figure 23: Business Environment Challenges faced by Exporters and Non-Exporters



Source: Author analysis of Tanzania Enterprise Survey Dataset 2022

6.0 CONCLUSION AND POLICY IMPLICATIONS

As stated in the introduction chapter, the main objectives of this study were two folds. The first was to provide comprehensive mapping of the enterprise sector in Tanzania, including identifying its structure/composition, challenges and prospects for growth. The second was to empirically determine the drivers of competitiveness and productivity of the Tanzanian enterprise sector in order to identify a set of appropriate policy measures to enhance realisation of the various private sector development policy objectives. To achieve these objectives, the study utilized the recently available Tanzania Enterprise Survey (TES) dataset for 2022 to provide the needed data for analysis. Availability of the dataset is a notable achievement in addressing the gaps in the existing/previous firm level datasets as it provides comprehensive information on Tanzania's enterprise sector. The survey contained a nationally representative sample of 1,872 firms covering the universe of enterprises sector in Tanzania Mainland and Zanzibar. The methodology used for carrying out the study involved a number of analytical aspects/steps.

First, we conducted a mapping of the enterprise sector to enhance our understanding of the firm characteristics, distribution across administrative regions and sectors. As a result, unlike most of the existing surveys that suffers limited coverage of the enterprise universe; it was possible to distinguish these characteristics while comparing firms of different size, activities/sectors and legal status. Following, we used descriptive analysis to identify and estimate different indices or measures of productivity and competitiveness, thereby providing complete information on the current status/levels of productivity and competitiveness across the entire enterprise sector. The results set a baseline upon which future surveys of similar scale can be compared. This was then followed by empirical analysis to identify the drivers of firm productivity and competitiveness. The identified determinants provides empirical evidence on the important focus areas or factors for policy action in order to promote firm competitiveness and productivity enhancement in the Tanzanian enterprise sector. To complement the discussion of results, the analysis was concluded by identifying priority key sectors and critical policy issues for enhancing productivity and competitiveness of the enterprise sector in Tanzania.

Several findings emerge from the study. Foremost, it is important to note that, while the results conforms with the commonly available evidence, the findings provides much more granular details especially in comparing firms of different types, size, sectors and other characteristic profiles. The study showed that the level of productivity and competitiveness is significantly driven by firm characteristics, including firm size, exporting, formal and gender status. The identified drivers reinforce our knowledge of the challenges and prospects for improving productivity and competitiveness of the Tanzania's enterprise sector. The key message is clear, that the enterprise sector is quite heterogeneous with significant differences such that the one-size fits all approach cannot be effective in policy measures to develop/promote the enterprise sector. Although the Government is keen to promoting women economic empowerment and entrepreneurship, the share of women owned businesses is less than a quarter of all enterprises, majority of which are in tourism, mining and quarrying and agriculture sectors.

However, some of the results are indeed eye-catching. For instance, Tanzanian enterprise sector has a very low level of exporting both in terms of a dismal number of exporters (15.9%) and even the few exporting firms export only a small proportion of total sales (4.2%). This means that the enterprise sector is largely domestic market oriented, implying limited success of the export promotion initiatives. Related to this, the analysis confirms, perhaps like in most other Sub-Sahara African economies, that informality and small size are a dominant feature of the Tanzanian enterprise sector. This fact suggests that, enterprise productivity and competitiveness is held back by the vicious circle of low capacity and weak entrepreneurship skills. The vice versa is also true that the more formal and larger firms are associated with much bigger capacity, hence higher levels of productivity and competitiveness and higher exporting incidence. The dichotomy leads to a competing demand for policy action to support growth of small/informal firms as well as augment the competitiveness of the large formal firms. This assertion does not mean that small/informal firms are not productive or competitive. Indeed, previous work on Tanzania has shown existence of small/informal firms with features of productive/competitive firms with significant growth of employment (see Diao, et al. 2018).

Of more interest to policy makers also is the extent at which different sectors have responded to or being impacted by initiatives to improve productivity and competitiveness. Again, driven by the varying firm characteristics and nature of activities, the results confirm the fact that sectors differ markedly, with some showing up as significant drivers of the overall levels of productivity/competitiveness and others less so. Construction, Financial and insurance, and Wholesale and retail sectors are top in the list, followed by Transportation & storage, Manufacturing, and Utilities (water and electricity). On the contrast, the Public sector, ICT and creative industry are bottom in the list. This ranking needs to be interpreted with caution though, since all the sectors are important in their own rights. It is therefore difficult to directly indicate the policy implication since much of the differences across sectors is driven by the nature of activities of the respective sectors rather than performance of the enterprises in it per se. For instance, it is not surprising that the Public sector is identified as the most unproductive or uncompetitive sector compared to financial sector that is dominated by private enterprises.

Another interesting conclusion from the results is that investment matters if firms are to improve productivity/competitiveness and enhance value addition. Consistent with findings from the literature, the results show that the level of productivity and competitiveness is an increasing function of capital intensity. However, descriptive analysis shows that overall, the level of investment is low across the enterprise sector (less than 10% of sales revenue) and that firms spend more on capital investment (e.g. equipment and machinery) compared to other forms of investment such as training and R&D. However, it is surprising to note that the sectors with a relatively high share of investment in sales are not the sectors with top most levels of productivity and competitiveness, presumably reflecting the nature of activity (capital intensive sectors) more than the performance of such enterprises. For instance, equipment and machinery forms a large part of investment spending (as share of sales) for heavy utility (electricity and water) and ICT sectors, which is necessary but not sufficient condition for enhancing productivity and competitiveness.

On the business environment issue, the results assessed progress made given initiatives made by the Government and results from previous surveys. The results indicate that some challenges are persistent, notably taxation (especially for large firms), access to finance (especially for MSMEs) and electricity (especially for the manufacturing sectors). Clearly, the initiatives made by the Government including introduction of online payments systems (digitalisation), rural electrification programs and financial inclusion strategies have made notable progress in alleviating these challenges. However, business environment appears to have deteriorated on other areas including transportation, access to land, corruption, business licensing and permits, crime/theft and disorder; and labour regulations and inadequately educated work force.

Finally, while the study could not address all critical issues on the development of Tanzania's enterprise sector, it is important to highlight some areas for further analysis. These include first, the need to investigate how to address the issue of size and informality in promoting enterprise development. Secondly, given the fact that some sectors play a more critical role in enterprise development than others, it is important to undertake a detailed sector specific research to understand the scope for promoting optimal levels of productivity and competitiveness in particular sectors, so as to provide more insight on the policy actions needed to unlock their potential. Third and finally, more specific study on behaviour of firms, challenges and prospects for exporting may generate useful insights to improve export promotion strategies.

The study contributes to the discussion about private sector development strategy for Tanzania. Following, a number of policy implications can be drawn on the basis of these findings. First, the findings underlie critical need for the Government to (i) promote enterprise development, including measures to address challenges of low capacity, high level of informality and low level of entrepreneurship; (ii) carry out overarching reforms to address systemic business environment challenges within the framework of Blueprint; (iii) adopt more aggressive strategies or programs for encouraging/supporting firms participation in international trade – thereby enhancing capacity of Tanzania in harnessing the opportunities in the Regional Trade Agreements and the seminal African Continental Free Trade Area (AfCFTA) agreement.

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ANNEXES

Annex A: Diagnostic Test Results for the overall estimates

Table A1: Variance inflation factor (VIF) estimates – All sectors

Variable	lnulc		lnvapw		lnTFP	
	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
lncap_int	1.501	.666	1.519	.658	1.519	.658
lage	1.255	.797	1.249	.8	1.249	.8
export	1.375	.727	1.393	.718	1.393	.718
female	1.203	.831	1.192	.839	1.192	.839
large	1.588	.63	1.576	.635	1.576	.635
docc	1.655	.604	1.697	.589	1.697	.589
ITU	1.369	.73	1.359	.736	1.359	.736
fdi	1.18	.847	1.173	.853	1.173	.853
train	1.625	.615	1.599	.625	1.599	.625
informal	1.682	.594	1.602	.624	1.602	.624
linkage	1.504	.665	1.538	.65	1.538	.65
loan	1.134	.882	1.149	.87	1.149	.87
Technology transfer						
From suppliers	1.1	.909	1.094	.914	1.094	.914
From FDI firms	1.193	.838	1.18	.847	1.18	.847
From FDI employees	1.08	.926	1.079	.927	1.079	.927
From fore expatriates	1.424	.702	1.423	.703	1.423	.703
From customers	1.3	.77	1.259	.794	1.259	.794
Utility problems						
Power outage	1.637	.611	1.597	.626	1.597	.626
Water shortage	1.195	.837	1.186	.843	1.186	.843
Both (Pow and Wat)	1.631	.613	1.57	.637	1.57	.637
Sector						
W/sale and retail	1.91	.523	1.986	.503	1.986	.503
Agriculture	2.029	.493	1.884	.531	1.884	.531
Tourism	1.623	.616	1.599	.625	1.599	.625
Educatn and Health	1.309	.764	1.289	.776	1.289	.776
Others	1.342	.745	1.371	.729	1.371	.729
Mining and quarry	1.202	.832	1.174	.852	1.174	.852
Transport and storg	1.269	.788	1.279	.782	1.279	.782
Construction	1.095	.913	1.087	.92	1.087	.92
Region						
Coast	1.379	.725	1.373	.728	1.373	.728
Arusha	1.139	.878	1.126	.888	1.126	.888
Tabora	1.27	.787	1.294	.773	1.294	.773
Kigoma	1.225	.816	1.216	.823	1.216	.823
Shinyanga	1.453	.688	1.504	.665	1.504	.665
Kagera	1.095	.914	1.101	.908	1.101	.908
Mwanza	1.22	.82	1.208	.828	1.208	.828
Mara	1.205	.83	1.235	.81	1.235	.81
Dodoma	1.389	.72	1.346	.743	1.346	.743
Singida	1.163	.86	1.152	.868	1.152	.868
Iringa	1.289	.776	1.282	.78	1.282	.78
Mbeya	1.329	.753	1.35	.741	1.35	.741
Rukwa	1.305	.766	1.294	.773	1.294	.773
Lindi	1.08	.926	1.092	.916	1.092	.916

Variable	lnulc		lnvapw		lnTFP	
	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
Mtwara	1.373	.728	1.449	.69	1.449	.69
Ruvuma	1.167	.857	1.169	.855	1.169	.855
Manyara	1.206	.829	1.248	.801	1.248	.801
Njombe	1.205	.83	1.208	.828	1.208	.828
Songwe	1.361	.735	1.375	.727	1.375	.727
Geita	1.58	.633	1.549	.646	1.549	.646
Katavi	1.24	.806	1.338	.748	1.338	.748
Simiyu	1.132	.883	1.129	.885	1.129	.885
Kasikazini Pemba	1.197	.835	1.184	.845	1.184	.845
Kusini Pemba	1.174	.852	1.159	.863	1.159	.863
Kasikazini Unguja	1.075	.931	1.159	.863	1.159	.863
Coast	1.102	.907	1.087	.92	1.087	.92
Arusha	1.099	.91	1.088	.919	1.088	.919
Tabora	1.284	.779	1.301	.769	1.301	.769
Kigoma	1.076	.929	1.088	.919	1.088	.919
Mean VIF	**1.32**	**.**	**1.319**	**.**	**1.319**	**.**

Source: Author analysis of TES 2022 dataset

Table A2: Omitted variable test for estimated models

lnulc	lnvapw	ln_TFP_OLS
Ramsey RESET test for omitted variables Omitted: Powers of fitted values of lnulc H0: Model has no omitted variables F(3, 1104) = 0.36 Prob > F = 0.7843	Ramsey RESET test for omitted variables Omitted: Powers of fitted values of lnvapw H0: Model has no omitted variables F(3, 1104) = 1.00 Prob > F = 0.3913	Ramsey RESET test for omitted variables Omitted: Powers of fitted values of ln_TFP_OLS H0: Model has no omitted variables F(3, 1104) = 0.75 Prob > F = 0.5195

Source: Author analysis of TES 2022 dataset

Table A3: Results for Model Specification Test

Variable	lnulc			ln_TFP_OLS			lnvapw		
	Coefficient	Std.err	P>t	Coefficient	Std.err	P>t	Coefficient	Std.err	P>t
_hat	1.098	0.310	0.000	0.998	0.032	0.000	1.012	0.480	0.035
_hatsq	0.018	0.055	0.747	-0.006	0.016	0.713	-0.000	0.015	0.979
_cons	0.128	0.433	0.767	0.008	0.044	0.847	-0.096	3.730	0.979

Source: Author analysis of TES 2022 dataset

Annex B: Diagnostic Test Results for the Manufacturing Sector Estimates

Table B1: Variance inflation factor (VIF) estimates

Variable	lnulc		lnvapw		lnTFP	
	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
lncap_int	1.609	.622	1.611	.621	1.611	.621
lage	1.439	.695	1.458	.686	1.458	.686
export	1.932	.518	1.886	.53	1.886	.53
female	1.454	.688	1.429	.7	1.429	.7
large	2.271	.44	2.22	.45	2.22	.45
docc	1.984	.504	1.991	.502	1.991	.502
ITU	1.741	.574	1.673	.598	1.673	.598
fdi	1.356	.738	1.351	.74	1.351	.74
train	1.785	.56	1.719	.582	1.719	.582
informal	1.389	.72	1.378	.726	1.378	.726
linkage	1.681	.595	1.711	.585	1.711	.585
loan	1.43	.699	1.392	.719	1.392	.719
Technology transfer						
From suppliers	1.206	.829	1.198	.834	1.198	0.834
From FDI firms	1.363	.733	1.36	.735	1.36	0.735
From FDI employees	1.219	.82	1.211	.826	1.211	0.826
From fore expatriates	1.965	.509	1.925	.519	1.925	0.519
From customers	1.611	.621	1.55	.645	1.55	0.645
Utility problems						
Power outage	2.226	.449	2.119	.472	2.119	0.472
Water shortage	1.772	.564	1.737	.576	1.737	0.576
Both (Pow and Wat)	2.198	.455	2.131	.469	2.131	0.469
sector	1.23	.813	1.22	.82	1.22	0.82
Region						
Kilimanjaro	1.363	.733	1.345	.743	1.345	0.743
Tanga	1.227	.815	1.195	.837	1.195	0.837
Morogoro	1.325	.754	1.378	.726	1.378	0.726
Coast	1.746	.573	1.725	.58	1.725	0.58
Arusha	1.348	.742	1.347	.742	1.347	0.742
Tabora	1.191	.84	1.181	.846	1.181	0.846
Kigoma	1.457	.686	1.433	.698	1.433	0.698
Shinyanga	1.255	.797	1.232	.812	1.232	0.812
Kagera	1.396	.716	1.342	.745	1.342	0.745
Mwanza	1.409	.71	1.383	.723	1.383	0.723
Mara	1.219	.82	1.203	.831	1.203	0.831
Dodoma	1.373	.728	1.353	.739	1.353	0.739
Singida	1.334	.75	1.315	.76	1.315	0.76
Iringa	1.266	.79	1.254	.797	1.254	0.797
Mbeya	1.624	.616	1.549	.646	1.549	0.646
Rukwa	1.25	.8	1.275	.784	1.275	0.784
Lindi	1.312	.762	1.42	.704	1.42	0.704
Mtwara	1.148	.871	1.131	.884	1.131	0.884
Ruvuma	1.31	.763	1.304	.767	1.304	0.767
Manyara	2.274	.44	2.144	.466	2.144	0.466
Njombe	1.215	.823	1.32	.757	1.32	0.757
Songwe	1.13	.885	1.124	.889	1.124	0.889
Geita	1.702	.588	1.664	.601	1.664	0.601
Katavi	1.341	.746	1.324	.755	1.324	0.755
Simiyu	1.121	.892	1.126	.888	1.126	0.888

Variable	lnulc		lnvapw		lnTFP	
	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
Kasikazini Pemba	1.116	.896	1.107	.904	1.107	0.904
Kusini Pemba	1.283	.78	1.314	.761	1.314	0.761
Kasikazini Unguja	1.209	.827	1.194	.837	1.194	0.837
Mean VIF	**1.488**	**.**	**1.469**	**.**	**1.469**	**.**

Source: Author analysis of TES 2022 dataset

Table B2: Omitted variable test for estimated models

lnulc	lnvapw	ln_TFP_OLS
Ramsey RESET test for omitted variables Omitted: Powers of fitted values of lnulc H0: Model has no omitted variables F(3, 228) = 3.56 Prob > F = 0.0150	Ramsey RESET test for omitted variables Omitted: Powers of fitted values of lnvapw H0: Model has no omitted variables F(3, 228) = 4.29 Prob > F = 0.0056	Ramsey RESET test for omitted variables Omitted: Powers of fitted values of ln_TFP_OLS H0: Model has no omitted variables F(3, 228) = 2.18 Prob > F = 0.0907

Source: Author analysis of TES 2022 dataset

Table B3: Results for Model Specification Test

Variable	lnulc			ln_TFP_OLS			lnvapw		
	Coefficient	Std.err	P>t	Coefficient	Std.err	P>t	Coefficient	Std.err	P>t
_hat	0.573	0.421	0.174	0.994	0.058	0.000	0.419	0.728	0.565
_hatsq	-0.078	0.075	0.301	0.009	0.024	0.724	0.018	0.023	0.424
_cons	-0.535	0.563	0.343	-0.012	0.077	0.876	4.636	5.866	0.430

Source: Author analysis of TES 2022 dataset

Notes:

(a) We performed three diagnostic tests on each set of our regression estimates. The first is correlation test which we executed by estimating Variable Inflation Factor (VIF) for each model (Tables A1 and B1). The second, is omitted variable test i.e., RAMSEY Re-set test (Tables A2 and B2) to check for omitted variable bias in our regression models and finally, we have performed model specification test (Table A3 and B3) to check for any model misspecification issues.

(b) It should be noted that the diagnostic tests are performed only on the initial regression results which were estimated without sample weights. We have not performed diagnostic tests on regression estimates that accounted for sample weights. Indeed, the assumptions of homoskedasticity, normality, and independence (e.g. no auto-correlation) are all assumptions needed for ordinary least squares. However, they are not needed for survey regression estimation i.e., svy: regress - which bases its inference on the sample design (stratification and variation between primary sampling

units) and is robust to violations of those assumptions. In other words, there's no need to test for those violations[7].

(c) In each of annex A and B, both the VIF and model specification test shows that our model estimates do not suffer from correlation, model misspecification and omitted variable biases. However, while omitted variable test i.e., insignificant P value in Table A2 shows there is no omitted variable bias in the all sectors regression, significant P values in Table B2 (manufacturing sector results) shows that the model results suffers from omitted variable bias. We believe this problem to be caused by low sample size in relation to the number of explanatory variables i.e., manufacturing sector regression covered between 280 and 305 firms in the TES dataset which is about 20% of the sample covered in all sectors regression.

7 See discussion on Statalist platform - SVY linear regression - Statalist

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