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Identifying Employment Creating Sectors in Kenya

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Abstract

Employment creation is a key priority for Kenya's development. This study uses the Computable General Equilibrium (CGE) model to assess the job creation potential in the Bottom-up Economic Transformation Agenda (BETA), which is being implemented through the Fourth Medium Term Plan (MTP IV). The study evaluates sector performance and provides evidence-based recommendations for prioritizing sectors that maximize employment opportunities. The policy simulations indicate that if BETA pillars meet their 2024 growth targets, 1,788,881 new jobs could be created, surpassing the 1.2 million jobs targeted in MTP IV. Of these, 407,732 would be direct jobs, and 1,381,149 indirect jobs. The infrastructure pillar will generate the most jobs at 697,809 jobs, with transport and storage sub-sectors leading at 309,538, followed by information and communication technology (ICT) at 24,407. The finance and production pillar will create 500,101 jobs, with construction and tea sub-sectors being the largest contributors at 373,816 and 152,552, respectively. The social pillar, comprising health and education, will generate 431,877 jobs, largely in indirect roles across other sectors. The environment and natural resources pillar will contribute 236,209 jobs, notably through accommodation and food services (59,497). The public administration pillar will create 2,276 indirect jobs but total direct employment creation in public administration will decline by 77,115 jobs. To unlock Kenya's job creation potential, targeted interventions across all pillars are essential. The infrastructure pillar can focus on investments in transport, storage, and ICT infrastructure, including logistics hubs and broadband expansion. Further, investment in ICT and power access reforms is critical to improve digital connectivity, foster innovation, and grow technology-driven businesses that create high-skills jobs. The finance and production pillar can foster public-private partnerships (PPPs), enhance market access for agro-products, and support small and micro enterprises (SMEs). Reducing reliance on rain-fed agriculture will strengthen tea, dairy, and agro-industries, ensuring job resilience. The social pillar can maximize job creation in education by promoting entrepreneurship and Open Distance and e-Learning (ODeL). The environment and natural resources pillar will need to focus on tourism infrastructure. Implementing marketing strategies and encouraging grassroots innovations will boost the accommodation and food services sector. Finally, the public administration pillar requires investment in capacity building, technology adoption, and upskilling to sustain job creation while mitigating potential technological disruptions.

Abbreviations and Acronyms

BETA	Bottom-Up Economic Transformation Agenda
CGE	Computable General Equilibrium
DEMETRA	Dynamic Equilibrium Model for Economic development Resources and Agriculture
EPI	Export Potential Indicator
EPZ	Export Processing Zones
ERS	Economic Recovery Strategy
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
GAMS	General Algebraic Modelling System
GEMs	General Equilibrium Models
GDP	Gross Domestic Product
GIFF	Growth Identification and Facilitation Framework
GoK	Government of Kenya
GVA	Gross Value Added
ICT	Information and Communication Technology
ILO	International Labour Organization
IILS	International Institute for Labour Studies
IOA	Input-Output Analysis
ISIC	International Standard Industrial Classification
ITC	International Trade Centre
JICA	Japan International Cooperation Agency
KAM	Kenya Association of Manufacturers
UK	United Kingdom
KIHBS	Kenya Integrated Household Budget Survey
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
MAPSKID	Master Plan Study for Kenya's Industrial Development
MSMEs	Micro, Small and Medium Enterprises
MTP IV	Fourth Medium-Term Plan (2023-2027)
NESC	National Economic and Social Council
PPPs	Public-Private Partnerships
SAM	Social Accounting Matrix
SAPs	Structural Adjustment Programmes
SEZ	Special Economic Zones

Table of contents

List of Tables

1. Introduction

Employment creation is a key development agenda worldwide, and jobs are fundamental to economic and social development. Jobs enable individuals to earn a livelihood, contribute to the economy through consumption and revenue generation, and foster human capital development. Indeed, economies grow, poverty diminishes, and socioeconomic transformation occurs as more productive employment opportunities are generated (ILO, 2021).

Employment creation is also important in a global economy where unemployment is one of the socioeconomic factors affecting the youth. High levels of youth unemployment can lead to social unrest, economic stagnation, and loss of opportunities for future generations. Employment creation is not only essential for equity and stability but also for social cohesion and economic prosperity. By prioritizing policies and initiatives that promote employment growth, governments, businesses, and organizations can contribute to building more inclusive and resilient societies (ILO, 2021; KIPPRA, 2021; World Bank, 2013).

In Africa, several countries have been experiencing high youth unemployment rates despite the relatively high economic growth rates experienced in the last two decades (Farole et al., 2018; ILO, 2022). This disconnect can be attributed to various factors, including limited diversification of economies, inadequate investment in sub-sectors with high employment potential, and inadequate skills development programmes that align with market needs.

Kenya is also affected by high unemployment rates especially among the youth. Although the overall unemployment rate for the working age group (15-64 years) was 4.9 per cent in the fourth quarter of 2022, that of the youth aged 15 to 34 years was 8.1 per cent (KNBS, 2022). In addition, youth unemployment rates (that is, for age groups 15-19, 20-24 and 15-34 years) have been higher than for the working age group over the 16 quarters between 2009 and 2022.[1] For both the youth and the working age group, the unemployment rates rose in 2020 due to the COVID-19 effects (Table 1.1).

In addition, many youths have disengaged from the labour market and about one in every seven youths (15-24 years) or 13.7 per cent were not in employment, education, or training (NEET) in Q1 of 2019 representing significant potential loss of human capital, both at the present and in the future. The NEET rate increased steadily reaching 16.8 per cent in Q1 of 2020, 17.9 per cent in Q1 of 2021, and 20.4 per cent in Q1 of 2022. This rise can be linked to a combination of factors including a decline in youth enrollment in education institutions. This set of labour market outcomes poses significant challenges for sustainable development. Consequently, expanding education, training opportunities, and creating jobs for the youth is essential for inclusive development and shared prosperity.

1 The unemployed are those who do not have a job, have been actively looking for work in the past four weeks, and are currently available for work.

Table 1.1: Selected indicators of the labour market, Q1 2019 to Q4 2022

Labour market indicator	2019				2020				2021				2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Employment rate (15-64 years)	62.6	66.5	66.1	66.7	64.4	57.7	63.9	65.0	63.7	63.6	62.8	62.4	62.8	62.6	62.6	63.4
Employment rate (15-34 years)	48.9	54.6	54.0	55.5	51.3	45.8	52.5	53.0	51.3	49.5	48.6	48.6	49.7	50.2	47.1	49.9
Unemployment rate (15-64 years)	6.2	4.7	5.3	4.9	5.2	10.4	7.2	5.4	6.6	6.1	5.6	5.6	5.5	5.8	5.3	4.9
Unemployment rate (15-19 years)	11.1	6.0	5.0	4.1	10.1	8.6	3.0	2.8	6.8	8.1	9.8	8.4	5.9	6.8	22.7	10.9
Unemployment rate (20-24 years)	16.8	13.9	16.0	14.2	12.7	22.8	17.6	15.0	16.3	15.7	11.8	14.6	18.3	14.9	14.2	15.6
Unemployment rate (15-34 years)	10.1	7.2	8.3	7.6	8.2	15.5	10.0	7.9	9.6	9.7	8.9	9.0	8.8	9.0	8.7	8.1
NEET rate (15-24 years)	14.7	12.3	13.0	12.9	16.8	17.9	15.6	18.0	16.6	22.3	18.1	19.6	20.4	19.3	19.9	16.8

Source: Kenya National Bureau of Statistics, Quarterly Labour Force Reports (Various)

In virtually all the economic policy documents after Kenya's independence, employment creation has featured prominently as a critical policy priority. To address unemployment, the government has always pursued a high economic growth rate strategy as an intervention for employment creation and poverty reduction. In this endeavour, the government has implemented various interventions to ensure economic growth. The first two post-independence five-year development plans and the sessional papers placed emphasis on rapid economic growth to reduce unemployment and alleviate poverty (Republic of Kenya, 1966; 1970; 1974; 1979; 1985; and 1998). In addition to promotion of economic growth, another broad strategy by the government has been the pursuit of industrialization. In the first two decades after independence, this was mainly through import substitution strategies. Some progress was made in this front with respect to the creation of various industries across critical value chains such as sugar, tea, pyrethrum, and textiles (Government of Kenya, 1980).

Sessional Paper No. 1 of 1986, titled *Economic Management for Renewed Growth*, placed significant emphasis on economic growth and encouraged private sector involvement as a priority for development and job creation. The policy emphasized structural adjustments to create a more efficient and diversified economy, aiming to generate sustainable job opportunities through industrial growth, agriculture, and rural development. It recognized the need for employment creation to address the rising levels of unemployment, especially among the youth, and sought to enhance skills training and entrepreneurship to better align the workforce with market demands. The Sessional Paper had mixed outcomes and while it successfully encouraged private sector growth and introduced structural adjustments that led to some economic diversification, the outcomes on employment creation fell short of expectations. Privatization and structural adjustments led to reductions in government spending and a shift towards a market-oriented economy, which spurred some job growth in the private sector but also led to public sector downsizing. By the end of the 1980s, despite the economy achieving relatively high rates of economic growth, youth unemployment and the share of youth not in education, employment or training (NEET) remained as significant challenges for the country.

The quest to generate employment through high economic growth was pursued through the 1990s and into the new millennium. Some of the overarching post millennial policy interventions include the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) (2003-2007) and Kenya Vision 2030 covering the period 2008-2030. The ERSWEC (2003-2007) policy had notable successes in boosting economic growth and creating jobs, though it fell short of fully achieving its employment targets. The policy aimed to create 500,000 jobs annually, primarily through economic reforms, infrastructure investment, and private sector support. While it spurred economic recovery and growth—leading to improvements in key sectors such as agriculture, tourism, and construction—Kenya created approximately 1.8 million jobs in the 2003-2007 period. Most of these jobs were generated in the informal sector, which accounted for over 80 per cent of the total generated employment (and actual yearly job creation averaged closer to 400,000).

When the ERSWEC (2003-2007) policy elapsed, the country started the implementation of the Kenya Vision 2030, through successive medium-term plans since 2008. Each of the first three medium term plans did not achieve both the economic growth and employment targets. The target was to achieve at least 10 per cent economic growth rate and under the First Medium-Term Plan (MTP I), from 2008 to 2012, the government set an ambitious target of creating 3.7 million jobs, or about 740,000 jobs annually. However, the actual average annual job creation during this period was about 500,000 jobs, falling short of the annual goal by roughly 240,000 jobs per year. During the Second Medium-Term Plan (MTP II), from 2013 to 2017, the target was to create 1 million jobs annually, totaling 5 million jobs over the five-year period. However, actual job creation during MTP II averaged about 800,000 jobs per year, largely in the informal sector. During MTP III (2018-2022), the target was to create a total of 6.5 million jobs over the five-year period, primarily in the manufacturing, agriculture, and housing sectors as part of the "Big Four Agenda". While some job creation progress was made, the full target of 6.5 million jobs was not achieved, with economic disruptions and budgetary limitations impacting the realization of planned employment figures.

The job creation target has been re-emphasized in the Medium-Term Plan IV (2023-2027) in the Bottom-up Economic Transformation Agenda (BETA) (2022-2027) with a target of 1.2 million jobs annually. As part of the employment creation strategy in MTP IV, the government purposes to: support Micro, Small and Medium Enterprises (MSMEs) through capacity building, credit facilitation and market linkages; fast-track establishment of Special Economic Zones (SEZ) and Industrial Parks and promote export led manufacturing; revitalize the agriculture sector through promotion of agro-processing and improvement of agricultural productions and supply value chains; and leverage ICT to increase employment opportunities for the youth through strengthening digital economy initiatives such as the Ajira Digital Programme, the digital public works for urban resilience pilot, and the establishment of ICT innovation hubs across constituencies.

This study proposes that selecting focus sectors for job creation must be based on evidence of their potential to generate employment. It conducts a comparative analysis of job creation potential across Kenya's economic sectors to guide the prioritization of activities that maximize employment opportunities. The study's specific objectives are to evaluate the performance of economic sectors in creating jobs and to identify key sectors and sub-sectors capable of making significant contributions to employment growth in the medium term. This evidence-based approach aims to inform targeted interventions for sustainable economic and job market development. The study sought to answer the following question: Which sectors have the highest potential of creating employment? The question focuses on identifying high-performing sectors to guide strategic investments and policy decisions for sustainable job creation in the country.

The rest of the paper is organized as follows: section two focuses on related literature; section three methodology; section four analysis of results followed by recommendations and policy implications in section five.

2. Literature Review

This section provides an overview of research conducted to evaluate the employment potential of various sectors. It begins by examining studies from a global and regional perspective, offering insights into widely accepted methodologies, frameworks, and trends that have emerged in assessing sectoral job creation potential. The section then transitions to studies conducted in Kenya, presenting research on sectoral employment generation aligned with the country's economic strategies, such as Vision 2030. This will set the stage for identifying gaps and opportunities in the current analysis for Kenya.

2.1 Identifying Employment Creating Sectors: Global and Regional Studies

Studies worldwide highlight diverse approaches in assessing the potential for sectors to create jobs, such as input-output analysis, social accounting matrix, general equilibrium models, and sectoral identification methods. These methods are often applied to identify sectors with high employment multipliers, assess the effects of economic policies on job creation, and understand industry dynamics in both advanced and developing economies. The global review includes studies from key international labour and economic research bodies, such as the International Labour Organization (ILO) and World Bank, which have assessed employment trends and sectoral growth patterns across various economies.

One of the common methods employed to evaluate the potential for sectors to create employment is through the use of general equilibrium models (GEMs). These models are typically utilized to simulate the potential impacts of policy changes, aiming to capture the interconnectedness among all sectors within an economy. Common inquiries addressed by this approach include examining the effects of specific policies on employment, wages, and output. Recent studies, such as the one conducted by the International Labour Organization (ILO) and the International Institute for Labour Studies (IILS) in 2013, have utilized GEM to assess the labour market implications of economic integration within the Association of Southeast Asian Nations (ASEAN). Additionally, computable general equilibrium (CGE) models are employed to provide insights into employment projections, as demonstrated by their utilization by the Ministry of Business, Innovation and Employment (MBIE) of New Zealand. However, a limitation of the GEM is the difficulty in isolating the factors driving the obtained results.

General equilibrium models (GEMs) integrate economic data from various sectors sourced from national accounts, labour force surveys, and input-output tables. Scenarios are developed based on potential policies, such as subsidies, tax cuts, or investments, in specific sectors. Each scenario reflects assumptions on productivity changes, consumer preferences, or government spending adjustments. The models simulate the effects of each scenario on sectoral growth and employment. Some of the key strengths of GEMs in employment analysis are: its comprehensive scope and ability to capture complex interconnections within the economy; ability to assess the sensitivity of employment to various policy changes; and to provide insights into which policies yield the most significant job gains. Computable general equilibrium (CGE) models can also project employment impacts over longer periods and can allow for adjustments to local labour market conditions, sectoral dynamics, and external economic conditions, making them applicable in diverse settings.

Another commonly utilized method is the Input-Output Analysis (IOA), which relies on *technical coefficients* extracted from input-output tables.[2] This method examines inter-industry relationships to identify sectors with strong backward and forward linkages, indicating potential for job creation. Sectors with high multipliers, meaning they have a strong impact on employment across other sectors, are prioritized. This method typically yields static outcomes and encompasses various iterations (Ernst et al., 2015). Multipliers derived from input-output tables can gauge the direct and indirect employment impacts of implementing changes within a sector of the economy. It enables the assessment of how employment impacts of output increments vary across sectors. Instances of studies employing this technique include Lieuw-Kie-Song and Abebe's (2019) application of multiplier analysis in the construction sub-sector in Rwanda, Haemyoung's (2018) examination of employment multipliers for South Korea, and Bekhet's (2011) research conducted in Malaysia. Input-Output Analysis (IOA) helps identify the direct, indirect, and induced employment impacts of changes in a specific sector or policy intervention. It calculates employment multipliers for each sector, indicating how changes in output affect employment across sectors. For example, a higher multiplier in the construction sector might indicate that an investment will lead to increased demand for labour in both construction and supporting industries such as cement production and transportation.

Some of the key strengths of IOA in employment analysis are that it offers detailed insights into inter-industry relationships, showing the sectors that have high employment multipliers, which is valuable for targeted job creation strategies. In addition, IOA differentiates between direct job creation in a target sector and indirect effects in related sectors, providing a clear picture of overall employment impacts. On the other hand, its key weaknesses are its static assumptions that potentially limit its accuracy for long-term forecasting. The IOA method does not easily account for structural shifts in the economy, such as rapid sectoral growth or decline, which can affect employment projections. It also assumes unlimited supply of inputs and labour. Its reliance on historical data implies it may not capture the full job creation potential in emerging sectors (like digital services or green energy), where data may be limited.

An extension of the widely employed input-output tables for assessing sectoral employment is the use of the Social Accounting Matrix (SAM). This tool is utilized to quantify the direct and indirect employment impacts of public investment through multiplier analysis. Instances of studies utilizing SAM include Mendez-Parra's (2015) examination in Tanzania and the National Economic and Social

2 Technical coefficients are numerical values that represent the relationship between inputs and outputs in a production process.

Council (NESC) study in Kenya (2012). Some of the strengths of the SAM is that it: offers a broad, interconnected view of the economy; tracks income distribution among households; and it can be used to model different policy scenarios and assess their employment impacts under different economic assumptions. However, both IOA and SAM tools have limitations. They yield static results and rely on relatively stringent assumptions, such as the absence of supply constraints and constant returns to scale in production. Additionally, these methods offer limited insights into the quality of the jobs created. In countries where the informal sector is significant, data limitations make it hard to fully capture its role in the economy and accurately reflect its employment potential in the SAM framework.

Another category of methods, known as sectoral identification, aims to pinpoint promising products and corresponding sectors for structural transformation and export expansion. These methods, collectively referred to by their specific methodologies, include the growth identification and facilitation framework, the economic complexity and product space method, and the International Trade Centre (ITC) export potential and product diversification indicators. These approaches have emerged from a renewed focus on a new generation of industrial policies, driven by the belief that well-conceived and executed industrial policies are essential for sustainable structural transition processes. All these methods are tailored to guide targeted industrial policies and sectoral strategies, and to identify sectors with export potential for specific countries.

The growth identification and facilitation framework (GIFF) is a method to identify potentially promising sectors by identifying comparative advantage based on the country's factor endowments. The economic complexity (EC) and product space (PS) method identifies potentially promising sectors largely based on multidimensional analyses of export data at the four-digit SITC level, encompassing roughly 1,000 products. The International Trade Centre (ITC) developed two indicators to identify potentially promising sectors: the export potential indicator (EPI) and the product diversification indicator (PDI), both based on export data at the six-digit Harmonized System (HS) classification level, encompassing roughly 4,000 products. One shortcoming of these sectoral methods/analyses is that they exclude non-tradeable sectors of the economy, including locally rendered services such as health, education, construction, and transport. Nevertheless, the methods can be applied to complement other methods and provide good insights for identifying promising sectors for job creation. Examples of study applying these methods include Hausmann et al. (2014) on the growth sector for Uganda; ITC (2018) in a case study of Jordan; and Lin and Xu (2016) for a study of Uganda.

Another recent set of approaches that is gaining prominence in studies that analyze employment creation is the use of strategic foresight methods or futures methodology (Wilkinson, 2016; Seidl, 2017). Strategic foresight refers to a systematic approach to anticipating and planning for the future by identifying emerging trends, challenges, opportunities, and potential disruptions that may impact an organization, a sector or even an economy. The method involves several key steps/techniques that include environmental scanning, trend analysis, developing alternative scenarios, and identification of opportunities.

2.2 Identifying Employment Creating Sectors: Kenyan Studies

The review focused on studies that examine sectors that have the greatest potential to contribute to job creation. The reviewed Kenyan studies apply some of the methods applied in global studies, including JICA (2007), KIPPRA (2012), National Economic and Social Council (NESC) (2011), Boulanger et al. (2018), Munga et al. (2021), and Onsomu et al. (2022).

There are a few studies that used the Social Accounting Matrix (SAM). An example is the study by NESC (2011), which examined the magnitudes of induced labour demand across sub-sectors that arises from an exogenous economic stimulus (Kiringai et al., 2006). The study assumed a 100 per cent expansion of the sectors. The employment effects of the stimulation were assessed across sub-sectors of the three main sectors, that is, agriculture, industry, and services (Appendix Figure 1). Since the structure of the economy usually changes slowly, the findings by NESC (2011) study has relevance for Kenya's economy. The strength of the NESC study is that it covers a wide set of sectors or sub-sectors – and thus has great potential to offer specific sub-sectoral policy directions. In addition, the study also offers important insights on the differential impacts on employment by gender from stimulation of various sectors.

The study findings indicate that within the agricultural sector, a stimulation of the livestock sub-sectors yielded the highest employment effect. Specifically, a 100 per cent stimulus in the beef and goat sub-sector resulted in a 23.9 per cent increase in labour demand while among crops (vegetables and rice production) yielded the largest labour effects. In industry, the stimulation of wood and paper manufacturing led to the highest increase in additional labour, followed by textile and footwear. Finally, within the services sub-sectors, hotels and restaurants (proxy for tourism) had the highest employment effect following an exogenous stimulation. The study also examined results by gender and education category. In examining effects by gender, the overriding finding was that an exogenous economic stimulation varies by gender and yields proportionately more male labour employment than female labour employment in most of the sub-sectors.

There is also a focus on the impacts of education or skills level on job creation. Individuals were categorized into three levels: those with no education, those with primary education, and those with secondary education and above. Stimulation of the agricultural sub-sectors creates most jobs for males with primary education followed by females with primary education (about 80% of the total jobs created). The study indicated that agricultural sub-sectors can be considered as pro-poor labour demand sub-sectors. On the other hand, the stimulation of industry creates most jobs for males and females with secondary education (including textile and footwear, wood and paper, and petroleum sub-sectors). This result suggested that industrial success or expansion would demand higher level skills on average. Finally, stimulation of services resulted in mixed outcomes for the levels of education with some sub-sectors creating jobs for mainly males with secondary education (for example, water and energy sub-sectors) or mainly for females with secondary education (for example, hotels and restaurants) while others created jobs predominantly for males with primary education (for example, construction).

The NESC (2011) study has some limitations with the first one being that it does not offer an analysis by type of jobs (wage versus non-wage), and secondly, it does not analyze the impacts by age (youth versus the rest of the working age population). Replication of a similar study addressing its limitations and using an updated SAM would be an interesting area for research on job creation in Kenya.

A recent study by Onsomu et al. (2022) set out to identify the most promising sectors and activities that have the potential to improve youth employment. This study had more disaggregated International Standard Industrial Classification (ISIC) sectors and employed the use of input-output tables as its primary approach. A new aspect of this study was its disaggregation of domestic services – which was lumped up in the study by Munga et al. (2021). The overriding finding of Onsomu et al. (2022) was that the sectors with the highest employment multipliers included agriculture, fishing, and forestry; finance, real estate and business services; and trade and repairs. Although manufacturing was identified as a sector with high potential in the earlier studies, the study by Onsomu et al. (2022) found a relatively low multiplier for manufacturing.

The studies reviewed above examined job creation across the entire economy, even when focusing on some sectors. There are earlier studies that examined job creation within selected sectors such as industry or a sub-sector within a broad sector such as manufacturing. The subsequent review presents findings from a couple of these studies. A particularly important study was conducted by JICA (2007) in collaboration with the then Ministry of Industrialization and Trade through the Master Plan Study for Kenya's Industrial Development (MAPSKID) initiative. The study was informed by the provisions that industrialization was a key path to creation of mass jobs through export growth. The overall goals of the MAPSKID initiative was to promote industrial development of Kenya by developing a master plan as a component of the economic recovery strategy (ERS). The objective of JICA (2007) was to evaluate the export growth and job creation potential of selected manufacturing sub-sectors. Sectors and sub-sectors selected based on performance, were identified. These included livestock and livestock products; fish and fish products; textiles and garments; horticulture; and food and beverages.

The process of implementing the study included two main phases, with the initial phase concentrating on identifying sub-sectors with significant potential to generate jobs. The study employed statistical and cluster analyses in its first phase. Cluster analysis was implemented using the diamond model. The evaluation included the job creation potential of the sectors. The major finding of the study was that food processing (agro-processing) had the largest contribution to employment relative to the other eight sub-sectors (the sub-sectors excluded textile and garments).[3] When the export processing zones (EPZs) were included in the analysis, the results remained similar apart from the introduction of the textiles and garments sub-sectors as an additional important sector in terms of job creation.

3 The eight sub-sectors included food processing, petroleum and other chemicals, pottery and glass products, electrical machinery, agro machinery, ICT, fish and fish products, and horticulture.

Another set of studies that deserve mention are various studies on job creation potential that focus on specific sub-sectors and their respective value chains. A few studies in this category include Munene and Wanjiku (2020) who estimated that a one unit change in contribution to the Gross Domestic Product (GDP) by the fisheries sector leads to a 5.78 units change in creation of employment in the overall fisheries sector; Kipsaat and Kataa (2020) who found that a 1.0 per cent change in output resulted to an increase in employment by 0.111 per cent holding all other factors constant; and Luseno and Obere's (2020) study on elasticity estimations, which showed that a 10 per cent increase in Gross Value Added (GVA) by manufacturing firms would increase employment by 3.8 per cent and productivity growth by 62.0 per cent. Mutuku and Mbatia (2020), in a study of the solar PV job creation potential in Kenya estimated a compounded annual job growth rate of 51 per cent between 2012 and 2018, and 26 per cent between 2018 and 2024.

The strength of these latter groups of studies is that they are able to examine sectors or sub-sectors that are promising in job creation yet excluded from many economy-wide studies. Even so, these latter studies have gaps. First, the studies did not examine job creation potential in a comparative manner and would make it challenging to prioritize sectors based on their potential to create employment. Second, some of these studies did not estimate the number of jobs created at each node of the value chain. Only Mutuku and Mbatia's (2020) study estimated the distribution of jobs along the Solar PV value chain with operation and maintenance accounting for 40 per cent of jobs, construction and installation (40%); manufacturing (12%); distribution (5%) and research and development (3%).

2.3 An Overview of the Literature Review

The reviewed studies, and especially the Kenyan studies, demonstrate that the country has achieved a degree of diversification across its economic sectors that have the potential to drive employment creation. There is a strong argument for promoting job creation across various industries since diversified economies generally support balanced economic growth and resilience to economic shocks. The reviewed studies highlight that key sectors include agriculture and/or agro-processing, which offer significant potential to create jobs following sector stimulation. Among the sub-sectors identified as yielding the highest employment effects are livestock, vegetables, and rice production.

Agriculture and services sectors are crucial in generating low-skill jobs, making these sectors inherently pro-poor. Among the services subsectors, hotels and restaurants (used as a proxy for tourism) are identified as having the highest employment effects following a stimulus. Although industrial sectors create fewer jobs than agriculture and services, all studies emphasise the sector's role in generating jobs that demand high-level skills which may not be available locally. Prominent sub-sectors within the industrial sector across Kenyan studies include wood and paper manufacturing, textiles and footwear, and textiles and garments.

The subsequent sections firm up these initial findings from the literature review by exploring job creation potential through qualitative methods.

The current study evaluates the likely effects of government initiatives aimed at employment creation. Specifically, it identifies the potential of various sectors and sub-sectors or industries in generating employment within the context of the policies and interventions outlined in the Fourth Medium Term Plan (MTP IV) on job creation in the country.

3. Methodology

3.1 Analytical Approach

The foregoing sections have reviewed the various methods that were employed in similar studies. After examining these considerations, this study, used Computable General Equilibrium (CGE) model to identify industries likely to make significant contributions to employment creation in the medium term.

The CGE model was chosen for its ability to analyze the entire economy and the interconnections between sectors, allowing for a comprehensive understanding of how changes in one sector can affect both the specific sector directly and other sectors indirectly. Additionally, CGE models are particularly valuable for assessing the impact of policy changes, such as government spending on job creation across different sectors. They also enable the simulation of “what-if” scenarios, such as evaluating whether targeted growth rates will achieve the desired employment outcomes. Compared to other methods like Input-Output (I-O) models, which assume fixed sectoral relationships, or econometric models, which may not effectively simulate broad economic changes, CGE models provide greater flexibility and detail.

This section provides a detailed explanation of the CGE policy simulation. Computable General Equilibrium (CGE) policy simulations were carried out to determine the number of jobs that would be created if the sectors under the Bottom-Up Economic Transformation Agenda (BETA) expanded at the targeted growth rates in 2024. The simulations were carried out with the assumption that there is unemployment in the economy and identified technological upgrading as a key driver of sectoral growth. They focused on short-term effects on job creation within a scenario where labour is freely mobile across sectors and wages adjust without restrictions.

The study considered five sectors under the BETA—finance and production, infrastructure, social, environment and natural resources, and public administration—which have sub-sectors that closely mirror those contained in the Social Accounting Matrix (SAM) that is used to support the policy simulations. The finance and production sectors are targeted to grow by 7.3 per cent in 2024. To realise this growth rate, each of the sub-sectors within finance and production—such as cotton and fibre, dairy, tea, mining, construction, and textile and apparel should grow by at least 7.3 per cent. The infrastructure pillar is expected to grow by 5.1 per cent in 2024 and the sub-sectors within this pillar—transport and storage, electricity, gas and steam, petroleum products, information and communication, and water supply and sewerage—are each expected to grow by at least 5.1 per cent. The social pillar is expected to grow by 5.1 per cent and the assumption is that each of the sub-sectors under the pillar—health and social work, and education—should each grow by at least 5.1 per cent. The public administration pillar is also expected to grow by 5.1 per cent. The environment and natural resources pillar is targeted to grow by 8.1 per cent and the sub-sectors under the pillar—forestry, accommodation and food services, and fishing—are each expected to grow by at least 8.1 per cent.

The Bottom-Up Economic Transformation Agenda targets to create an average of 1.2 million jobs per year. It is envisaged that for this number of jobs to be created, the BETA pillars and sub-sectors should at least grow by the targeted growth rates (Table 2).

Table 3.1: Targeted and actual growth rates of the BETA pillars sub-sectors

BETA sector/pillar	Sub-sector	Target growth*	Actual growth**
Finance and production	Cotton and fibre	7.3%	7.2%
	Dairy	7.3%	11.1%
	Tea	7.3%	12.5%
	Mining	7.3%	-1.3%
	Construction	7.3%	3.1%
	Textile and apparel	7.3%	7.0%
Infrastructure	Transport and storage	5.1%	10.6%
	Electricity, gas and steam	5.1%	0.9%
	Petroleum products	5.1%	0.3%
	Information and communication	5.1%	5.3%
	Water supply and sewerage	5.1%	0.3%
Social	Health and social work	5.1%	2.0%
	Education	5.1%	2.8%
Environment and natural resources	Forestry and logging	8.1%	0.5%
	Accommodation and food services	8.1%	6.3%
	Fishing	8.1%	-0.3%
Public administration	Public administration and defense	5.1%	5.0%

Source: Fourth Medium Term Plan (MTP IV), 2023/24-2027/28

**assumes the MTP growth targets are achieved*

***assumes the growth rates observed in 2023 and applies them to 2024*

The simulations are anchored on the 2020 Social Accounting Matrix (SAM) which has 40 sub-sectors (Table 3.2). A job is defined by the total number of hours worked per year by an average worker in a given sector. This was calculated by first determining the number of hours worked per week by a worker in each sub-sector using data from the Kenya Integrated Household Budget Survey (2015/16). These weekly hours were then converted to annual hours by multiplying by 52 weeks. The annual hours per worker were used to estimate the base number of jobs in each sector by dividing the total number of hours utilized by the sector in a year by the average annual hours worked per worker. Using this method, a job represents the allocation of a standard amount of work hours per year within a sector, and in 2020, there were approximately 18.5 million jobs in the economy, with significant concentrations in sectors such as electricity, gas and steam, construction, accommodation and food services, other services, food crops, and real estate (Table 3.2).

The total number of base jobs estimated is consistent with the total recorded employment provided in the annual Economic Survey (2020) of 17.4 million (which excludes smallscale agriculture and pastoralist activities).

Table 3.2: Sub-sectors contained in the 2020 SAM and corresponding number of hours worked per week

BETA sector	BETA sub-sector	Total hours worked in 2020	Hours worked per week	Hours worked per year	Base number of jobs
Finance and production	Cotton and fibre	4,961,174	38	1,950	2,544
	Dairy	274,471,286	40	2,080	131,957
	Tea	974,419,819	44	2,288	425,883
	Mining	559,381,302	46	2,392	233,855
	Construction	8,297,952,532	47	2,444	3,395,234
	Textiles and apparel	211,230,566	45	2,340	90,269
Infrastructure	Transportation and storage	6,858,589,425	63	3,276	2,093,587
	Electricity, gas and steam	138,915,462	47	2,444	56,839
	Petroleum products	4,350,722	60	3,120	1,394
	Information and communication	800,353,538	52	2,704	295,989
	Water supply and sewerage	74,219,597	43	2,236	33,193
Social	Health and social work	768,507,822	45	2,340	328,422
	Education	2,119,419,561	42	2,184	970,430
Environment and natural resources	Forestry	257,949,038	40	2,080	124,014
	Accommodation and food services	536,426,666	48	2,496	214,915
	Fishing	130,477,767	45	2,340	55,760

BETA sector	BETA sub-sector	Total hours worked in 2020	Hours worked per week	Hours worked per year	Base number of jobs
Non-BETA sectors	Food crops	2,201,125,513	26	1,336	1,647,056
	Sugarcane	66,582,610	29	1,508	44,153
	Coffee	73,481,326	40	2,080	35,328
	Tobacco	2,185,988	26	1,336	1,636
	Flowers and other crops	41,019,333	30	1,560	26,294
	Livestock	410,257,113	42	2,184	187,847
	Meat processing	133,968,137	40	2,080	64,408
	Grain milling	851,217,137	46	2,392	355,860
	Bakery	149,829,632	48	2,517	59,532
	Beverages	140,212,756	63	3,276	42,800
	Other food processing	14,870,229	45	2,340	6,355
	Leather and footwear	74,309,440	40	2,080	35,726
	Wood products	77,115,924	30	1,560	49,433
	Paper and printing	87,085,550	50	2,600	33,494
	Other chemicals	197,857,473	40	2,080	95,124
	Fertilizers	18,064,054	30	1,560	11,580
	Non-metal minerals	222,603,462	40	2,080	107,021
	Machinery and other equipment	279,299,110	40	2,080	134,278
	Other manufacturing	1,871,556,752	40	2,080	899,787
	Wholesale and retail trade	5,725,591,723	50	2,600	2,202,151
	Finance and insurance	633,618,502	44	2,288	276,931
	Real estate	601,858,125	38	1,976	304,584
	Other services	3,584,457,223	42	2,184	1,641,235
Public administration	Public administration and defense	4,287,722,391	46	2,392	1,792,526
Total					18,509,423

Source: Authors' estimations based on SAM 2020

The simulations sought to answer the question of how many jobs would be created if each of the sub-sectors under BETA pillars grew at the targeted rates. The jobs created were obtained as both growth rates in created jobs and the number of jobs created across respective sectors (see details in Appendices Tables 1-8). Specifically, the targeted sector growth rates were applied to the Dynamic Equilibrium Model for Economic development Resources and Agriculture (DEMETRA) CGE model to obtain the growth rates in job creation per sub-sector. The growth rates in created jobs were then applied to the base number of jobs that existed in each of the sub-sectors in 2020 to obtain the number of jobs created with the targeted sector growth.

Assuming that labour can move freely across sectors and wages adjust freely with sector growth, the simulations generated both direct and indirect jobs. Direct jobs are those additional jobs created within a sub-sector due to growth in that sub-sector, while indirect jobs are those generated in sectors other than the one experiencing growth. Indirect jobs result from both forward and backwards linkages between sectors. For example, growth in the textile and apparel sub-sector would generate direct jobs within that sub-sector and indirect jobs in the cotton and fibre sub-sector, since the cotton and fibre industry supplies raw materials to the textile and apparel industry.

The simulations were operationalized by loading the 2020 Social Accounting Matrix (SAM) for Kenya into the model.gms of the DEMETRA model. The dataset containing the SAM was titled data_KEN_V1_2020.xlsx and contained the SAM that was calibrated for ease of reading by the model.gms. The execution of this model.gms returned a normal completion, which indicates that the data contained in the SAM was well calibrated and read by the model. The next step was loading the Excel version of the experiment file into the General Algebraic Modelling System (GAMS) version of the experiment file. This experiment file was titled experiment_KEN_AGGG.xlsx and contained the specific simulation instructions, which were executed by the DEMETRA model. The experiment file was loaded, initialized, equations on sector growth specified, and the model closure rules assigned. The simulations were anchored on Equations (3.1) and (3.2).

ADVAADJASIM(“a_cons”,”Extreme”) = 1.073; ....(3.1)

ADVAADJA.FX(a)=ADVAADJASIM(a,sim1); ....(3.2)

In Equation 3.1, ADVAADJASIM instructs the model that the simulation being carried out pertains to growth; “a_cons” indicates that the simulation is applied on the construction sector; “extreme” indicates that the growth considers all fundamentals for growth including technological upgrading; and “1.073” indicates that the construction sector upon which the simulation is applied grows by 7.3 per cent. Equation 3.2 represents the closure rule which fixes growth to a specific sector “a” and executes the simulations over the simulation set 1 “sim1” as contained in the Excel version of the experimental file. Successful execution of this simulation indicates that Equation 3.1, containing the shock, is properly specified in the two experiment files. The instructions contained in Equation 3.1 are adjusted accordingly to reflect other sub-sectors and other levels of target growth rates. Each executed simulation generated results for both direct and indirect effects in jobs created.

The method outlined above was supported by qualitative research methods to allow for a deeper exploration of emerging sectors, capturing insights that may not be quantifiable through existing secondary data. The study reviewed literature, including case studies, conducted expert interviews, and engaged with stakeholders from relevant industries, including entrepreneurs, industry experts, policymakers, and representatives from academia and civil society. The study also utilized workshop reports and other events that involved interactions with multidisciplinary experts to facilitate brainstorming and discussions, on the emerging sectors. The review of emerging sectors was considered and focused on variables that provided insight into the growth and significance of the sectors. These variables included sectoral output trends, labour market conditions, government policies and incentives, global and regional dynamics, market size and growth, and investment trends.

3.2 Data Type and Data Sources

A number of data sources were considered. The data used to support an assessment of past performance of economic sectors was from the annual Economic Survey for both the broad sectors, that is, for agriculture, industry, and services, as well as the 21 International Standard Industrial Classification (ISIC) sectors. Supplementary data was also sourced from the annual Statistical Abstract, which provided more disaggregated data for specific sectors. The data allowed for computation of the distribution of sectoral wage employment across the ISIC sectors and growth in wage as well as informal sector employment over time. The CGE simulations were anchored on data from the 2020 Social Accounting Matrix (SAM), which has 40 sub-sectors.

4. Simulation Results on Employment Creation Across Sectors

This chapter presents the results of the Computable General Equilibrium (CGE) simulations under two key assumptions. The first set of results assumes the achievement of targeted Bottom-Up Economic Transformation Agenda (BETA) growth rates as outlined in MTP IV. The second set of simulations or "business as usual scenario" assumes that current (or 2023) sectoral growth rates persist. Note that current rates refer to the growth rates for 2023. All the new jobs refer to jobs created within a year.

4.1 Simulation Results Based on Targeted and Current Sectoral Growth Rates

This sub-section summarizes the results of the CGE simulations. The findings are first presented in terms of job creation across the five key BETA priority pillars: finance and production, infrastructure, social sector, environment and natural resources, and public administration. This is followed by a broader discussion of the sub-sectors within each of the pillars. Finally, we delve into each pillar in greater detail before moving on to the recommendations.

4.1.1 Summary of results for the BETA pillars

If the targeted growth rates for the BETA pillars are achieved, approximately 1,788,881 new jobs will be created across the finance and production, infrastructure, social, environment and natural resources, and public administration pillars. These jobs include 407,732 direct positions and 1,381,149 indirect opportunities. Majority of these jobs would emerge from the infrastructure pillar, followed by the finance and production pillar, the social pillar, and the environment and natural resources pillar. The public administration pillar would have a net loss of jobs (see Table 4.1). The total number of jobs if targeted growth rates are achieved surpasses BETA's annual job creation target of 1.2 million set under MTP IV.

However, under a "business as usual" scenario—assuming current growth rates persist—1.88 million additional jobs could be generated, driven primarily by the assumption of a robust growth in the infrastructure pillar, which accounts for nearly 1.1 million jobs. Despite this, fiscal constraints and ongoing budget cuts make the 2023 growth rates for the infrastructure pillar unlikely to be sustained.

If the targeted growth rates outlined in MTP IV are achieved, most direct jobs will be created in the finance and production pillar (262,706), followed by the infrastructure pillar (160,490), and the environment and natural resources pillar (78,218). In terms of indirect jobs, the infrastructure pillar leads with 537,319 jobs, followed by the social pillar (446,168), the finance and production pillar (237,395), and the environment and natural resources pillar (157,991). Negative values in job projections reflect shifts in labour demand across sectors, assuming workforce mobility. These indicate sectors losing jobs as others expand employment opportunities (see Table 4.1). The ratio of direct to indirect jobs varies across sectors, with all apart from the finance and production sectors creating more indirect jobs under both scenarios (Table 4.1).

Table 4.1: Number of new direct and indirect jobs created per BETA pillar assuming targeted growth rates are achieved

BETA pillar	Base number of jobs	Total jobs created by BETA pillar targeted growth rates			Total jobs created by BETA pillar historical growth rates		
		Total	Direct jobs	Indirect jobs	Total	Direct jobs	Indirect jobs
Finance and production	4,279,743	500,101	262,706	237,395	410,704	390,768	19,936
Infrastructure	2,481,002	697,809	160,490	537,319	1,080,370	336,983	743,387
Social sector	3,091,378	431,877	-14,291	446,168	269,614	-6,628	276,242
Environment and natural resources	394,688	236,209	78,218	157,991	153,490	45,096	108,394
Public administration	343,900	-77,115	-79,391	2,276	129,981	77,885	52,096
Total	10,590,711	1,788,881	407,732	1,381,149	2,044,159	844,104	1,200,055

Source: Authors' estimations based on SAM 2020

4.1.2 Results on job creation for BETA sub-sectors

The study focused on a total of 17 sub-sectors across the five BETA pillars. If the targeted growth rates are achieved, the sub-sectors contributing the most to job creation would be construction (373,816) and transport and storage (309,538). Notably, all jobs created in the education sub-sector are indirect jobs (Table 4.2). If the sectors grow at the rates observed in 2023, the sub-sectors that will contribute the most to job creation are transport and storage (953,109), tea (182,149), and accommodation (153,240) (Table 4.2).

Table 4.2: Number of jobs created in the BETA sub-sectors assuming targeted growth rates are achieved

BETA sector	Sub-sector	Total – targeted growth	Direct jobs	Indirect jobs	Total – actual growth
Finance and production	Construction	373,816	(30,455)	404,271	91,541
	Tea	152,552	190,617	(38,065)	182,149
	Mining and quarrying	71,347	52,463	18,884	(11,116)
	Textile and apparel	40,330	39,730	600	78,935
	Dairy	22,491	9,954	12,537	57,757
	Cotton and fibre	2,176	397	1,779	3,577
	Other sub-sectors [4]	-162,611	0	-162,611	
	Total (finance and production)	**500,101**	**262,706**	**237,395**	
Infrastructure	Transport and storage	309,538	149,231	160,307	953,109
	Information and communication	24,407	6,503	17,904	112,859
	Electricity supply	8,037	2,945	5,092	9,226
	Water supply; sewerage, waste management	5,977	1,676	4,301	952
	Petroleum products	166	135	31	4,216
	Other sub-sectors	349,687	0	349,684	
	Total (infrastructure)	**697,812**	**160,490**	**537,319**	
Social	Education	34,391	(5,619)	40,010	84,921
	Health and social work	(3,201)	(8,672)	5,471	28,922
	Other sub-sectors[5]	400,687	0	400,687	
	Total (social)	**431,877**	**-14,291**	**446,168**	
Environment and natural resources	Accommodation and food service activities	59,497	60,814	(1,317)	153,240
	Forestry and logging	23,528	8,958	14,570	837
	Fishing and aquaculture	10,876	8,446	2,430	
	Other sub-sectors[6]	142,306	0	142,308	
	Total (environment/ natural resources)	236,207	78,218	157,991	
Public administration	Public administration and defense	(77,115)	(79,391)	2,276	129,979

Source: Authors' estimations based on SAM 2020

4 See Appendix Table 3

5 See Appendix Table 5

6 See Appendix Table 7

(a) Finance and production pillar

Key sub-sectors under this pillar are construction, textile and apparel, dairy, tea, and mining. Each of these sub-sectors is targeted to grow by 7.3 per cent in the MTP IV. The simulations focused on the impact of a 7.3 per cent growth on job creation in each of the sub-sectors and spill-over effects in job creation in the other sub-sectors of the economy (indirect jobs). The results are presented in Table 4.3, and Appendix Tables 2 and 3. If the targeted growth is achieved, the simulations indicate that the construction sub-sector, along with tea, and textiles and apparel, will be key drivers of job creation. Majority of the jobs will be created in the tea sub-sector (182,149), construction (91,541), and textile and apparel (78,935) (Table 4.3).

Table 4.3: Number of jobs created in the finance and production sub-sectors assuming targeted and actual growth rates are achieved

BETA sector	Sub-sector	Total – targeted growth	Direct jobs	Indirect jobs	Total – actual growth
Finance and production	Construction	373,816	(30,455)	404,271	91,541
	Tea	152,552	190,617	(38,065)	182,149
	Mining and quarrying	71,347	52,463	18,884	(11,116)
	Textile and apparel	40,330	39,730	600	78,935
	Dairy	22,491	9,954	12,537	57,757
	Cotton and fibre	2,176	397	1,779	3,577
	Other sub-sectors	-162,611	0	-162,611	0
	Total	**500,101**	**262,706**	**237,395**	**402,843**

Source: Authors' estimations based on SAM 2020

If the current growth rates (2023) persist, the finance and production pillar is expected to generate 402,843 jobs, fewer than the 500,101 jobs projected under the higher targeted 2024 growth rates. In the "business as usual" scenario, the tea and construction sub-sectors are anticipated to lead in job creation, contributing 182,149 and 91,541 jobs, respectively. Conversely, the cotton and fibre sub-sector is projected to add only 3,577 jobs despite its relatively high growth rate.

These findings highlight significant opportunities for job growth in the construction sub-sector and, to a lesser extent, in the mining sub-sector. Targeted interventions could increase growth in these areas, aiming for MTP IV's target of 7.3 per cent growth—up from the current 3.1 per cent for construction and a negative growth in mining and quarrying. Additionally, maintaining high growth rates in tea, dairy, and other agro-based sub-sectors requires strategies to reduce dependence on rain-fed agriculture, as employment in these areas remains heavily weather-dependent.

(b) Infrastructure pillar

Sub-sectors under this pillar include roads and transport, energy and petroleum, information and communication technology, and water and irrigation. The sub-sectors are targeted to grow by 5.1 per cent. The simulations focused on the impact of a 5.1 per cent growth target for 2024 in each of the sub-sectors on job creation for those sectors and spill-over effects in job creation in the other sub-sectors in the economy. The results are presented in Table 4.4 and Appendix Table 1. Under this assumption, majority of the jobs will be created in the transport and storage sub-sector (309,538) and information and communication technology (ICT) (24,407). At the same growth rate, the sub-sector of water supply and sewerage would yield 5,977 jobs, electricity, gas and steam (8,037), and petroleum products (166). Targeted investments particularly in the transport and storage sub-sector, and information and communication technology (ICT) would yield more jobs for the country (Table 4.4). On the other hand, if growth is assumed to be at the rate that prevailed in 2023, the total jobs created under the infrastructure pillar would be 1,080,362. The category of "Other" sub-sectors would yield a very low number of jobs.

Table 4.4: Number of jobs created in the infrastructure sub-sectors assuming targeted and actual growth rates are achieved

BETA sector	Sub-sector	Total – targeted growth	Direct	Indirect	Total – actual growth
Infrastructure	Transport and storage	309,538	149,231	160,307	953,109
	Information and communication technology	24,407	6,503	17,904	112,859
	Electricity supply	8,037	2,945	5,092	9,226
	Water supply; sewerage, waste management	5,977	1,676	4,301	952
	Petroleum products	166	135	31	4,216
	Other sub-sectors	349,687	0	349,684	0
	Total	697,812	160,490	537,319	1,080,362

Source: Authors' estimations based on SAM 2020

(c) Social pillar

Targeted sub-sectors under this pillar include education, health and social work, and other sub-sectors. The sub-sectors in the SAM that match these sub-sectors are education, and health and social work. The growth target for 2024 is 5.1 per cent, which is applied to each of the sub-sectors. The impact of the growth on job creation was examined for those specific sub-sectors and spill-over effects in job creation in other sectors (indirect jobs). The results are presented in Table 4.5 and Appendix Tables 4 and 5. Majority of the jobs under this pillar are created in the education sub-sector (40,010) and health and social work (5,471), respectively. According to the Computable General Equilibrium (CGE) results, most jobs generated in this sector are indirect.

Table 4.5: Number of jobs created in the social sub-sectors assuming targeted and actual growth rates are achieved

BETA sector	Sub-sector	Total targeted growth rates	Direct jobs	Indirect jobs	Total – actual growth rates
Social	Education	34,391	(5,619)	40,010	82,938
	Health and social work	(3,201)	(8,672)	5,471	29,978
	Other sub-sectors	400,686	0	400,686	0
	Total	**431,876**	**-14,291**	**446,167**	**112,916**

Source: Authors' estimations based on SAM 2020

The total jobs created in the social pillar, assuming actual growth rather than the targeted growth rate are 108,216. Education would create the most indirect jobs (82,938). Compared with the results, assuming targeted growth rates, it is clear that economic growth plays a crucial role in job creation. If the targeted growth rate of 5.1 per cent was achieved, the education sub-sector would become the largest job creator in this pillar, and the total number of jobs in the pillar would be 431,876 jobs—an additional 318,960 jobs compared to those created under the actual 3.1 per cent growth rate (Table 4.5).

A notable observation is the loss of direct jobs in the social sub-sectors. The loss of direct jobs in the education and health sub-sectors is a critical issue as these sectors rely heavily on a stable workforce to meet public service needs. The direct jobs in these sectors are mainly teaching positions and administrative jobs. Job losses in these areas are usually driven by several factors including attrition (due to migration of high-skilled professionals, which often results in gaps that are hard to fill), retirement and deaths. In years where hiring or recruitment is minimal, retirements and deaths can lead to net job losses. It is expected that mortality rates can be high, especially in regions with high burdens of communicable diseases. These factors, combined with hiring freezes or cutbacks in public funding for these sectors, would result in net job losses.

Even when recruitment happens, keeping new staff can be difficult due to issues like low pay, which can cause employees to migrate, such as the large number of nurses leaving the country. If new employees exit shortly after joining, the overall workforce may still shrink, worsening the shortage. These combined factors mean that unless there are ongoing efforts to recruit, hold, and support professionals in education and healthcare, these sectors may continue to face workforce instability.

(d) Environment and natural resources pillar

Key target sub-sectors under this pillar include forestry, tourism, and fisheries. From the Social Accounting Matrix (SAM), sub-sectors closely related to these sub-sectors are forestry, accommodation and food services, and fishing. The projected growth of these sub-sectors in 2024 is 8.1 per cent. This growth was applied in the simulations to determine its impact on direct and indirect job creation. The results are presented in Table 4.6 and Appendix Tables 6 and 7.

Under the assumption of 8.1 per cent growth, majority of the jobs will be created in the accommodation and food services sub-sector (59,497) followed by forestry and logging (23,528). Kenya can capitalize on job creation in these sectors particularly in accommodation and food services. Areas for investment include infrastructure enhancement, providing targeted training programmes, and encouraging sustainable practices. Supporting these sectors with improved access to resources, technology, and market opportunities will not only sustain current job growth but also create more employment opportunities, contributing to the overall economic development and resilience of these industries.

Table 4.6: Number of jobs created in the environment and natural resources sub-sectors assuming targeted and actual growth rates are achieved

BETA sector	Sub-sector	Total – targeted growth rates	Direct	Indirect	Total – actual growth rates
Environment and natural resources	Accommodation and food service	59,497	60,814	(1,317)	153,240
	Forestry and logging	23,528	8,958	14,570	837
	Fishing and aquaculture	10,876	8,446	2,430	(590)
	Other sub-sectors	142,306	0	142,308	0
	Total	**236,207**	**78,218**	**157,991**	**153,487**

Source: Authors' estimations based on SAM 2020

The total number of jobs created in the environment and natural resources pillar, assuming actual growth rather than the targeted growth rate, is 153,487. These jobs are broken down by sub-sector in Table 4.6, with accommodation and food services leading with 153,240 jobs. Targeted interventions are likely to result in higher job creation growth.

(e) Public administration

The targeted sub-sector under this pillar was public administration, which also matches the sub-sector in the Social Accounting Matrix (SAM). The 2024 growth target for this pillar is 5.1 per cent, which is applied to the sub-sector. The impact of this growth on job creation was examined for the sector and the spill-over effects in job creation in other sectors (indirect jobs). The results are presented in Table 4.7 and Appendix Table 8. In both the targeted growth and prevailing growth rates, total employment creation in public administration will decline by 77,115 and 77,885, respectively; and 2,276 indirect jobs will be created.

Table 4.7: Number of jobs created in the public administration sub-sectors assuming targeted and actual growth rates are achieved

BETA sector	Sub-sector	Total – targeted growth	Direct	Indirect	Total
Public administration	Public administration and defense	(77,115)	(79,391)	2,276	(77,885)

Source: Authors' estimations based on SAM 2020

5. Conclusion and Policy Implications

5.1 Conclusion

Employment generation is a key priority for the government. However, over the years, the country has experienced mixed outcomes in the labour market, characterised by an expansion of the labour force and an increase in total employment, alongside various forms of labour market underutilisation such as underemployment, inactivity, and unemployment. Overall, the findings suggest that the Kenyan economy has undergone limited structural change. Nevertheless, there has been a shift in the relative importance of sectors in creating employment, with the role of industry diminishing while the service sector has grown.

The Computable General Equilibrium (CGE) simulations suggest that if the targeted BETA growth rates as outlined in MTP IV are achieved or if the 2023 sectoral growth rates persist, the country could create over 1.7 million jobs annually, surpassing the current target of approximately 1.2 million jobs per year as outlined in the Fourth Medium Term Plan (2023-2027). Most of these jobs are expected to be generated within the infrastructure pillar, followed by the finance and production pillar, then the social pillar, and finally the environment and natural resources pillars. The sub-sectors across the five BETA pillars that would contribute most to job creation under the assumption of the 2024 growth rates include construction (373,816), transport and storage (309,538), tea (152,552), mining and quarrying (71,347), and accommodation and food service (59,497). These are followed by the textile (40,330), education (34,391), and ICT (24,407).

5.2 Recommendations

The recommendations are provided for each pillar and the focus is on issues and feasible interventions.

(a) Infrastructure pillar

Given that most of the job creation occurs in the transport and storage sub-sector, with significant contributions from information and communication, targeted investments in these sub-sectors has the potential to create significant jobs. Additional investments can be made in further development of supportive infrastructure and incentives for businesses operating within these sub-sectors. These sub-sectors not only drive direct employment but also catalyze growth in other industries by improving connectivity, efficiency, and accessibility across the economy. The country can leverage these areas to create substantial job opportunities by:

(i) Linking projects with local MSMEs through initiatives that include capacity building and awareness creation.

(ii) Enhancing the various markets through policy reforms aimed at encouraging participation of various players including fast tracking the Mini and Micro Off-Grid Power Policy and the National Valuation Policy.

(iii) Expanding logistics and warehousing capabilities near key transit points including Mombasa and Nairobi.

(iv) Investing in ICT infrastructure, such as broadband expansion, data centres, and innovation hubs, to create both high-skill and support jobs.

(v) Enhancing affordability and access by last mile users of ICT through regulations that enhance competition by reducing uncertainties and barriers to entry. A supportive regulatory environment also encourages small and medium enterprises (SMEs) to participate in infrastructure projects, providing job opportunities at various levels.

(b) Finance and production pillar

Based on the findings that the construction and tea sub-sectors are the key drivers of job creation in this pillar, while textile and apparel, mining, dairy, and cotton and fibre sub-sectors have significant potential for further job growth. The MTP IV has proposed pertinent interventions for each of the main sub-sectors and substantial attention is on strengthening linkages with MSMEs through various initiatives. Key interventions likely to enhance job creation are given below.

For construction:

(i) Encourage public-private partnerships (PPPs) to fund large-scale infrastructure projects, which will drive job creation in the construction and related sectors.

(ii) Implement capacity building of *jua kali* MSMEs through skills development to access technology and certification.

(iii) Expand support services for businesses, including the purchasing and distribution of various machines to construction SMEs cooperatives; increase awareness among MSMEs production units about available government opportunities; promote *jua kali* products; prioritize financial inclusion funds for the construction value chain; and establish MSMEs business development centres in every constituency ward.

(iv) Enhance market access through mobilization and aggregation of MSMEs into cooperatives (labour and material supplies); and ring-fencing certain components of low-cost housing projects for MSMEs.

For the tea sub-sector and other agricultural products as proposed in the MTP IV, it will be important to:

(v) Enhance market access by establishing incubation centres for specialty teas diversification; implement a global marketing strategy for Kenya's tea; and sensitize exporters on market requirements and opportunities.

In addition to the interventions proposed in the MTP IV, it will be important for the Ministry of Agriculture and other agencies to:

(vi) Maintain high growth in tea, dairy, and other agro-based sub-sectors, while reducing reliance on rain-fed agriculture, as employment in these sub-sectors is greatly affected by weather conditions.

(vii) Implement continuous skills transfer and support to local producers such as leveraging consumer driven standards that otherwise limit market access (for example, the European Good Agricultural Practice (EuroGAP) and maximum pesticide residue levels).

(c) Social pillar

In the social pillar, the education sub-sector shows strong potential for job creation. A multi-faceted approach is essential to further increase job opportunities in the education sub-sector. According to the CGE results, all the jobs generated in the education and health sub-sectors are indirect. To further stimulate job creation, it is important to promote entrepreneurship in education by supporting the development of educational start-ups that focus on innovative learning tools and educational content creation. This will contribute to job growth within the entrepreneurial ecosystem. It will be important to:

(i) Establish a National Policy Framework on Open Distance and e-Learning (ODeL).

(ii) Support the Open University of Kenya initiative by enhancing enrolment across gender.

(d) Environment and natural resources pillar

Given the finding that the accommodation and food services sector is a leading driver of job creation in Kenya, the following recommendations are proposed to further boost job creation in this sector:

(i) Expand domestic and international markets for dairy products, supported by marketing and branding initiatives that create demand-driven job growth.

(ii) Invest in tourism-related infrastructure, such as roads, airports, and public amenities, to enhance accessibility to tourist destinations and improve visitor experience.

(iii) Promote community conservancies and innovations to enhance job creation at the grassroots level.

(e) Public administration pillar

Given that most of the job destruction occurs in the defined public administration sub-sectors, it will be important to:

(i) Link the public administration initiatives that include capacity building and relevant skills development for the public administration sector.

(ii) Enhance the adoption of technology and related skills given the potential loss of jobs in public administration.

References

Bekhet, H. A. (2011), "Output, income and employment multipliers in Malaysian economy: Input–output approach". *International Business Research*, 4(1): 208-223. https://doi.org/10.5539/ibr.v4n1p208.

Boulanger, P., Dudu, H., Ferrari, E., and Philippidis, G. (2018), "A multi-region economy-wide approach for assessing the impact of agricultural policies on sustainability". *Sustainability*, 10(10): 3717. https://doi.org/10.3390/su10103717.

Ernst, C., Merola, R., and Samaan, D. (2015), *Employment impact assessment: A guide for ex-ante assessment of employment impacts*. International Labour Organization. https://www.ilo.org/wcmsp5/groups/public/ed_emp/documents/publication/wcms_398509.pdf.

Farole, T., Puerta, M. L., Canut, C., and Rizvi, A. (2018), Jobs in global value chains: Building better jobs in developing countries. World Bank. https://openknowledge.worldbank.org/entities/publication/da6b7a16-fc61-5de8-8ef5-c91b89627a0c.

Hausmann, R., Chauvin, J., and Santos, M. A. (2014), *Uganda: Identifying the binding constraints to inclusive growth*. Harvard Kennedy School, Center for International Development. https://growthlab.cid.harvard.edu/publications.

IFPRI (2017), 2013 Social Accounting Matrix for Kenya [Dataset]. Washington, DC: IFPRI. https://doi.org/10.7910/DVN/KYIRMV.

International Labour Organization (2021), *World Employment and Social Outlook: Trends 2021*. Geneva: ILO.

International Labour Organization (2022), *Global employment trends for youth 2022: Investing in transforming futures for young people*. https://www.ilo.org/global/publications/books/WCMS_853321/lang--en/index.htm.

International Trade Centre (2018), Jordan: Reaping the benefits of trade agreements with the European Union. https://intracen.org.

Japan International Cooperation Agency (2007), The study on master plan for Kenyan industrial development in the Republic of Kenya (MAPSKID). JICA. https://openjicareport.jica.go.jp.

Kenya Institute for Public Policy Research and Analysis (2021), *Kenya economic report 2021*. Transforming agriculture for inclusive growth and sustainable livelihoods. KIPPRA. https://kippra.or.ke.

Kenya National Bureau of Statistics (2022), Quarterly labour force report, Q4 2022. KNBS. https://www.knbs.or.ke.

Kiringai, J., Thurlow, J., Wanjala, B., Waiyaki, N., Mutunga, C., Njenga, G., Mutua, J., and Nafula, N. (2007), *A 2003 social accounting matrix for Kenya: Methodological note (*Discussion Paper No.72. of 2007). Kenya Institute for Public Policy Research and Analysis (KIPPRA).

Méndez-Parra, M. (2015), Empowering the modelling for policy with the 2015 Social Accounting Matrix for Tanzania. [Conference paper or data]. ResearchGate.

National Economic and Social Council (2011), *Unemployment in Kenya: Proposed interventions* (Discussion Paper No. 3/2011). Nairobi, Kenya: National Economic and Social Council, Office of the President. Open Library.

Onsomu, E., Munga, B., Nyabaro, V., and Munene, B. (2022), Employment creation potential for youth in the Kenyan economy (GSYE Working Paper). African Economic Research Consortium. August, 2022. publication. aercafricalibrary.orgIDEAS/RePEc.

Republic of Kenya (2003), Economic Recovery Strategy for Wealth and Employment Creation 2003–2007. Nairobi: Ministry of State for Planning.

World Bank (2013), Jobs are a cornerstone of development, says World Development Report 2013 [Press release]. Washington, DC: World Bank.

Appendices

Appendix Table 1: Growth rates for the infrastructure pillar by sub-sectors

Sub-sector	Transport and storage	Electricity, gas and steam	Petroleum products	Information and communication technology	Water supply and sewerage
Food crops	2.405	0.048	0.018	0.647	0.006
Cotton and fibre	1.44	0.086	0.148	1.313	0.069
Sugarcane	2.407	-0.002	-0.046	0.399	0.011
Coffee	-4.928	-0.015	-0.046	0.387	0.011
Tea	-4.702	-0.012	-0.042	0.274	0.012
Tobacco	-3.002	-0.011	-0.04	0.497	0.012
Flowers and other crops	-12.703	0.002	-0.007	0.574	-0.017
Livestock	3.57	0.059	0.022	0.765	0.01
Dairy	3.497	0.062	0.025	0.805	0.005
Fishing	2.495	0.055	0.023	0.724	0.011
Forestry	6.565	0.077	0.038	0.876	0.006
Mining	4.256	0.141	0.035	0.929	0.008
Meat processing	2.126	0.037	0.007	0.504	0.002
Grain milling	1.949	0.048	0.016	0.614	0.004
Bakery	1.761	0.02	0.013	0.666	0.003
Beverages	1.558	0.038	0.011	0.546	-0.001
Other food processing	-0.591	0.05	0.075	0.922	0.013
Textile and apparel	-0.985	0.039	0.04	0.804	0.023
Leather and footwear	1.708	0.038	0.011	0.706	-0.001
Wood products	-4.252	0.029	0.016	1.565	0.012
Paper and printing	1.53	0.037	0.03	0.885	0.004
Petroleum products	1.264	0.043	0.535	0.542	0.003
Other chemicals	1.316	0.044	0.048	0.618	0.003
Fertilizers	1.794	0.034	0.001	0.549	0.008
Non-metal minerals	3.294	0.041	0.043	0.627	0.004

Sub-sector	Transport and storage	Electricity, gas and steam	Petroleum products	Information and communication technology	Water supply and sewerage
Machinery and other equipment	2.495	0.069	0.061	0.678	0.006
Other manufacturing	4.058	0.039	0.021	0.653	0.004
Water supply and sewerage	3.154	0.124	0.031	0.777	0.299
Electricity, gas and steam	3.734	0.901	0.018	0.719	0.003
Construction	6.26	0.078	0.033	0.858	0.006
Wholesale and retail trade	4.119	0.069	0.042	0.364	0.006
Accommodation and food services	1.064	0.124	0.006	0.67	0.003
Transportation and storage	15.743	0.054	0.028	0.72	0.004
Information and communication	2.816	-0.015	0.019	2.288	0.003
Finance and insurance	4.05	0.055	0.049	0.506	0.004
Real estate	3.48	0.034	0.019	0.444	0.003
Other services	6.561	0.048	0.031	0.754	0.004
Public administration	1.936	-0.005	-0.009	0.058	0
Health and social work	2.734	-0.036	-0.008	0.249	-0
Education	3.499	0.01	0.018	0.301	0.002

Source: Authors' estimations based on SAM 2020

Appendix Table 2: Growth rates for the finance and production pillar by sub-sectors

Sub-sector	Cotton and fibre	Dairy	Tea	Mining	Construction	Textile and apparel
Food crops	-0.003	0.713	2.084	-0.042	0.624	0.098
Cotton and fibre	15.403	-0.288	-22.992	-0.07	0.801	67.233
Sugarcane	-0.129	0.658	-4.594	0.219	0.854	-3.067
Coffee	-0.096	0.673	-14.906	0.209	0.862	-3.329
Tea	-0.213	0.628	82.218	0.183	0.877	-2.135

Tobacco	-0.138	0.665	1.846	0.211	0.794	-2.754
Flowers and other crops	0.686	-1.362	-91.652	-0.168	1.714	-5.795
Livestock	0.006	0.092	1.63	-0.071	0.732	0.272
Dairy	0.009	11.211	2.14	-0.074	0.712	0.348
Fishing	0.017	-0.045	-4.213	-0.057	0.732	0.013
Forestry	0.02	0.23	-0.852	0.151	-0.254	0.481
Mining	0.017	0.217	-3.532	-3.342	-0.339	0.02
Meat processing	0.01	0.103	-0.35	-0.046	0.523	0.136
Grain milling	0.003	0.453	0.667	-0.029	0.593	0.01
Bakery	0.006	0.371	-1.123	-0.029	0.615	-0.054
Beverages	0.004	0.417	0.772	-0.034	0.581	0.096
Other food processing	0.132	-0.018	-9.516	0.035	0.631	1.542
Textile and apparel	0.91	0.079	-8.632	0.019	0.718	41.584
Leather and footwear	0.013	0.075	-3.119	-0.03	0.512	-0.15
Wood products	0.028	-0.004	-13.096	0.184	0.284	-0.986
Paper and printing	0.033	0.092	-3.625	-0.029	0.513	0.231
Petroleum products	0.034	0.082	-3.536	-0.038	0.411	0.283
Other chemicals	0.016	0.118	-3.178	-0.02	0.556	-0.128
Fertilizers	-0.041	0.258	4.415	0.027	0.652	-0.429
Non-metal minerals	0.014	0.162	-1.457	0.011	-0.146	0.151
Machinery and other equipment	0.037	0.138	-4.535	-0.051	1.111	0.28
Other manufacturing	0.032	0.123	-2.251	-0.066	0.61	0.383
Water supply and sewerage	0.144	0.42	1.019	-0.19	0.559	2.99
Electricity, gas and steam	0.018	0.12	-1.637	-0.195	0.427	0.205
Construction	0.018	0.264	0.035	0.175	-0.358	0.458
Wholesale and retail trade	0.031	0.24	-0.758	-0.13	1.174	0.56
Accommodation and food services	0.018	0.083	-6.039	-0.003	0.517	-0.296
Transportation and storage	0.018	0.143	-0.707	-0.086	0.897	0.261
Information and communication	0.019	0.13	-1.327	-0.077	0.622	0.27

Finance and insurance	0.022	0.164	-1.166	-0.106	0.688	0.324
Real estate	0.016	0.097	-0.593	-0.069	0.497	0.286
Other services	0.02	0.131	-1.021	-0.092	0.7	0.304
Public administration	0.013	0.076	-2.156	-0.039	0.323	0.067
Health and social work	0.013	0.09	-1.375	-0.042	0.414	0.124
Education	0.018	0.108	-0.617	-0.074	0.531	0.317

Source: Authors' estimations based on SAM 2020

Appendix Table 3: Actual jobs created in the finance and production pillar sub-sectors

Sub-sector	Cotton and fibre	Dairy	Tea	Mining	Construction	Textile and apparel
Food crops	(49)	11,744	34,325	(692)	10,278	1,614
Cotton and fibre	392	(7)	(585)	(2)	20	1,711
Sugarcane	(57)	291	(2,028)	97	377	(1,354)
Coffee	(34)	238	(5,266)	74	305	(1,176)
Tea	(907)	2,675	350,152	779	3,735	(9,093)
Tobacco	(2)	11	30	3	13	(45)
Flowers and other crops	180	(358)	(24,099)	(44)	451	(1,524)
Livestock	11	173	3,062	(133)	1,375	511
Dairy	12	14,794	2,824	(98)	940	459
Fishing	9	(25)	(2,349)	(32)	408	7
Forestry	25	285	(1,057)	187	(315)	597
Mining	40	507	(8,260)	(7,815)	(793)	47
Meat processing	6	66	(225)	(30)	337	88
Grain milling	11	1,612	2,374	(103)	2,110	36
Bakery	4	221	(669)	(17)	366	(32)
Beverages	2	178	330	(15)	249	41
Other food processing	8	(1)	(605)	2	40	98
Textile and apparel	821	71	(7,792)	17	648	37,538
Leather and footwear	5	27	(1,114)	(11)	183	(54)
Wood products	14	(2)	(6,474)	91	140	(487)

Sub-sector	Cotton and fibre	Dairy	Tea	Mining	Construction	Textile and apparel
Paper and printing	11	31	(1,214)	(10)	172	77
Petroleum products	0	1	(49)	(1)	6	4
Other chemicals	15	112	(3,023)	(19)	529	(122)
Fertilizers	(5)	30	511	3	75	(50)
Non-metal minerals	15	173	(1,559)	12	(156)	162
Machinery and other equipment	50	185	(6,090)	(68)	1,492	376
Other manufacturing	288	1,107	(20,254)	(594)	5,489	3,446
Water supply and sewerage	48	139	338	(63)	186	992
Electricity, gas and steam	10	68	(930)	(111)	243	117
Construction	611	8,963	1,188	5,942	(12,155)	15,550
Wholesale and retail trade	683	5,285	(16,692)	(2,863)	25,853	12,332
Accommodation and food services	39	178	(12,979)	(6)	1,111	(636)
Transportation and storage	377	2,994	(14,802)	(1,800)	18,779	5,464
Information and communication	56	385	(3,928)	(228)	1,841	799
Finance and insurance	61	454	(3,229)	(294)	1,905	897
Real estate	49	295	(1,806)	(210)	1,514	871
Other services	328	2,150	(16,757)	(1,510)	11,489	4,989
Public administration	233	1,362	(38,647)	(699)	5,790	1,201
Health and social work	43	296	(4,516)	(138)	1,360	407
Education	175	1,048	(5,988)	(718)	5,153	3,076
Total jobs created by sub-sector	3,577	57,757	182,149	(11,116)	91,541	78,935

Source: Authors' estimations based on SAM 2020

Appendix Table 4: Growth rates for the social pillar sub-sectors

Sub-sector	Health and social work	Education	Public administration
Food crops	0.109	0.335	0.542
Cotton and fibre	0.103	0.353	0.901
Sugarcane	0.15	0.607	0.203
Coffee	0.149	0.609	0.179
Tea	0.14	0.582	0.166
Tobacco	0.131	0.544	0.213
Flowers and other crops	-0.096	-0.222	-0.748
Livestock	0.108	0.336	0.604
Dairy	0.098	0.306	0.541
Fishing	0.122	0.369	0.578
Forestry	0.366	0.91	2.976
Mining	0.358	0.94	2.944
Meat processing	0.084	0.268	0.476
Grain milling	0.123	0.358	0.618
Bakery	0.119	0.362	0.562
Beverages	0.095	0.305	0.461
Other food processing	0.101	0.346	0.462
Textile and apparel	0.111	0.413	0.637
Leather and footwear	0.068	0.274	0.451
Wood products	0.171	0.49	1.105
Paper and printing	0.083	0.273	0.489
Petroleum products	0.047	0.29	0.266
Other chemicals	0.093	0.32	0.595
Fertilizers	0.099	0.337	0.466
Non-metal minerals	0.077	0.635	1.761
Machinery and other equipment	0.204	0.571	0.73
Other manufacturing	0.121	0.327	0.252
Water supply and sewerage	0.045	0.316	0.297
Electricity, gas and steam	0.034	0.28	0.374
Construction	0.396	0.995	3.104
Wholesale and retail trade	0.201	0.565	1.436
Accommodation and food services	-0.04	0.115	-0.604
Transportation and storage	0.143	0.415	0.896
Information and communication	0.095	0.304	0.502
Finance and insurance	0.129	0.378	0.761

Sub-sector	Health and social work	Education	Public administration
Real estate	0.065	0.167	0.091
Other services	0.107	0.286	0.547
Public administration	0.078	0.236	-4.345
Health and social work	-1.064	0.271	0.527
Education	0.107	-0.323	0.605

Source: Authors' estimations based on SAM 2020

Appendix Table 5: Actual jobs created in the social pillar sub-sectors

Sub-sector	Health and social work	Education
Food crops	1,795	5,518
Cotton and fibre	3	9
Sugarcane	66	268
Coffee	53	215
Tea	596	2,479
Tobacco	2	9
Flowers and other crops	(25)	(58)
Livestock	203	631
Dairy	129	404
Fishing	68	206
Forestry	454	1,129
Mining	837	2,198
Meat processing	54	173
Grain milling	438	1,274
Bakery	71	216
Beverages	41	131
Other food processing	6	22
Textile and apparel	100	373
Leather and footwear	24	98
Wood products	85	242
Paper and printing	28	91
Petroleum products	1	4
Other chemicals	88	304
Fertilizers	11	39
Non-metal minerals	82	680
Machinery and other equipment	274	767

Sub-sector	Health and social work	Education
Other manufacturing	1,089	2,942
Water supply and sewerage	15	105
Electricity, gas and steam	19	159
Construction	13,445	33,783
Wholesale and retail trade	4,426	12,442
Accommodation and food services	(86)	247
Transportation and storage	2,994	8,688
Information and communication	281	900
Finance and insurance	357	1,047
Real estate	198	509
Other services	1,756	4,694
Public administration	1,398	4,230
Health and social work	(3,494)	890
Education	1,038	(3,134)
Total jobs created by sub-sector	28,920	84,924

Source: Authors' estimations based on SAM 2020

Appendix Table 6: Growth rates of the environment and natural resources pillar sub-sectors

Sub-sector	Forestry	Accommodation and food services	Fishing
Food crops	0.014	0.296	-0.002
Cotton and fibre	0.088	1.094	-0.005
Sugarcane	-0.069	-4.047	0.011
Coffee	-0.079	-4.033	0.012
Tea	-0.086	-3.799	0.012
Tobacco	-0.059	-3.751	0.01
Flowers and other crops	-0.296	1.922	0.038
Livestock	0.018	0.935	-0.008
Dairy	0.019	0.694	-0.001
Fishing	0.009	0.316	-0.535
Forestry	0.452	1.707	-0.002
Mining	-0.053	1.089	-0.002
Meat processing	0.018	0.924	-0.002
Grain milling	0.024	0.456	-0
Bakery	0.023	0.265	-0

Sub-sector	**Forestry**	**Accommodation and food services**	**Fishing**
Beverages	0.019	1.323	-0
Other food processing	0.039	-0.227	-0
Textile and apparel	0.037	-0.512	-0.001
Leather and footwear	0.02	0.298	-0.001
Wood products	0.028	-1.099	0.001
Paper and printing	0.02	0.36	-0.001
Petroleum products	0.017	0.132	-0.002
Other chemicals	0.021	0.234	-0.001
Fertilizers	0.006	-0.634	0.002
Non-metal minerals	-0.033	0.661	-0.002
Machinery and other equipment	0.03	0.293	-0.001
Other manufacturing	0.019	0.385	-0.002
Water supply and sewerage	0.014	0.938	-0.007
Electricity, gas and steam	0.012	2.45	-0.002
Construction	-0.065	1.724	-0.003
Wholesale and retail trade	0.041	1.351	-0.002
Accommodation and food services	0.027	20.861	-0.001
Transportation and storage	0.026	0.811	-0.002
Information and communication	0.02	0.949	-0.002
Finance and insurance	0.02	1.733	-0.002
Real estate	0.014	0.517	-0.001
Other services	0.021	1.392	-0.002
Public administration	0.012	-1.055	-0.001
Health and social work	0.014	-1.078	-0.001
Education	0.016	-0.873	-0.002

Source: Authors' estimations based on SAM 2020

Appendix Table 7: Actual jobs created in the environment and natural resources pillar sub-sectors

Sub-sector	Forestry	Accommodation and food services	Fishing
Food crops	231	4,875	(33)
Cotton and fibre	2	28	(0)
Sugarcane	(30)	(1,787)	5
Coffee	(28)	(1,425)	4
Tea	(366)	(16,179)	51
Tobacco	(1)	(61)	0
Flowers and other crops	(78)	505	10
Livestock	34	1,756	(15)
Dairy	25	916	(1)
Fishing	5	176	(298)
Forestry	561	2,117	(2)
Mining	(124)	2,547	(5)
Meat processing	12	595	(1)
Grain milling	85	1,623	-
Bakery	14	158	-
Beverages	8	566	-
Other food processing	2	(14)	-
Textile and apparel	33	(462)	(1)
Leather and footwear	7	106	(0)
Wood products	14	(543)	0
Paper and printing	7	121	(0)
Petroleum products	0	2	(0)
Other chemicals	20	223	(1)
Fertilizers	1	(73)	0
Non-metal minerals	(35)	707	(2)
Machinery and other equipment	40	393	(1)
Other manufacturing	171	3,464	(18)
Water supply and sewerage	5	311	(2)
Electricity, gas and steam	7	1,393	(1)
Construction	(2,207)	58,534	(102)
Wholesale and retail trade	903	29,751	(44)
Accommodation and food services	58	44,833	(2)
Transportation and storage	544	16,979	(42)
Information and communication	59	2,809	(6)

Sub-sector	Forestry	Accommodation and food services	Fishing
Finance and insurance	55	4,799	(6)
Real estate	43	1,575	(3)
Other services	345	22,846	(33)
Public administration	215	(18,911)	(18)
Health and social work	46	(3,540)	(3)
Education	155	(8,472)	(19)
Total jobs created by sector	837	153,240	(590)

Source: Authors' estimations based on SAM 2020

Appendix Table 8: Actual jobs created in public administration pillar sub-sectors

Sub-sector	Public administration
Food crops	8,927
Cotton and fibre	23
Sugarcane	90
Coffee	63
Tea	707
Tobacco	3
Flowers and other crops	(197)
Livestock	1,135
Dairy	714
Fishing	322
Forestry	3,691
Mining	6,885
Meat processing	307
Grain milling	2,199
Bakery	335
Beverages	197
Other food processing	29
Textile and apparel	575
Leather and footwear	161
Wood products	546
Paper and printing	164
Petroleum products	4
Other chemicals	566
Fertilizers	54

Sub-sector	**Public administration**
Non-metal minerals	1,885
Machinery and other equipment	980
Other manufacturing	2,267
Water supply and sewerage	99
Electricity, gas and steam	213
Construction	105,388
Wholesale and retail trade	31,623
Accommodation and food services	(1,298)
Transportation and storage	18,759
Information and communication	1,486
Finance and insurance	2,107
Real estate	277
Other services	8,978
Public administration	(77,885)
Health and social work	1,731
Education	5,871
Total jobs created by sector	129,981

Source: Authors' estimations based on SAM 2020

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