SMALL BUSINESS DEVELOPMENT, STRUCTURAL CHANGE AND ECONOMIC GROWTH IN SUB-SAHARAN AFRICA

DISSERTATION

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Abbreviations

AEO	African Economic Outlook
CESM	Community Earth System Model
CRU TS	Climatic Research Unit Timeseries
DSSAT	Decision Support System for Agrotechnology Transfer
EBO rate	Established Business Ownership rate
ERP	Economic Recovery Program
ETD	Economic Transformation Database
FAO	Food Agriculture Organization of the United Nations
GEM	Global Entrepreneurial Monitor
GGDC	Groningen Growth and Development Centre
GLSS	Ghana Living Standard Survey
GSGDA	Ghana Shared Growth and Development Agenda
IBES	Integrated Business Establishment Survey
ILO	International Labor Organization
LFAC	Less Favorable Agricultural Condition
MIROC-ESM	Model for Interdisciplinary Research On Climate – Earth System Model
MSMEs	Micro, small and medium enterprises
NCEP	National Centre of Environment Prediction
NCEP-NCAP	National Centers for Environmental Prediction-National Center for Atmospheric Research
NEIP	National Entrepreneurship and Innovation Programme
NIBUS	National Informal Business Upliftment Strategy
NSEA	National Small Enterprise Act
OECD	Organization for Economic Cooperation and Development
SAP	Structural Adjustment Program
SEDA	Small Business Development Agency
SMEs	Small and medium-sized enterprises
SMMEs	Small, medium and micro-enterprises
SPI	Standardized Precipitation Index
SSA	Sub-Saharan Africa

STIDEP	Science, Technology and Innovation Development Programme
STP	Seda Technology Programme
TEA rate	Total Early-stage Entrepreneurial Activity rate
UNDP	United Nations Development Programme
WB	World Bank
WBGES	World Bank Group Entrepreneurship Survey
WDI	World Development Indicators
WGI	Worldwide Governance Indicators

Chapter 1
Introduction

1.1 Motivation and Review

If we have a look at Sub-Saharan Africa (SSA), we may find that structural change is high in the debate on sustainable development and economic growth. Further, steady economic growth is one of the main goals for policymakers in this region. To encourage the development process and accelerate economic growth, small business is seen as one of the strategic tools to achieve this goal. In this view, the role of the small business in the SSA region is a central part of the discussion about African entrepreneurship and the process of economic development. That region is heterogeneous. In this work, I employ case studies.

The thesis covers four topics based on the intersection of the fields of entrepreneurship and development economics: (a) African small business development, including SME policies; (b) the process of structural change in Sub-Saharan Africa; (c) the special role of agriculture in modern African development; (d) relationship between institutions and entrepreneurship in developing and developed countries in the world. My analysis is inspired by three strands of the literature.

The View from Entrepreneurship Literature

The starting point of this work is that entrepreneurship is the core component of the economic development process (Schumpeter, 1911; Leibenstein, 1968) and is the foundation of economic growth (Holcombe, 1998). Further, entrepreneurship is considered through entrepreneurial activity. Micro-, small- and medium-sized enterprises are the crucial vehicles through which individuals may realize their entrepreneurial ambitions (Carree and Thurik, 2010; Wennekers and Thurik, 1999). The contribution of the entrepreneur is considered through four directions such as

employment generations, creation innovation, enhancing productivity, and growth (Van Praag and Versloot, 2007).

A large amount of entrepreneurship literature documents the relationship between entrepreneurship and economic growth (e.g., Carree and Thurik, 2010; Ferreira et al., 2017; Urbano et al., 2019; Valliere and Peterson, 2009; Van Stel et al., 2005; Wennekers and Thurik, 1999). On the one side, the empirical studies on the effect of entrepreneurial activities on economic growth at the cross-country level show the mixed results and challenge to confirm a theoretical hypothesis about the positive impact of entrepreneurship on economic growth. For example, Sternberg and Wennekers (2005) note that entrepreneurial activity has a positive effect on economic growth in highly developed countries, but a negative effect in developing countries. Ferreira et al. (2017) state that entrepreneurship depends on the stage of economic development and therefore may reflect either a positive or negative impact on the same economic strategy. On the other side, evidence from this strand of the literature suggests that the results of research done in developed countries are not always suitable for the context of developing countries.

A growing body of literature claims the vital importance of the role of SMEs for job creation, particularly create employment for vulnerable groups including women and youth; income generation; poverty reduction in the developing countries (e.g., Abisuga-Oyekunle et al., 2020; Ayyagari et al., 2014; Beck et al., 2005; Gollin, 2008; Liedholm et al., 1994; Reeg, 2013).

Even if there is a broad discussion about SME development and the importance of SME policies as a tool for promoting the SME sector in the Sub-Saharan African region, there is a lack of knowledge about country cases (Mamman et al., 2019). In this thesis, to examine SME development in Ghana and South Africa, I focus on SME policies as part of the framework of SME development.

It should be noted that the paper by Naudé (2010) states that two subdisciplines as development economics and entrepreneurship have a long time been studied separately without the direct intersection. This fact creates a gap in the existing literature for deeper investigation of the role of entrepreneurs and entrepreneurship in developing countries. A useful review of the literature on two subdisciplines and their intersections is provided by Hessels and Naudé (2019, p. 399). They determine

that there is no common "scientific approach" to the role of entrepreneurship in economic development. Hessels and Naudé (2019) suggest it needs to consider structural change and institutional aspects.

The View from Development Economics Literature: Structural Change and Agriculture

Focus on Structural Change Issues

Recent rapid economic growth in the African continent is one of the main puzzles for development economics at the present as noted in a growing body of literature (Diao and McMillan, 2018; McMillan and Harttgen, 2014; Rodrik, 2016). Having studied the key seven characteristics of rapid growth in Africa, Diao and McMillan (2018) claim that African growth cannot be attributed without understanding the contribution of micro-, small- and medium-sized enterprises because the majority of economies are presented by those small-scales activities. In addition, according to Diao and McMillan (2018), on the one side, it is highly expected that the role of the domestic market in understanding growth is more meaningful than the international market. On the other side, the domestic market is directly connected to micro-, small- and medium-sized enterprises where these enterprises mostly operate and provide needed employment under rapid structural transformation process. Further, McMillan and Harttgen (2014) point out that there is a renewed interest in the understanding of the contribution of micro-, small- and medium-sized enterprises conditioned by high labor force growth and simultaneous trends in a substantial decline in relative employment share in African agriculture. Then, the paper by Rodrik (2016) states that the African pattern of structural change is far from the usual view of structural transformation and most countries in the SSA region go through the way of "pre-mature deindustrialization" phenomenon. This phenomenon is marked by a significant increase of labor force in the services sector but mostly operates in informal activities and lower productivity (Rodrik, 2016, p. 13).

In early research on the SME contribution in developing countries, the manufacturing sector was considered as the main driver to boost economic growth and raise welfare (Beck et al, 2005). However, based on the above-mentioned development literature in the context of Sub-Saharan Africa, one might conclude

the understanding of the role of micro-, small- and medium-sized enterprises in the African development process is required to have the complex view and look at all sectors, not just one. This dissertation thesis aims to fill the existed gap by using the shift-share analysis. The novelty is to use macro data instead of micro to obtain basic insight into the role of small businesses in the economic development process. The direction of this approach could be explained by two reasons. Firstly, microdata on small businesses in national surveys usually contain information only about the registered establishments and do not account for the self-employed and informal sector. Secondly, the microdata by firms in developing countries is in general presented by a few sectors. That motivates to use aggregate sectoral data.

Focus on Agriculture Issues

The importance of agriculture in the economic development process has been emphasized a long time ago, as well as the diversity of regional cases, and the absence of a general solution for all nations (Johnston and Mellor, 1961). Today agriculture still plays a central role in sustainable economic development in Sub-Saharan Africa (Dawson et al., 2016). This region did not have experience of the Green Revolution that promotes agricultural growth and alleviates poverty (Pingali, 2012). Moreover, the SSA region is at higher risk from climate change than most other world regions (Müller et al., 2014). All in all, the impact of climate change on agriculture is a set of complex links in the context of the general development path. To reduce the climate change impact on crop yield in the future, it is necessary to include and implement adaptation strategies (Pingali, 2012). In this thesis, crop yields as a part of the agricultural system are taken into consideration.

The View from Development and Entrepreneurship Literature: Institutional Aspects

Finally, within this thesis, I study the relationship between formal institutions and entrepreneurship. The part of the work was motivated by exploring the intersection of this relation in economic and management fields. From development economics literature we know that the quality of institutions is the main cause that explained why some countries have been more successful

in terms of economic performance than others. For example, the paper by Rodrik et al. (2004) states a few meaningful points that, firstly, only institutions have the direct and more important effect impact on the development rather than exogenous determinants as geography and another endogenous determinant as trade. Secondly, a better quality of institutions, especially better property rights protection in the country is potentially increasing investment and encourage entrepreneurship. An interesting example that we can learn from his paper is that institutions explain why some East Asia countries have successful stories of development and why mostly Latin American and African countries still meet the big challenge to boom their economies and promote entrepreneurship, too.

In line of development economists, researchers from entrepreneurship fields also support the idea that institutions matter for entrepreneurial decision-making (Chowdhury et al., 2019; Welter and Gartner, 2016). Better institutions shape favorable conditions and create special incentives for desirable economic behavior. For example, Baumol (1990) suggested that different historical institutional backgrounds determine the appropriate type of entrepreneurship. Moreover, the existed differences in entrepreneurial activities, including productive and unproductive, were driven by the different quality of institutions across countries and regions in the world (Baumol, 1990). Another key aspect from the paper by Bruton and Ahlstrom (2003) is that in developing countries or emerging economies not everything works exactly the same way as in developed countries. Thus, developing countries tend to have an institutional setting that is significantly different from that of more developed countries (Bruton and Ahlstrom, 2003; Prantl and Spitz-Oener, 2009; Smallbone and Welter, 2001). Another important point is that the quality of institutions affects entrepreneurial activities differently (Sobel, 2008). Moreover, the paper by Chowdhury et al. (2019, p. 51) states that not all institutions play the same role which could be explained by a dynamic relationship between institutions and economic development.

This reveals that there is some vacuum in the existing literature in understanding which particular institution (institutional dimension) has a stronger influence on entrepreneurship.

1.2 Research Framework: Goal, Methods, Data

The purpose of this work is to study the features of African entrepreneurship, the nature of SME development, how the SME development process is expressed in Ghana and South Africa under structural processes, the structural change process in Ghana, the relationship between formal institutions and entrepreneurial rate.

Methodology

The study is conducted with application of the methods of graphic presentation of information; review of literature; the methods of comparison, analogy, and systematization; statistical analysis of data; shift-share analysis, including decomposition method.

Materials

Within this study I use the following groups of secondary data. On the one side, I utilize internationally consistent and comparable databases such as the World Development Indicators and the Worldwide Governance Indicators released by the World Bank; the Economic Transformation Database prepared by the Groningen Growth and Development Centre; the Global Entrepreneurship Monitor surveys conducted by Babson College and London Business School. On the other side, I employ secondary data, including the official reports and national and regional surveys from African Development Bank, the Small Development Agency, and the Ghana Statistical Services, including as Ghana Living Standard Surveys and also Integrated Business Establishment Surveys.

1.3 Outline of the Thesis

This thesis includes four chapters in addition to the present introductory chapter which has an overview of the following chapters. The remainder of this work is structured as follows.

Chapter 2 focuses on the issues related to SME development and how SMEs could be embedded into the process of structural change using Ghana and South Africa as a case study. To note that Ghana and South Africa have had different economic and political initial country conditions since the independence period. Starting from the 1990s, privatization has occurred in both countries along with the state's interest to support the formation of a sustainable SME sector. Hence, Ghana and South Africa are interesting cases for comparative analysis. This chapter aims to explore the nature of SME and its development, the nature of structural change, and the process of economic growth in both countries. The key question is to identify how SME development might be embedded into the process of structural change. To achieve this goal, I formulate and solve the following tasks: firstly, to present the country profile of Ghana and South Africa, drawing attention to economic growth trends, the social-economic trends such as unemployment and urbanization between 1991 and 2017. Secondly, to investigate the nature of the structural process by focusing on broad sectoral division such as agriculture, industry, including manufacturing, and services using the World Development Indicators released by the World Bank. In addition, to give insight into the concept of structural change in Sub-Saharan Africa. Thirdly, to examine the nature of SME development, with special interest to SME policies in Ghana and South Africa by using secondary data sources, including official studies and reports from the African Development Bank, the United Nations Development Programme, the Ghana Statistical Services, the Small Development Agency in South Africa, and others.

Chapter 3 deals with one of the directions of the economic development process in the Sub-Saharan African region and uncovers the questions about the importance of the agricultural sector in that region and the impact of climate change on crop yields. Several aspects on this topic should be underlined. On the one side, the crop sub-sector is the major one for the agricultural sector. Agriculture is the most vulnerable economic sector to climate change, especially in Africa. On the other side, there is uncertainty regarding climate change projections in the nearest future. That leads to the key point that sustainable crop production is under question due to climate change.

Thus, this chapter aims to examine the concepts of agriculture and climate change for Sub-Saharan Africa and to review modern literature on the topic such as "The impact of climate change on crop yields in Sub-Saharan African countries", especially with the focus on staple crops such as maize, millet, groundnuts, cassava, and sorghum. Building on a sample of selected papers, I undertake the following three tasks: first, to investigate databases, models, and approaches. Second, to compare results and identify similarities and differences. Finally, to summarize the results and identify which climatic variables will be responsible for future changes in yields of major crops (cereals, tubers, and root crops) in Sub-Saharan Africa.

Chapter 4 provides some new insight into the structural change process in Ghana and also seeks answers to what sector plays a key driver of economic performance between 1990 and 2018. To point out that structural change is associated with the reallocation of workers from lower to higher productive economic activities. This chapter aims to investigate the pace and direction of structural change by applying the decomposition method and by using the Economic Transformation Databases. Under this study, I address the three questions: (1) did an increase in economy-wide labor productivity growth driven by the within-sectoral effect or structural change effect in three sub-periods between 1990 and 2018? (2) What kind of structural change either growth-enhancing or growth-reducing has occurred during the observed three periods? (3) Does the direction and pattern of structural change in Ghana coincide with the overall trend in Africa? To reach this goal, I set up and solve the following tasks: firstly, to provide insight into the notation about structural change and its prominent features in Africa. Secondly, to study the main trends in output, employment, and labor productivity between eleven economic sectors. Thirdly, to evaluate the contribution of structural change to aggregate labor productivity by using the decomposition approach. This method allows to decompose the labor productivity growth into two components such as within-effect and between-effect and then, make a suggestion about the pattern of structural change.

Chapter 5 covers another important topic in the context of intersection entrepreneurship and development economics fields. The relationship between formal institutional dimensions (rule of law, control of corruption, regulatory quality) and two entrepreneurial activity rates (total early-stage entrepreneurial activity rate and established business ownership rate) are estimated. The important point is that formal institutions create necessary conditions where both early established and mature entrepreneurship operate. The goal of this research is to obtain new insight about the comparison between the early and mature entrepreneurial rate and their response to institutions. To reach this goal, the following tasks are set up. Firstly, to consider the theoretical framework of institutions and entrepreneurship and their measurement. Secondly, to explores the link between institutions, entrepreneurship, and economic development by reviewing the experience diversity of the countries and regions based on literature review. Thirdly, to conduct the empirical work based on two samples of countries such as the efficiency-driven and innovation-driven and finally, to provide the interpretation of the obtained results based on the literature review and empirical findings.

1.4 Main Findings

Based on the main findings obtained in the different chapters in this thesis, I can formulate some concluding remarks.

Chapter 2 presents the overview of small business development within the context of two African countries. Evidence from Ghana and South Africa shows that the private sector is characterized mostly by micro-, small- and medium-sized enterprises. Hence, the SME sector is important for the African economies. However, the SME sector is still very vulnerable because a relatively large share of SMEs refers to the informal sector. In Chapter 2, it is revealed that the governments of Ghana and South Africa have conducted a set of programs and the established certain institutions to support SME development and shape the sustainable SME sector. The review of key programs helps to find out the main policy objectives and future directions of development of the SME sector in both economies. As regards

the embeddedness of small-scall activities to the ongoing structural transformation, SMEs have the potential to reply to needs for growing job opportunities.

In this sense, it is important to know the dynamic of labor productivity by sectoral economic activities and reveal the labor-intensive sectors characterized by the high rate of absorption of released labor due to the movement from other sectors of the economy. The results from Chapter 4 shows that in the case of the Ghanaian economy the main leading sectors of employment are associated with agriculture, trade services, and manufacturing from 1990 to 2018. Even if the relative share of agricultural employment continued to decline over the studied period, this sector kept playing a substantial role in job creation and being a main source of employment. This finding is connected to Chapter 3 where the importance of the agricultural sector in the specific context of the SSA region is stated. Based on the literature review and statistical evidence, I reveal that the role of agriculture in sustainable development in the given region is featured by reduction of poverty and malnutrition, food security, and still the crucial job creator for many countries in this area. Having reviewed a sample of new studies about the impact of climate change on crop yields in SSA, I identify the main problems related to the agricultural sector, particularly crop production, and formulate some special measures under the concept of sustainable agriculture.

In Chapter 4, the consideration of the structural change process in Ghana over three sub-periods allows obtaining the following results: (1) economywide labor productivity growth is driven by the within-sectoral effect rather than the between effect. (2) The type of structural change varied from growth-reducing to growth-enhancing during observed sub-periods. In addition, evidence from the second sub-period from 2000 to 2009 suggests that there are some similarities in this phenomenon of “premature deindustrialization” in Ghana. For this reason, the picture is still mixed and should be interpreted with caution. (3) In comparison with other countries in the SSA region, Ghana is consistent with the general pattern of structural change in high-income African countries. The important remark in Chapter 4 is to make the bridge between the process of structural transformation and small business development, it is necessary to look at all sectors and detect the links between the movement of economic activities. The evidence from Chapter 3

and Chapter 4 suggests that for sustainable economic development in the future for Africa, it needs to promote several sectors and not only one.

In Chapter 5 we can learn some useful lessons as regards the relationship between entrepreneurial activities and formal institutional dimensions across efficiency-driven (refer to developing) and innovation-driven countries (refer to developed). In order to provide new insight into the discourse about the effect of institutions on entrepreneurial activities, entrepreneurial rate on early and mature level is considered. This approach gives an understanding of how the different quality of institutional dimensions might have a different impact on businesses that started recently and businesses that existed several years. Firstly, it is found that there is the diversity of experience across the countries and regions to that relationship. Secondly, various formal institutions such as rule of law, control of corruption, or regulatory quality have a different effect on the entrepreneurial rate in the early stage and the mature stage of business.

To sum it up, there are not any conflicts and logical contradictions between results in Chapters[1].

[1] All views and errors are my own.

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Chapter 2
SME Development, Economic Growth and Structural Change: Evidence from Ghana and South Africa[1]

2.1 Introduction

There is a broad discussion about the important role of SMEs in the Sub-Saharan African region. As stated in the paper by Fjose et al. (2010), SMEs comprise more than 95 percent of enterprises of all sizes in given region, and at the same time the region is pretty much heterogeneous that leads to different SME landscapes. According to the African Economic Outlook report which was prepared by the African Development Bank together OECD and UNDP highlighted that 22 percent of the working-age population in Africa belongs to the group who started new businesses (AEO, 2017, p. 158). This rate is the highest compared with other regions in the world. Previous researchers (Ayyagari et al., 2014; Beck et al., 2005; Nichter and Goldmark, 2009) who have studied the role of SMEs in developing countries suggest that SMEs can be a key driver of employment, job creation, fostering innovation, and tend to contribute to economic growth and improved well-being. Entrepreneurship is broadly recognized as a driver of economic growth (Audretsch et al., 2006; Thurik and Wennekers, 2004). Moreover, the dynamics of entrepreneurship may largely depend on the institutional context and level of economic development (Acs et al., 2008).

The work by Ndulu et al. (2008) points out that the Sub-Saharan African region has a diversity of experience with economic growth. The paper by Thorbecke and

[1] This study has been published in *Journal of Agriculture and Environment* (2020). doi.org/10.23649/jae.2020.2.14.7

Ouyang (2018) notes that the structure of growth in SSA within the period from 1986 to 2012 differs significantly from the period from 1960 to 2000 in the region as well as from the global growth pattern. It could be explained by the specific initial country conditions that combined effects of globalization and development strategies will generate and lead to different paces of growth and different structures of growth from exclusive to inclusive (Thorbecke and Ouyang, 2018). Following the paper by Dietrich (2012), the analysis of overall economic growth is associated with the phenomenon of structural change in the three main sectors such as agriculture, industry and services. Next, structural change places high in the debate on economic growth in Africa (de Vries et al., 2015). In line with this discourse, Fosu (2018) stated that the importance of understanding the structure of economies in this region and the process of structural change is a crucial topic in the literature at present time.

Thus, Sub-Saharan Africa is an interesting region for the investigation of small business development through country-study. In this work, I take two countries for consideration, namely Ghana and South Africa. The brief review of some important events: over the last three decades, significant economic and political transformations[2] occurred in Ghana and South Africa. In 1992 the first multi-party democratic election took place in Ghana. Since that year Ghana has grown into a stable and vibrant democracy. Since 1994 South Africa has experienced a serious transformation of economy and society after the Apartheid era happed from 1948 to 1994. Hence, both countries focus on liberalization, privatization (Aryeetey and Fosu, 2008; Tregenna, 2008) and have the state's interest in the existence of the private sector as such (Jedwab and Osei, 2012; Rogerson, 2004). In this context, SMEs are seen as a key tool for accelerating economic growth and development in Ghana and South Africa. Consequently, SME policy becomes an integral part and complement to other policies.

[2] Information about the chronology of economic events in Ghana and South Africa is based on the book by Ndulu, B.J., Azam, J.P., O'Connell, S.A., Bates, R.H., Fosu, A.K., Gunning, J.W. and Nijinkeu, D. (2008). The political economy of economic growth in Africa, 1960-2000. Vol. 1. Cambridge: Cambridge University Press.

The purpose of this paper is to investigate the nature of SME and its development, the nature of structural change and the process of economic growth in Ghana and South Africa based on the method of country-study. Hence, this paper focuses on understanding how SMEs could be included in the structural change process. To achieve this purpose, the following research questions should be examined: How did the structure of economies change over the past decades (from 1991 to 2017)? What is the nature of SME development in Ghana and South Africa since the 1990s? What lessons can we learn from the two country cases in the context of SME development under the structural change in the SSA region?

The chapter is organized as follows. Section 2.2 presents the country profile of Ghana and South Africa with my own calculation of economic growth trends. In addition, the social-economic trends with a focus on unemployment and urbanization are reported. Section 2.3 explores the structural change process over the period from 1991 to 2017 using the World Development Indicators by the World Bank. Within this sub-chapter, the empirical evidence of sectoral changes in employment and value-added in the economies are described. Additionally, recent literature on structural change is discussed. Section 2.4 examines the nature of SME development, with a particular focus on SME policies in the countries under study based on secondary data sources, including official studies and reports from the African Development Bank, the United Nations Development Programme, the Ghana Statistical Services, the Small Development Agency in South Africa, and others. Section 2.5 concludes.

2.2 Country Profile

2.2.1 Economic Growth Trends

Economic growth is the growth of the real output of an economy over time. Generally, economic growth is measured in terms of an increase in real Gross Domestic Product (GDP) over time or an increase in real GDP per capita. In economic literature, two widely used sources of data on real GDP across countries are the World Development Indicators, published by the World Bank and the Penn World Table, published by the University of Groningen. In this paper, the World

Bank Development Indicators are used to analyze macroeconomic performance in Ghana and South Africa.

It is important to explain what is real GDP? As stated in the paper by Feenstra et al. (2015), the concept of real GDP means GDP estimated at constant prices over time. In other words, constant series are employed to measure the true growth of a series by adjusted for the effect of price inflation. Moreover, the World Bank Indicators report data for real GDP in the "constant" term. Recent data of GDP from the World Development Indicators are constant 2010 U.S. dollars. This means that dollar figures as common currencies for GDP are converted from domestic currencies using 2010 official exchange rates, and then it allows making a comparison across countries (Notes WB dataset, 2019).

Figure 2.1 and Figure 2.2 present comparative development indicators such as real GDP per capita, the growth rate of real GDP and the growth rate of real GDP per capita to help to examine the trends of Ghana and South Africa in comparison with other Sub-Saharan African countries. As shown in Figure 2.1 between 1991 and 2017 GDP per capita in Sub-Saharan African countries rose from 1266 to 1662 U.S. dollars and in Ghana from 834 to 1738 U.S. dollars, respectively. South Africa has the highest GDP per capita in the region and it increased from 5852 to 7482 U.S. dollars. Besides, during the study period GDP per capita in SSA increased 31 percent, in South African and Ghana, on 30 percent and 108 percent, respectively.

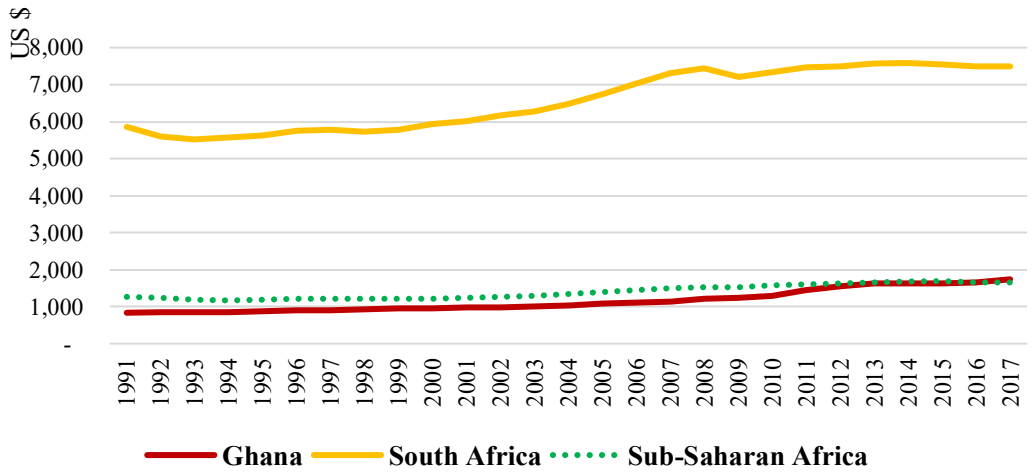

Figure 2.1: Economic performance in Sub-Saharan Africa, 1991–2017, GDP per capita, constant 2010 US $

Source: Author's illustration based on the World Development Indicators (WDI 2020).

It should be stressed that Ghana is one of the fastest-growing economies among Sub-Saharan African countries. Note that Ghana participated in Millennium Development Goals launched by United Nations Development Programme and showed remarkable results, especially in terms of Goal 1 aimed to reduce the extreme poverty (MDGs UNDP Ghana, 2015). Moreover, Aryeetey and Fosu (2008) analyzed economic growth in Ghana during the period between 1960 and 2000 and emphasized that Ghana plays a pioneering role in the political and economic transition in the Sub-Saharan African region approximately four decades of independence period.

Figure 2.2A and Figure 2.2B reflect that the trends of economic growth such as growth rate of real GDP and growth rate of real GDP per capita in Ghana were positive between 1991 and 2017, on the one side, and had a higher growth rate of both indicators compared with other Sub-Saharan African countries, on the other side. The comparison between South Africa and the Sub-Saharan African region shows that in South Africa the growth rate of real GDP was less than in Ghana and the whole region.

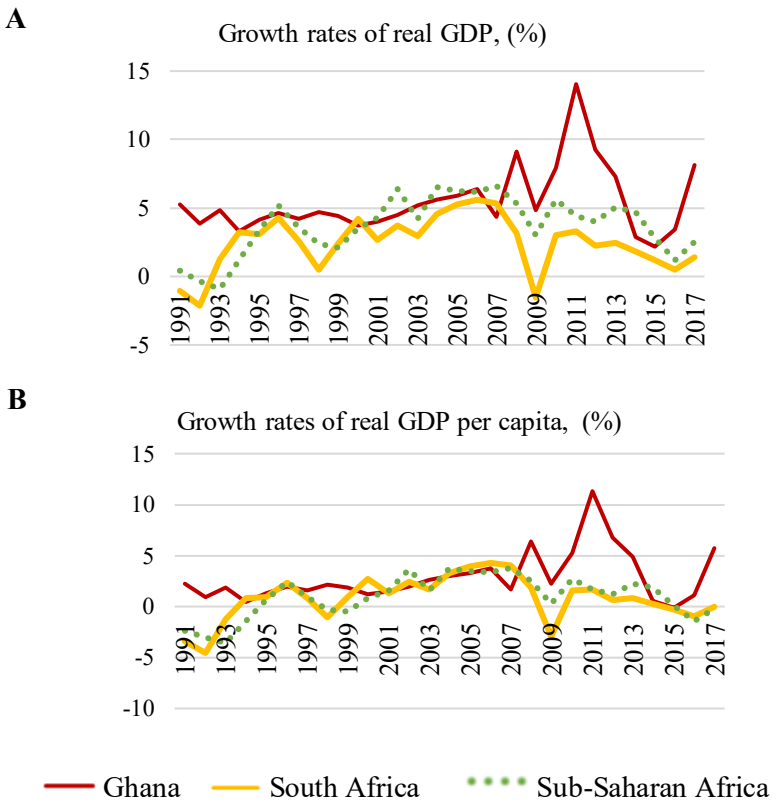

Figure 2.2: Trends of economic growth in the Sub-Saharan African region, 1991–2017

Source: Author's illustration based on the World Development Indicators (WDI 2020).

To better understand the trends of growth, a simple moving average is used to smooth out short-term fluctuations and reveal the long-run trends. To note that the received value of the simple moving average refers to the last point of the interval window so that the curve of moving average is shifted the graph to the right to the last value of the interval. This means that the moving average is set between 1995 and 2017. Figure 2.3 shows trends of growth GDP together with simple moving averages in Ghana and South Africa.

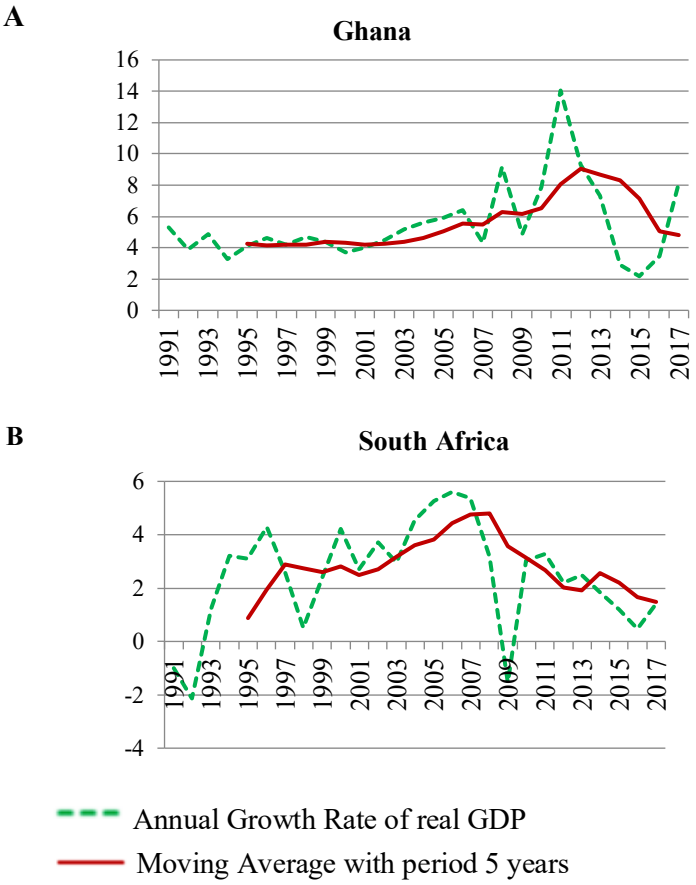

Figure 2.3: Trends of average growth rates of real GDP of Ghana and South Africa, 1991–2017

Source: Author's calculations based on the World Development Indicators (WDI 2020).

Between 1991 and 2017 the Ghanaian economy presented up-warding growth trends, but some strong fluctuations have occurred. For example, during a study period annual GDP growth rate increased from 5 percent to 8 percent. The highest peak was recorded in 2011 and accounted for approximately 14 percent. The

favorable period of GDP growth in Ghana was recorded between 2008 and 2012 with average growth rate approximately 9 percent (Figure 2.3A). In 2014 growth spurt could be explained by starting production of oil at the end of 2010 and also aided by the significant export performance of cocoa and precious metals as gold based on AfDB Ghana (2013).

Therefore, between 1991 and 1993 real GDP growth in South Africa was negative close to zero due to the Apartheid era. Since 1994 economy in South Africa started the rapid process of trade liberalization so that has become full re-entry into the global economy. The positive economic growth was observed during the period between 1994 and 2017. For except, in 2009 growth was negative and was (– 2.9) percent (see Figure 2.3B). According to the paper by Bhorat et al. (2014), the sharp decline of growth was caused by the global financial crises, one the one side, and during the following years after the strong slowdown of growth economy of South Africa tries to recover, on the other side. As shown in Figure 2.3B, more successful period of GDP growth in South Africa was between 2004 and 2008 with an average growth rate approximately 4.80 percent, with the highest value recorded in 2006 of around 5.6 percent. The post-1994 period in South Africa has seen mixed results. The economy experiences pressure from the global economic slowdown together with internal structural bottlenecks, such as high level of unemployment, inequality, not a sufficient level of productivity improvement and racial imbalance. However, the economy of South Africa is characterized by a globally competitive financial and business services sector by Bhorat et al. (2014). As highlighted in the paper by Rodrik (2008), a slow economic growth was likely to connect with structural change in South Africa.

Evidence from recent literature on economic growth in the SSA region reflects several important findings. For example, Thorbecke and Ouyang (2018, p.67) suggested that starting from 2000, the speed of growth in SSA has experienced “a quantum jump” and growth pattern has become more inclusive. Another view is presented in the paper by Rodrik (2016) that recent GDP growth in Africa should be interpreted with caution. The key question is what factors may influence economic growth in Sub-Saharan African countries. The first is associated with the endogenous factors such as “the improved treatment of agriculture”, the general

improvement in the quality of institutions and the emergence of a middle class, according to Thorbecke and Ouyang (2018, p.67). The second group of factors is exogenous factors which include high global commodity prices and the favorable external environment based on the view of Rodrik (2016).

2.2.2 Social-Economic Trends in Population, Unemployment, and Urbanization

In this subchapter, social-economic indicators are considered to identify key trends for comparison between countries and to better understand the ongoing economic development process.

A continued rapid population growth is observed in Ghana and South Africa during a study period. In Ghana, population grew from 14.8 million in 1991 to 29.1 million in 2017, according to the data from the World Bank (WDI, 2020). In the case of South Africa, the population increased from 36.8 million in 1991 to 57.0 million in 2017. Overall, during a study period population growth in Ghana was 96.6 percent, and in South Africa 54.9 percent, respectively. In line with population dynamics, a share of the rural and urban population should be taken into consideration. Figure 2.4A and Figure 2.4B demonstrate that process of urbanization occurs in Ghana and South Africa.

In Ghana, the urban population increased from 37 percent in 1991 to 55 percent in 2017, and the rural population declined from 63 percent to 46 percent, respectively (see Figure 2.4A). In 2009, it is recorded that the urban population started to prevail on the urban population in Ghana.

In South Africa, the urban population increased from 53 percent to 66 percent between 1991 and 2017, while the rural population reduced from 47 to 34 percent, respectively (see Figure 2.4B).

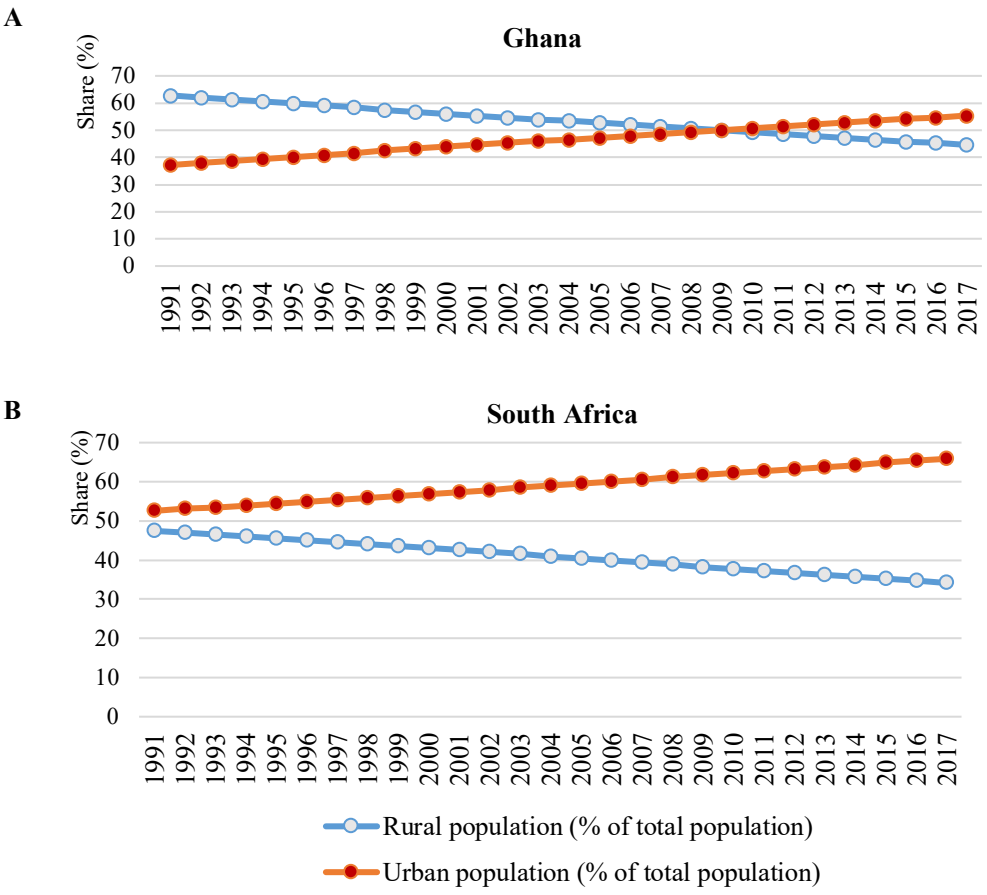

Figure 2.4: Rural and urban population in Ghana and South Africa, 1991–2017
Source: Author's calculation based on the World Development Indicators (WDI 2020).

Having considered the distribution of population between urban and rural areas during the study period, it allows us to recognize that the urbanization process in Ghana and South Africa has been slightly different. On the one side, in countries, urban population continued to grow, and rural populations continued to decline modestly. On the other side, during a study period more than half of the population in South Africa had already lived in urban areas.

Urbanization is usually seen as a response to economic growth based on the paper by Jebwab (2013). It may be assumed that the process of urbanization is driven by different factors. It could be related to movement labor force between sectors, on the one hand, and external factors as climate change, on the other hand. For example, Henderson et al. (2017) revealed that the adverse climate change and urbanization in Sub-Saharan Africa have a strong relationship. They suggest that climate change will influence structural transformation so that it may be two

scenarios. The successful scenario will be where cities may absorb the excess force of labor from agricultural rural areas. The second scenario is likely to be challenging in less industrialized cities in this region. The main result provided by the paper by Henderson et al. (2017) is that further migration from rural to urban areas will continue due to persistent climate change.

One of the important indicators of the macro-economic process is unemployment. In this context it needs to know what share of the labor force without work, but available for and seeking employment. As stated by Rodrik (2008), the economy of South Africa strongly suffers from a high level of unemployment, one of the highest in the world. The results of this trend derived from shrinkage of the non-mineral tradable sector (among them manufacturing). Figure 2.5 illustrates that level of unemployment fluctuated from 28 to 27 percent during a study period. It reached its highest point in 2003, and it was approximately 34 percent. The lowest value of unemployment in South Africa was recorded in 2008 and it was approximately 23 percent. The highest rate of unemployment in South Africa is mostly associated with the young and unskilled population Bhorat et al. (2014) and Rodrik (2008). As shown in Figure 2.5, unemployment in Ghana increased from 4.6 percent to 6.6 percent. Unemployment peaked above 10 percent for two years, namely 1999 and 2000 and then fell moderately until 2006.

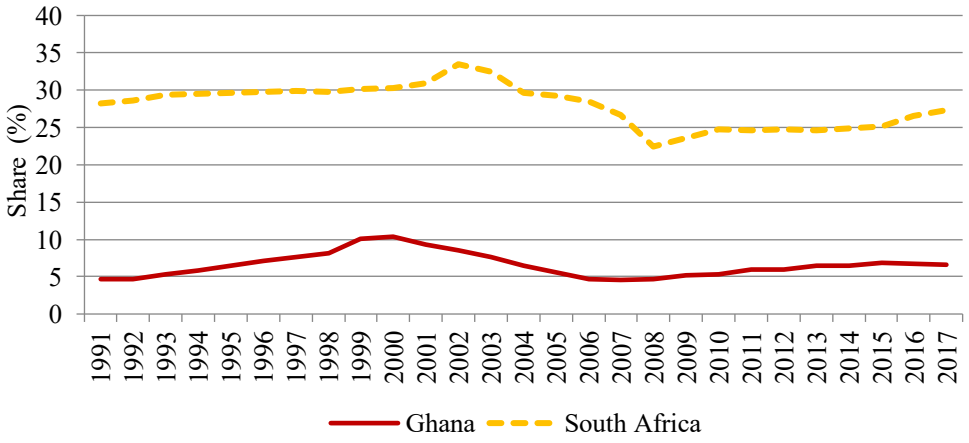

Figure 2.5: Trends of unemployment, (% of total labor force) (modeled ILO estimate) in Ghana and South Africa, 1991–2017

Source: Author's calculations based on the World Development Indicators (WDI 2020).

2.3 Structural Change

2.3.1 The Theoretical Framework of Structural Change

Economic development deals with structural change (Jedwab and Osei, 2012) and structural transformation and industrialization (McMillan and Rodrik, 2011). The concept of structural transformation is associated with various dimensions such as industrialization, agricultural transformation, demographic transition and urbanization (Chenery et al., 1986). Structural change can appear in two forms such as growth-enhancing and growth-reducing (McMillan et al., 2017; McMillan and Rodrik, 2011). Former means that labor force shifts from the low-productive sector to the high-productive sector. Latter suggests that general productivity reduces under the condition if the labor force moves towards low-productive sectors. For this reason, recent literature draws special attention to the following questions: How does structural change occur in Africa? Is structural change growth-enhancing in the Sub-Saharan African region?

Several studies stress that the nature of structural change in Sub-Saharan Africa stays different in comparison with other developing regions (Chenaf-Nicet, 2019; Diao et al., 2017; Rodrik, 2016; McMillan and Rodrik, 2011). For example, Rodrik (2016) pointed out that the pattern of structural change in African countries looks different from the classical pattern that took place in Asia countries and performed high growth due to labor flow towards higher-productive sectors (manufacturing and services). In the case of Sub-Saharan Africa, rural migrants moved from the rural agriculture sector to the urban service sector characterized by low-productivity and also operating under informal activities. In the paper by Rodrik (2016) and by Diao et al. (2017) reported that between 1990 and 1999 structural change was growth-reducing in most Sub-Saharan African countries due to lower labor productivity growth which was closed to zero. Between 2000 and 2010 labor productivity growth occurred, and as a result, structural change became growth-enhancing for some African countries. Chenaf-Nicet (2019) stated that economies in the Sub-Saharan African region strongly differ from other developing economies in terms of the impact of international integration and institutional conditions on structural change.

In addition, Dietrich (2012) investigated that the direction of causality either economic growth causes structural change or conversely in terms of employment and also the real value added. In that paper, Dietrich (2012) provided us the important two messages about the causal direction between economic growth and structural change. The first result suggests that economic growth is slowing down structural change in the short term. However, in the long term, this causal relationship has an accelerating effect. The second result connected to the causal direction from structural change to economic growth shows that structural change effect positively or has "at least a non-negative impact on economic growth" Dietrich (2012, p. 919).

2.3.2 Structural Change in Ghana and South Africa: Stylized Facts

Mostly stylized facts of structural change are associated with changes in the sector shares of GDP, sector employment shares, labor productivity. To investigate the main trends of structural change, three main broad divisions of sectors such as agriculture, industry (including manufacturing) and services are considered (Dietrich, 2012). To get insight into the main stylized facts of structural change in Ghana and South Africa, two key indicators such as the relative share of value added in GDP and the relative sectoral employment share are considered in this paper.

Figure 2.6A illustrates the processes of structural change in the Ghanaian economy between 1991 and 2017 in terms of the sectoral distribution of real GDP. The first important stance is that the structure of the economy reflects a shift in dominance from agriculture to services. In more detail, the share of agriculture over the study period has reduced significantly from 46 to 19 percent. However, the share of services has increased steadily from 37 to 42 percent. There was a modest fluctuation in the contribution of service to GDP during the period from 1993 to 2005. Then, between 2005 and 2006 a steep rise took place from 28 to 46 percent, and it kept the same level with slight fluctuations during the period from 2006 to 2012. Despite the declining share of service until 36 percent in 2014, the contribution of service to GDP remained as dominant compared by other sectors. In 2017 value added from the service sector made a substantial contribution to GDP and accounted for 42 percent. The second important stance is that the manufacturing

sector remained at the same level with little changes. Between 1991 and 2017 the share of manufacturing contribution to GDP increased from 9 to 11 percent. During the estimated period other industrial sectors have grown significantly from 8 to 27 percent (see Figure 2.6A). In 2014 it reached its highest point, approximately 32 percent.

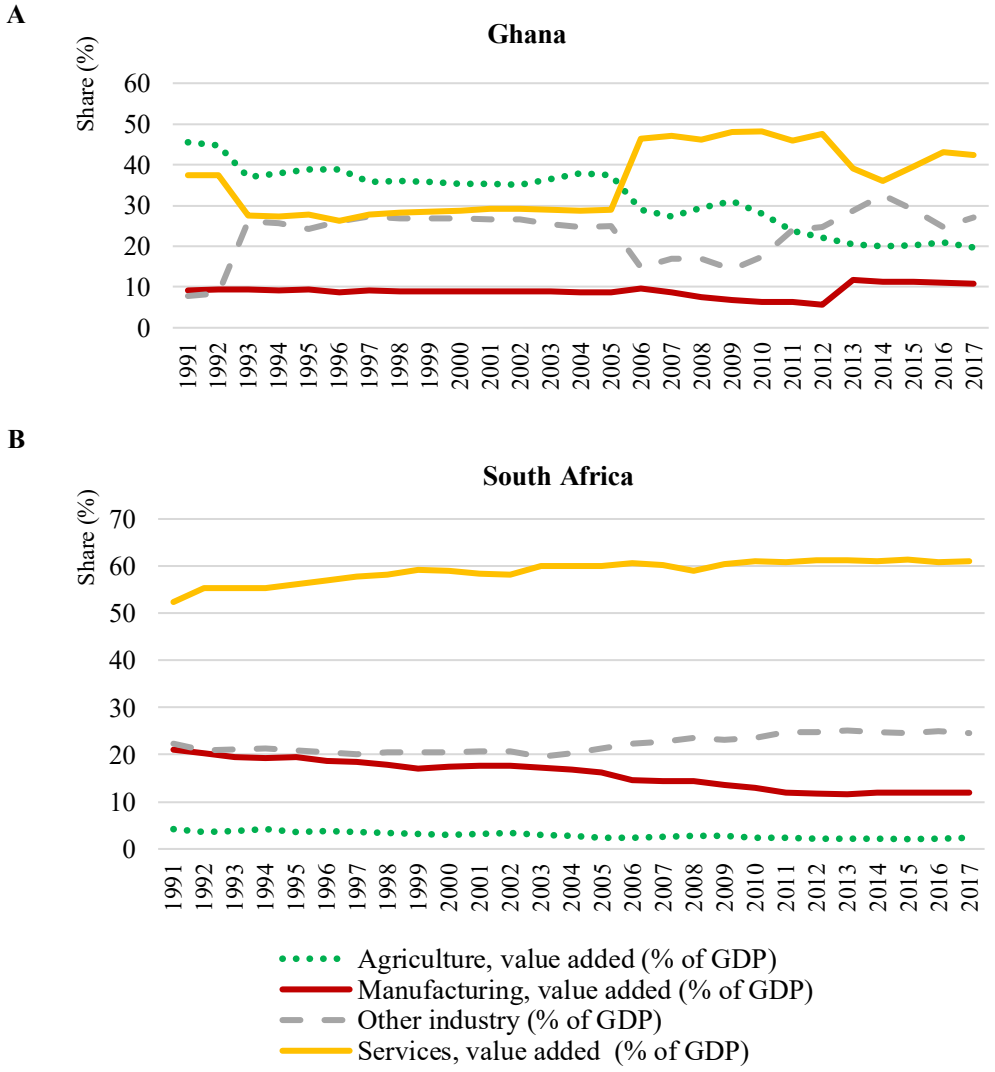

Figure 2.6: Sectoral composition of value added[3] (percentage of GDP) in Ghana and South Africa, 1991–2017

Source: Author's calculations based on the World Development Indicators (WDI 2020).

[3] Based on the International Standard Industrial Classification of All Economic Activities (ISIC Rev.4, 2008), the industry covers mining and quarrying, manufacturing, construction, electricity, water, and gas (divisions from 5 to 43). To study value added, the World Bank reports often manufacturing as a separate group. For this reason, economic activities in mining, construction, electricity, and gas divisions are presented as one group and called "other industry".

In case of South Africa there are the following results (see Figure 2.6B). Firstly, during 1991 and 2017 the structure of the economy of South Africa connected with the dominant contribution of service to GDP from 52 to 61 percent, respectively. Secondly, there was a declining trend in agriculture over the period from 4 to 2 percent. This means that over the study period the relative share of agriculture sector in value added to GDP has been much smaller compared with service and industry sectors. Thirdly, there is a significant reduction in the share of contribution of the manufacturing sector to GDP from 21 to 12 percent, respectively. Fourthly, the share of other industrial sector increased modestly from 22 to 25 percent over the period under study.

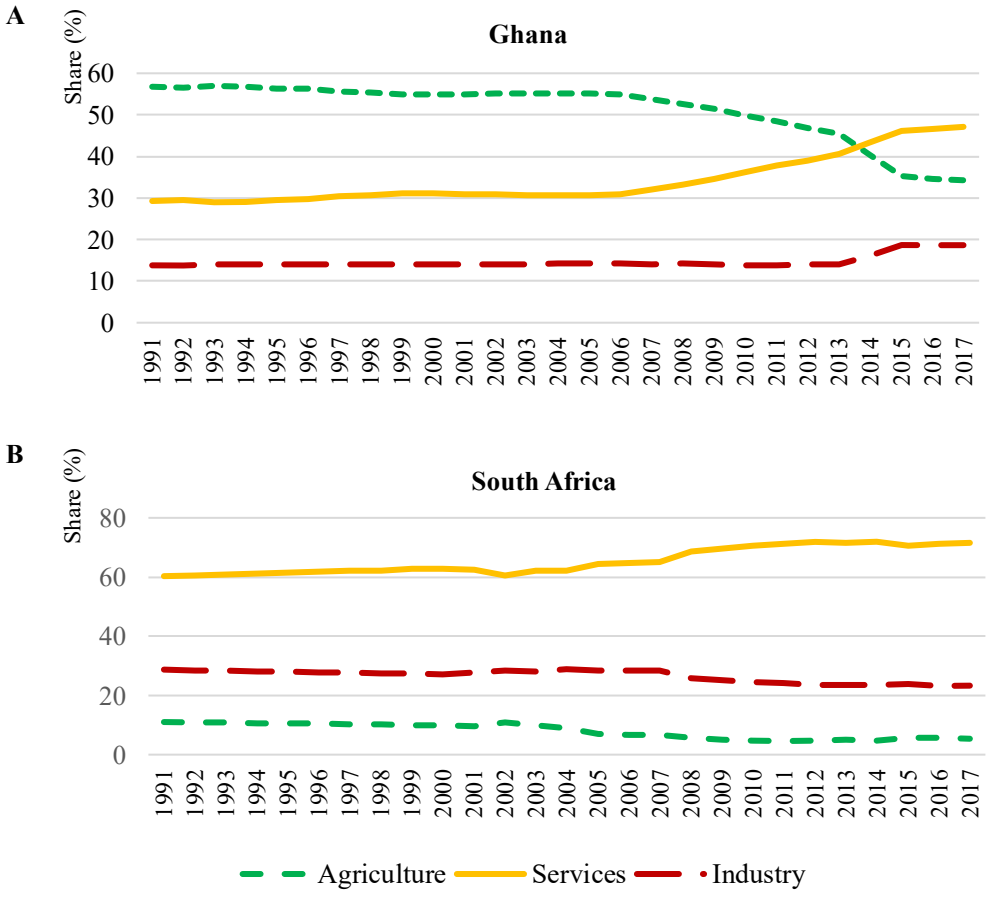

Figure 2.7: Sectoral composition of employment (percentage of total employment) (modeled ILO estimate), in Ghana and South Africa, 1991–2017

Source: Author's calculations based on the World Development Indicators (WDI 2020).

Figure 2.7A shows that in Ghana sectoral composition of employment shows a steady growth of service sector over the study period from 29 to 47 percent, and a significant reduction of agriculture from 57 to 34 percent. Nevertheless, the agriculture sector stays the second source of jobs. Additionally, cocoa as the non-food agricultural sector is one of the largest agricultural export commodities in Ghana, and its production influences shaping employment structure, according to the paper by Kolavalli and Vigneri (2011). Between 1991 and 2013 the share industry sector including manufacturing fluctuated slowly from 13 to 14 percent and between 2014 and 2017 grew from 14 to 19 percent.

As shown in Figure 2.7B, structural change in the employment sectoral composition of South Africa does not undergo significant change compared to Ghana. During the study period the service sector remained the largest source of job, the industry took kept the second position and agriculture was the third position. In more detail, the relative contribution of agriculture to the total employment declined steeply from 11 to 5 percent. This continued reduction can be explained by the employment growth in service sectors along with the adoption of production technologies and the regulatory environment (STATS RSA, 2020). Between 1991 and 2017 the relative share of employment increased from 60 to 71 percent. The industry sector continued to decline during the study period from 29 to 23 percent.

2.3.3 Key Aspects from Literature

Line with the considered stylized facts, it should be highlighted a few papers about studies on structural change in Ghana and South Africa. For example, Jedwab and Osei (2012) used the data from 1960 and 2010 for analyzing structural change in Ghana and obtained the following key findings: (i) economy with limited industrialization; (ii) economy remains agricultural; (iii) since 1992 employment has increased relatively more in the private service sector; structural change happened without Green Revolution, an Industrial Revolution, and a Service Revolution as occurred in Asian countries; (iv) it is suggested that structural change became growth-enhancing after 1992. By contrast, the paper of McMillan (2017)

provided other results after considering period between 1990 and 2000 and compared structural change in Ghana and Vietnam. Thus, authors derive the following conclusion that there are significant improvements, structural change have comparatively poor records compared to Vietnam (McMillan et al., 2017). The paper of by Sparreboom and Gomis (2015) investigated the relationship between structural change and employment in Ghana and concluded that a shift of labor forces the agricultural sector to services that has occurred by productivity gains. Nevertheless, the expansion of the share of employment in services is associated with the low quality of job creation. This means that the share of vulnerable employment in services does not decline.

Structural change and industrialization processes in South Africa were studied by Brohat et al. (2014), Rodrik (2008), Tregenna (2008). For example, Rodrik (2008) suggested that South Africa had experienced the transformation since 1994. Nevertheless, the weakness of the export-oriented manufacturing sector leads to constraint growth opportunities and job creation. Brohat et al. (2014) pointed out that transformation in South Africa that has taken place since 1994 has been below expectations. In the paper by Tregenna (2008), the connections between the manufacturing and services sectors and their contribution to employment and growth in the context of South Africa have been investigated. The decreasing trend of manufacturing or its replacement by services is likely to have negative effects on medium- to long-term growth and employment prospects in South Africa. Tregenna (2008) put the question: could be the process of reducing the relative employment share of manufacturing can be regarded as premature deindustrialization in South Africa.

The key question could be why the service sector absorbed the large flow of the labor force. De Vries (2015) suggested that market-oriented policy reforms, which conducted in the 1990s in the SSA region, probably increased demand for wholesale and retail services. In more detail, the liberalization of trade fostered the imports of large number of consumer goods and investment good parts, and also encouraged the expansion of foreign retail chains via FDI. Furthermore, the more recent period starting from the 2000s was likely to be driven by rising incomes and

a relatively larger share of domestic demand is shifting to the consumption of services.

Note that there are many different scenarios of how rapid economic growth may occur in Sub-Saharan African countries. According to Rodrik (2016), high-growth scenarios for African countries could realize through four scenarios. The first option is to renew the manufacturing sector so that it focuses on industrialization. The second option is suggested to diversify non-traditional agricultural products due to generation agricultural-led growth. The third option is to improve productivity in services in order to generate rapid growth. The final option for growth is based on natural resources if a country has it. Moreover, enterprises are considered as a tool to enhance growth. However, it requires creating an enabling environment for the private sector and supporting domestic entrepreneurs. The next step should be consideration of political initiatives for the SME sector in Ghana and South Africa.

2.4 SME Development and pro-SME Policy

2.4.1 What Are SMEs in Ghana and South Africa?

There is no universal definition of small and medium-sized enterprises due to distinctions between countries and sectors of the economy. The definition of SMEs is widely disseminated and is based on three main criteria: number of employees, turnover and balance sheet total (ILO Report IV, 2015). However, many countries also have their definitions of SMEs.

In Ghana, the definition of SMEs has mostly defined by the number of employees in the enterprise. For example, in the Integrated Business Establishment Survey (IBES) conducted by Ghana Statistical Service in 2014 adopted the following classification: micro-sized enterprises (up to 5 employees), small-sized enterprises (up to 30 employees) and medium-sized enterprises (up to 100). Large enterprises are a business entity in which more than 100 employees have engaged (IBES Report, 2015).

In South Africa, the official definition of a “small business” is set up in Section 1 of the National Small Business Act of 1996. It is said that “small business” means a

"separate and distinct business entity, containing cooperative enterprises and non-governmental organizations", which managed by one owner or more, which, including its branches or subsidiaries (see from Berry et al., 2002, p. 13).

Initially, SMEs in South Africa have been defined through three proxies such as a number of employees, total annual turnover and total gross asset value. Starting from 2019, SMEs are defined by two approaches, excluded total gross asset value. In addition, over time from 1996 to 2018, small business was classified as micro- (fewer than 5 employees), very small (fewer than 10 to 20 employees, depending upon industry), small (fewer than 50 employees) or medium (fewer than 100 to 200 employees, depending upon industry) enterprises which may have variations, according to industry sector (SEDA, 2020).

Having studied the National Surveys, three aspects concerning the SME development in Ghana and South Africa might be indicated. Firstly, the statistical offices of the two countries use a different abbreviation for the term "micro-, small and medium enterprises". For example, in South Africa, the term "small, medium and micro-enterprises" with the abbreviation SMMEs is used the statistical surveys and reports. At the same time, Ghana statistical office applies the term "micro, small and medium enterprises", respectively the abbreviation, in this case, is MSMEs. For clarity and easy categorization, in this work, the abbreviation "SMEs" that includes three categories of enterprises (micro, small and medium), is employed for both countries. To bring attention that the SMEs is considered through the employment dimension in this work.

Secondly, the majority of establishments in both countries belonged to SMEs. For example, the highest share of enterprises in the economy of Ghana during 1985 and 2014 was comprised of SMEs. Moreover, in Ghana the largest relative share of SMEs has been presented by micro-enterprises. The main tendency is that the number of enterprises of all sizes has grown significantly, according to IBES Report 2015. Another example, the composition of formal SMEs in South Africa in 2014 was presented by 60 percent of small enterprises, 36 percent of micro and 4 percent of medium enterprises based on SME Annual Review (2014).

Thirdly, the SME sector is vulnerable due to the relatively large share of SMEs belongs to the informal sector. For instance, in 2008 and in 2015 approximately 65

percent of SMEs were in the informal sector in South Africa (SEDA Report, 2016). This evidence is in line with the paper by Valliere and Peterson (2009). They found that in the case of developing countries, the positive effects of any high-expectation entrepreneurs are weakened by constrained access to the formal economy.

2.4.2 SME Policy in Practice: Evidence from Ghana and South Africa

Based on the paper by Smallbone and Welter (2001), there are five directions on how government may affect the process and pace of development of the SME sector in an economy. Firstly, it is through the macroeconomic environment in which small business operate. Secondly, it is the impact of the legal requirement of legislation such as rule of law and regulatory quality on firms of different sizes. Thirdly, it is the direct support programs for the SME sector and the design SME policies that could have the potential contribution for SME development by government. Fourthly, it is through the economic institutions and their agents such as the banks, business support infrastructure. The final direction is through the education system, for example, conduct the training and coaching with the aim to stimulate the population to start and run their own business successfully.

By using the third approach from the paper by Smallbone and Welter (2001), I focus on the support national SME programs and their objectives, also consider the process of design government agencies and institutions to stimulate SME development in both countries.

Since the late 1980s many African countries have taken the first steps to create an enabling environment for the private sector development (Mamman et al., 2019) and also consider SMEs as the tool for economic development and economic growth (AfGR Report, 2009).

The work for the establishment of new specific institutions in Ghana and South Africa has been conducted, and in addition, programs have been launched that encourage entrepreneurial activities. The chronological order of establishment government agencies and institutions which are responsible for the development of the SME sector in studied countries is demonstrated in Table 2.1.

In more detail, the private sector promotion began early in Ghana than in South Africa under the Structural Adjustment Program (SAP) and the Economic Recovery Program (ERP). Since 1983 Ghana launched both programs, the private sector became an integral element of economic development strategy, according to Arthur (2006). The National Board for Small Scale Industries established in 1985 is the first institution that coordinates and develops micro and small enterprises sector in Ghana (Arthur, 2006). To build a bridge between university and industry, particularly micro-, small- and medium-scale enterprises in line with innovative technology the Science and Technology Policy Research Institute was established in 1988 (CSIR, 2020). As the role of the private sector has increased, and in this regard, it was necessary to coordinate the implementation of different programs. In 2001 Ghanaian government established the Ministry of Private Sector Development. To provide training, support new entrepreneurs and their initiatives in different industries from e-commerce, healthcare, IT and digital media, Meltwater Entrepreneurial School of Technology has been established (see Table 2.1).

Table 2.1: Agents and institutions that shape SME policy and support entrepreneurial and innovative activities

Country	Agents and Institutions
Ghana	The National Board for Small Scale Industries (1985) The Science and Technology Policy Research Institute (1988) The Ministry for Private Sector Development (2001) Meltwater Entrepreneurial School of Technology (2008)
South Africa	The National Empowerment Fund (1998) The Small Enterprise Development Agency (Seda) (2004) The Technology and Innovation Agency (2008) The National Youth Development Agency (2009) The Small Enterprise Finance Agency (2012) The Department of Small Business Development (dsbd) (2014)

Source: Author's illustration based on Arthur (2006), DTI (2019), Rogerson (2004), SEDA (2020), Services Ghana (2019).

Since the democratic transition in 1994, the Government of South Africa has established several agencies to promote and support SMEs, also enhancing technological and non-technological innovation activities in enterprises of all sizes. Over the recent two decades, six major public institutions relating to SMEs have been established, which are presented in Table 2.1. The first of these was the National Empowerment Fund, established in 1998. It should be emphasized that the Small Business Development Agency (SEDA) is the key organization coordinating the implementation of national programs on various issues of sustainable development of SMEs (see Table 2.1).

As mentioned above, SME policy is determined as public initiatives designed to enhance existing enterprises in terms of a certain size. In this line, SME programs refer to an integral part of SME policies (ILO Report, 2015; Mamman et al., 2019). Table 2.2 presents a list of the main programs and strategies for SME sector development.

Table 2.2: The key SME support programs in Ghana and South Africa

Ghana	South Africa
Science, Technology and Innovation Development Programme (STIDEP I)	White Paper on National Strategy for the Development and Promotion of Small Business in South Africa (1995)
National Entrepreneurship and Innovation Plan of Ghana (NEIP)	The National Small Enterprise Act (NSEA) (No. 192 of 1996), (No. 26 of 2003) and (No. 29 of 2004)
Rural Enterprises Programme	The SEDA Technology Programme (STP) (2006)
Private Sector Development Strategy 2010–2015	The Incubation Support Program under the Department of Trade and Industry (2012)
Ghana Shared Growth and Development Agenda (GSGDA) II, 2014–2017	Black Business Supplier Development Programm
	The National Informal Business Upliftment Strategy (NIBUS)

Source: Author's illustration based on AfDB Report (2011), Ghana (2011), Berry et al. (2002), CSIR (2020), DTI (2019), GSGDA Report (2014), ILO Report (2016), NIBUS (2020), Rogerson (2004), SEDA (2020), Services Ghana (2019), UNCTAD Ghana Repot (2019).

A review of the documents and their policy goals helped to identify different target groups, on the one hand, and to confirm the assumptions that the SME sector in Ghana and South Africa is heterogeneous and faces different challenges that need to be addressed, on the other hand. Based on the above mentioned programs, I summarize the various SME policy objectives: (1) to build an enabling environment for the SME sector and encourage competitiveness SMEs; (2) to refine business development services, especially provide technology and communication support for SMEs; (3) to provide integrated national support for start-ups and small businesses[4]; (4) to develop innovative technology in the SME sector in order to increase the quality of life through innovation; (5) to support entrepreneurial activities in target groups, particularly among women and young; (6) to increase formal jobs and create opportunities for higher incomes; (7) to support survival entrepreneurs who operate in the informal economy; (8) to improve the livelihoods and incomes of rural poor micro and small entrepreneurs.

2.5 Conclusion

Under this study, I investigated the nature of SME development and the process of structural change. Based on the above comparative analysis of two countries, I draw the following basic conclusions.

Firstly, the economies of Ghana and South Africa are not on the same macroeconomic trajectory. For example, trends of economic growth including the simple moving average show that it was two times higher in Ghana than in South Africa. To note that the real GDP growth rates were mostly positive and increasing in both countries.

Secondly, rapid population growth and rapid urbanization had occurred in Ghana and South Africa. A comparison of demographic trends shows that in Ghana, the population was growing faster than in South Africa and that the

[4] For example, the establishments of business incubators are considered as the strategic tools to facilitate entrepreneurship and to help to reduce the high rate of failure of technology-based small enterprises.

Ghanaian population increased approximately double times. The ratio of urban to rural population was different in the two countries. For example, at the beginning of the study period, in South Africa, more than half of the population lived in urban areas compared to Ghana, where less than 37 percent settled in cities. Nevertheless, over the whole study period, the urban population continues to grow in both cases. Having considered the unemployment trends, one can suggest that South Africa significantly suffers from a high level of unemployment compared to Ghana.

Thirdly, the study of the sectoral composition of employment and output variables reveals the specific features of structural change and identify the main trends in the structure of the economies. The compositional changes in employment and value-added between three broad divisions of sectors (such as agriculture, industry, including manufacturing, and services) were taking place in the period under review. Based on the received empirical evidence, it is likely to expect that the services sector will continue to generate more jobs than industry and agriculture in Ghana and South Africa. Evidence from the study literature shows structural change is a comprehensive process that includes many aspects. For example, in South Africa, structural change is strongly linked to continued economic challenges such as a higher rate of unemployment and unstable economic growth.

The consideration of the question “What are SMEs in Ghana and South Africa?” allows a better understanding of the shape of the SME sectors. On the one hand, each country does not have one common definition of SMEs. On the other hand, the SME sector is important for the economies in both countries because most enterprises are SMEs.

To explore the nature of SME development, I use secondary data, including the official reports and surveys from the different national, regional, and international organizations such as African Development Bank, the United Nations Development Programme, the Ghana Statistical Services, the Small Development Agency, and others. Furthermore, the review of key programs allows to identify the main policy objectives and directions of SME development in Ghana and South Africa. It was found out that the recognition of the key role

of SMEs in both countries started at the same point in time, and political initiatives to support and improve the SME sector have grown in both countries.

In summary, SMEs have the potential to contribute to structural transformation. However, the SME sector is still very vulnerable because a relatively large share of SMEs belongs to the informal sector. In addition, SME policies are key instruments to shape the sustainable SME sector. Indeed, it requires that SME policies are reinforced by supportive macroeconomic, industrial, investment, and physical infrastructure policies. Under these conditions, the SME sector can become sustainable and can contribute positively to the transformation of the economy. Based on this study, it would suggest that future research will require a more detailed examination of how SMEs can be included in the process of structural change with a focus on labor productivity across all sectors.

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Chapter 3
Climate Change and Its Impact on Crop Yields in Sub-Saharan Africa: Evidence from New Studies[1]

3.1 Introduction

Agriculture is the most vulnerable economic sector to the impact of climate change, especially in the Sub-Saharan African region. It is expected that adverse climate change would have a considerable direct impact on agricultural production and the agricultural system in the next few decades. In this sense, agriculture is at the intersection of three major challenges: achieving food security, adapting to the impacts of climate change, and reducing emissions (AGRA, 2017). This means that sustainable crop production is under question due to changes in atmospheric CO_2 concentration, changes in patterns of temperature, and changes in precipitation. For example, warming trends reduce global yields by approximately 1.5% by decade without sustainable adaptation (OECD/FAO, 2016).

According to Müller et al. (2014), the main impact of climate change on crops is a decrease in crop yields, which tends to enhance the risk of food insecurity, poverty, and malnutrition. Hence, the resilience of production crops to climate change, particularly global warming, and shift in the precipitation

[1] This study has been published in *Journal of Agriculture and Environment* (2020). doi.org/10.23649/jae.2020.1.13.3

Early this work was presented under the PhD course "Advance Economics of the Environment" hold by Prof. Dr. Astrid Dannenberg at the University of Kassel, March 2018.

patterns, is highly critical for food security. Put differently, the agricultural production systems meet many crucial challenges in the context of increasing food demand for a growing population, loss of biodiversity, emerging pests, and diseases, and, finally, the adverse effects of climate change (Nyasimi et al., 2014).

Furthermore, there are a lot of directions of how climate change could create risks for agriculture, including threats for crop production, the productivity of livestock and fisheries, forestry (FAO, 2017). Especially, there is growing attention from the academic community to investigate possible consequences of climate change for Africa in the context of crop yields (Blank, 2012; Calzadilla et al., 2013; Kahsay and Hansen, 2016; Müller et al., 2014, etc).

Two questions arose in the discussion above: Why is agriculture important in the SSA region? To what extent are crop yields important in the future under climate change in the case of Africa?

The purpose of this paper is to examine the concepts of agriculture and climate change for Sub-Saharan Africa and to review modern literature on the topic such as "*The impact of climate change on crop yields in Sub-Saharan African countries*". Based on the sample of selected papers, I deal with the following three tasks: firstly, investigate the databases, models, and approaches. Secondly, to compare results and to identify similarities and differences. Finally, to summarize findings and reveal what climate variables will be responsible for future changes in the yields of staple crops (cereals, tubers, and roots) in the Sub-Saharan African region.

This chapter includes three parts. The first part (Section 3.2) describes the relationship between agriculture and climate change in the case of SSA based on the statistical evidence and new literature on this topic. The second part (Section 3.3) presents the review of four papers that studied the impact of climate change on crop yields. Under this part database, models, approaches are briefly described, and then a summary of key findings is discussed. The third part (Section 3.4) concludes.

3.2 Relationship between Climate Change and Agriculture in Sub-Saharan Africa

3.2.1 Sub-Saharan Africa and the Agricultural Sector

Agriculture is associated with several underlying trends that influence economic development in the region. These trends comprise rapid growth of population, rapid urbanization, rural diversification, structural transformation (OECD/FAO, 2016).

Economies are highly dependent on the agricultural sector in the Sub-Saharan African region. The statistical evidence shows that the agricultural sector is the most important economic sector in terms of contribution to GDP and employment (Figure 3.1 and Figure 3.3). For example, on average the agricultural sectoral share in the GDP among Sub-Saharan African countries[2] is accounted for 15.8% in 2017 (WDI Statistics, 2020). Figure 3.1 with randomly selected countries of this region reports the variety of cases among SSA countries from Bostwana (about 2% in GDP) and Chad (about 49% in GDP).

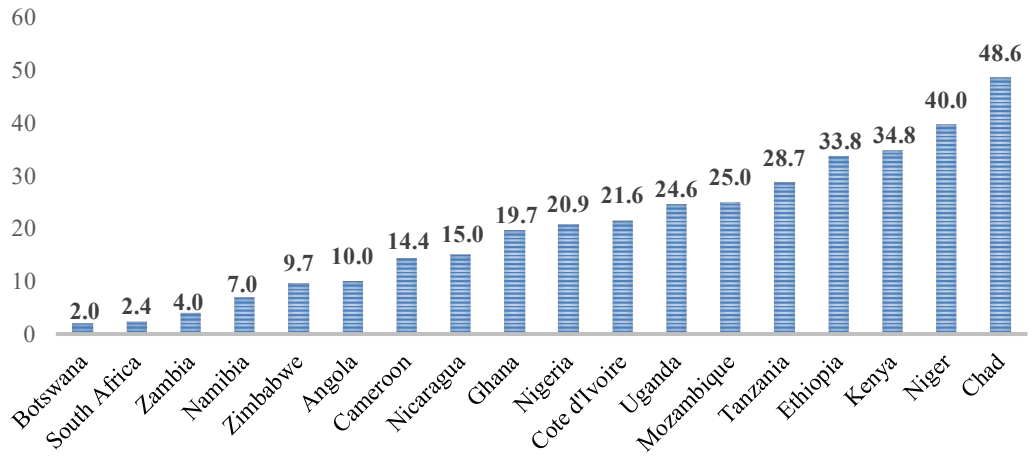

Figure 3.1: Agriculture sector's share in GDP in 2017, selected Sub-Saharan African countries

Source: Author's illustration based on the World Development Indicators (WDI 2020).

To better understand the role of agricultural sector in the economies in Africa, let us compare this indicator with other counties in the world. For comparison

[2] Note that Sub-Saharan Africa includes 46 countries based on the list of the World Bank.

purposes, Figure 3.2 provides statistical evidence of the share of the agricultural sector in GDP in other countries in the world.

For example, in 2017, the agricultural sectoral share in GDP is about 1.6% in the European Union, in Brazil is about 4.6%, in China and India is about 7.6% and 15.6%, respectively (see Figure 3.2). Hence, the share of the agricultural sector of total GDP in Sub-Saharan African counties is still extremely high.

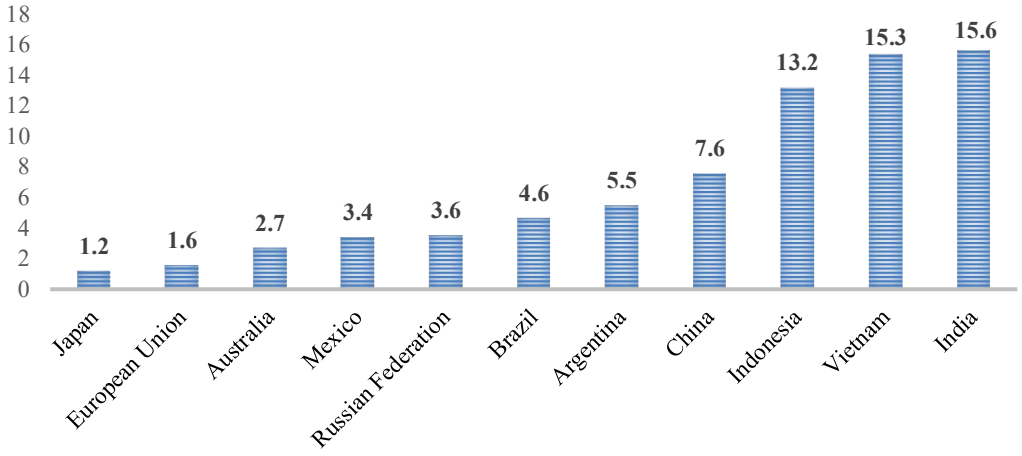

Figure 3.2: Agriculture sector's share in GDP in 2017, selected countries from other regions in the world

Source: Author's illustration based on the World Development Indicators (WDI 2020).

As illustrated in Figure 3.3, the share of employment in agriculture are different in by example of three developing regions such as Sub-Saharan Africa, Latin America and Caribbean, and East Asia and Pacific. On the one side, the share of employment declines in the overall structure of the economy from 1997 to 2017. On the other side, agriculture has still been the key source of employment in the economics of the Sub-Saharan African region where more than half of the total workforce is provided by agriculture.

Furthermore, the population of Sub-Saharan African countries is significantly growing every year. From 1950 to 2010, it grew from 186 million to 856 million people (see Figure 3.4). It is expected that the population of Sub-Saharan Africa could be as large as 2.7 billion people. That will lead to increasing agricultural consumption. In that context, sustainable agricultural production is a crucial foundation for sustainable economic development.

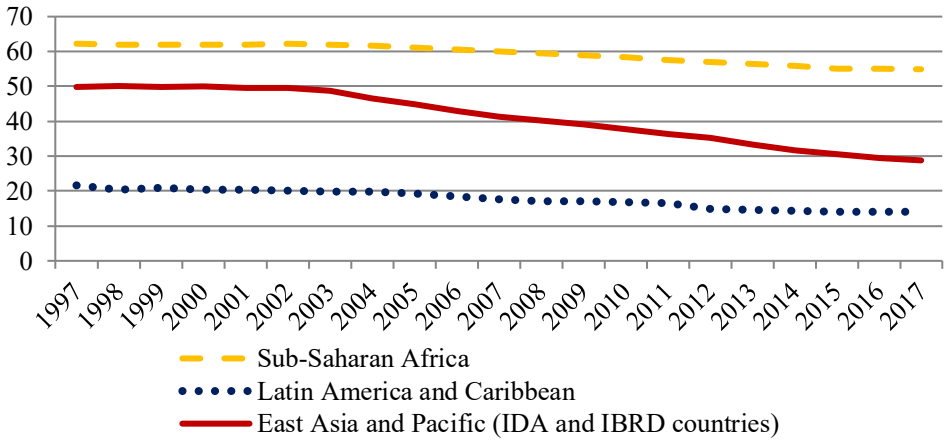

Figure 3.3: Employment in agriculture (% of total employment) (modeled ILO estimate) in the world by developing regions, 1997–2017

Source: Author's illustration based on the World Development Indicators (WDI 2020).

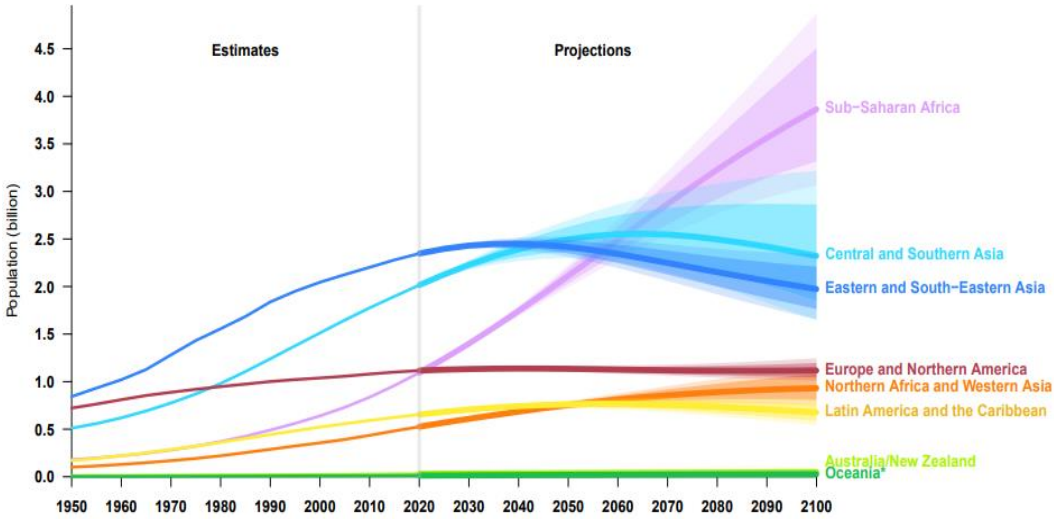

Figure 3.4: Estimations and projections of population in the world by regions

Source: Illustration from the World Population Prospects 2019. Data Booklet. (WPP 2019, p. 4).

Note that the Sub-Saharan African region remains the highest share of the malnourished population in the world. In spite of the reduction of malnutrition from 33% in 1990–1992 to 23% in 2014–2016, the percentage of malnutrition stays the highest among developing regions (AGRA, 2017). As the Food Agriculture Organization (FAO) states that the number of undernourished people in Sub-Saharan Africa has mainly been due to the impact of conflict and climate change (FAO, 2017). Hence, climate change brings risks to the African agricultural

systems, affecting crop, livestock, and fisheries productivity. After viewing the statistics, one might see that agriculture is not only a major source of employment, but also plays an important role in African food security.

3.2.2 Sub-Saharan Africa and Climate Change

Future climate change is expected to have a negative impact on agriculture in Sub-Saharan Africa through different ways. It means climate change will affect the direct and indirect effects. As stated in the paper by Henderson et al. (2017, p. 61), adverse climate change is likely to will push people out of rural areas into urban areas so that urbanization "provides an *"escape"* from the effect of deteriorating climate on agricultural productivity".

A key point is the direct effect of climate change is connected to crop yields. Generally, plant growth is strongly dependent on a weather event, especially in Sub-Saharan Africa. The main determinants (weather conditions or weather variables) of crop growth are precipitation, average temperature, the evapotranspiration rate, quality of the soil. Moreover, rainfed lands dominate in Sub-Saharan Africa, and rainfed agriculture accounts for more than 95% of farmed land in SSA (IWMI, 2020). The productions of the following crops as maize, millet, and sorghum mostly occur in rainfed areas (Van Ginkel et al., 2013). It should be highlighted that maize is the largest crop of the summer season, particularly across Eastern and South African countries of the SSA region. It suggests that increasing pressure on rainfed cropland is expected to create adverse conditions to the production of the main staple crops and then a rise of crop yield will be under threat.

For this reason, making projections of climate change to crop yields is a pivotal topic for Sub-Saharan African countries. Many researchers addressed questions related to climate change and how it influences crop yields in the Sub-Saharan African region (Calzadilla et al., 2013; Kahsay and Hansen, 2016; Lybbert and Sumner, 2012; Serdeczny et al., 2017; Schlenker and Lobell, 2010; Van Ginkel et al., 2013). The crucial question is how would changes in temperature and precipitation decrease the average production of the main crops in SSA will be addressed in the next sections.

3.3 Analysis of Recent Literature on Climate Change and its Impacts in Sub-Saharan Africa

3.3.1 The Sample of the Papers

I focus on the papers which study the impact of climate change on staple crops[3] in Sub-Saharan Africa. I selected two papers that cover mostly all countries in the SSA region and one paper with a focus on the West Africa region. Hence, the selected papers mostly cover four or five crops. A detailed analysis of the sample which is presented by three contemporary papers provides deep insight into the methodology and the main results in the world scientific literature. The selected papers are published from 2010 to 2015 in the following journals as *Climate Change, American Journal of Climate Change*, and *Environmental Research Letters* (see Table 3.1).

Table 3.1: The sample of selected papers

№	Article
1 Study	Ahmed, Wang, Yu, Koo, and You (2015). Potential impact of climate change on cereal crop yield in West Africa. *Climatic Change*, 133(2), pp. 321-334.
2 Study	Blanc (2012). The impact of climate change on crop yields in Sub-Saharan Africa. *American Journal of Climate Change*, 1(1), p. 1-13.
3 Study	Schlenker and Lobell (2010). Robust negative impacts of climate change on African agriculture. *Environmental Research Letters*, 5(1), p. 1-8.
4 Study	Roudier, Sultan, Quirion and Berg (2011). The impact of future climate change on West African crop yields: What does the recent literature say? *Global Environmental Change,* 21(3), pp. 1073-1083.

Source: Author's illustration.

In addition, the paper of Roudier et al. (2011) is taken into consideration as a controlled paper (see Table 3.1). In more detail, Roudier and her co-authors

[3] It is important to highlight that maize, millet, groundnuts, cassava, wheat, rice, and sorghum are one of the most vital sources of calories, fat, and protein in this region. However, rice is usually excluded from studies because, by the contrast of the other staple crops, the production of rice requires significant irrigation (Blanc, 2012).

collected 16 papers covering the period between 1996 and 2010 to estimate *the potential impact of climate change on crop yields* in West African countries. The West African region is part of Sub-Saharan Africa and highly dependent area in SSA to climate change issues. For this reason, the work of Roudier et al. (2011) may provide a full picture regarding the different methods and variables that were used in the analysis, and the key challenges for making a prediction of the impact of climate change on agriculture in the Sub-Saharan African region were highlighted. Furthermore, the main objective of this work is to identify uncertainties. Indeed, uncertainties are the challenges for making reliable future scenarios of agricultural production. According to Roudier et al. (2011), quantifying the impacts of climate change on crop yield is a complicated task due to several large uncertainties in the regional projections of climate change, in the response of the crop to environmental changes such as rainfall, temperature, CO_2 concentration, and therefore, in the connection between climate models and crop productivity functions.

3.3.2 Theoretical Framework about Climate Projections

A climate scenario is a plausible representation of future climate created for specific use in investigating the potential effects of anthropogenic climate change (Mendelsohn et al., 1994).

In the climate change literature, two general approaches are implemented to convert climate scenarios into feasible agriculture yields (Ahmed et al., 2015; Knox et al., 2016; Roudier et al., 2011). There are empirical (statistical) modeling and process-based crop modeling. The goal of both approaches is to assess the response of crop productivity to climate. It is necessary to describe the main aspects of both approaches. In the case of empirical crop models in which statistical relationships are derived from observations, connecting crop yields in a given location to local climate variables, are relatively easy to compute, evaluate, calibrating and validating a robust statistical model demands long a time series of yields and climate (Roudier et al., 2011).

In contrast to the first approach, the reproduction of climate impact on the observed yield at a large spatial scale is more complicated by using process-based

crop modeling (Ahmed et al., 2015). It means that process-based crop modeling does not provide a complete picture change of climate at a large scale.

It is important to underline that there is a third approach named "Ricardian analysis" to estimate the impact of climate change on crop yields where adaptation strategies have been taken into consideration. This approach was introduced and constructed by a group of scholars as Robert Mendelsohn, William D. Nordhaus and Daigee Shaw (Mendelsohn et al., 1994). Note that the previous above-mentioned two universal approaches do not include aspects as adaptation into the analysis. The main point is that the "Ricardian approach" concentrates on land values and farm revenues instead of crop yields. It means that monetary variables are a basis for this approach. The input variables are temperature, precipitation, or carbon dioxide. This approach would allow us to measure the economic value of different activities and consequently to check if the economic impacts are included by the production-function approach. However, this approach does not allow considering tendencies of future yields that can be explained why it is not often applied. The first time this approached was adopted for the USA (Mendelsohn et al., 1994). In addition, "Ricardian analysis" is also implemented in studying climate in African countries (Roudier et al., 2011).

3.3.3 Results and Discussion based on the Sample of Selected Papers

The starting point is to study and summarize the key findings from the paper by Roudier et al. (2011). As noted above, Roudier and her coauthors have done the meta-base analysis by combined outcomes from 16 articles. Based on their sample of papers, they aimed to examine the amplitude and uncertainty of the impacts on crop productivity in West African countries. Their analysis shows the following heterogeneous results.

Firstly, to concentrate more precisely on a response of the yield to climate change, the yield change without the CO_2 fertilization effect was considered. Furthermore, the process-based crop models and the empirical crop models have provided mostly similar outcomes for future yields.

Secondly, the main cultivated crops in the Sub-Saharan African region have largely been taken into an account in that sample of observed papers. However, Roudier et al. (2011) stated that many authors have not focused on specifying cultivars. It is important that various cultivars of the same crop species should be considered in future studies, as this will provide more accurate results.

Thirdly, CO_2 fertilization effects were investigated in 16 papers. On the one hand, some studies find out that there is a large extent of uncertainties in quantifying the impact on agriculture is the effect of CO_2. On the other hand, other studies have not revealed large discrepancies between "with" and "no" CO_2 fertilization scenarios.

Fourthly, despite a large dispersion of future yield changes, ranging from a loss of yield of about – 50% to an increase of yield + 90%, the median value provides a negative loss of yield of approximately 11 %.

Fifty, negative climate change impacts on crop productivity are more severe under high intensity of warming scenarios, with a median yield loss of about 15% for the most intense warming scenarios.

To sum up, Roudier et al. (2011) revealed from the results of 16 papers that the negative climate change impact arises from a temperature increase that leads to a decline in the crop cycle duration and generates higher water stress via higher evapotranspiration demand.

Next, three collected papers are examined. The finding from these papers will partly correspond with the results that have been considered above. The main elements of analysis such as geographical areas (number of countries), types of crops, baseline and horizon, climate models and crop models, scenarios are presented in Table 3.2.

It should be underlined that the papers by Blanc (2012) and by Schlenker and Lobell (2010) investigate almost all countries from the Sub-Saharan African region that are 37 and 39 out 46 countries. The paper by Ahmed et al. (2015) covers 13 countries of West Sub-Saharan Africa (see Table 3.2). A further step is to focus on implemented methods, approaches, models, and databases.

Table 3.2: Review of selected papers

	Study 1	*Study 2*	*Study 3*
	Ahmed et. al. (2015)	Blanc (2012)	Schlenker and Lobell (2010)
Sample of countries	13 countries in West SSA	37 countries in SSA	39 coutires in SSA
Type(s) of crop	maize, sorghum, millet	millet, maize, sorghum, cassava	maize, sorghum millet, groundnut, cassava
Baseline	1980–1998	1961–2002	1961–2000 for CRU 2.1 dataset 1961–2002 for NNC
Horizon	2041–2059	until 2100	2046–2065
Climate model	Model for Interdisciplinary Research On Climate – Earth System Model (MIROC-ESM); Community Earth System Model (CESM)	GCMs	GCMs
Crop model	Process-based crop model Decision Support System for Agrotechnology Transfer (DSSAT) based on present-day country-level yield	Empirical modeling	Empirical modeling
Scenario	The calibration model to project the future yields. Two scenarios	A1F1, A2, B1, B2	A1B

Source: Author's illustration.

Study 1

In the paper by Ahmed et al. (2015), the process-based crop model was used to study the impact of climate change on cereal crop yields, and then the following questions were addressed as: (1) what climate variables can be implemented to make a prediction for future changes in the productivity and yield of crops like maize, sorghum, and millet? (2) How could Decision Support System for Agrotechnology Transfer model be calibrated in order to simulate the observed yields of cereal crops under country-level? Given the process-based crop model DSSAT combines weather and soil data, together with crop management strategies.

In spite of the consideration only the West Africa region out the Sub-Saharan African region, authors pointed out that there was the diversity of climate levels which was represented by hot desert climate, hot semi-arid climate, and tropical climate. Moreover, the future climate data with the period from 2041 to 2059 arose from two models as the regional climate model RegCM4.3.4 which has been elaborated by Giorgi (2012, seen from the paper Ahmed et al., 2015, p. 326), and the Community Land Model version 4.5 which was introduced by Olsen (2010, seen from the paper Ahmed et al., 2015, p.326). The research was based on the following climate models such as MIROC-ESM and CESM (see Table 3.2).

In result, future crop yields are expected to decrease due to intended changes in temperature and precipitation (Ahmed et al., 2015). However, the crop response of maize, millet and sorghum to climate change will be different. In order to have the full picture, it needs to include the date of the temperature of the growing season and precipitation under the plant life cycle, in other words, various growth stages of a plant. Although increasing temperature leads to decline crop yield, present-day yield and growing season rainfall have a positive correlation. To summarize the analysis of the first study, it should be noted that crop responses to climate change are heterogeneous due to the uncertainties.

Study 2

In the paper by Blanc (2012), statistical modeling was applied to estimate the impact of climate change on the main crop yields in the SSA region. Table 3.2 shows that Blanc used output production function and separate equations for to relation to four analyzing crops such as millet, maize, sorghum and cassava. Panel data were employed where area harvested (in hectares, Ha) and yields (in tonnes/Ha) were derived from the FAO database, further, the weather data were obtained from CRU TS 2.1 dataset.

It is important to consider in more detail the weather variables. Generally, average precipitation and temperature variables are taken as the main indicators of climate change. Standardized precipitation index called SPI, evapotranspiration, drought, and floods were also included in the analysis. Additionally, evapotranspiration rate is a more complex indicator which combines the loss of

water from soils and from crops to show crop water use. Furthermore, the evapotranspiration rate was determined by the Hargreaves equation. To prevent multicollinearity, two models as T-P and ET-SPI were implemented, where the T-P model contained the weather indicators. To estimate extreme precipitation conditions, the ET-SPI regression included dummies variables as the squared term for evapotranspiration rate, flood, and drought. In addition, the effect of CO_2 concentration was also analyzed.

The following results have been received. Firstly, the increasing temperature has a negative effect on yields for each crop. For example, a rise in 1-degree Celsius declines maize yield by 8.3%. Secondly, the precipitation effect differs between LFAC (less favorable agricultural condition) and non-LFAC countries, the evapotranspiration rate has a negative effect on yield for all studying crops. To make a prediction about future changes in crop yields, four scenarios were implemented (see Table 3.2). On the one hand, all these storylines showed that temperature will increase within all four future scenarios which will lead to changes in precipitation, drought, and floods in the region. On the other hand, each crop has a different range of the predicted effect of climate change on yield.

Finally, it is expected that future climate change will reduce yields for all crops, with the exception of cassava. As found by Blank (2012), under conditions of climate change crop yields are predicted to range between -19% and +6% for maize, between -38% and -13% for millet, between -47% to -7 % for sorghum (Blanc, 2012). One exception is represented by cassava. It is likely to be zero yield changes in 2100. However, the prediction in the case of cassava must be interpreted with a great extent of caution.

Study 3

The third paper by Schlenker and Lobell (2010) examines the impact of climate change on yields of the main five crops as millet, maize, groundnut, sorghum, cassava maize using an empirical model. Panel data were used in the research. Four specifications for modeling the impact of weather were implemented. There were (1) average weather, (2) quadratic in average weather, (3) a piecewise-linear function of temperatures captured by the two variables degree days 10–30 ˚C and

degree days above 30 ˚C, (4) degree days categories: piecewise-linear functions within 5 ˚C intervals: [10 ˚C, 15 ˚C); [15˚C, 20 ˚C); [20 ˚C, 25 ˚C); [25 ˚C, 30 ˚C); [30 ˚C, 35 ˚C); [35 °C, ∞˚C). Based on the agricultural literature, researchers used degree days as a theoretical basis for crop growth. Therefore, scholars employed 16 climate change models with respect to the A1B scenario (Schlenker and Lobell, 2010). Researchers utilized the historic time series data from NCC (between 1961 and 2002 and from CRU (Climatic Research Unit) between 1961 and 2002 and therefore included predicted monthly daily maximum and minimum temperature changes into historic weather data.

The key results from the empirical modeling showed that temperature changes have a stronger impact on yields than changes in precipitation. It can be explained by two reasons. Firstly, the marginal impact of one standard deviation in rainfall is smaller than the one standard deviation changes in temperature (Schlenker and Lobell, 2010). Secondly, projections of temperatures increase for the 16 implemented climate models are larger relative to precipitation changes.

Outcomes from the Studies

Having studied the sample of papers, allows me to identify the following tendencies such as:

1. Thinking in terms of similarities in studied papers, it should be specified, firstly, the source of crop dataset. It was data from the Statistical Department of the Food and Agriculture Organization. The source of climate data mostly represents the National Centre of Environment Prediction (NCEP), etc. For example, Ahmed et al. (2015) used for the observation the National Centers for Environmental Prediction – National Center for Atmospheric Research (NCEP – NCAP).

2. Econometric estimates suggest that the evaluation of the past events will keep the tendency in the future (Blanc, 2012).

3. There are several explicative variables such as the crop yields, the area, and the CO_2 fertilization effect, the intensity of the warming scenario which have been examined and considered in the selected papers. However, fertilization is not considered a key determinant of production in agriculture. So far, the SSA region is not expected to significantly increase its usage. That means the level of fertilizer

consumption will not be rise. Another key variable is crop variety selection that is not taken into account in a number of studies. Therefore, the choice of SSA`s farmers is constrained due to the poor variety of new seeds and seed supplies in SSA.

4. Under this topic, scholars focused on *the key staple crops* (mostly presented by cereal crops) in the context of Sub-Saharan African countries (Ahmed et al., 2015; Blanc, 2012; Schlenker and Lobell, 2010). It should be noted that cereal crops are important sources of getting calories and nutrition. These types of crops are mostly growing in rainfed lands in the African region (FAO, 2017). Hence, the most general crops that examined in published studies related to the Sub-Saharan African region are millet, maize, cassava, sorghum.

5. Different types of crops and cultivars have different growing season. That leads that the impact of climate change has a different response on different types of crops.

6. The different crops have various extents of sensitivity and vulnerability as a response to increasing temperature and warming, droughts, excessive precipitation. For example, Ahmed et al. (2015) highlighted that maize is more sensitive to warming and drought, millet and sorghum are more sensitive to warming. Blanc also found out that maize is more vulnerable to droughts. However, cassava is relatively a drought-resistant plant, but vulnerable to redundant water. Furthermore, in countries with less favorable agricultural conditions millet is more sensitive to precipitation change compared to countries with more favorable agricultural conditions (Blanc, 2012).

7. Spatial variability in the crop productivity is one of the crucial factors that should be taken into consideration to emphasize the impact of climate change on the regional agriculture, according to Ahmed et al. (2015).

8. Being that cassava is a root crop, it is not simply to empirically match data of weather in the framework of the growing season to a certain yield.

3.4 Conclusion

In summary, the study of the papers on the topic "*the impact of climate change on crop yields*" shows that climate change is expected to be an additional stress to the economies of Sub-Saharan African countries in the future. Agriculture in that region is the most vulnerable sector to climate change conditioned by natural factors such as rainfed lands, water scarcity, also limited economic funds and institutional potential to perform adaptation. The consideration of the sample of papers allows me to identify the main problems related to the agricultural sector in the future and obtain several findings. On the one hand, the concept of sustainable development is associated with the sustainable agriculture in the Sub-Saharan African region. The main concern about the level of crop productivity is related to expectable changes in temperature and precipitation which will lead to the direct reductions in crop productivity through different physiological mechanisms of plants. On the other hand, the concept of sustainable agriculture is required to implement and perform several special measures. Firstly, it is necessary to expand the set of crops with different adaptive potentials for the region to mitigate the adverse effects of climate change. Secondly, to use plant breeding for the development of new cultivars that are resistant to drought, diseases, and pests. Thirdly, to implement irrigation technologies to overcome water deficits. Fourthly, to further support the training of farmers in the most up-to-date agricultural practices. Finally, to accumulate and collect full-scale data on crop yields in different years to be able to make predictions for the coming and future years and implement this knowledge in adaptation strategies.

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Chapter 4
The Study of Structural Change in the Economy of Ghana: New Evidence 1990–2018

4.1 Introduction

Since the 1990s African countries entered a new era of development (Newfarmer et al., 2019). In light of the recent economic boom that occurred in Sub-Saharan African countries at the beginning of the 21st century, processes of structural change have received renewed attention in the debate about sustained economic growth (de Vries et al., 2015; McMillan and Rodrik, 2011; McMillan et al., 2014; Rodrik, 2016). Next, there was a substantial decline in the relative share of employment in the agricultural sector in the SSA region (McMillan and Harttgen, 2014) and a significant increase in the relative share of employment in services characterized by low productivity and informal activities (Rodrik, 2016).

As noted in the literature, the African structural change pattern differs from the usual pattern which took place in the Asian region and marked with a big movement of the labor force from agriculture to labor-intensive and export-oriented manufacturing (Diao and McMillan, 2018; McMillan and Harttgen, 2014; Rodrik, 2016). The important point is that the Sub-Saharan Africa region is very heterogeneous with the rapid changing structure of economy. It is expected to be an active research area, and at present there is a lack of knowledge about the country cases (McMillan and Headey, 2014).

Ghana is one of the interesting cases, as we can see from Chapter 2. The recent change in economic structure raises the question about labor productivity and the movement of the labor force, on the one side, and on the other side, there is an open new perspective for small businesses. There are two important facts about the public

and private sectors. Firstly, the share of the employed population in the private sector increased significantly from 69.1% to 92.5%, between 2005 and 2017. In the rural area, the employed population grew from 75.3% to 95.7% (see in Appendix, Table A.4.1). Secondly, employment is mostly presented by the self-employed population, but their relative share moderately reduced between 2005 and 2017 (see in Appendix, Table A.4.2). These stylized facts show us the increasing role of employment and where the majority of the working population performs small-scale activities.

It should be noted that the direction of the reallocation of the released labor force is important because the movement of workers across sectors with different levels of productivity either may accelerate or reduce aggregate productivity growth (Diao et al., 2019). In this sense, structural change has also received a lot of attention in the debate about the perspectives for small businesses under the reallocation of workers (Diao and McMillan, 2018; Honorati and de Silva, 2016; Szirmai et al., 2013). To understand the role of the SME sector in the development process and what is the direction of labor movement between sectors, it is required to have a complex view and look at all sectors, not just one.

Under this chapter, the key research questions are the following: (1) Did an increase in economy-wide labor productivity growth driven by the within-sectoral effect or structural change effect in three sub-periods between 1990 and 2018? (2) What kind of structural change either growth-enhancing or growth-reducing has occurred during the observed three periods? (3) Does the direction and pattern of structural change in Ghana coincide with the overall trend in Africa?

The purpose of this chapter sheds light on the process of structural change, especially to study the pace and pattern and compare the results between three selected periods. To examine the pace and pattern of structural change, I utilize the methodology proposed by McMillan and Rodrik (2011) and de Vries, Timmer and de Vries (2015). The core point is that both methods allow studying the potential contribution of *within sector effect* or *reallocation effect* concerning the aggregate labor productivity growth. The paper fills the gap by providing new evidence about structural change in Ghana based on the obtained decomposition results.

This chapter is structured as follows. Section 4.2 describes the concept of structural change and its key features in Africa. Section 4.3 outlines the methodology employed to conduct the decomposition analysis and describes the data used in this paper. Furthermore, the choice of observed periods is explained. Section 4.4 provides an overview of the structure of the Ghanaian economy by documenting output, employment, and labor productivity trends between eleven economic sectors. Section 4.5 discusses the obtained results of the decomposition analysis. Section 4.6 presents some concluding remarks.

4.2 Related Literature

This subchapter provides insight into the concept and key aspects of structural change process. Then, the prominent features of the process of structural transformation in Africa are described.

Theoretical Framework

Structural transformation is associated with productivity growth and development (McMillan and Header, 2014). Specifically, structural transformation deals with reallocation of economic activities across three broad sectors: agriculture, industry (especially manufacturing) and services (Herrendorf et al., 2014; Van Neuss, 2019). Structural change is defined as labor movement from low productivity sector as agriculture to the expected more productive modern sectors of the economy like manufacturing and services (McMillan and Harttgen, 2014; Rodrik, 2016; Timmer et al., 2015).

Next, there are two ways to obtain productivity growth: either by increasing productivity in the sector due to new technologies, innovations, and the education of people, or by redistributing the labor force between sectors, namely, moving workers to more productive economic activities (McMillan and Rodrik, 2011).

Evidence from the development literature points out that there are two “kinds” or “directions” in the context of structural change (Diao et al., 2019; McMillan and Rodrik, 2011; Van Neuss, 2019). Let consider it in more detail. The “right kind” or “right direction” of structural change means that the labor force moves from less productive to more productive sectors (McMillan and Rodrik, 2011, p.12) and the

economy-wide labor productivity increases (Jebwab and Osei, 2012). Therefore, the structural change would refer to growth-enhancing structural change. By contrast, the "wrong kind" or "wrong direction" of structural change is connected to the opposite reallocation of workers so that the labor force moves from highly productive to less productive sectors, comprising also informal activities, and it is accompanied by a decline of the economy-wide labor productivity (Jebwab and Osei, 2012, p. 3; McMillan and Rodrik, 2011, p. 12). That would mean growth-reducing structural change.

Key Aspects of the Present Discourse about Structural Change in Africa

Evidence from the development literature shows that structural change in Sub-Saharan Africa is a complex phenomenon. There is no common answer on the discussion of what certain sectors will play a key role for sustainable development in the African region in the future.

The part of the problem is associated with pessimism about the manufacturing sector and industrialization in general (Carmignani and Mandeville, 2014; Mijiyawa, 2017; Page, 2012; Rodrik, 2016; Szirmai and Verspagen, 2015). There was a long discussion about the expectable industrialization in the African continent. The fact is African continent has not experienced industrialization. Africa's manufacturing sector is less developed than in the decade after independence, and potential sub-industry sectors like agro-businesses are not well developed in the whole region, according to Page (2012). The paper by Mijiyawa (2017) investigated drivers and challenges for the manufacturing development based on a sample of 53 African countries from 1995 to 2014 and their results show that most African manufacturing sectors are restricted by high competition from manufacturing goods imported from China. Another view viewed in the paper by Carmignani and Mandeville (2014). The authors suggest that the main concern about the growth slowdown is connected to economic activity reallocation from agriculture to non-manufacturing sectors like mining. It might lead to a resource curve in the future (Carmignani and Mandeville, 2014, p. 135).

Another point relates to agricultural productivity and the link to industrialization and the new role of agriculture in modern African development.

For example, several studies by Collier and Dercon (2014), Dawson et al. (2016), Diao et al. (2010) attempted to determine the opportunity for the large-scale agricultural revolution which would lead to successful economic transformation in the region. The main concern related to the fact that Africa did not experience Green Revolution before. A more recent paper by Diao and her colleagues (2018) studied the relationship between growth in labor productivity in agriculture and employment in the manufacturing sector in the African region under two periods from 1960 to 2010 and from 1996 to 2010. They found that since 1996 there was a positive relationship. They also suggest that growth in agricultural productivity could play a role in industrialization increasing the supply of agricultural products needed for agro-based industries like food processing. All in all, improvements in agricultural productivity are expected to boost rural incomes while increasing the domestic market size for manufacturing products (Diao et al., 2018). Another supported point about the connection between the agricultural sector and industry sectors comes from the work by Owoo and Lamdon-Quayefio (2018). They explore the potential of the agro-processing industry for structural transformation in Ghana and found out two findings: firstly, agro-processing is a key important sub-sector of the manufacturing industry, where food and beverages are the main components of processed goods. Secondly, small and medium-sized enterprises in the informal sector are mostly engaged in agro-processing activities in rural areas.

4.3 Methodology and Data

4.3.1 Decomposition Method

To explore the contribution of structural change to the economy-wide labor productivity growth in Ghana during the period 1990–2018, in this chapter I implement the method of decomposition introduced by McMillan and Rodrik (2011) and de Vries, Timmer and de Vries (2015). Both decomposition approaches are well-known in modern literature of development and structural change and decomposition of labor productivity growth (Diao et al., 2019; Foster-McGregor and Verspagen, 2016; Geiger et al., 2019; Jedwab and Osei, 2012; Mensah et al., 2018; McMillan et al., 2017).

It should be mentioned that the economywide labor productivity in year T can be expressed in the following way:

$$\boldsymbol{P^T = \frac{Y^T}{L^T} = \sum_{i=1}^{n} \frac{Y_i^T}{L_i^T} * \frac{L_i^T}{L^T} = \sum_{i=1}^{n} P_i^T * S_i^T} \quad (4.1)$$

where P^T denotes the economy-wide labor productivity in year T, Y^T is the value-added in year T and L^T is the total employment at the time T. Firstly, total labor productivity can be measured as the ratio of aggregate value-added to total employment (total number of persons engaged). Further, total labor productivity can be defined as the sum of sectoral labor productivity levels weighted by the sectoral employment share. Denote that Y_i^T is the value-added in sector *i* at year T and L_i^T is employment in sector *i*, P_i^T is the sector labor productivity level in year T and S_i^T is the share of employment in the sector.

Based on the first decomposition method by McMillan and Rodrik (2011), the change of aggregate labor productivity between initial (O) and final periods (T), is decomposed into two components and can be written such as:

$$\boldsymbol{\Delta P = \sum_{i=1}^{n} (S_i^T P_i^T - S_i^O P_i^O)} \quad (4.2)$$

$$\boldsymbol{\Delta P = \sum_{i=1}^{n} S_i^O * (P_i^T - P_i^O) + \sum_{i=1}^{n} (S_i^T - S_i^O) * P_i^T} \quad (4.3)$$

where ΔP^T is the change in aggregate labor productivity between periods T and O on the left-hand side. On the right-hand side, the first term of decomposition is called "*the within*" component of productivity growth (McMillan and Rodrik, p. 13) or "*within-effect*" (de Vries et al., 2015, p. 679). Both terms of the first component have the same meaning and are often used in the literature. This first component shows how much aggregate labor productivity growth could be attributed to changes within individual sectors. If the within effect is positive (negative) when labor productivity growth in sector *i* is positive (negative). The second term on the right-hand side is called the "*structural change effect*" (McMillan and Rodrik, p.13) or "*between effect*" (de Vries et al., 2015, p. 679). This second component explains how the reallocation of workers across sectors contributes to the productivity effect.

Note that within effect is positive (negative) when labor productivity growth in sectors is positive (negative).

The second method of decomposition analysis is proposed by de Vries, Timmer and de Vries (2015). The change of aggregate labor productivity includes three components in comparison with McMillan and Rodrik's approach. Hence, de Vries, Timmer and de Vries (2015) offers to split the structural change effect on two components and call them "*static structural change effect*" and "*dynamic structural change effect*" which is represented as follows:

$$\Delta \boldsymbol{P} = \sum_{\boldsymbol{i=n}}^{\boldsymbol{n}} \boldsymbol{S_i^O} * (\boldsymbol{P_i^T} - \boldsymbol{P_i^O}) + \sum_{\boldsymbol{i}}^{\boldsymbol{n}} (\boldsymbol{S_i^T} - \boldsymbol{S_i^O}) * \boldsymbol{P_i^O} + \sum_{\boldsymbol{i}}^{\boldsymbol{n}} (\boldsymbol{S_i^T} - \boldsymbol{S_i^O}) * * (\boldsymbol{P_i^T} - \boldsymbol{P_i^O}) \quad (4.4)$$

On the right-hand side, the first component is the same as in the Equation 3 and it is the within effect. The second component is the static structural change effect. The third component is the dynamic structural change effect. Together the second and third components represents the total reallocation effect. The idea of differentiation the structural change could by explained in the following way. The statis component shows whether reallocation of workers shifts in sectors with above-average productivity levels. The dynamic component is considered as the joint effect in changes of in employment share and sectoral productivities. This third component will be positive (negative) if labor force is moving to sectors that are undergoing positive (negative) productivity growth (de Vries et al., 2015). In other words, the dynamic structural change component allows to get insight into ability of the host expanding sector to employ additional workers and maintain high levels of productivity.

All in all, in this chapter I employ both above-mentioned decomposition approaches to examine the pattern and pace of structural change and explore the labor reallocation across different sectors and how it had occurred over 28 years.

4.3.2 Data

Under this section, the database and construction of variables used in the analysis are described. The choice of the observed periods is explained further.

For decomposition analysis, I use the Economic Transformation Database[1] prepared by researchers from the Groningen Growth and Development Centre and United Nations University World Institute for Development Economics Research. This dataset provides information about the sectoral employment and sectoral value added in current prices and constant prices for developing countries, particularly countries of the Sub-Saharan African region including Ghana, from 1990 to 2018 (de Vries et al., 2021). The data covers the main sectors of the economy as specified in the International Standard Industrial Classification, Revision 4 (ISIC rev.4). Hence, all together these twelve sectors cover the total economy. Due to the point that the real estate sector has no employment equivalent so that it should not be included in labor productivity analysis, according to de Vries et al. (2021). Thus, in this paper, I focus on eleven sectors of the Ghanaian economy. The detailed overview about the sectoral division of the economy reflects in Table A4.3 (see Appendix).

Furthermore, it is necessary to discuss the key issues about the concept of employment and gross value-added data which are introduced in the methodological notes of ETD. Firstly, the concept of employment in the ETD is determined as "all persons engaged", containing all paid employees, the self-employed, and family workers (de Vries et al., 2021, p. 5). Age boundary refers to 15 years. To avoid underestimation of full coverage of the working population and their reliable breakdown by sector, the ETD has mostly been built based on national household surveys instead establishment surveys which are prepared on firm-level questionnaires. Have including the self-employed and family workers in dataset which are abundant in African countries, and they are mostly in the informal sectors, this allows for a better assessment of economic activity in sectors and the

[1] Note that the Economic Transformation Database covers three principles of consistency such as internal, international and intertemporal consistency (de Vries et al., 2021). It is a unique database for deeper structural transformation analysis. It should be drawn attention that there is some discrepancy in case for value-added data between data from the World Bank and the Groningen Growth and Development Centre. For example, due to the revision of the System of National Accounts, there is a dramatic jump in value-added in case of Ghana in comparison with previous estimates and other data sources (de Vries et al., 2021, p. 43).

total economy. Secondly, the time series of real value added in the ETD is adjusted in 2015 prices.

To examine the output, employment and productivity trends under this work, several variables are generated for analysis based on the original variables. Firstly, I construct the sectoral employment shares, the data on persons engaged is used. Secondly, I construct the sectoral value-added shares, the data on value added at constant 2015 prices in local currency, namely Ghanaian cedi, is utilized. Thirdly, the sectoral labor productivity is computed by value added in constant prices divided by persons engaged (see Table A4.4 in Appendix).

4.3.3 The Choice of Years and Observed Periods

The key points for analysis are the following years 1990, 2000, 2009 and 2018. The whole timeline is divided into three periods such as 1990–2000, 2000–2009, 2009–2018. The choice of periods is motivated by economical processes and events that happened in the Ghanaian economy under a new era for the Sub-Saharan African region. The important issue is that since 1990 Ghana has tried to accelerate the development of the private sector, especially small businesses. The consideration of three periods helps to understand the perspective for small businesses under structural transformation.

The first period between 1990 and 2000 is marked by the recovery of the economy and response of adopted programs such as trade and investment liberalization, privatization (Asiedu and Folmer, 2007; Huq and Tribe, 2018). It is necessary to mention that in the late 1970s and early 1980s Ghana faced a bundle of economic and structural problems (Jebwab and Osei, 2012). Since 1983 the Economic Recovery Programme (ERP) and then, Structural Adjustment Programme (SAP) were launched with an aim to stabilize the economy and reduce macroeconomic imbalances, etc. (Huq and Tribe, 2018).

The second period between 2000 and 2009 is characterized by further improvement in the economy (Jebwab and Osei, 2012), poverty reduction and economic growth (Molini and Paci, 2015), rapid urbanization (Population and Housing Census Report, 2010). As one can see from Figure 4.1, since 2009, the urban population dominates the rural population in Ghana.

The third period between 2009 and 2018 is associated with the economic boom due to oil production in the beginning. However, from 2013 to 2015 the Ghanaian economy was under a period of economic instability due to the financial and economic crisis, including the energy crisis, and faced serious macroeconomic challenges associated with slowing growth (Honorati and de Silva, 2016).

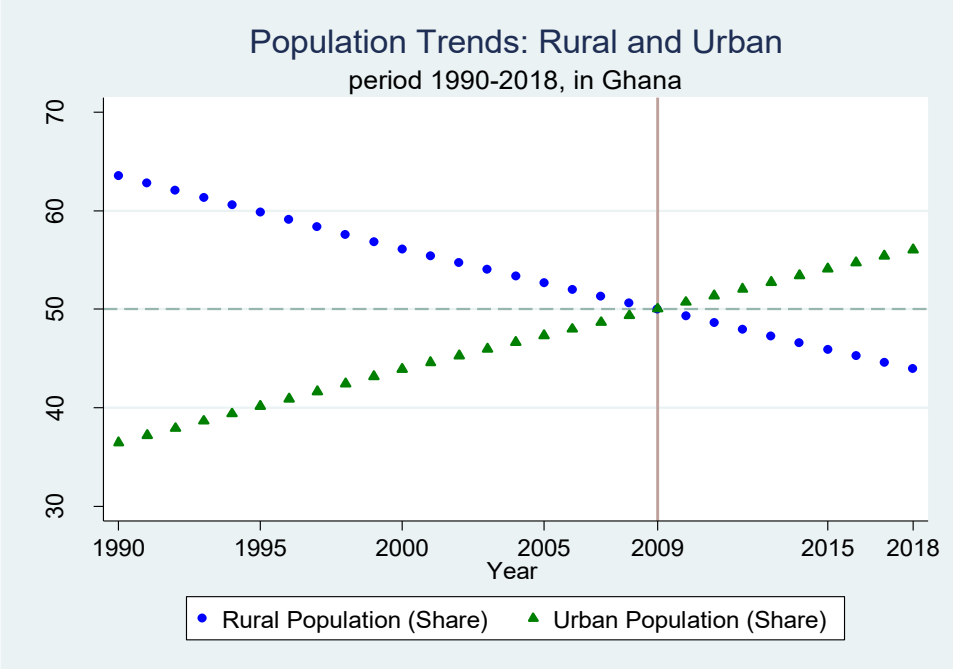

Figure 4.1: Urban and rural population trends in Ghana, 1990–2018

Source: Author's illustration based on the WDI World Bank (2021).

4.4 Analysis of Structural Change: Main Trends

To get into insight about the overall macroeconomic performance in Ghana between 1990 and 2018, in this section I focus on the main stylized facts and trends in terms of output, employment, labor productivity and find out the key changes which have been occurred under three observed periods such as 1990–2000, 2000–2009, 2009–2018. Moreover, three scatterplots of the correlation between sectoral changes in employment share and relative productivity level of sectors are presented.

Generally, the discussion of the stylized facts of structural transformation takes place around broad sectors such as agriculture, manufacturing as a part of industry, and services (Herrendorf et al., 2013). The investigation of structural change is

handled by examining the evolution of the sectoral share of employment and sectoral value added in total economic activity (Van Neuss, 2019).

The main idea is to obtain the first evidence into the reallocation of economic activities across sectors. Furthermore, a subdivision of industry and services sectors is useful to better understand where indeed transformation has occurred and where labor productivity has been increased or reduced. In this work, I focus on eleven sectors and also documents stylized facts in terms of market and non-market services.

Table 4.1 provides insights into the contribution of the share of each sector to the gross domestic product in the Ghanaian economy for the following years 1990, 2000, 2009 and 2018. Note that the value-added share is calculated based on the chaining method by de Avillez (2012) and Dumagan (2013). In addition, the compound annual growth rate of the real sectoral and total value-added for three studied periods are reported (see Table 4.1).

Table 4.1: Share of sectors in value added (as percentage of GDP) in Ghana, 1990–2018

Sector	Share of value added by sector (percentage)				Compound growth rate of value added by sector (percentage)		
	1990	2000	2009	2018	1990–2000	2000–2009	2009–2018
Agriculture	**23.6**	**23.5**	**25.5**	**17.3**	**5.1**	**4.7**	**3.4**
Industry	**33.5**	**29.4**	**23.1**	**29.8**	**3.3**	**5.6**	**10.0**
Mining	3.7	3.2	2.5	12.0	3.8	5.1	24.8
Manufacturing	24.5	20.6	13.5	9.9	3.1	3.1	5.3
Utilities	2.3	2.3	1.6	1.8	3.6	6.6	5.3
Construction	3.0	3.3	5.6	6.2	3.9	12.0	7.4
Services	**42.9**	**47.1**	**51.3**	**52.9**	**4.2**	**6.5**	**5.6**
Market Services	31.0	32.0	30.7	36.9	4.8	6.3	6.1
Trade Services	16.1	17.5	17.4	23.2	5.1	6.1	5.6
Transport Services	5.5	5.3	4.7	6.6	4.8	6.1	5.2
Business Services	7.7	7.5	5.8	3.4	4.0	5.6	8.2
Financial Services	1.7	1.6	2.8	3.7	3.8	8.3	7.9
Non-market Services	11.9	15.1	20.7	16.0	3.2	6.7	4.8
Government Services	11.2	14.1	19.7	15.1	3.2	6.8	4.7
Other Services	0.7	1.0	1.0	0.9	4.0	5.9	8.1
Total Economy	100.0	100.0	100.0	100.0	4.2	5.8	6.4

Source: Author's calculation based on ETD by de Vries et al. (2021).

Having compared the structure of the economy in the observed years, several aspects should be pointed out. In the first position, one can see that in 1990 the largest share of sectoral value added in the structure of the economy was shaped by agriculture (23.6%), manufacturing (24.5%) and trade service (16.1%). In 2018, the trade services (23.2%), agriculture (17.3%) and government services (15.1%) sectors were the leading sectors that contributed to the gross domestic product. The second position is that the share of value-added of all services sectors, including market and non-market services, has increased from 42.9% to 52.9%. Although the growth rate of services sectors was slightly reduced from the second to the third observed period from 6.5% to 5.6%, services remain the largest contributor to the gross domestic product in the economy is compared with agriculture and industry output. The third position is that the share of industry sectors in gross value added decreased gradually from 33.5% to 29.8%, though the manufacturing value-added share slowed down substantially from 24.5% in 1990 to 9.9% in 2018 compared to other industrial sectors. The declining share of manufacturing activities to the structure of GDP is a general trend that has been experienced by the African region in recent decades (Diao and McMillan, 2018; Rodrik, 2016). It is interesting to note that the contribution of the mining sector, mostly oil industry, to the Ghanaian GDP raised substantially in the third observed period so that this sectoral share increased from 2.5 % in 2009 to 12% in 2018, and this natural resource sector reported the highest annual average growth rate of 24.8% between 2009 and 2018 compared to other sectors of the economy. This boom in the mining sector is explained by the commencement of oil production in 2011, according to Alagidede et al. (2013), Aryeetey and Baah-Boateng (2015). As stated in the study by Owoo and Lambon-Quayefio (2018), oil field discovery in Ghana was also associated with a deterioration in the performance of the agricultural sector due to the Dutch Disease phenomenon. The fourth position is that the contribution to the gross value added by the agriculture sector was fell gradually from 23.6% to 17.3%, based on the Economic Transformation Database, and the annual growth rate also declined from 5.1% to 3.4%.

To summarize, the structure of gross value added by type of economic activities has varied significantly, especially the market services sector, namely trade services, became the largest contributor to national output among eleven sectors at the end of the studied period. At the same time, all sectors registered a positive

annual average growth rate of sectoral output, during the observed periods of analysis.

Ghanaian economy experienced the rapid growth of labor force so that the total employment increased from 6.3 million persons in 1990 to 13 million persons in 2018 based on the ETD database (de Vries et al., 2021). That means that the economic active population aged 15 and older grew 206.1% over the whole period. Based on the World Development Indicators (WDI, 2021), during the same period, the population increased significantly from 14.8 million in 1990 in 2018 to 29.8 million, an increase of 201.3%. As pointed out in the paper by Tsatsenko (2020, A), between 1997 and 2017 agriculture still created a lot of jobs and the major source of employment in Sub-Saharan African countries in comparison to other developing regions as the Latin American and the Caribbean, East Asian and Pacific regions. It is important to consider the sectoral composition of employment in the Ghanaian economy and to identify the main expanding and shrinking sectors.

Table 4.2 shows the employment distribution across eleven sectors for four observed years and also the average growth of employment during three observed periods. The average annual growth of employment was about 3.4% and 3.5% in the second and the third period. It should be outlined several key stylized facts. Firstly, agriculture continues to play an important role in job creation and to be a major source of employment in the Ghanaian economy, even if its relative share has declined significantly. For example, it was 55.0% in 1990 and 33.3% in 2018. This evidence is in line with the previous studies such Aryeetey and Baah-Boateng (2015) and Alagidede et al. (2013). Secondly, services sectors, including market and non-market, absorbed new workers so that workers engaged in services from 28.5% in 1990 to 46.7% in 2018. Considering all observed years, the biggest employment expansion was found in the market services sectors, where the employment share raised from 20.9% to 30.9%. The leading services sectors have been a trade services, including retail and wholesale trade, accommodation and food services activities which registered 26.3% of total employment in 2018. Note that trade services are typically associated with informality in Sub-Saharan African countries and non-tradable (Newfarmer et al., 2019; Szirmai et al., 2013). It is interesting to note that between 2000 and 2009, there was a steep average annual

growth of labor force in transport (10.5%), business (8.9%) and financial (11.6%) market service activities and also in other non-market services activities (26.7%). Over the third periods, non-market services such as government services contributed to the total employment around 12.8% that it was much more compared to previous two periods. Thirdly, the positive trends concerning employment in manufacturing is observed so that the relative share of this sector reached a peak in 2018, was around 15.8% (see Table 4.2).

Table 4.2: Employment share by sectors (as percentage to total employment), in Ghana, 1990–2018

Sector	Sectoral share of employment (percentage)					Compound annual growth rate of employment (percentage)		
	1990	2000	2009	2018		1990–2000	2000–2009	2009–2018
Agriculture	**55.0**	**55.5**	**45.2**	**33.3**		**1.3**	**1.1**	**–0.1**
Industry	**16.5**	**16.2**	**15.0**	**20.0**		**1.0**	**2.5**	**6.7**
Mining	0.8	1.5	1.0	0.5		8.0	-0.3	–4.4
Manufacturing	13.5	11.2	10.1	15.8		–0.7	2.3	8.7
Utilities	0.5	0.4	0.4	0.4		0.0	3.2	2.1
Construction	1.7	3.1	3.4	3.3		7.4	4.5	2.8
Services	**28.5**	**28.3**	**39.8**	**46.7**		**1.1**	**7.4**	**5.2**
Market Services	20.9	21.3	24.4	30.9		1.4	5.0	6.1
Trade Services	18.1	18.2	18.9	26.3		1.3	3.9	7.2
Transport Services	1.7	1.8	3.3	2.4		2.1	10.5	-0.5
Business Services	0.9	1.0	1.6	1.7		2.1	8.9	4.5
Financial Services	0.2	0.3	0.6	0.6		8.1	11.6	2.3
Non-market Services	7.6	7.0	15.4	15.7		0.3	12.9	3.6
Government Services	6.0	5.4	5.7	12.8		0.1	4.0	13.2
Other Services	1.6	1.6	9.7	2.9		1.0	26.7	–9.7
Total Economy	100.0	100.0	100.0	100.0		1.2	3.5	3.4

Source: Author's calculation based on ETD by de Vries et al. (2021).

All in all, the Ghanaian economy has experienced of rapid reallocation of labor force from agriculture to trade services sectors and manufacturing. The key source of employment is agriculture, trade services (market), government and other (non-market) services, manufacturing in 2018. Thinking in the context of division of three main sectors (agriculture, industry, and services), no doubt that the expanding

sector is services. That means that the Ghanaian economy may experience premature deindustrialization.

Table 4.3 shows that the compound annual growth of the sectoral labor productivity differed across sectors. Based on the obtained results from Table 4.2, it is known that agriculture, trade services, and manufacturing are the labor-intensive sectors in the Ghanaian economy. Having compared these three sectors within each observed period, some important results are obtained. During the first period from 1990 to 2000, all the above-mentioned sectors had the same growth of labor productivity, which was about 3.8%. Over the second period from 2000 to 2009, the growth of labor productivity declined in manufacturing and trade services compared to agriculture.

Table 4.3: Sector composition of labor productivity growth in Ghana, 1990–2018

Sector	Compound annual growth rate of labor productivity (percentage)		
	1990–2000	**2000–2009**	**2009–2018**
Agriculture	3.78	3.57	3.53
Industry	2.29	2.99	3.08
Mining	–3.94	5.43	30.57
Manufacturing	3.80	0.82	–3.14
Utilities	3.63	3.32	3.11
Construction	–3.24	7.14	4.53
Services	3.00	–0.91	0.37
Market Services	3.35	1.19	–0.05
Trade Services	3.82	2.15	–1.46
Transport Services	2.68	–3.99	5.66
Business Services	1.89	–3.07	3.57
Financial Services	–4.04	–2.96	5.51
Non-market Services	2.90	–5.46	1.17
Government Services	3.05	2.70	–7.52
Other Services	3.01	–16.40	19.62
Total Economy	2.95	2.27	2.94

Source: Author's calculation based on ETD by de Vries et al. (2021).

One can see that the compound annual growth rate in the manufacturing sector and market trade services were about 0.8% and 2.2%, respectively. During the third period, the negative growth rate happened in both the above-mentioned non-agricultural sectors. Labor productivity in agriculture rose steadily over the entire

sample of periods, above 3.5%. It should be drawn attention to the mining sector and other sectors where a jump in sectoral labor productivity growth occurred. The highest compound growth rate in mining sectors from 2009 to 2018 may be explained by the increasing production in the oil industry with declining employment (Aryeetey and Baah-Boateng, 2015). As well-known from the literature (McMillan et al., 2017) the natural resource sector has a limited capacity to generate many job places. Growth of labor productivity in other services sector presented non-market services activities is directly dependent on the number of engaged people, it could be seen from Table 4.1 and Table 4.2. To sum it up, the compound annual growth rate of the aggregate labor productive varied around 2.3% and 3.0% during periods.

Table 4.2 illustrates that the Ghanaian economy has experienced the movement of workers from traditional rural sectors like agriculture into the modern urban sector like services. The important question is what direction of structural change we may see.

The phenomenon of reallocation of labor force refers to structural change which could go in the right direction or the wrong one. Using an approach by McMillan and Rodrik (2011), I construct three scatterplots for each observed period in order to reveal the direction of structural change. These scatterplots illustrate how changes in employment shares of eleven sectors during each period are correlated with the relative productivity of sectors by the end of the period. In more detail, the horizontal axis is the change of employment shares between the initial and final year for the period, in percentage points. The vertical axis is the relative productivity of the sectors, and it is measured by the ratio of the natural logarithm between sectoral and aggregate productivity at the end of the period. The size of circles indicates the employment share in the initial year for the observed period. In other words, the larger the circle of the relevant sector of the economy, the greater the contribution of this sector to total employment would be.

It should be noted that the paper by Martins (2018) suggested that in the classical pattern of growth-enhancing structural change, agricultural sector has a reducing labor share and should be in the bottom-left (third) quadrant and relative labor productivity is low. At the same time, sectors with more dynamic economic

activities should locate in the top right (first) quadrant and these sectors tend to have growing labor share and relatively higher productivity of labor. McMillan and Rodrik (2011) and Jebwab and Osei (2012) outlined that if the correlation between sectoral productivity and changes in employment shares is positive (negative), it would mean structural change in the right (wrong) direction. According to McMillan and Rodrik (2011), if changes in employment shares are positively correlated with productivity levels, the "between effect" term will be positive and structural change will increase total productivity growth. Hence, the main message of the scatterplots would be to uncover the direction of flow of labor movement and how is correlated with labor productivity in the respective sectors.

Figure 4.2 demonstrates a small growth-reducing role of structural change during the first observed period (1990–2000). The steady negative slope is depicted.

There is a heterogeneity of productivity levels between different sectors. For example, the main leading sectors of employment are agriculture, trade services and manufacturing. Despite the manufacturing is highly productive rather than trade services and agriculture sectors, the employment share of manufacturing was reducing and absorbed less labor. At the same time, the agriculture sector with the largest labor share has much lower productivity in comparison with manufacturing and various services sectors. This evidence is consistent with the study by Gollin et al. (2014) that explored the agricultural productivity gap and stated that agriculture is less productive than non-agricultural sectors in the context of developing countries. It is interesting to note that business, financial, transport services sectors, and mining and construction industrial sectors are in the top-right quadrant associated with relatively high productivity and a growing share of labor during this first period.

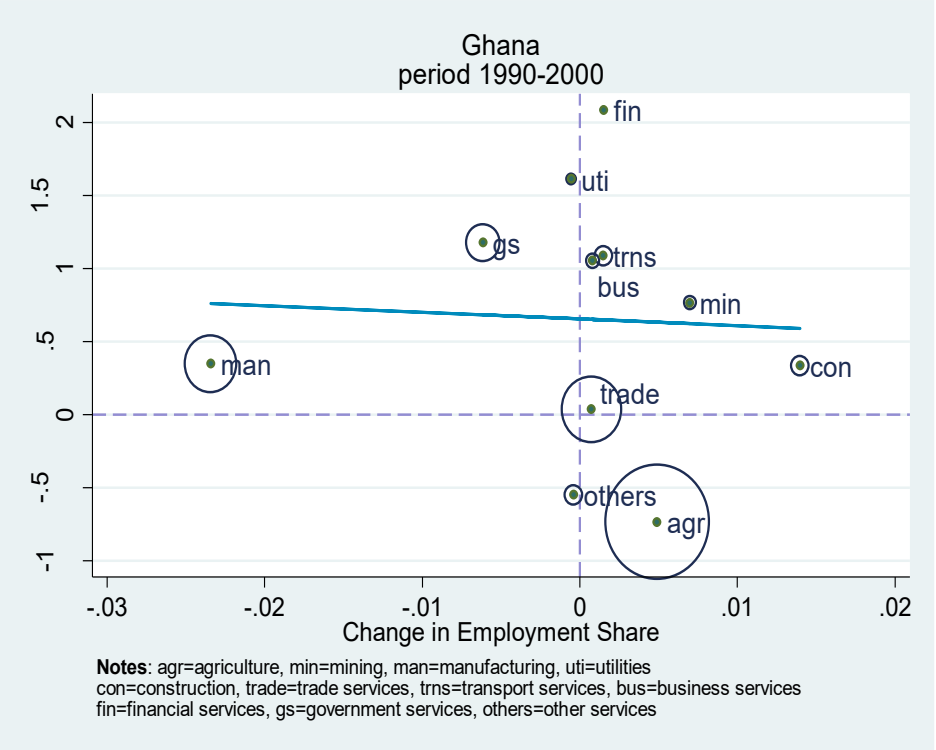

Figure 4.2: Correlation between sectoral productivity in 2000 and change in employment shares in Ghana (1990–2000), Period 1

Source: Author's calculation based on ETD by de Vries et al. (2021).

As shown in Figure 4.3, during the second observed period Ghanaian economy has experienced a growth-reducing structural change, despite the largest relative loss in employment occurred in the agricultural sector. The relative share of the labor force increased in manufacturing with declining labor productivity. It should be noted that trade services service has lower productivity than manufacturing but higher than in agriculture. So more labor-intensive market services sector like trade services absorbed new workers and was one of main the employers with low labor productivity. In addition, the sharp expansion of relative employment share held in the non-market services sectors such as government services, including public administration, education, social work activities, and other services activities. One may see that the other services sector is located now in the bottom-right quadrant as an outlier. Having compared the first period with the second, the reduction of productivity has been observed in the market services sector such as transport, business and financial services activities. That result is in line with the stylized fact

from Table 4.3. As mentioned in other studies (Diao and McMillan, 2015; Diao et al., 2017; Grabowski and Self, 2020; McMillan and Harttgen, 2014; Rodrik, 2016), African countries have experienced "premature deindustrialization". Although there are some similarities in this phenomenon in Ghana during the second period, the picture is mixed.

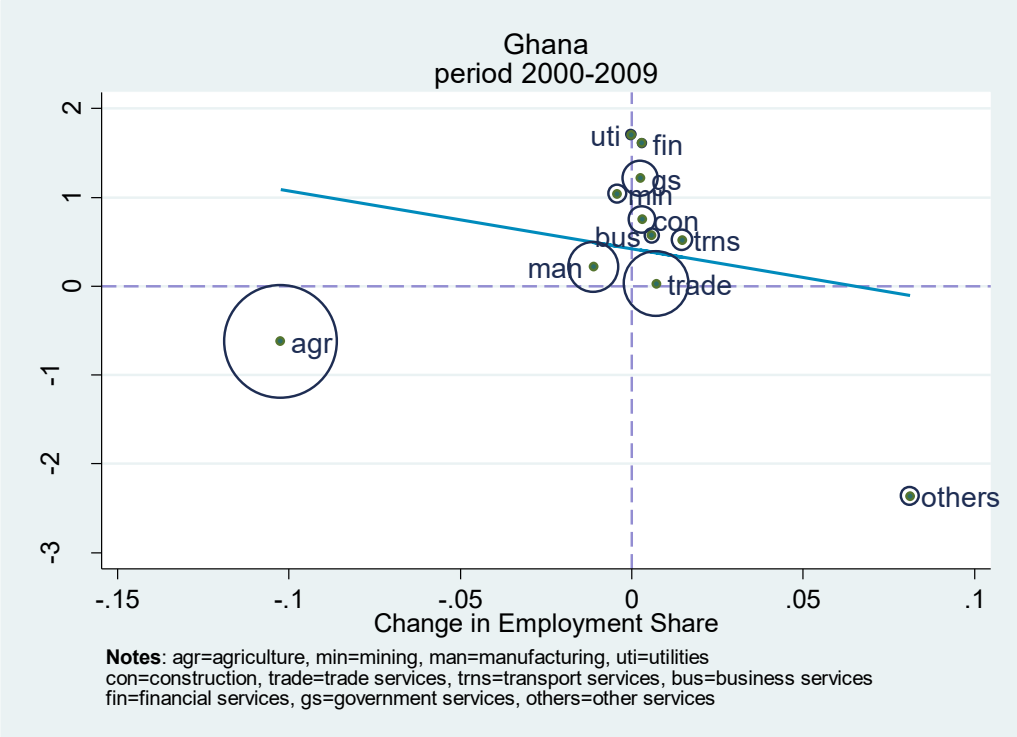

Figure 4.3: Correlation between sectoral productivity in 2009 and change in employment shares in Ghana (2000–2009), Period 2

Source: Author's calculation based on ETD by de Vries et al. (2021).

Figure 4.4 demonstrates that the slope is modestly positive, specifying a growth-enhancing kind of structural change. However, it is difficult to say that the third observed period in Ghana presented the usual "right" direction of structural change. On the one side, the relative share of agricultural employment continued to decline even if this sector remained to play an important role in a generation. On the other hand, the manufacturing and trade services characterized by high labor intensity had a lower than average relative level of labor productivity. The key result is that the movement of workers from the traditional sector as agriculture to the modern sector as manufacturing does not accompany by a significant increase in labor productivity which has occurred in East Asian countries. For instance,

McMillan and Rodrik (2011) provide evidence based on the case of Thailand that releasing workers from the agricultural rural sector was absorbed by modern urban sector like manufacturing which was a highly productive and tradeable sector. As illustrated in Figure 4.4, in case of the Ghanaian economy is different.

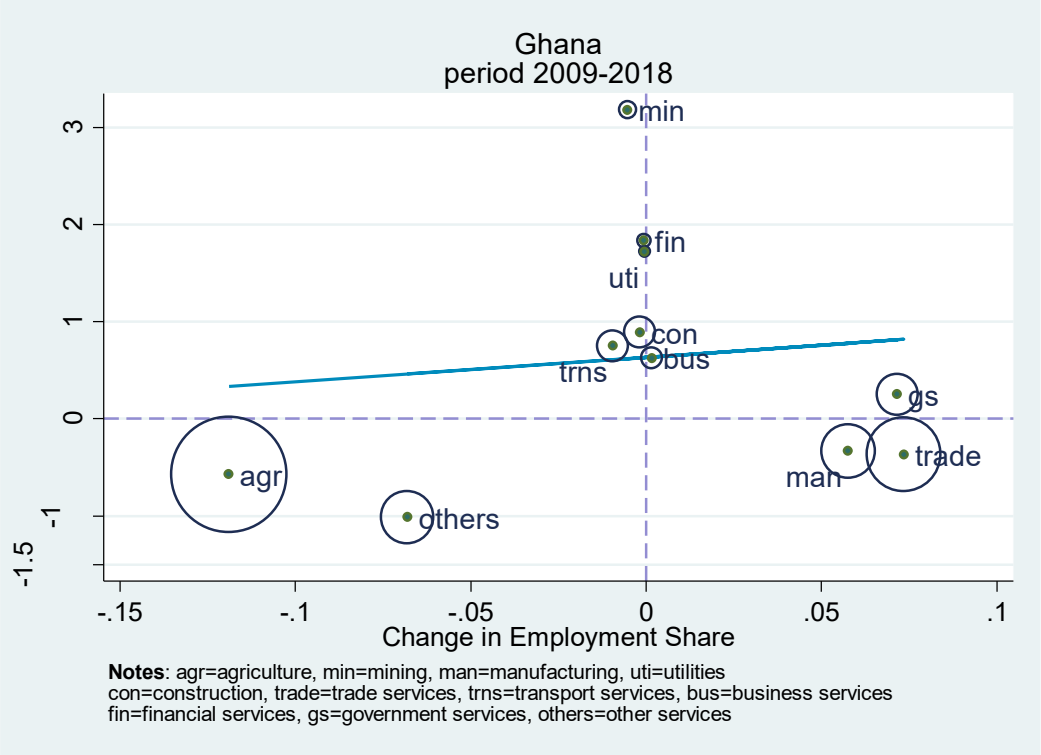

Figure 4.4: Correlation between sectoral productivity in 2018 and change in employment shares in Ghana, (2009–2018), Period 3

Source: Author's calculation based on ETD by de Vries et al. (2021).

As seen from Figure 4.4, the mining sector with decreasing relative share of employment registered a significant raising in the relative productivity level compared with other sectors. The finding of this paper is consistent with earlier works by McMillan and Harttgen (2014) that have stated the natural resources sector with pretty-high labor productivity do not provide much more new job places so that mining sector does not absorb releasing workers from the traditional sector.

Having studied the direction of structural change over observed periods, two main results have been obtained. Firstly, the reallocation of the worker from the agricultural sector to the services sector provides us evidence that structural transformation happened in the Ghanaian economy between 1990 and 2018.

Secondly, the type of structural change varied from growth-reducing to growth-enhancing. One can see how employment structure and labor productivity trends have been evolving.

4.5 Results of Decomposition Analysis

Based on the obtained results by using two methods, the key findings are documented and discussed. As seen from Table 4.4, within-effect play a major role of contribution to the aggregate labor productivity growth over three observed periods. Especially, the highest estimate is registered for the third period, where within-effect is about 3.72%. At the same time, the reallocation effect is negative by using the method of McMillan and Rodrik (2011) so that it does not accelerate grow rather reduces it. It is interesting to highlight that the results of this paper are consistent with the work of Geiger et al. (2019) where they received negative dynamic components of structural change for the period from 1990 to 2010 (see Appendix, Table A.4.5). According to the paper by de Vries et al. (2015), the negative dynamic component means that sectors face some difficulties to absorb new additional workers at the same rate of marginal productivity.

Table 4.4: Results of decomposition analysis

Period	Within	Between	Structural Change Components:		Total Growth Productivity (%)
			Static	Dynamic	
1990–2000	2.94	0.01	0.42	–0.41	2.95
2000–2009	2.28	–0.01	0.79	–0.79	2.27
2009–2018	3.72	–0.78	2.77	–3.56	2.94

Source: Author's calculation based on the ETD.

Having compared the results from other papers on structural change in Ghana in terms of the components, one can see that there is a variation in the results. It could be explained by the following factors such as (a) differences in observed sectors as documented in the paper by Jedwab and Osei (2012) (see in Appendix, Table A.4.6); (b) differences in studied period (see in Appendix, Table A.4.5); (c) using different dataset, especially value-added.

Table 4.5 presents the sectoral decomposition of contribution to total productivity change. One of the interesting points is that the within effect is a contributor to sectoral agricultural labor productivity. In the case of trade services which is the second main expanding sector is between effect.

Table 4.5: Contribution of between and within components to change of economic labor productivity level

Sector	Period 1990–2000			Period 2000–2009			Period 2009–2018		
	WE	BE	Total	WE	BE	Total	WE	BE	Total
Agriculture	32.32	0.93	33.26	43.92	–29.95	13.97	29.86	–29.25	0.61
Mining	–3.21	5.96	2.75	8.53	–6.43	2.10	99.23	–55.10	44.13
Manufacturing	23.57	– 13.11	10.45	5.36	–7.54	–2.18	–10.48	18.02	7.54
Utilities	2.81	–1.06	1.75	3.19	–0.32	2.87	2.38	–0.99	1.39
Construction	–3.74	7.74	4.00	16.75	3.57	20.32	12.00	–1.82	10.18
Trade Services	23.21	0.30	23.52	17.71	4.06	21.77	–8.04	22.15	14.11
Transport Services	4.58	1.76	6.33	–7.40	13.48	6.08	11.91	–8.74	3.17
Business Services	1.77	0.92	2.69	–3.10	5.66	2.56	3.48	1.35	4.82
Financial Services	–2.63	4.82	2.19	–2.65	8.32	5.67	6.44	–1.54	4.90
Government Services	20.10	–7.89	12.21	21.25	4.66	25.91	–32.36	40.00	7.64
Other Services	0.94	–0.09	0.85	–3.22	4.16	0.94	12.26	–10.75	1.51
Total Economy	99.72	0.28	100.00	100.33	–0.33	100.00	126.67	–26.67	100.00

Source: Author's calculation based on the ETD.

Another important finding is related to how the Ghanaian experience of structural change coincides with the Sub-Saharan African as a whole. The obtained result in my work is consistent with the paper by Xinshen Diao, Kenneth Harttgen and Margaret McMillan (see paper Diao et al., 2017) who investigated the structural change and made a comparison between low- and high-income African countries. There are two interesting findings. On the one side, the structural change made a contribution to annual productivity growth by 1.57 % in lower-income countries and (-0.05%) in high-income countries in African from 2000 to 2010. Secondly, within sector effect is stronger in high-income countries (Diao et al., 2017, p. 425). Thus, I conclude that Ghana is in line with the general pattern of structural change regarding high-income African countries.

4.6 Conclusion

Having investigated the structural change in Ghana over three periods, I obtain the following results.

The first period (1990–2000) is characterized by a small growth-reducing role of structural change. There is a heterogeneity of productivity levels between different sectors. The main leading sectors of employment are agriculture, trade services and manufacturing. Despite the manufacturing is highly productive rather than trade services and agriculture sectors, the employment share of manufacturing was reducing and absorbed less labor. This fact is in line with the general situation in the African region as specified in the literature (Diao et al., 2017).

The second period (2000–2009) is marked by a growth-reducing structural change, despite the largest relative loss in employment occurred in the agricultural sector. The growth of labor productivity declined in manufacturing (0.8%) and trade services (2.2%) compared to agriculture (3.5%). As we know from the recent literature, African countries have experienced "premature deindustrialization" (Diao and McMillan, 2015; Dioa et al. 2017; McMillan and Harttgen, 2014; Grabowski and Self, 2020; Rodrik, 2016;). That phenomenon is also taken place in Ghana. However, there are some similarities in this phenomenon in Ghana during the second period, but the picture is still mixed.

The third period (2009–2018) is featured by a growth-enhancing structural change. In more detail, the manufacturing and trade services characterized by high labor intensity had a lower than average relative level of labor productivity. The positive trend of the employment in manufacturing was observed so that when the relative share of this sector reached a peak in 2018, it was around 15.8% in comparison with previous periods. The relative share of agricultural employment continued to decline even if this sector remained to play an important role in a generation. It was 55.0% in 1990 and 33.3% in 2018. Services sectors, including market and non-market, absorbed new workers so that workers engaged in services from 28.5% in 1990 to 46.7% in 2018.

In summary, the obtained results of this paper are that economy-wide labor productivity growth is mostly driven by the productivity growth within individual sectors. In other words, the within effect is accompanied by labor productivity growth in Ghana in all three observed periods.

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Chapter 5
The Relationship between Formal Institutions and Entrepreneurship: A Cross Country Analysis[1]

5.1 Introduction

In recent decades, the contribution of entrepreneurship to economic growth has been widely recognized (Acs et al., 2014; Desai, 2011; Urbano et al., 2019; Wong et al., 2005). Evidence from entrepreneurial literature shows that entrepreneurship boost innovation, creates new job places and provides a more fair distribution of income (Acs, 2006; Baumol, 1990; Valliere and Peterson, 2009). However, the contribution of entrepreneurial activities to a total economy is significantly different among countries, even if the group of countries is belonged to one geographical area and has some similarities in culture. It leads to the block of questions: what are the determinants that influence the formation of entrepreneurship in a country? Why does entrepreneurial activity flourish in some counties and fails in others? Why conditions for entrepreneurial activities are less sustainable in developing countries than in developed even if the former has a higher rate of the total early entrepreneurial activities, according to the GEM report (2014). All these questions are related to the institutions that play a central role in explaining economic performance and differences in the entrepreneurial landscape among countries.

Furthermore, institutions are of importance for economic growth, economic development, and entrepreneurship. As stated in the paper by Acemoglu and

[1] The study is based on a joint work with Ganira Ibrahimova (PhD Student at the chair for Entrepreneurship and Family Business, University of Siegen). It was published in Online Publication Server of Siegen University Library (March 2021). Available at: doi.org/10.25819/ubsi/9634

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Robinson (2008), institutions are considered as the fundamental causes of economic growth and also, specific institutional characteristics are reasons why economic outcomes are different across countries. Institutions condition the incentives and the constraints on economic actors, and as a result, institutions form economic outcomes (North, 1990). The connection between institutions and entrepreneurship is that institutions make a contribution to building the macroeconomic foundations of microeconomic behavior (Minniti and Lévesque, 2008). For example, institutional arrangements influence not only the level of entrepreneurship in a country or a region but also the type of entrepreneurship initiatives, by making them less or more productive and sustainable (Bruton et al., 2010). It is important to underline that entrepreneurship is associated with human nature, and then, the realization of the entrepreneurial propensity of individuals is highly dependent on the quality of institutions in a country, in the context of the microeconomic side (Baumol, 1990). Having made new comprehensive syntheses of the literature over the last 25 years (from 1992 to 2016) about the interaction among entrepreneurship, institutions and economic growth, Urbano et al. (2019) summarize that entrepreneurship has different impacts on the economy due to institutions among countries and regions.

Hence, the study of the relationship between institutions and entrepreneurship remains a focus of the growing interest of researchers and policymakers. Our paper is in line with of other works that uncover the relationship between institutions and entrepreneurship. Before we describe our intended contribution to this field, we highlight the key existing directions in this research area. The effects of institutions on entrepreneurship could be divided into four ways. Firstly, plenty of literature studies the impact of institutional dimensions on two types of entrepreneurship such as the necessity and opportunity (Amorós et al., 2019; Fuentelsaz et al., 2015; Van Stel et al., 2007; Wong et al., 2005) and these analyses are mostly based on the cross-country sample. Besides, the researchers attempt to connect this relationship to different economic development stages. For example, Fuentelsaz et al. (2015) conclude that the development of formal institutions primarily benefits

opportunity entrepreneurship which is linked to economic growth. Additionally, formal institutions favor the relative presence of necessity entrepreneurship. Secondly, several papers examine the different effects of formal and informal institutions on opportunity entrepreneurship (Aparicio et al., 2016; Fuentelsaz et al., 2015). Thirdly, a huge research area on the topic of the relationship between entrepreneurship and institution is associated with the effect of different formal institutions on new business formation either inside one country (Agostino et al., 2020) or in a cross-country sample (Aidis et al., 2012; Klapper et al., 2007; Levie and Autio, 2011; Stenholm et al., 2013). Fourthly, only a few papers analyze how various institutional dimensions may differently affect either the entrepreneurial stage (Hartog et al., 2010) or entrepreneurial aspiration (Troilo, 2011). As we can see from entrepreneurship and institutional literature, formal institutions shape either "good" or "bad" conditions for entrepreneurs, and then it influences the sustainability of entrepreneurship in economics. In this way, there are a lot of different studies on the topic of how the quality of institutions affects the total early entrepreneurial activity rate in the previous literature. However, there is still a gap in this research field: what is the impact of institution on the established business ownership rate, and there is a lack of knowledge of comparison between the role of institutions on those two different entrepreneurial rates.

The goal of this paper sheds light on the effect of whether different institutional dimensions could enable or hinder entrepreneurial activities on two different stages such as early and mature. In more detail, we explore the relationships between a particular set of formal institutional dimensions and two rates of entrepreneurship based on two samples of countries by using a series of simple ordinary least squares regressions. In the case of each sample, we focus on six single relationships independently from each and then we estimate what is the effect of a single formal institution on the level of entrepreneurship either in the early or mature stage. Then we compare the results between the two groups of countries and look at how each observed relationship behaves differently at different stages of economic development.

In this paper, we work with two samples of countries presented by efficiency-driven and innovation-driven countries, according to the classification of the GEM report. Note that innovation-driven countries are characterized by a healthy set of basic requirements and factors for creating an enabling environment for entrepreneurship and innovation. Efficiency-driven countries tend to grow faster than wealthier countries and strive for a robust economy as in countries with innovation economies. Nevertheless, they are still in the process of further development and establishment of sustainable conditions for entrepreneurial activities (GEM, 2014). A comparison between two groups of countries allows us to see the role of the institution in creating stable entrepreneurship at different stages of development.

To achieve the research goal, the following questions are examined in this paper:

- Which institutional dimension (rule of law, control of corruption, or regulatory quality) has a stronger relation to the early (TEA) and the mature (EBO) rates?
- Are there any differences in these effects between two groups of economies, namely in efficiency-driven and innovation-driven economies?

This work may help policymakers design policy to shape a sustainable entrepreneurship landscape and support entrepreneurial activities, particularly in fast-growing developing countries. Furthermore, the paper will be interesting for future researchers who are interested to investigate deeply the impact of different formal institutions on early and mature entrepreneurial rates and the results of the paper will be helpful for further country studies.

After the introduction, this chapter is organized as follows. Section 5.2 describes the theoretical framework of institutions and entrepreneurship and their measurement. Section 5.3 explores and dicusses the link between institutions, and entrepreneurship, and economic development by reviewing the diversity of countries's and region's experiences based on literature from both fields as entrepreneurship and development economics. Section 5.4 outlines the samples of countries, variables, and sources of data, and method that utilized for second part of this study. Section 5.5 presents the empirical results of the analysis. Section 5.6 provides the interpretation of our results based on the review of literature and empirical findings is provided. Section 5.7 concludes.

5.2 Institutions and Entrepreneurship: Theoretical Framework, Measurement Issues and Indicators

5.2.1 Institutions: Definitions and Theoretical Background

Economists who have highly emphasized the role of institutions and established the mainstream of new institutional economics are Douglass North, Ronald Coase, Oliver Williamson and Elinor Ostrom[2]. The new institutional economy concentrates on several explanations of the institutions' impact on economic behavior and economic development: those that reduce transaction costs, encourage trade and contribute to development, and those that direct the state to protect property rights rather than expropriate them (Klein, 1999; Richter, 2016). Further, the diverse group of well-known institutionalists and economists (North, 1990, 1991; Acemoglu and Robinson, 2008; Gneezy and Rustichini, 2000; Greif, 2006) state, that institutions matter a big deal for the economic behavior and development.

The first scientist, who defined the institution, was Douglass North. According to his definition, institutions are the humanly devised constraints that structure political, economic and social interaction. Throughout history, people have created institutions to secure order and reduce uncertainty in interaction processes. Along with the standard economic constraints, they also define choice sets and thus determine transaction and production costs, profitability and feasibility of engaging in different economic activities (North, 1991).

When we look at the definitions of institutions in the modern literature, we will find out that a large body of it has been built on the works of Coase, Williamson, and North. We also find out that the importance of institutions since that time has increasingly grown, and now they are widely explained and well discussed in more modern development papers (Ackerman, 2004; Grindle, 2004; Leftwich and Sen, 2010; North et al., 2009; 2013). However, the interpretation of institutions as a tool providing the framework for social interactions could differ. According to Chang and Evans (2005), institutions do not exist separately from the individuals, but embedded in normative values and cultures that are internalized and impact either

[2] Based on the paper by Richter (2005) where he outlines the history and evolution of economic field as New Institutional Economics.

social behavior or self-identity. Barley and Tolbert (1997, p.97) see the complex of institutions as a "web of values, norms, rules, beliefs and taken for granted assumptions". Leftwich (2010) states that the establishment of institutions stands on the interaction process between social structure and individual agency; being dependent on actors to create and adopt norms that are key to stable social conditions.

Thinking in terms of the relation between institutions and entrepreneurship, the importance of the following terminology, such as "game rules", "bad" and "good" institutions are reflected. In more detail, the activity of any entrepreneur or economic agent in society is also governed by a certain set of rules (North, 1991). These rules both structure the interaction and create restrictions. As soon as a rule emerges, there might be incentives to break it, so the rules are often accompanied by enforcement mechanisms for their execution. Therefore, institutions are kind of "game rules" that are working in society, as well as organizations and businesses operating in this environment are "Game players", acting accordingly to these rules (North, 1991). When these rules are clear and well defined, then as a result, the opportunistic behavior decreases, the trust increases. This leads in its turn to the increase of the long-term contracts enforcement, reduction of transaction costs and as a result, to an efficient institutional structure (North et al., 2013). On the contrary, "bad" quality institutions might reduce the incentives to invest and prevent the process when resources have been allocated in the most productive way (Knowles and Weatherson, 2006). Quality of institutions can shape or destroy the conditions for entrepreneurship (Baumol, 1990; Johnson et al., 1997).

According to the North's the classification of institutions, institutions could be formal and informal. Formal institutions are rules that are provided in written form, while informal institutions are non-written codes of behavior, conventions and customs in contrast to formal ones (North, 1990). Therefore, what he means by distinguishing between formal and informal institutions is that in the case of formal institutions, people are not only dealing with codified rules, but also with well-organized sanctions. Informal institutions, on the contrary, are referring to those institutions where the rules are not codified, nor the sanctions. In most cases, the informal institutions have been inherited within the social group, the society, the

culture and people learn about them through the interactions they make (North, 1990). Formal and informal, institutions undoubtedly have very big impact on the entrepreneurial climate in a country. In our research, we will focus on selected formal institutions and their impact on entrepreneurial activity levels in two groups of countries refers to the two different stages of economic development.

5.2.2 Measurement of Institutions and Institutional Indicators

In this paper, we use the World Governance Indicators[3] as the source of institutional indicators. Note that the WGI measures are useful as a tool for broad cross-country comparisons and for evaluating broad trends over time when making cross-country analysis. Especially, quantitate measurement of institutions itself could be a complicated task because institutions themselves have a more qualitative nature (Svensson, 2005). The WGI represent the views on the governance qualities and measures institutions through six aggregate dimensions[4].

Another important point is that quality of institutions affects differently entrepreneurial activities (Sobel, 2008). Moreover, the paper by Chowdhury et al. (2019, p. 51) states that not all institutions play the same role which could be explained by a dynamic relationship between institutions and economic development. For this reason, we deal only with those indicators that might have a direct effect on entrepreneurial activity such as the rule of law, control of corruption or regulatory quality which comes from well-known institutional database as the

[3] Note that the World Governance Indicators (WGI) project is one of the well-known institutional databases that developed by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank Development Research Group) in 1999 (Kaufmann et al., 1999). Pablo Zoido-Lobaton and Massimo Mastruzzi also made a big contribution to the development and updating of the WGI (Kaufmann et al., 1999; Kaufmann et al., 2009; 2010).

[4] Those six aggregate governance indicators in the WGI projects are divided into three groups: A, B and C. For example, the group A included includes indicators, reflecting the process of how governments are selected, monitored, and replaced. Those indicators are *Voice and Accountability* and *Political Stability and Absence of Violence/Terrorism*. The indicators of group B reflect the government capacity of formulating and implementing effective and sound policies. Those indicators are *Government Effectiveness* and *Regulatory Quality*. The indicators of the group C show the respect that state and citizens have towards the institutions that govern social and economic interactions among them. Those indicators are *Rule of Law* and *Control of Corruption* (Kaufmann et al., 2009; 2010).

Worldwide Governance Indicators project. Further, we consider briefly the three selected institutional dimensions.

Regulatory quality[5] measures the perception of the government ability to formulate and implement sound policies and regulations that permit and promote private sector development (WGI Online, 2020). Evidence from literature shows that regulatory quality provides easier market entry for entrepreneurs, due to the transparency and well enforced rules and regulations on the market (Agostino et al., 2020; Johnson et al., 2002), while a weak regulatory quality can create opportunistic behavior and reduce economic efficiency level (Bridgman et al., 2009). Thus, this institutional dimension has the direct impact on entrepreneurial activity because it forms favorable economic conditions, in which the entrepreneurs are operating.

Rule of law[6] captures perceptions of the extent to which agents have confidence in and abide by the rules of society (WGI Online, 2020). This institutional indicator also has a direct impact on entrepreneurial activity in a country because it protects entrepreneurship in a given country by law, by property right protection, contract enforcement quality, and by fair courts. For example, Rodrik et al. (2004) point out the important role of the rule of law together with property rights which reflects a well-organized and defined legal framework in the country (Rodrik et al., 2004). Besides, the rule of law increases the mutual trust of economic agents (Efendic et al., 2015) and attracts high-growth companies (Estrin et al., 2013). All these effects have a positive influence on entrepreneurial activity in given country.

Control of corruption[7] is third institutional dimension that might have a direct impact on entrepreneurship (Aidis et al., 2012; Aparicio et al., 2016;

[5] Note that Regulatory quality is an institutional indicator of WGI dataset, which belongs to the group B. The individual variables used to construct this institutional dimension are investment and financial freedom, business regulatory environment, unfair competitive practices, price controls, discriminatory tariffs, and taxes, ease of starting a business by local law, regulatory burden, according to WGI Online (2020).

[6] Rule of law is an institutional indicator of the WGI dataset, which belongs to the group C. The individual variables used to construct this institutional dimension are violent and organized crime, private property protection, property rights, reliability on police service, judicial independence, business cost of crime), according to WGI Online (2020).

[7] Control of corruption is the indicator of the WGI dataset, which belongs to the group C. The individual variables used to construct this institutional dimension are corruption among public officials, corruption, public trust in politicians, irregular payments and bribes in different spheres, according to the WGI Online (2020).

Johnson et al., 1997; Svensson, 2005). For example, the corruption impedes the development and growth of entrepreneurial activities (Aidis et al., 2012). Corruption might raise the costs of production and hinder the amount of entrepreneurial activity in the formal sector (Aidis et al., 2012; Johnson et al., 1997). It also reduces the benefits of operating in the formal sector, while rising the transaction cost and the costs of production (Johnson et al., 1997, Friedman et al., 2000). Thus, this third selected institutional indicator has a direct impact to entrepreneurial activity, because it provides the transparency of doing business in a given country and absence of illegal transaction costs related to entrepreneurial activity.

5.2.3 Measurement of Entrepreneurship at the Cross-Country Level: Sources and Indicators

According to the GEM project, entrepreneurship is determined such as "any attempt to create a new business or a new venture, such as self-employment, a new business organization or the expansion of an existing business by an individual, a team of individuals, or an established business" (GEM Online, 2020). Thinking in terms of entrepreneurial activities, we usually mean that ***entrepreneurial activity*** is "the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets" (Ahmad and Seymour, 2008, p. 9).

There are two well-known and good established international entrepreneurship data like the World Bank Group Entrepreneurship Survey (WBGES) and the Global Entrepreneurial Monitor (GEM). Both databases measure entrepreneurship by several indicators.

The GEM considers entrepreneurial intentions. The World Bank's Entrepreneurship Survey reflects only the actual level of entrepreneurial activity. For example, the key indicator of entrepreneurship in WBGES is *the entry rate* that is defined as new firms (those that were registered in the current year) as a percentage of total registered firms. Another important indicator is *the business density* which is determined by the number of registered firms as a percentage of the active population (Klapper, 2006). Based on the paper by Acs et al. (2008) with the title "What does "entrepreneurship" data really

show?", we can get to know what differences between two popular sources for internationally comparable data. Having summarized their findings, the main discrepancy between two datasets is shown in Figure 5.1.

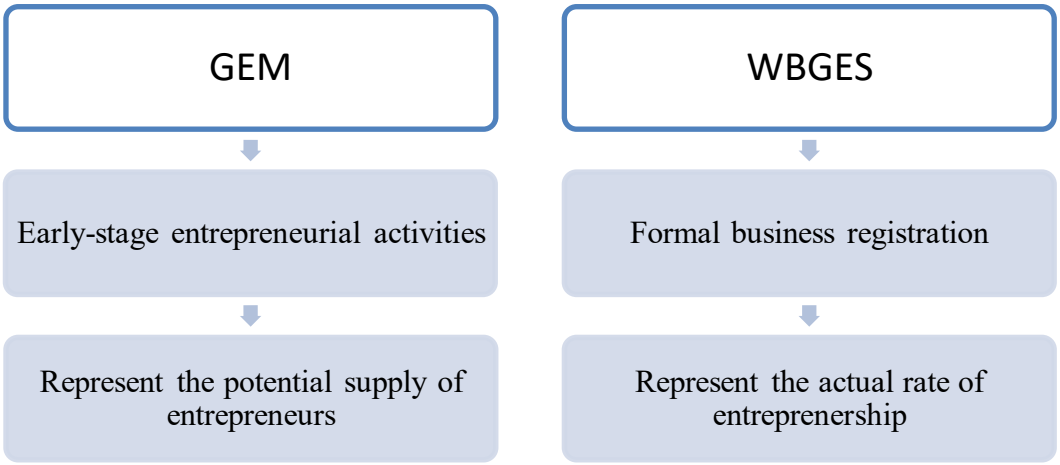

Figure 5.1: Differences between GEM and WBGES databases

Source: Adapted from Acs et al. (2008).

The key goal of GEM attempts to explain why rates of entrepreneurship "differ among economies at the similar stages of economic development" (GEM, 2014, p. 24). Note that the GEM project is unique of nature, because it explores the dynamics of the level of entrepreneurial activity in the various countries, and how it connects to the level of economic development and therefore identifies factors that stimulate or impede entrepreneurial activity. Moreover, the GEM determines the extent to which entrepreneurial activities influences economic growth in terms of specific groups of economies such as factor-driven, efficiency-driven, and innovation-driven (GEM, 2017).

Evidence from the entrepreneurship literature shows that entrepreneurship is ***the process***. This keyword "process" is "the first stone" to build and establish the GEM methodology. Hence, based on the GEM methodology there are several phases which entrepreneurs go around during his or her entrepreneurial life. Further, we consider step by step all phases (such as potential entrepreneurs, nascent entrepreneurs, new business owners, established business owners) and highlight the main terminologies concerning the entrepreneurship process under the GEM. Firstly, *potential entrepreneurs* are who still only expecting to start in the near future. Secondly, *the*

nascent entrepreneurs are people actively involved in starting a new venture but do not pay salaries or wages for the period more than three months (Acs et al., 2008, p. 279; the GEM 2014, p. 21). Thirdly, *new business owners* are people who have moved beyond the nascent stage and have paid salaries and wages for more than three months but less than 42 months. Fourthly, *established business owners* are individuals who run ventures for more than three and a half years.

Under the GEM conceptual framework entrepreneurial activities are presented by three groups as the following:

1. *Total early-stage Entrepreneurial Activity (TEA)* consists of nascent entrepreneurs and new business owners. The TEA rate is the key indicator of the Global Entrepreneurship Monitor.

2. *Established business ownership rate* is the percentage of the adult population who are accounted as established business owners.

3. *Business discontinuation rate* is the percentage of the adult population aged between 18 and 64 years (who are either a nascent entrepreneur or an owner-manager of a new business) who have, in the past 12 months, discontinued a business, either by selling, shutting down, or otherwise discontinuing an owner/management relationship with the business (GEM, 2014).

It should be noted that Bosma (2013) summarized the existed 89 academic publications based on the GEM project from 2004 to 2012 and found out that the early-stage entrepreneurial activity rate, including opportunity TEA and necessity TEA, was taken into consideration for the majority of empirical studies. There is little attention is drawn to established business ownership rates. Bosma (2013) points out that in the future researchers should use other variables associated with entrepreneurial activities not only the TEA rate. A recent paper by Bosma et al. (2018) reposts that since 2010 modern empirical studies also analyze the entrepreneurship vie the TEA rate with particular attention on innovation type of entrepreneurship, namely, opportunity TEA rate. Based on the above-mentioned evidence from the literature, our paper will contribute by filling the gap in the existed papers by providing empirical evidence on the comparison of the early and mature entrepreneurial rate in the efficiency- and innovation-driven countries.

5.3 Institutions, Entrepreneurship, and Economic Development: History of Different Countries and Regions

It is important to understand to what extent institutions matter for entrepreneurial activities in the context of various regions, such as East Asia, Latin America, Africa, East and Central Europe. Further, we briefly review some cases.

Comparison between the Latin American and East Asian Regions

The starting point in our discussion is the paper by Bruton et al. (2009). They compared two regions, such as Latin America and Asia, to identify what the institutional differences are and how they affect the development of entrepreneurial ventures. Until the 1990-s Latin American regions were far from market-economy in the context of West European and North American countries. Since 1990, many countries from Latin America had put a lot of effort to conduct market reforms and introduce the transformation process of the economy. However, Latin America began the transformation process later than the East Asian region so that venture capitalists in the East Asian region gained already from existed and established institutions. Bruton et al. (2009) point out that countries from East Asia have well-established institutions.

The focus on the process of market transformation has received a great support in that region. The paper by Larroulet and Couyoumdjian (2009) examines a Latin American paradox and the relationship between entrepreneurship and growth and institution settings. It is found that there are a high level of entrepreneurial activities rate and "mediocre rates of economic growth" due to the high level of informality (Larroulet and Couyoumdjian, 2009, p. 96). Moreover, Aparicio et al. (2016) also reveal that Latin American countries are characterized by a high level of informal economy in comparison to the high-income level countries. Another part of the explanation of differences between the two large regions Latin America and East Asia is that the labor market is regulated better in Korea and Taiwan than in Latin American countries (Johnson, 2018) and entry cost for starting a business is relatively lower making more favorable environment for business (Bae et al., 2003).

The Latin American Region: Case of Chile

Chile represents an interesting case in the context of other Latin American countries. It is the first country in this region that experienced a remarkable transition to democracy and market economy (Espinoza et al., 2019; Larroulet and Couyoumdjian, 2009). According to Larroulet (2013), over the past 25 years, Chile has made positive achievements on its path of progress. The key drivers have been the development of an economic model in which progress is influenced by the strength of the private sector, and the ability to create a stable democratic system. One example of stimulating entrepreneurship is the set of reforms oriented to reduce red tape so that new to launch new firm from 27 days (Larroulet, 2013). The establishment of the National Council for Innovation and Competitiveness in 2005 promoted the creation of start-ups (Espinoza et al., 2019).

The East Asian Region: Cases of Taiwan and South Korea

Taiwan and South Korea as one of the most successful examples of transformation emerging economies to market-oriented economies occurred between the 1960-s and 1990-s (Rodrik et al., 2004). Both countries are labeled East Asian tigers and characterized by rapid industrialization and a fundamental change in institutional system, high growth rate (Rodrik et al., 2004), and well perform institutions such as rule of law (Bruton et al., 2009). Several modern studies compared the formal institution effect on entrepreneurial activities between countries in the region and with other regions. For example, Zhang et al. (2017) examine how sub-national institutions influence the international performance of export-oriented small and medium-sized enterprises in the case of South Korea. They found that government transparency and legal rules have a positive impact on international entrepreneurial capability. Chen et al. (2003) note that the economy of Taiwan experienced a substantial transformation process such as labor regulation, privatization, and development sector of the export-oriented firms. Another example, Van der Zwan et al. (2011) analyze the cross-country and cross-regional difference between East and Central European countries against the East Asian countries with their different marker reform experiences. The key idea of the

paper by Van de Zwan et al. (2011) is that introduction of market reforms needs time for adaptation of economics and emergence of entrepreneurial culture.

The African Region: Cases from Sub-Saharan Africa

The development of institutions and their impact are center in the discourse about the economic performance, entrepreneurship development and enhancing income levels in the context of the Sub-Saharan African region. The historical evidence shows that the post-independence period in African regions has been characterized by the diversity of political regions (Luiz, 2009), political instability (Humphreys and Bates, 2005), weak and unsecured institutions of property rights (Acemoglu et al., 2012). Next, after 2000 the annual growth rate of GDP per capita in the Sub-Saharan African region jumped around 3% so that it was noticeably better the economic performance than in the Latin American countries but still far from East Asian countries (Rodrik, 2016, p. 10). However, there is a huge concern about this recent growth performance (Rodrik, 2016).

Indeed, the African region is still much poorer in comparison to other regions in the world and faces many economic challenges due to the weak institutions (Acemoglu et al., 2012). In this regard, many researchers draw particular attention to the role of institutions and how to get the right institution in place to reduce the poverty, enhance income-level, create a favorable environment for entrepreneurship and investment (Acemoglu et al., 2012; Bates et al., 2013; Humphreys and Bates, 2005; Luiz, 2009; Luiz and Stewart, 2014). For example, Luiz (2009) investigates the questions of how to embed the right institutions in local realities. Another paper by Luiz and his colleague Stewart (2014) studies the multinational enterprises in South African countries to existed corruption in African markets. The paper by Munemo (2021) investigates the relationship between natural resource rents and entrepreneurship by analyzing 28 African countries from 2002 and 2014. Due to the fact institutions represent a causal relationship between the pursuit of resource rents and new business formation Munemo (2021) also attempts to address the question to what extent the quality of institutions shapes the structure of remuneration, which in turn affects the allocation of resources between rent-seeking and entrepreneurship. To summarize, the institution and especially,

institutions of property rights obtained a lot of attention in the studies in the context of the Sub-Saharan African region, on the one side, and the quality of institutions and how institutions are well adopted, and what new opportunities for development they can generate is in the list of today's debates, on the other side.

The European Region: Special Attention to East and Central European Countries

The European region is a diverse where we can see different cases of how institutional dimensions perform. Since the 1990-s a big transition process took place in Central and Eastern European countries (Tyson et al., 1994). Many researchers have studied the role of institutions in this transformation process and how the movement from planned to market economies, and how the emergence of the private sector occurred in East and European countries (Manolova et al., 2008; Smallbone and Welter, 2001; Tyson et al., 1994; Van der Zwan et al., 2011). Another strand for research is the comparison between mature economies and emerging market economies and how institutions affect entrepreneurial activities in the entire European region (Bosma et al., 2018; Prantl and Spitz-Oener, 2009; etc). For example, mature market economies usually have much more rules compared to emerging economies so that higher regulation tends to decline the intention to establish a new business in mature market economies in comparison to transition economies (Prantl and Spitz-Oener, 2009; Urbano et al., 2020).

The Summary on the Reviewed Countries and Regions Cases

All the studies mentioned in this sub-chapter give us the idea that there are many ways how the institutional dimensions influence economic performance, entrepreneurial activities, and finally, economic development. Especially, emerging market economies are a very heterogeneous group across regions in the world. The important knowledge is that there are many uncovered questions about how institutional dimensions could shape the environment and motivation for entrepreneurship. In this paper, we attempt to fill the gap in the literature by investigating the relationship between certain formal institutions and new (early) or established (mature) forms of entrepreneurship.

5.4 Data and Methodology

5.4.1 Variables and Data Sources

In this paper we investigate how the institutions influence entrepreneurial activities. Our dependent variable for the study is entrepreneurship, and independent variable is related to three institutional dimensions such as control of corruption, rule of law and regulatory quality. We expect the impact of various institutional dimensions is likely to differ according to the stage of entrepreneurial activities. To reflect differences between two stages of entrepreneurial activities, Total Early-Stage Entrepreneurial Activity rate (TEA rate) and Established Business Ownership rate (EBO rate) are employed. It should be stressed that we work with the cross-sectional data covered year. Our data derived from the data published in the GEM Global report 2016/2017 and the online database like the Worldwide Governance Indicators (WGI) project. The more detail description of the entrepreneurial and institutional variables, their sources is given in Table 5.1.

Table 5.1: Description of the variables

Dimension	Variable	Description	Source
Dependent			
Entrepreneurship	Total Early-Stage Entrepreneurial Activity	the share of the adult population aged 18 to 64 years who have taken steps to start a new business (start-up entrepreneurs) or managed a new business and paid their salary in 3 months and less than 42 months (new entrepreneurs) (GEM, 2016)	GEM
	Established Business Ownership rate	the share of the adult population aged 18 to 64 who is currently the owner-manager of the established business, in particular earns and manages that has paid salaries, wages or any other payments to the owners for more than 42 months (GEM, 2016)	GEM

Dimension	Variable	Description	Source
Independent			
Institutional Indicators	Control of Corruption	perceptions the degree to which public power is exercised for private gain, including petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (WGI Online, 2020)	WGI
	Rule of Law	perceptions of the degree to which agents have confidence in and abide by the rules of society, in particular, the contract enforcement quality, property rights protection, the police, and the court system, as well as the probability of crime and violence (WGI Online, 2020)	WGI
	Regulatory Quality	perceptions of the government ability to formulate and implement sound policies and regulations that allow and promote private sector development (WGI Online, 2020)	WGI

Source: Authors' illustration.

5.4.2 Sample

Each sample for two groups of countries such as efficiency-driven and innovation-driven is derived from the GEM report date. Table 5.2 lists two samples of countries. Each sample consists of eleven countries from different geographic regions. It should be noted that countries from GEM data are usually categorized by economic development stages, namely factor, efficiency- and innovation-driven economies, on the one side, and different regions, on the other side. In this sense, as stated in the paper by Amorós (2009), the GEM data is incredibly useful for study entrepreneurial activities and entrepreneurship in the context of different stages of economic development.

Table 5.2: Sample of countries by economic development stages

Sample 1: Efficiency-Driven countries			**Sample 2: Innovation-Driven countries**		
N	*Country*	*Region*	*N*	*Country*	*Region*
1	Bulgaria	Europe	1	Austria	Europe
2	Chile	Latin America	2	Finland	Europe
3	Croatia	Europe	3	Germany	Europe
4	Georgia	Asia	4	Italy	Europe
5	Hungary	Europe	5	Korea	Asia
6	Latvia	Europe	6	Netherlands	Europe
7	Malaysia	Asia	7	Portugal	Europe
8	Poland	Europe	8	Slovenia	Europe
9	Slovakia	Europe	9	Spain	Europe
10	South Africa	Africa	10	Switzerland	Europe
11	Uruguay	Latin America	11	Taiwan	Asia

Source: Authors' illustration based on the classification of countries in GEM report 2016.

The choice of countries and their groups is explained by the following reasons. Firstly, we take into consideration only efficiency-driven and innovation-driven countries due to the availability of data. The factor-driven group is excluded in our analysis due to a limited number of countries (seven out sixty-four). Secondly, we try to pick countries from various geographical regions such as Europe, Asia, Africa, Latin America. Furthermore, the selection of countries is dependent on the size of the countries. For this reason, we exclude from our analysis the largest economies like the USA, China, Brazil, Russia, and India. Thirdly, two groups of selected countries are expected to have two different patterns of entrepreneurial activities and their attitude to start a business and run a business under particular institutional conditions. It could be mentioned that countries with innovation-driven economies are the most developed and are characterized as more knowledge-intensive. Countries with an efficiency-driven economy are located between factor-driven and innovation-driven categories (GEM, 2014; 2015). That means their activities moved from subsistence agriculture and extraction businesses, they have more efficient production processes than before recently and try to increase their competitiveness in the global market.

5.4.3 Method

The method employed in this paper is a statistical method of correlation and a simple regression model. We are interested in understanding which the certain institutional dimension (rule of law, control of corruption or regulatory quality) has a stronger impact to the level of entrepreneurship (either early or mature). Thus, to examine the relationship between formal institution and entrepreneurship rate, we use a series of simple ordinary least squares regressions for both country's samples.

5.5 Results

5.5.1 Basic Description

The descriptive statistics for two samples of countries are reported in Table 5.3 and Table 5.4. For example, the consideration of the TEA rate allows us to obtain two results. Firstly, the TEA rate tends to be higher in efficiency-driven countries rather than in innovation-driven countries. Secondly, the value of the TEA rate inside on group of the same development level shows substantial variation.

Table 5.3: Descriptive statistics, Efficiency-Driven countries

Variable	Obs.	Mean	Std. Dev.	Min	Max
TEA rate	11	10.364	5.559	4.7	24.2
EBO rate	11	6.345	2.058	2.5	9.5
Control of corruption	11	67.876	11.146	51.0	88.5
Rule of Law	11	69.625	9.329	52.4	85.1
Regulatory Quality	11	75.612	8.214	62.0	89.9

Source: Authors' calculation based on the GEM and WGI.

In the case of efficiency-driven countries, this indicator has a value between 4.7 and 24.2. In the case of innovation-driven countries, the TEA rate takes a value between 4.4 and 11 (see Table 5.4). At the same time, in the innovation-driven countries established business ownership rates are higher than for the efficiency-driven countries. In the case of 11 innovation-driven countries, it takes a value between 5.2 and 11.1, and for efficiency-driven countries, this indicator varies between 2.5 and 9.5. The interpretation of the statistical results related to entrepreneurship dimensions gives the key message that not all entrepreneurs who

operate in the early-stage entrepreneurial activity can move to the stage of established businesses like a mature business. In other words, an established business that runs more than 42 months is associated with the sustainability of entrepreneurship in an economy.

Table 5.4: Descriptive statistics, Innovation-Driven countries

Variable	Obs.	Mean	Std. Dev.	Min	Max
TEA rate	11	7.345	2.067	4.4	11.0
EBO rate	11	7.627	1.752	5.2	11.1
Control of corruption	11	82.475	13.471	59.6	99.5
Rule of Law	11	87.545	10.756	62.0	99.0
Regulatory Quality	11	87.063	9.707	73.1	98.6

Source: Authors' calculation based on the GEM and WGI.

Summary statistics regarding institutional dimensions (see Table 5.3 and Table 5.4) reports that the value[8] of those indicators are higher in innovation-driven countries for all three cases. The variation among countries is substantial. For example, in efficiency-driven countries, the rule of law has minimum value is 52.4 and the highest value as 85.1, with a relatively modest standard deviation of 9.33. In comparison, in innovation-driven countries, the rule of law varies from 62.0 to 99.0, with a relatively modest standard diviation of 10.76. Evidence from our statistical evidence is consistent with the works of Urbano et al. (2019) and Desai (2011), where they stay that those countries with the similar economic development stage differ in the rate of the entrepreneurial activities and level of institutional indicators. In this sense, efficiency-driven countries are more heterogeneous compared with innovation-driven.

5.5.2 Analysis of the TEA Rate and Three Institutional Dimensions

Based on the empirical evidence from Figure 5.2 and Figure 5.3, we may summarize the following points such as:

1. In the case of efficiency-driven countries, the correlation between the TEA rate and institutional indicators is higher than in innovation-driven countries. It is

[8] Note that the value of institutional indicators measures in percentile rank terms from 0 to 100 where higher values refer to better outcomes, according to Kaufmann et al. (2010).

proved by the correlation coefficient which fluctuates between 0.615 and 0.819 (see Appendix, Table A5.1). One could suggest that the strength of the relationship between these formal institutions and the early-stage entrepreneurial rate is pretty much strong.

2. Nevertheless, the explanatory power of three institutional dimensions is different. As we can see from Figure 5.2, the rule of law explains more of the variation in the TEA rate for 11 efficiency-driven countries. Control of corruption explains less than the rule of law. The lower value of R-squared is associated with regulatory quality. For example, in Figure 5.2.B, the scatterplot depicts a fairly strong positive relationship between the TEA rate and rule of law in efficiency-driven countries. The data points distribute close to the regression line. The correlation coefficient is equal to 0.819. Using the value of R-squared is 0.6707, this suggests that rule of law explains about 67.07% of the variation in the TEA rate under this sample of countries.

3. The explanatory power of three institutional dimensions in innovation-driven countries has the same sequence in descending order as in efficiency-driven countries like rule of law, control of corruption and regulatory quality. For instance, the scatterplot in Figure 5.3.B illustrates a more moderate positive relationship between variables such as the TEA rate and rule of law in comparison by other two scatterplots. Using the R-squared is 0.3210, we can assume that rule of law explains about 32.10 % of the variation in the TEA rate under the present sample of countries. It should be noted that three institutional dimensions can explain less the variation in the early entrepreneurial activity rate in innovation-driven countries than in efficiency-driven ones. In both groups of countries, the rule of law is stronger associated with the TEA rate compared with control of corruption and regulatory quality.

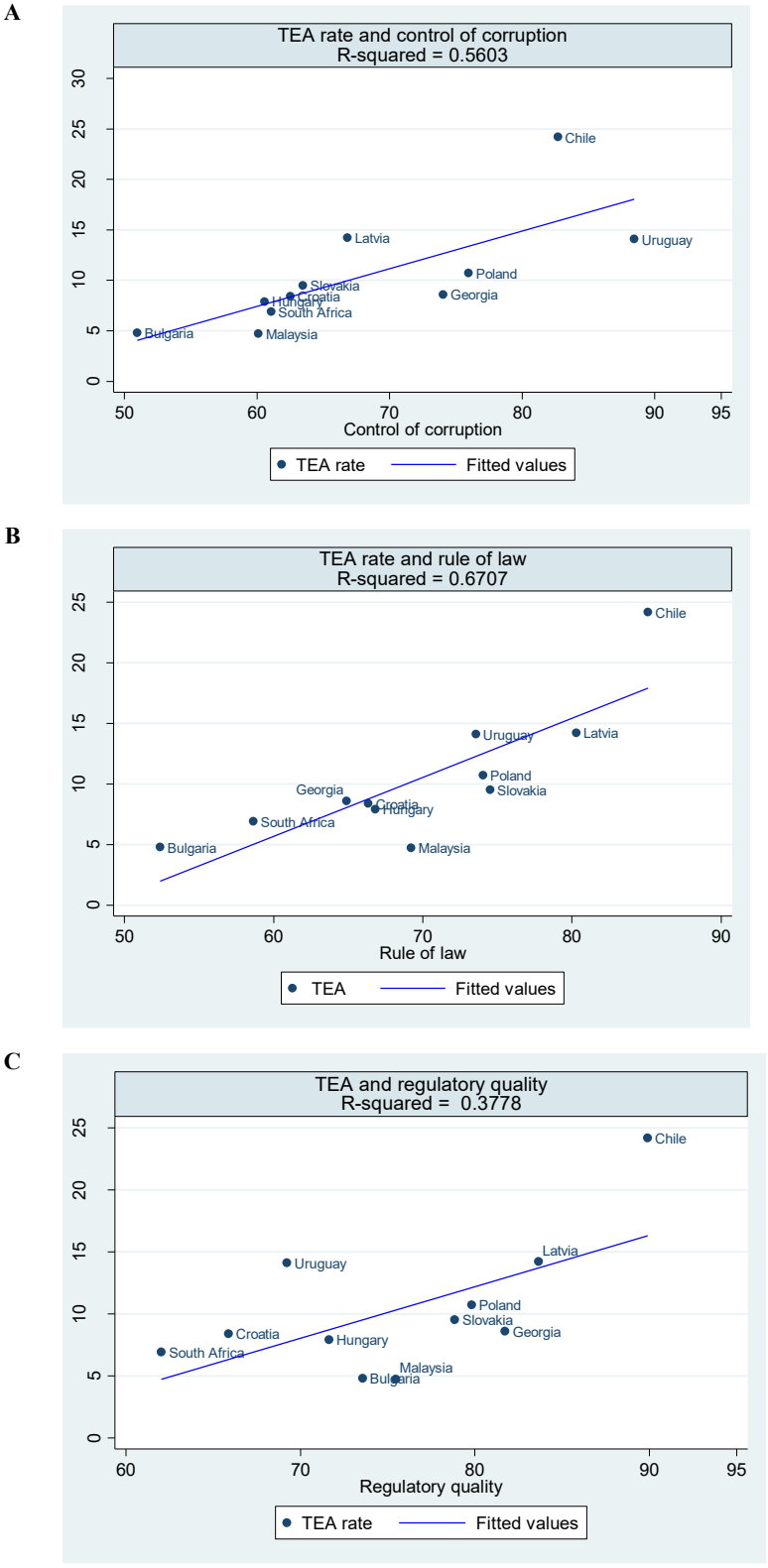

Figure 5.2: Correlation between TEA rate and institutional dimension (s), in Efficiency-Driven countries

Source: Authors' calculation.

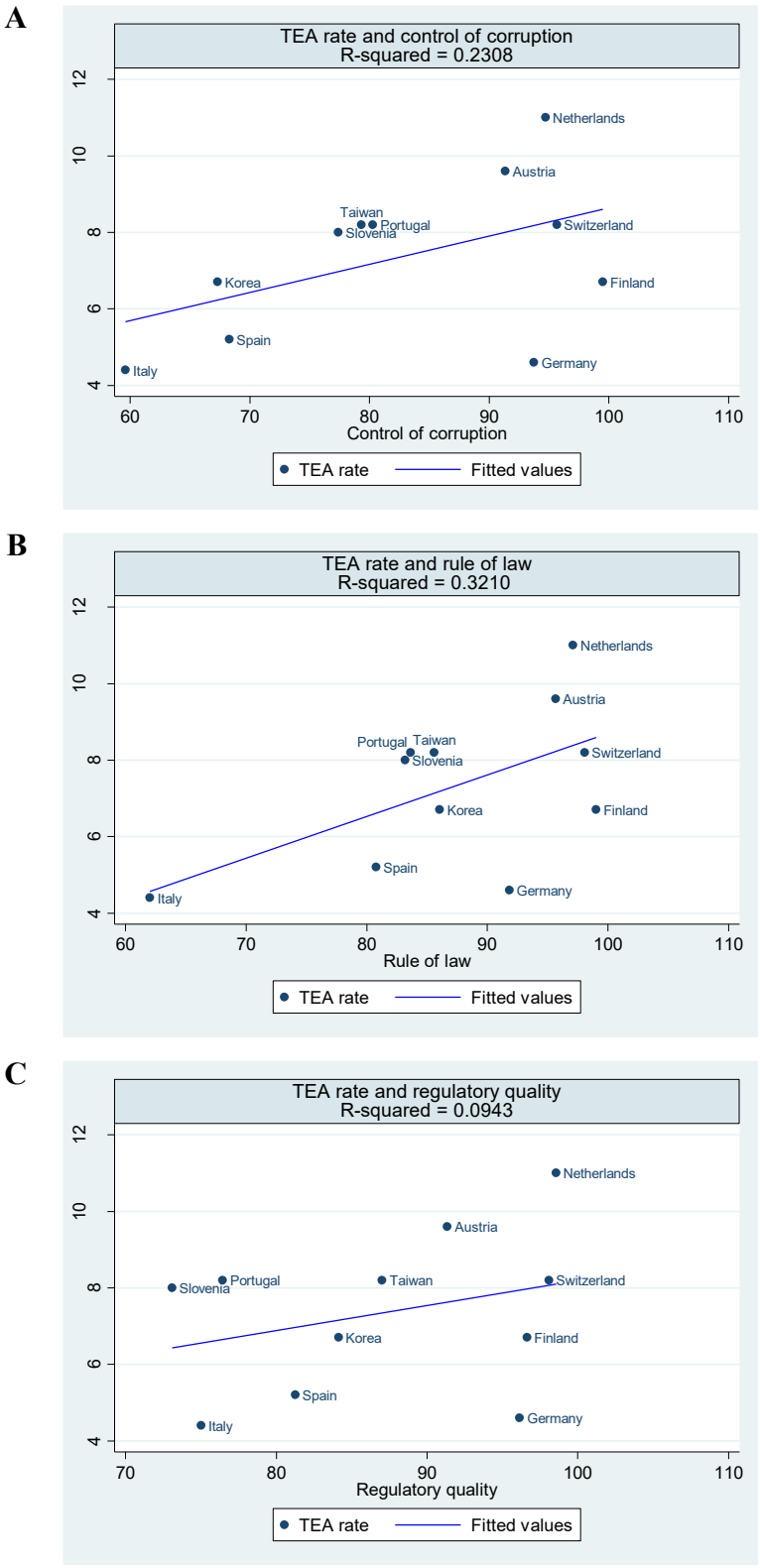

Figure 5.3: Correlation between TEA rate and institutional dimension (s), in Innovation-Driven countries

Source: Authors' calculation.

5.5.3 Analysis of the EBO Rate and Three Institutional Dimensions

The empirical evidence in terms of the EBO from Figure 5.4 and Figure 5.5, we could document the following points as:

1. In the case of efficiency-driven countries, there is a positive correlation between institutional indicators and the EBO rate. The correlation coefficient fluctuates between 0.5–0.8 (see Appendix, Table A5.2).

2. However, the R-squared, shows a different degree of explanatory power in analyzed relationships. If we look at the scatterplot in Figure 5.4.C, we see the highest index of explanatory power in this country sample. The correlation index between regulatory quality and the EBO rate equals to 0.801, and R-squared value is also greater than in other cases – 64% of the EBO rate is explained by regulatory quality in efficiency-driven group of countries. Less strong correlation and explanatory power index belongs to rule of law – it explains about 32% of EBO rate in efficiency driven countries. And the least explanatory power index is associated with control of corruption – 29%.

3. In the case of the innovation-driven countries, the correlation between the EBO rate and institutional indicators are higher than in efficiency-driven countries. It is proved by the correlation coefficient is more than 0.7 in all three cases and that means the strength of the relationship between these institutions and the entrepreneurial rate is very strong (Figure 5.5). Regarding the explanatory power of three institutional dimensions, the sequence in descending order for innovation-driven countries are the following: the rule of law – explanatory power of 58%, then control of corruption with explanatory power of 53% and regulatory quality explanatory power of 52%. It assumes that all three institutional indicators explain half of the variation in the EBO rate, in the context of innovation-driven countries.

4. The interesting findings are the following. The rule of law is stronger connected to the EBO rate in innovation-driven countries compared with the other two institutional dimensions (58%). The regulatory quality as a formal institution has the strongest correlation efficient and highest explanatory power in all cases analyzed (67%) with the EBO rate in efficiency-driven countries.

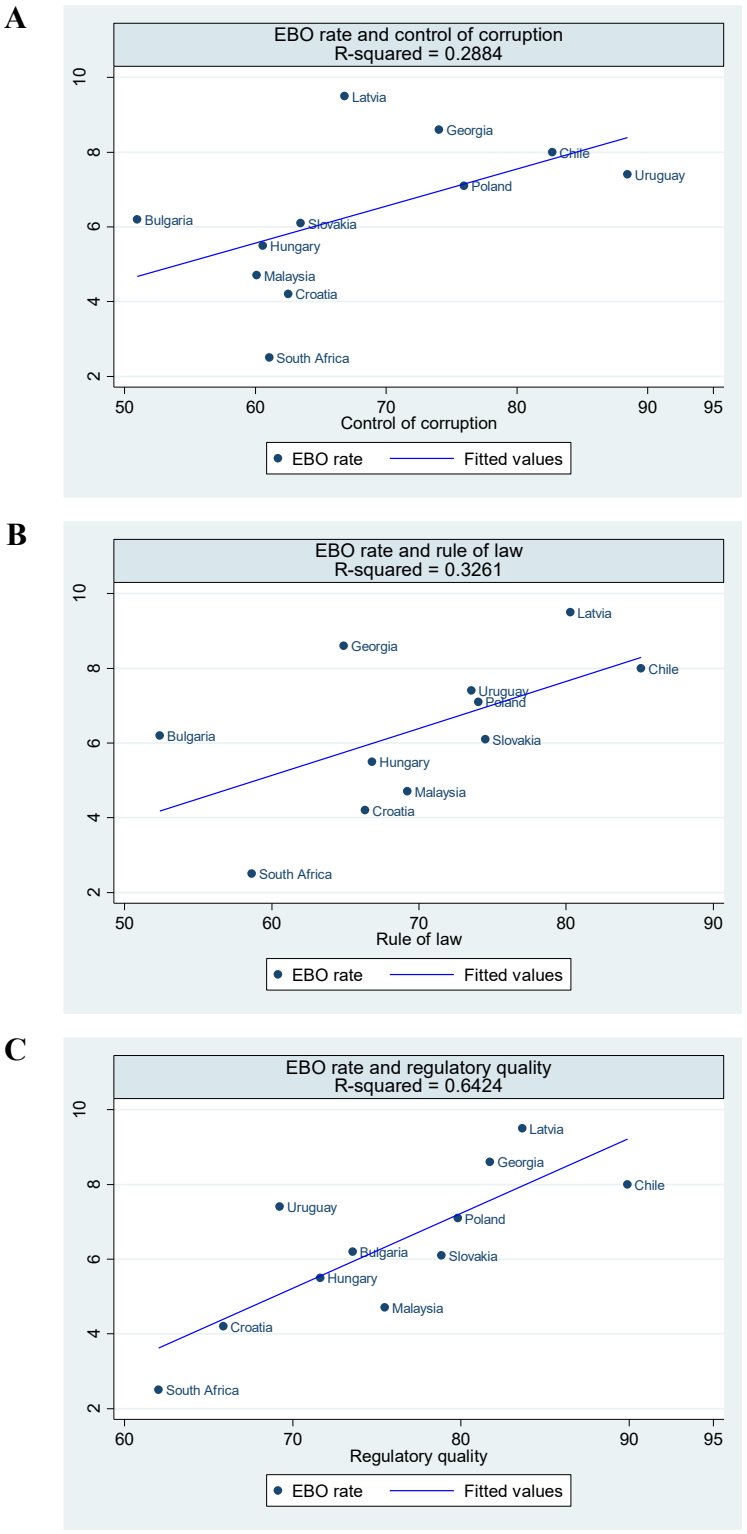

Figure 5.4: Correlation between EBO rate and institutional dimension(s), in Efficiency-Driven countries

Source: Authors' calculation.

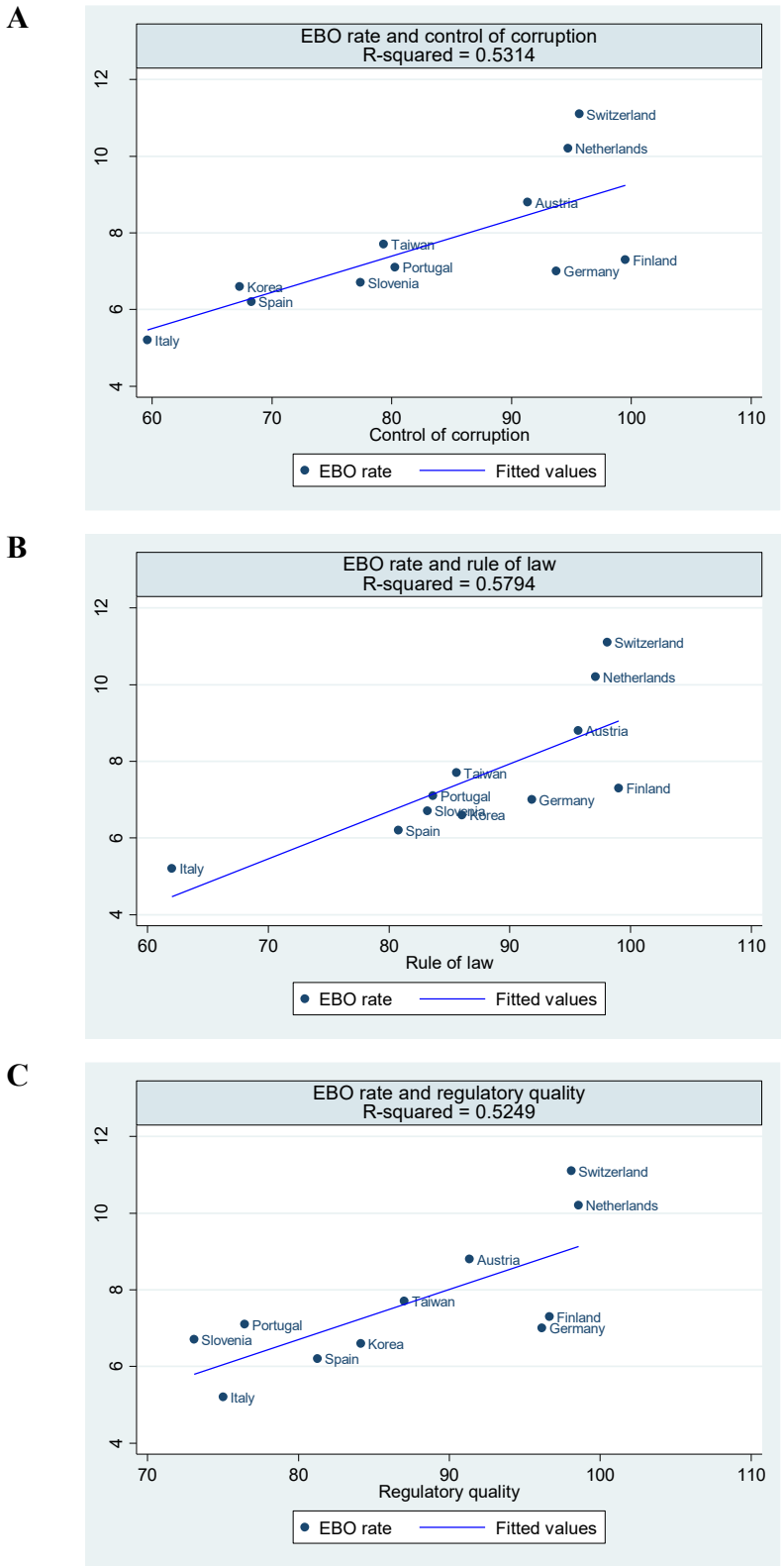

Figure 5.5: Correlation between EBO rate and institutional dimension(s), in Innovation-Driven countries

Source: Authors' calculation.

5.6 Discussion

The main question of our research is to shed some light on how certain formal institution can influence the development of enterprise landscapes in the context of different levels of economic development. After we have carefully analyzed a large number of publications that dedicated to this topic, we suggest that institutions are equally important for all countries regions, but they have a different impact from economy to economy due to the different historical and cultural backgrounds of institutions, and the period of time they have been existing since then. The part of our analysis is to evaluate whether formal institutions have the same impact on innovation-driven (mostly developed countries) and efficiency-driven countries (mostly developing countries).

Having investigated the entrepreneurial literature, we find that there is the existing gap in understanding how certain institutions could affect on quality of entrepreneurial activities. For example, Bosma (2013) and Bosma et al., (2018) underline that mostly researchers focus on entrepreneurial indicators such as, motivation starting business and start-ups, and so that there is lack of knowledge about other entrepreneurial activities. In order to provide new insight into the discourse about the effect of institutional dimension on entrepreneurial activities, we consider entrepreneurial rate on early and mature level.

Evidence from our empirical results allows us to identify two different tendencies. On the one hand, in efficiency-driven countries, the TEA rate is more correlated to institutions than the EBO rate (especially regulatory quality). On the other hand, in innovation-driven countries, the EBO rate is more correlated to institutions than with the TEA rate (especially rule of law).

Before we move to our concluding remarks, the specific aspects regarding studied entrepreneurial indicators based the GEM project will be discussed. Thus, the TEA rate reflects the situation on new firms' registration, bureaucracy and different procedures to start the business, while the EBO rate reflects the sustainability of the business in the economy. For this reason, TEA rate is usually high in emerging economies, but established business ownership rate is usually low (GEM, 2019). It is consistent with our statistical evidence.

It is important to underline that the GEM shows an economy could have a large number of potential and nascent entrepreneurs, but this amount will not be

transformed directly to a high number of established firms that will be sustainable for a long time.

Evidence from literature suggests that in developing countries there is a high rate of entrepreneurship, namely, the growth of new enterprises and a high proportion of start-ups. However, a much smaller percentage of such start-ups in developing efficiency-driven countries than in developed innovative-driven countries can become fast-growing firms and stay in the market, resulting in the significant contribution to added value. It could be explained by the fact that a high proportion of entrepreneurial initiatives in innovation-driven countries are initiated by opportunities that indeed make a contribution to total economic growth (Amorós, 2009). Our two samples of countries confirm this assumption (see Table 5.5).

Table 5.5: Relationship between the TEA rate and the EBO rate and economic development stage

TEA rate in the Efficiency-Driven countries	>	TEA rate in the Innovation-Driven countries
EBO rate in the Efficiency-Driven countries	<	EBO rate in the Innovation-Driven countries

Source: Author's illustration.

The schematic illustration above depicts our findings that the TEA rate is stronger connected to formal institutions than the EBO rate. This could indicate that institutions have more restrictive effect on total early entrepreneurial rate in developing countries. In addition, it could reflect that institutional system in these countries is quite young, so it affects mostly newly established businesses. In innovation-driven countries the EBO rate is stronger associated with these three formal institutions than the TEA rate. This might demonstrate the long-term historical interaction between institutions and entrepreneurship in developed countries. It might also depict less institutional restrictions and favorable conditions for total early-stage entrepreneurial activities, such as start-ups and business incubators. Hence, newly established business contributes significantly to economic growth in these countries.

We discover that the institutional dimension with the highest correlation coefficient to entrepreneurial activity is the institution of *Rule of Law*. Note that this indicates very "healthy" interaction between entrepreneurs and the legislation system. The rule of law includes fundamental variables for business activity such as property rights protection

and contract enforcement mechanism, as well as the court system, responsible for the solution of the occurring problems. This institutional dimension reflects the ability of the business to define property rights, to acquire or to dispose of the property as a result of business transactions on conditions fixed in a business contract.

If the contract is not implemented by one of the sides, the police and the judicial system included in this mechanism will intervene. In other words, the institution of the rule of law ensures the necessary legislative framework for the functioning of a business.

The second position fairly belongs to the *Control of Corruption*. It is also strongly correlated with entrepreneurial activity in all our studied cases. That institution comprises such variables as the level of transparency, the corruption level, trust in politicians, bribes and capture of the state by elites. This institution impacts both the TEA and EBA rates, because corruption may create information asymmetries, and as a result uncertainty, which has a negative effect on the business climate. Besides, in all the mentioned cases of corruption, there could be hidden barriers for "outsiders" to enter the market (capture of the state by the elite), as well as some corruption barriers such as transactional costs of "bribes" that make problems for established entrepreneurship (bribes to government officials).

The institution of *Regulatory Quality* has the least impact on entrepreneurial activity in all cases, except the EBO rate in efficiency-driven countries. The key finding is that the mature entrepreneurial activity in this group of countries has the strongest correlation with the regulatory quality compared with the rule of law and control of corruption. This leads to the assumption that mature established business is very sensitive to the regulatory quality institution, as it contains all necessary conditions for the business environment. Variables included in this institutional indicator are an investment and financial freedom, market conditions, taxes, ease of starting a business, etc. In developing countries, established business is very reactive to existing unfavorable business conditions. In this sense, financial freedom might mean low or no access to financial funds to start a business; bank loans are extremely high and unaffordable for entrepreneurs. Market conditions are also not favorable for the business. For instance, there may be unfair competitive practices, price controls and market monopolization cases, because anti-monopolistic regulations are weak. Other regulatory quality problems, that mature established business in efficiency-driven countries face, are discriminatory tariffs and taxes which can become unbearable regulatory burdens.

5.7 Conclusion

In this paper we contribute to the understanding of the impact of the particular institutional dimensions on the early and mature entrepreneurial activity. Our contribution to this topic consists of two steps. Firstly, we focus on the set of institutional dimensions that have a direct impact on entrepreneurship. Having considered an early literature, not all formal institutions from our set influence the level of entrepreneurship equally, firstly, and rule of law, control of corruption and regulatory quality are the key institutional dimensions in the context of entrepreneurial activities. Secondly, we estimate the institutional effect on two different entrepreneurship rates such as early and mature. We have revealed that the effect of institutions has a different impact on entrepreneurial activities in the beginning of launch business and later on running established firms.

Since entrepreneurship depends not only on the institutional environment but also on the stage of economic development, we conduct a cross-country analysis based on the GEM project data, including two groups of countries such as efficiency-driven and innovation-driven economies. Our empirical results confirm that in efficiency-driven countries the relationship between formal institutions and the TEA rate is more intense, while in innovation-driven countries this relationship is stronger between formal institutions and the established business ownership rate.

Better quality of institutions provides a more sustainable entrepreneurial ecosystem in the country. The implication of our research paper intends to improve the entrepreneurial landscape. This paper provides new insight into the differences between the institutional effect on two entrepreneurial rates. By using cross-sectional data, we present a basic framework for further future empirical investigation. For example, future research could be a focus on investigating this effect by using panel data to see the dynamics of this relationship.

The main message of this paper is that various formal institutions such as rule of law, control of corruption, or regulatory quality have a heterogeneous effect on the total early-stage entrepreneurial rate and established business ownership rate.

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Appendix

Table A4.1: Type of employer for the current employed populations aged 15–64 years, by locality

Type of employer	GLSS_5 (2005/2006)			GLSS_6 (2012/2013)			GLSS_7 (2016/2017)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Private sector	66.4	75.3	69.1	90	97.1	93.5	89.3	95.7	92.5
Public sector	30.8	23.1	28.5	9.2	2.6	5.9	10.1	3.9	6.9
NGOs	0.4	0.3	0.3	0.3	0.1	0.2	0.3	0.2	0.3
International Organizations	1.1	0.4	0.9	0.2	0.1	0.1	0.1	0.1	0.1
Cooperatives	0.4	0.3	0.4	0.1	0.1	0.1	0.1	0.1	0.1
Others	0.9	0.6	0.8	0.2	0.0	0.2	0.1	0.00	0.1
All	100.0	100	100	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors calculation based on the composition of the nationwide household surveys such as Ghana Living Standards Survey data, including three rounds GLSS 5, GLSS 6, GLSS7.

Table A4.2: Type of work engaged by the currently employed population aged 15–64 (by locality)

Type of work	GLSS_5 (2005/2006)			GLSS_6 (2012/2013)			GLSS_7 (2016/2017)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Wage employment	33.8	7.3	16.4	32.5	8.6	20.2	34.4	12.6	23.5
Self-employed with employees, including	6.3	3.1	4.2	9.0	3.6	6.1	6.0	2.2	4.1
Non-agricultural	5.5	1.1	2.6	7.4	1.7	4.4	5.5	1.3	3.4
Agricultural	0.8	2.0	1.6	1.6	1.9	1.7	0.5	0.9	0.7
Self-employed without employees, including	46.2	54.6	51.7	40.4	52.0	46.3	43.7	54.8	49.3
Non-agricultural	35.4	13.8	30.5	30.9	12.8	21.6	36.7	15.7	26.3
Agricultural	10.8	40.8	21.2	9.5	39.2	24.7	7.0	39.1	23.0
Contributing family workers, including	13.7	35.0	27.7	18.1	35.8	27.4	15.9	30.4	23.1
Non-agricultural	2.2	1.2	23.6	4.6	2.3	3.4	5.1	2.4	3.7
Agricultural	7.2	32.2	1.6	7.1	30.2	18.9	3.5	23.1	13.2
Other	4.3	1.6	2.5	6.4	3.3	5.1	7.3	4.9	6.2
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors calculation based on the composition of the nationwide household surveys such as GLSS data, including three rounds GLSS 5, GLSS 6, GLSS7.

Table A4.3: The list of sectors for labor productivity analysis

№	ETD sector name	Description based on ISIS Rev.4
1	***Agriculture***	Agriculture, forestry, fishing
2	***Industry, including*** Mining	Mining and quarrying
3	Manufacturing	Manufacturing
4	Utilities	Electricity, gas, steam and air conditioning supply; water supply; waste management and remediation activities.
5	Construction	Construction
6	***Services, including*** Trade services	Wholesale and retail trade; repair of motor vehicles and motorcycles; accommodation and food service activities
7	Transport services	Transportation and storage
8	Business services	Information and communication; professional, scientific and technical activities; administrative and support service activities.
9	Financial services	Financial and insurance activities
10	Government services	Public administration and defence; compulsory social security; education; human health and social work activities
11	Other services	Arts, entertainment and recreation; other service activities; activities of households as employers; undifferentiated goods- and services-producing activities of households for own use; other service activities.

Notes: ISIS rev. 4. is International Standard Industrial Classification of All Economic Activities, Revision 4.

Source: Author's illustration based on the Economic Transformation Database by de Vries et al. (2021).

Table A4.4: The list of variables of sectoral analysis based on the ETD

Original variables from the ETD	**Constructed variables based on the original**
Number of persons engaged (thousands)	Share of sectoral employment (percentage)
Gross value added at current basic prices (millions, in local currency, namely Ghanaian cedi)	Share of value added by sector (percentage)
Gross value added at constant 2015 prices (millions, in local currency, namely Ghanaian cedi)	Labor productivity (thousands, in Ghanaian cedi)

Source: Author's illustration.

Table A4.5: Comparison of results with other modern studies

Study	Period	Productivity Growth	Within-Sector Effect	Structural Change Effect, including	
				Static	Dynamic
The results of this work	1990–2000	2.95	2.94	0.42	–0.41
	2000–2009	2.27	2.28	0.79	–0.79
	2009–2018	2.94	3.72	2.77	–3.56
De Vries et al. (2015)	1990–2000	3.2	2.8	0.8	–0.3
	2000–2010	2.6	2.3	0.8	–0.5
Geiger et al. (2019)	1990–2010	2.93	2.38	0.70	–0.15
Mensah et al. (2018)	1990–2000	3.3	2.7	0.6	0.0
	2000–2015	5.1	5.2	0.4	–0.6
Diao and Hazell (2019)	1984–2011	2.93	2.14	0.78	
	2000–2011	2.73	1.93	0.80	
McMillan et al. (2017)	1992–2000	1.0	–0.9	2.0	
	2000–2006	4.5	6.0	–1.5	
	2006–2010	2.7	0.0	2.6	

Notes: the papers by De Vries et al. (2015), Mensah et al. (2018) and McMillan et al. (2017) presents cross-countries studies where Ghana was included in the sample. The papers by Geiger et al. (2019) and Diao and Hazell (2019) are country-study with full focus on Ghana.

Source: Author's illustration based on the selected papers.

Table A4.6: Results based on the paper by Jedwab and Osei (2012)

Years	Productivity Growth	Decomposition of Productivity Growth	
		Within-Sector Effect	Structural Change Effect
9 Sectors			
1992–2000	1.03	0.32	0.71
2000–2006	4.50	5.12	–0.62
2006–2010	2.74	2.36	0.37
15 Sectors			
1992–2000	1.03	–1.00	2.03
2000–2006	4.50	5.08	–0.58
2006–2010	2.74	1.56	1.17

Source: Author's illustration based on the paper by Jedwab and Osei (2012).

Table A5.1: Correlation matrix, Efficiency-Driven countries

		1	2	3	4
1	TEA rate	1.000			
2	Control of corruption	0.749	1.000		
3	Rule of law	0.819	0.665	1.000	
4	Regulatory quality	0.615	0.370	0.672	1.000
		5	2	3	4
5	EBO rate	1.000			
2	Control of corruption	0.537	1.000		
3	Rule of law	0.571	0.665	1.000	
4	Regulatory quality	0.801	0.370	0.672	1.000

Source: Authors' calculation.

Table A5.2: Correlation matrix, Innovation-Driven countries

		1	2	3	4
1	TEA rate	1.000			
2	Control of corruption	0.480	1.000		
3	Rule of law	0.567	0.905	1.000	
4	Regulatory quality	0.307	0.831	0.828	1.000
		5	2	3	4
5	EBO rate	1.000			
2	Control of corruption	0.729	1.000		
3	Rule of law	0.761	0.905	1.000	
4	Regulatory quality	0.725	0.831	0.828	1.000

Source: Authors' calculation.

Table A5.3: Regressions results for the sample of the Efficiency-Driven countries

	Model_1 TEA rate	Model_2 TEA rate	Model_3 TEA rate	Model_4 EBO rate	Model_5 EBO rate	Model_6 EBO rate
Control of corruption	0.373**			0.0991**		
	(0.137)			(0.0377)		
Rule of law		0.488***			0.126*	
		(0.144)			(0.0645)	
Regulatory quality			0.416*			0.201***
			(0.211)			(0.0507)
Constant	–14.98	–23.61**	–21.09	–0.384	–2.424	–8.836**
	(8.377)	(9.628)	(15.53)	(2.845)	(4.801)	(3.866)
R^2	0.560	0.671	0.378	0.288	0.326	0.642
Observations	11	11	11	11	11	11

Note: Robust standard errors are shown in parentheses.

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

Source: Authors' calculation.

Table A5.4: Regressions results for the sample of the Innovation-Driven countries

	Model_ 7 TEA rate	Model_8 TEA rate	Model_9 TEA rate	Model_10 EBO rate	Model _11 EBO rate	Model –12 EBO rate
Control of corruption	0.0737			0.0948**		
	(0.0439)			(0.0317)		
Rule of law		0.109**			0.124***	
		(0.0381)			(0.0371)	
Regulatory quality			0.0654			0.131**
			(0.0722)			(0.0458)
Constant	1.267	–2.184	1.654	–0.190	–3.225	–3.754
	(3.296)	(3.012)	(6.164)	(2.271)	(3.020)	(3.792)
R^2	0.231	0.321	0.094	0.531	0.579	0.525
Observations	11	11	11	11	11	11

Note: Robust standard errors are shown in parentheses.

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

Source: Authors' calculation.

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