UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

July 2017

UNCTAD Research Paper No. 2
UNCTAD/SER.RP/2017/2/Rev.1

# Innovation, diversification and inclusive development in Africa

Patrick N. Osakwe
UNCTAD

Nicole Moussa
UNCTAD

## Abstract

A key guiding principle of the newly adopted Sustainable Development Goals is to "leave no one behind." Bringing this vision to fruition will require eradication of poverty, fairer income distribution and sustained social progress over the next fifteen years. Furthermore, it will inevitably require creating decent employment through transformation of the production and export structures of African economies. This paper argues that technological innovation is vital to addressing both challenges of low structural transformation and lack of inclusive development on the continent. Against this backdrop, the paper discusses linkages between innovation, transformation and inclusion. It also presents stylized facts on transformation, the state of innovation and inclusion in Africa and, more importantly, offers policy recommendations on how to promote technological innovation to trigger transformation and build inclusive societies in Africa.

**Key words:** Africa, Diversification, Social inclusion, Technological innovation

## Contents



## Acknowledgements

The authors would like to thank Professor Karl Wohlmuth and referees of the African Development Perspectives Yearbook (volume 20) for comments on an earlier version of the paper. The authors also thank Paul Akiwumi and colleagues in the Trade and Poverty Branch (ALDC) for useful discussions.

# 1. Introduction

An overarching principle of the Sustainable Development Goals (SDGs) adopted by global leaders in 2015 is to "leave no one behind." Realizing this vision will require poverty eradication, better income distribution and sustained social progress over the next 15 years. The assessment of performance in implementation of the Millennium Development Goals (MDGs) indicates that Sub-Saharan Africa (SSA) is the only region that did not meet the MDG of halving poverty by 2015. In addition, a recent study found that by 2030 Africa will be home to a large part of the world's extreme poor (Beegle et. al. 2016). These facts suggest that if the international community want to enhance prospects for achieving the SDGs, there has to be a special focus and attention on SSA, particularly the least developed countries in the region. But there also has to be a concerted effort by the international community to engender structural transformation and foster inclusive growth thereby laying a solid foundation for sustained development and ensuring that no one is indeed left behind in the development process.

Technology and innovation are crucial for addressing the challenges of low structural transformation and inclusive development in Africa. For example, technological innovation can enhance competitiveness and trigger a shift of resources from low to high productivity activities thereby inducing transformation of the structure of an economy. It can also foster inclusion through enabling the acquisition of knowledge and skills which permit economic agents to fully participate in, and benefit from, the development process.[1] Against this backdrop, this paper presents stylized facts on structural transformation, the state of innovation and inclusion in Africa and, more importantly, offers recommendations on how to promote technological innovation to trigger structural transformation, build inclusive societies, and enhance prospects for achieving the SDGs in Africa. The paper is organised as follows: Section 2 discusses channels through which technological innovation could affect structural transformation and inclusion. Section 3 presents some stylized facts on structural transformation in Africa while Section 4 assesses Africa's performance in achieving the goal of building inclusive societies as reflected in the SDGs. Section 5 examines the state of technology and innovation in Africa and Section 6 discusses policies that could be adopted to foster technology and innovation with a view to promoting transformation and inclusive development in Africa. Section 7 contains concluding remarks.

# 2. Innovation, transformation and inclusion: the linkages

The economic literature suggests that development occurs through structural changes involving movement of labour and other resources from low to high productivity activities both within and across sectors (Pack 2012). Osakwe (2016) shows that African countries have not been able to successfully transform their economies and foster inclusive development despite the rapid growth experienced by the continent over the past decade. This paper argues that technological innovation will play a vital role in addressing both the challenges of structural transformation and inclusive development and African governments should therefore, strengthen efforts to foster technological innovation. In this section, we draw on insights from the economic literature to delineate mechanisms through which technological innovation can be linked to transformation and inclusion. Economic theory suggests that technological innovation is the main driver of sustained long run growth and the diffusion of such innovation permits lagging countries to shift production towards sectors with increasing returns thereby promoting growth convergence (Verspagen 2004; Aghion and Howitt 1998). Technological innovations are associated with new products and processes and a

[1] Note that technological progress can foster inclusion only if people can access and use new technology and innovation. If some segments of society (for example, unskilled workers) do not have good and affordable access to new technology, then technological progress can indeed become a source of social exclusion.

create new patterns of demand resulting in a change in the sectoral composition of an economy. In addit they trigger investment, enhance productivity growth and bring about changes in the organisation of firms (Sandven, Smith and Kaloudis 2005).

In the Schumpeterian literature on economic growth, the interaction of demand growth and technologi learning induces structural change in an economy towards technology intensive sectors resulting in higher growth rates (Cimoli et. al. 2011; Schumpeter 1934). When a new technology is introduced and diffused tends to have a structural impact because it leads to an increase in activities that rely on the new techno anda decrease in those activities associated with older technologies. Furthermore, new technologies a generally associated with an increase in productivity and so countries that are at the technological fron are able to compete in new sectors and their economic structure towards more technology intensive sectors. The focus of the discussion so far has been on how technological innovation affects structu change. But the literature also recognises the fact that innovations tend to evolve much faster in so activities (such as manufacturing) than in others (such as agriculture) and so the structure of an economy also have an impact on the pace of technological innovation. For example, countries that have an indus structure tilted towards high-tech sectors experience faster technological progress than those relying on low tech sectors. In this context, the structure of an economy can affect the rate at which it approaches t technological frontier and so affect the technology gap between countries (Cimoli et. al. 2011).

With regard to inclusive development, the literature suggests that technological innovation plays a crucial ro in determining whether or not the growth and development process in a society is inclusive. To the ext that new technologies result in better quality jobs (particularly for the poor), reduce environmental pollut increase efficiency of resource use, and improve health, they can have a positive impact on living stand and make the growth process more inclusive (Naude and Nagler 2015). Innovation can also have a positive impact on income distribution if it gives vulnerable groups better access to markets and permits them to t advantage of opportunities created in the development process. For example, the rapid spread of mobile telephones in Africa has been credited with giving poor farmers better access to finance. It has also b used by some governments to provide input subsidies directly to farmers thereby eliminating middle reducing leakages in the delivery system (Osakwe and Poretti 2015). While technological innovation could have a positive impact on growth and inclusion, there is also recognition that it can be a source of soc exclusion. One channel through which innovations could lead to social exclusion in an economy is through the nature of technological change, as reflected in new technologies being capital rather th labour-intensive. Since labour is the only asset owned by most poor people, innovations that are associa with capital intensive techniques (which use more of skilled rather than unskilled labour) make it challeng for vulnerable groups to participate in the growth process and so increase inequality. But technologi innovation can also foster social exclusion through having adverse effects on the environment environmental services which tend to have a disproportionately negative impact on the poor (UNCTAD 2 In sum, the literature suggests that technological innovation can have a structural impact and that its effect on the distribution of income will depend in part on the nature of new innovations and whether vulnerable groups can access and use such innovations.

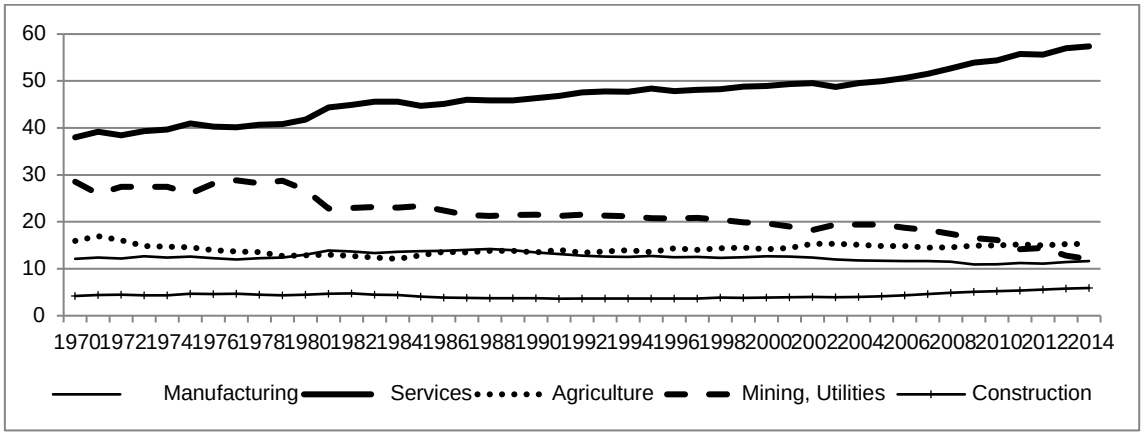
# 3. Scope and nature of structural transformation in Africa

To understand the scope and nature of structural changes that have taken place in Africa over the past decades, this section examines structural transformation from both a domestic and an internation perspective. At the domestic level, the focus is on the contribution of key economic activities or sectors (agriculture, manufacturing, services etc.) to output and employment. And at the international level, the fo is on the contribution of manufacturing to total exports and the contribution of technology-intensive exports to total manufacturing exports.

## Output and employment

There has been a significant change in the structure of African economies over the past few decades, w services playing a dominant and increasing role both in output and employment. Figure 1 shows that the share of services in value added increased from 38 per cent in 1970 to 57 per cent in 2014. This increase in the share of services went hand in hand with a decrease in the share of mining and utilities in total va added. With regard to agriculture, its share has been relatively low and flat over the period and in 2014 it accounted for just 15 per cent of total value added in Africa. As with the agriculture sector, the share of manufacturing in value added remains very low relative to the share of the services sector. In fact, in 2014 manufacturing accounted for only 12 per cent of total value added, which is lower than its peak value of 14 per cent in the 1980s.

Figure 1.Share of economic activities in real value added in Africa (%), 1970-2014




Source: UNCTADStat database (http://unctad.org/en/Pages/Statisti

Note: Value added measured at 2005 constant prices.

Another approach to examining the nature of structural change that has occurred in Africa at the dome level is to look at the share of various activities in total employment. It is well known that most of the continents labour force is in the agriculture sector. In particular, in most countries, two-thirds of the labour force works in the agriculture sector[2] which accounts for a low share of value added, indicating that average labour productivity is much lower in agriculture than in other key sectors. The finding that labou productivity in agriculture is relatively very low suggests that there is a need to reallocate some labou productive activities in industry and services. While some of this reallocation is already taking place, they seem to be going mostly to the services sector and, more importantly, to low rather than high productiv activities in the services sector.

To further explore the productivity issue, we calculate relative productivity levels across sectors using an extended version of the Groningen Growth and Development Center (GGDC) database, which prov disaggregated data on employment and value added for 13 African countries beginning in 1960.[2] The results suggest that in 2010 (relative to the situation in 1960): (1) labour productivity in manufacturing eith declined or remained largely unchanged in most of the countries in the sample, Botswana being a exception; (2) in most countries labour productivities were relatively high in the mining sector; and (3) a lot of the labour that moved from agriculture and industry into the services sector ended up in the categ "other services" which consists of: community, social and personal services, government services, and trade, restaurants and hotels. These activities classified under "other services" have very low productivity comp to the other components of services such as "finance, insurance, real estate and business services" a

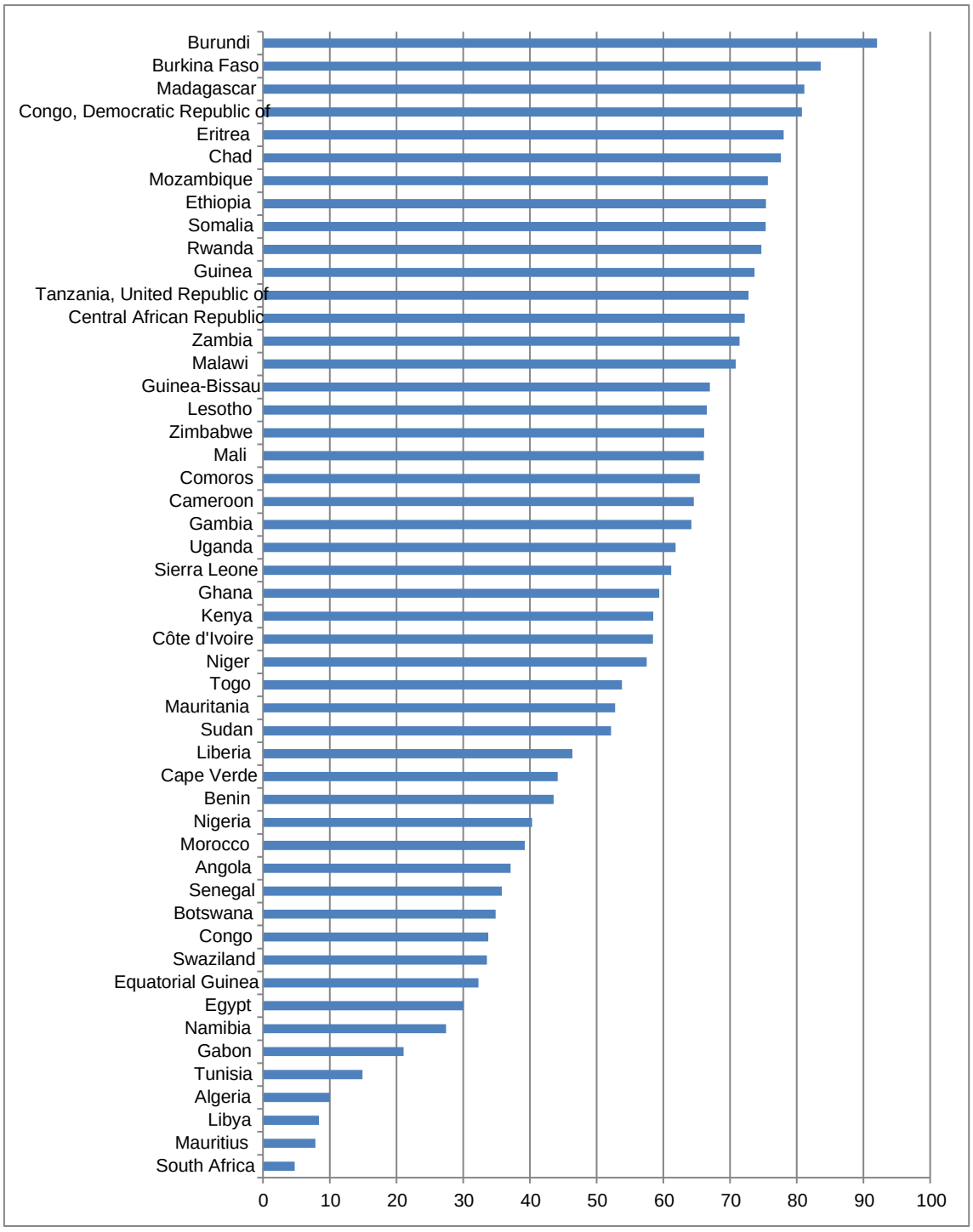
[2] The countries are: Botswana, Egypt, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Morocco, Nigeria, Senegal, South Africa, U Republic of Tanzania, and Zambia.

"transport, storage and communications." The category "other services" also has the second lowest productivity level after agriculture. Historically, at the initial stage of development labour tends to move f agriculture to manufacturing and then, as incomes rise, to services. However, African countries seem to be by-passing this normal process of structural change, with labour moving from agriculture and industry low-productivity services. This development is of concern to African countries because it has negati consequences for their ability to exploit the potential of industrialisation for employment generation.

An interesting question to pose at this stage is what factors drive productivity changes in Africa? Follow McMillan and Rodrik (2011) and de Vries et al. (2015), we decompose labour productivity growth into three components: the within effect (which captures productivity growth within sectors), the static between (which reflects differences in productivity levels across sectors); and the dynamic between effect (which reflects differences in productivity growth across sectors). The within effect will be positive when labo productivity growth in the sectors is positive and the between effects are positive when labour moves fro less to a more productive sector. Figure 3 shows that a lot of the productivity growth that occurred in African countries in the sample in the period 2000-2010 was driven by positive productivity growth within sectors (the within effect) and a reallocation of labour from sectors with low productivity levels to those with hig productivity levels (the between static effect). The results also show that the reallocation of labour across sectors also created dynamic losses in the sense that the marginal productivity of additional workers in expanding sectors has been below the existing activities in other sectors and this is reflected in the fact that the between dynamic effects are negative.

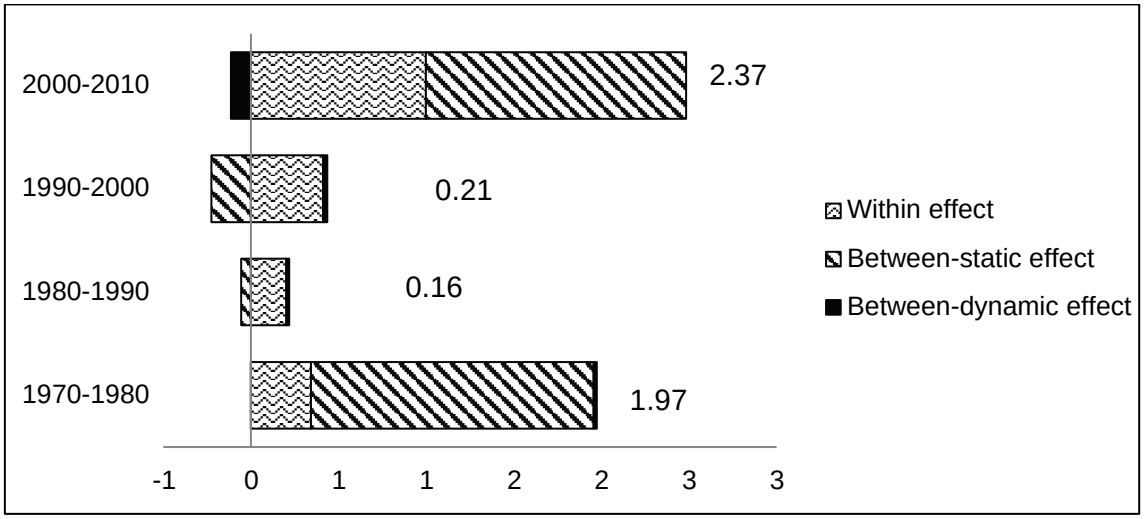
Africa's patterns of structural changes and productivity growth are quite different from those of developing Asia, where all three components of productivity growth made positive contributions over the past fo decades (Figure 4). In the 1990s and 2000s, within sector productivity grew in all sectors, but mostly in manufacturing, boosted by high investment levels, which in turn generated various linkages and posit effects of economies of scale, technological advance, and knowledge and skills acquisition (UNCTAD 20 This process generated a positive dynamic reallocation effect that has been growing over the decades, indicating that the movement of workers affected positively the growth of productivity in the expandi sectors, which was mainly manufacturing.

Figure 2 Agriculture's share of total employment in 2012 (%)




Source: Compiled based on data from the ILO's GET 2014 database, http://ilo.org/global/research/global-reports/global-employment-trends/2014/WCMS_234879/lang--en/index.htm).

Figure 3.Average annual labour productivity growth in Africa by driving factors (%), 1970-2010




Source: Computed based on data from the GGDC database (http://www.rug.nl/ggdc/productivity/10 sector database).

Figure 4 Average annual labour productivity growth in Asia by driving factors (%), 1970-2010