Three Interventions to Foster Sustainable Transformation in Africa

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In recent years several African countries have embarked on reforms aimed at structurally transforming their economies to minimize their dependence on primary exports and generate greater employment opportunities through value-addition. Meanwhile, the recently adopted 2030 Agenda for Sustainable Development and Africa's continental development initiative (i.e., Agenda 2063) call on member countries to integrate environmental, social and economic sustainability considerations into their transformation initiatives and to avoid the untenable "grow first and clean up later" strategy pursued by industrialized countries. This paradigm shift essentially makes sustainability an integral component of any structural transformation initiative going forward. However, the experiences of industrialized and emerging countries highlight potential trade-offs between growth, social inclusion and environmental conservation. For instance, China's transformation has been associated with steep declines in poverty but rising inequalities and dramatic increases in the level of greenhouse gas emissions. How will the pursuit of sustainable development influence structural transformation pathways in Africa? We argue that sustainable structural transformation requires careful sequencing of policies to minimize trade-offs and leverage synergies among the economic, social and environmental dimensions of sustainability. Drawing on the New Structuralist Economics school of thought which posits that structural transformation requires factor endowment upgrading underpinned by active government intervention, we identify three mutually reinforcing areas of intervention to catalyse sustainable structural transformation in Africa: investments in human development; investments in energy; and leveraging innovations in mobile telephone technologies for financial inclusion.

Key Words: Structural transformation, Sustainable development, energy, financial inclusion, human development.

1. Introduction

For over a decade, Africa has made significant progress in sustaining positive growth while improving its performance on social

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indicators such as health and education. Real GDP increased by 54 percent between 2004 and 2014, which is more than twice the global rate of 24 percent (UNCTAD, 2016). Over the same period, maternal and child mortality halved, while several countries achieved universal primary enrolment as well as gender parity at the primary level of education (ECA et al., 2015). These developments transformed Africa's narrative from a hopeless continent to a continent on the rise.

Notwithstanding these positive developments, a number of countervailing trends raise doubts about the sustainability of the continent's development trajectory. First, growth has been associated with limited employment opportunities and only marginal declines in poverty. Extreme poverty (measured at $1.25 per day) in Sub-Saharan Africa declined a mere 15 percent over the 23-year period from 1990 to 2013. Meanwhile, the number of people classified as extremely poor increased by 109 million during the period 1990 to 2012 (UNSD, 2016) while unemployment and underemployment remain enduring features of the development landscape. Approximately 70 percent of jobs in Sub-Saharan Africa are classified as vulnerable and youth unemployment averaged 21.1 percent in 2014 (ECA et al., 2016).

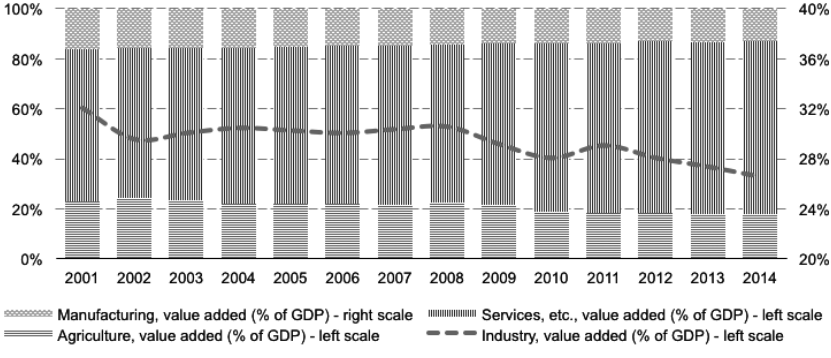
The continent is also characterized by high levels of income inequality and inequalities in access to social services. Measured by the Gini coefficient, Africa's income inequality (0.439 over the period 2000–2009) is second only to Latin America's (0.522 percent) (AfDB, 2012). In 2010, six out of the 10 most unequal countries worldwide were in Africa; Southern Africa is the most unequal sub-region of the continent (Armah et al., 2014).

Income inequalities have translated into pervasive disparities in access to social services. Births to women in the top quintile are nearly three times more likely to be attended by a trained professional than births to women in the poorest quintile. Ninety percent of women living in urban areas have at least one antenatal care visit during pregnancy, compared to 71 percent of women living in rural areas (ECA, 2011). Children and adolescents from the poorest households are at least three times more likely to be out of school than children from the richest households. And children from the poorest households are more than twice as likely to be stunted as children from the richest households, leading to further school dropouts (ECA, 2014).

One school of thought attributes the limited inclusiveness of growth to the lack of structural transformation or the failure of most

African countries to significantly transform their low productivity agrarian economies into high productivity industrial ones. Most African countries depend on a narrow range of primary commodities, which renders them vulnerable to external shocks and undermines prospects for job creation through value addition and beneficiation. Indeed, the current pattern of development in most African countries runs counter to the expected pattern in most emerging countries (McMillan and Rodrik, 2011). Growth has been driven largely by the services sector while the contribution (using the value-added approach to GDP estimation) of manufacturing, to GDP has declined since 2001, stagnating at around 11 percent of GDP (see figure 1).

Figure 1. Sectoral contributions to GDP in Africa



Source: Armah and Baek (2015)

The environmental impact of growth depends on the indicator being examined. The impact of growth on the level of greenhouse gas emissions has been minimal but the growth of such emissions has been rising in recent years. Africa has the lowest level of greenhouse gas emissions globally, however; like the rest of the world, the continent's emissions are closely associated with GDP per-capita growth (see figure 2 and 3) (Armah and Baek, 2015).

This relationship suggests that notwithstanding the relatively low share of manufacturing in GDP, the current growth pattern in Africa is environmentally unsustainable and inconsistent with the objectives of the Sustainable Development Goals, which call on countries to simultaneously achieve the triple objectives of economic, social and environmental sustainability. In this context, the experience of emerging countries like China, where steep reductions in poverty have been associated with substantial increases in inequality and greenhouse gas

emissions, is instructive. China reduced poverty from over 60 percent in 1990 to less than 10 percent in 2010, lifting 566 million people out of extreme poverty, yet income inequality and greenhouse gas emissions increased substantially over the same period.

Figure 2. Carbon dioxide emissions & per capita GDP growth trends in Sub-Saharan Africa

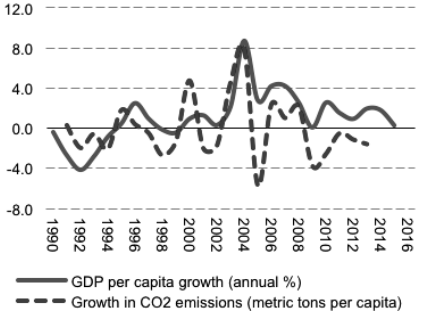
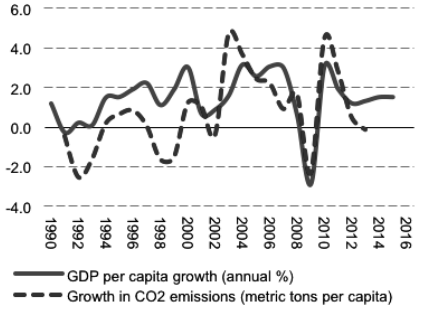


Figure 3. Carbon dioxide emissions & per capita GDP growth trends globally



Source: Armah and Baek (2015)

In an effort to increase employment opportunities and reduce inequalities, African countries have prioritized commodity-based industrialization as a strategy for structural transformation in a continental development strategy called Agenda 2063. At the global level, African leaders have also signed on to the 2030 Agenda for Sustainable Development, which also emphasizes industrialization and value addition as key development objectives. Furthermore, to avoid the experiences of industrialized and emerging countries, both agendas prioritize social inclusion and environmental conservation as integral components of structural transformation.

These trends signal a paradigm shift from traditional notions of structural transformation which emphasize productivity improvements, sectoral shifts and demographic transitions but exclude issues of social inclusion and environmental sustainability (e.g., Timmer, 2007). Thus, integrating social and environmental sustainability considerations in the development paradigm requires a broader definition of structural transformation; however, it also raises questions about the appropriate policy measures required for its achievement (Dabla-Norris et al., 2013; Armah et al., 2014; Armah and Baek, 2015). For instance, how can countries expand manufacturing output without damaging the environment or widening inequalities?

This study identifies investments in human capital, renewable

energy and financial inclusion as mutually reinforcing and catalytic interventions that can promote economic, social and environmental sustainability. For instance, investments in renewable energy foster growth and employment with limited environmental impact. Leveraging ICT, particularly mobile telephones, for financial inclusion fosters social inclusion by facilitating access to financial services by vulnerable segments of society.

2. Achieving sustainable structural transformation

Operationalizing a structural transformation agenda that is anchored by economic, social and environmental sustainability requires an understanding of how the three dimensions interact. A substantial body of work on sustainable development has focused on the growth and environment nexus (Michaelowa and Michaelowa, 2009). For instance, the Brundtland Commission, which pioneered the concept of sustainable development, defined it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Agenda 21, the outcome document of the Earth Summit held in Rio de Janeiro in 1992, called for the integration of environmental and developmental concerns. Subsequently, in 2012, the Rio +20 Conference called on UN member States to "further mainstream sustainable development at all levels, integrating economic, social and environmental aspects and recognizing their interlinkages, so as to achieve sustainable development in all its dimensions." (UN, 2012). However, the concept of sustainable development has been challenged on several grounds. One school of thought is that growth is inherently unsustainable because it is accompanied by a depletion of resources and environmental degradation (Repetto et al., 1989; Pearce and Atkinson, 1993; Hamilton and Clemens, 1999; Dasgupta, 2013).

Concerns about the potential tensions between growth and environmental sustainability are mirrored in the structural transformation literature as well. A widely agreed definition of structural transformation refers to a process by which the relative importance of different sectors and activities of an economy changes over time. In the African context, this implies: a relative decline of low-productivity agriculture and low value-added extractive activities; a relative increase in manufacturing and high-productivity services; a decline in the relative share of agricultural employment in GDP; rural-to-urban migration that stimulates the

process of urbanization; and a rise of a modern industrial and service economy (Timmer, 2007). However, while structural transformation lays the foundation for high and sustained economic growth, it is likely to lead to deterioration in environmental quality, unless deliberate action is taken to ensure environmental sustainability during the transformation process (UNCTAD, 2012).

The views expressed above are consistent with the Environmental Kuznets curve concept (Grossman and Krueger, 1995; López-Menéndez, Pérez and Moreno, 2014) which provides a theoretical framework for the analysis of the relationship between growth and the environment. According to this school of thought industrial development initially causes higher emissions of greenhouse gases; however, net emissions eventually drop as the increase in income level leads to technological advancements associated with curbing such emissions.

However, the empirical validity of the Kuznets curve depends on the environmental good in question. For instance, while carbon dioxide emissions hardly decline with levels of development, sulphur dioxide[2] emissions declined 74 percent among European Union countries due to factors such as fuel-switching to low-Sulphur fuels such as natural gas and the impact of EU directives relating to the Sulphur content of certain fuels (European Environmental Agency, 2017).

A contrasting school of thought argues that with current technological innovations newly developing countries can decouple greenhouse gas emissions from their developmental process. Indeed, the experiences of Norway and Sweden suggest that countries can achieve high levels of Human Development (measured by the HDI) while attaining low levels of carbon dioxide emissions per capita (Bhattacharjee and Iftikhar, 2011). Furthermore, some scholars (e.g., Collier and Venables, 2012; Simon, 2013) argue that relative to other continents, the potential for economic greening is higher in Africa because the continent has a geographical advantage for producing renewable energies, given its vast untapped water resources and abundant sunshine. Additionally, Africa could leapfrog fossil fuels to green energy if it were to benefit from the diffusion of green technology already developed in the global

[2] Sulphur dioxide is emitted when fuels or other materials containing Sulphur are combusted or oxidized. It is a pollutant that contributes to acid deposition resulting in changes in soil and water quality with adverse effects on aquatic ecosystems in rivers and lakes and damage to forests, crops and other vegetation (European Environmental Agency website accessed May 25 2017: https://www.eea.europa.eu/data-and-maps/indicators/eea-32-sulphur-dioxide-so2-emissions-1/assessment-3).

West. This would position the continent to leverage synergies between environmental and economic development at the early stages of the development process. In fact, some Africa countries (e.g., Ethiopia) are among the global front runners in this arena (UNEP, 2015).

But the environment is only one aspect of sustainable development. What synergies or trade-offs exist between the pursuit of economic growth and social inclusion? One school of thought, which is in line with the "grow first and redistribute later" strategy (Kuznets, 1955; Smith, 1982/1759), hypothesizes an inverted U-shaped relationship between inequality and growth, with inequality increasing in the early stages of development as capital holders become relatively wealthier due to new opportunities to invest, and subsequently decreasing as the benefits of transformation trickle down to the population.

In contrast to Kuznets, other scholars argue that reducing inequality promotes growth by ensuring a more optimal allocation of resources (Aghion and Bolton, 1992; Banerjee and Newman, 1993; Piketty, 1997), and enhancing human capital development (Perotti, 1996). The latter line of thinking has implications for policy sequencing; countries must prioritize social inclusion if they are to accelerate growth.

Other studies argue that the relationship between growth and inequality depends on other characteristics such as the structure of economies, political and social institutions and cultural heritage (Kaelble and Thomas, 1991). Hence, this school of thought emphasizes the role of income transfer mechanisms in decoupling growth from income inequality (Palma, 2011).

The country-level evidence on the nexus between growth and social inclusion is mixed and significantly depends on the policy approaches (Herzer and Vollmer, 2012). The structural transformation process observed in some Asian countries such as South Korea, Taiwan and Singapore were mainly associated with substantial growth in the manufacturing and export sectors during the 1960–1990s period, which resulted in substantial reductions in absolute poverty while maintaining low (tolerable) levels of income inequality. This ideal outcome was possible because these countries immediately reinvested the benefits from economic growth into areas that supported an inclusive growth process, including land reform and universal education (Stiglitz, 1996).

The foregoing analysis of the literature suggests that the pursuit of economic, social, and environmental sustainability is a complex objective that requires active policy interventions to minimize trade-offs and

leverage synergies. This raises the question of the appropriate policy choices that can leverage synergies and minimize trade-offs across the economic, social and environmental dimensions of development?

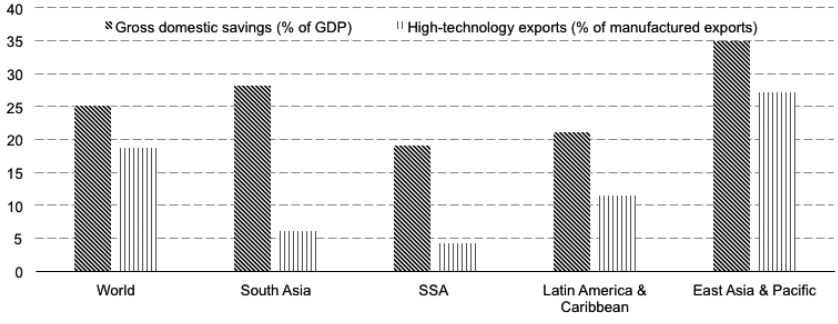
3. Perspectives from the New Structural Economics

Recent perspectives by the New Structural Economics school of thought provide useful insights in this regard (Lin, 2012). This development paradigm emerged in response to the failure of structural adjustment programmes to stimulate growth in developing countries and the realization that the emerging countries of East Asia succeeded in structurally transforming their economies without following the dominant neo-liberal market approach. The New Structural economists posit that the structure of an economy and its comparative advantage depend on the structure and composition of its factor endowments. While factor endowments are given in the short term, they can be altered in the long term through upgrading and technological innovation. They argue that it is only by changing a country's factor endowments, including through continual technological innovation, that a country can achieve sustained economic development and an optimal industrial structure.

While the New Structuralists acknowledge the central role of markets in facilitating the upgrading of factor endowments, they accord governments an active role in "coordinating investments for industrial upgrading and diversification and in compensating for externalities generated by first movers in the dynamic growth process" (Lin, 2012). To improve industrial competitiveness, countries need to increase the relative share of capital, technology and infrastructure in their factor endowment mix (Chang and Baek, 2010).

In several respects the New Structural Economics paradigm speaks to the development realities of most African economies, which tend to score relatively low on investment, savings and technological innovation indicators. Sub-Saharan African countries on average have lower savings and investment to GDP ratios than other regions of the world (see figure 4) and the technological content of their manufactured exports is also relatively lower than the global average (see figure 5), due in part to limited investments in research and development (see figure 6).

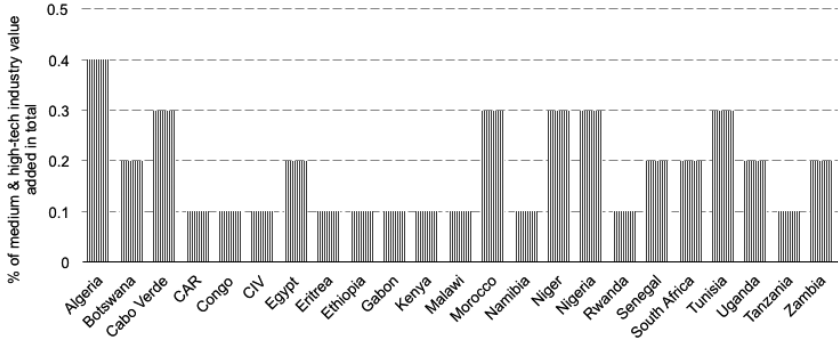
Figure 4. Average trends in savings and high-tech exports, 2002–2015



Source: Author's own elaboration on the basis of the World Bank (2017)

The school of thought is, however, silent on the specific capital and technology investments that are needed and on the appropriate sequencing of the upgrading process. Appropriate sequencing requires an understanding of the sectoral interlinkages of policy actions and an appreciation of the potential impacts, trade-offs and synergies associated with specific policy actions. The question is what policy interventions are likely to have the greatest catalytic impact on factor upgrading in Africa without degrading the environment or compromising social inclusion.

Figure 5. Proportion of medium and high-tech industry value added in total value added

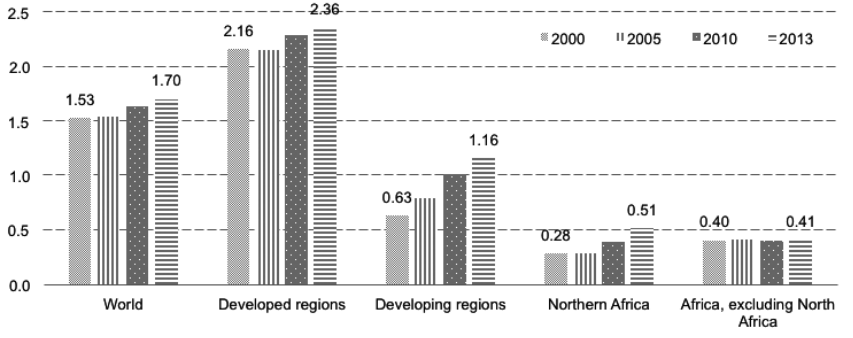


Source: Author's own elaboration on the basis of the UNSD (2017)

Using panel data for 29 African countries for the period 1995–2011 to analyze the contributions of economic, social and environmental sustainability to sustainable structural transformation in Africa, Armah and Baek (2015) find that an integrated approach to sustainable

development that takes into account the economic, social and environmental dimensions has the most beneficial impact on Africa's structural transformation process.

Figure 6. Research and development expenditure as a share of GDP



Source: Author's own elaboration on the basis of the UNSD (2017)

The main policy conclusion of the study is that countries should not prioritize one dimension over the other but should adopt a simultaneous approach that accords greater priority to interventions that unlock the most binding structural constraints. Investments in social development without appropriate investments in economic development will likely result in a brain-drain, as has been the case in several African countries. Similarly, investments in economic infrastructure without corresponding investments in human development will likely create domestic labor supply and demand mismatches necessitating the importation of skilled labor or resulting in inefficiencies.

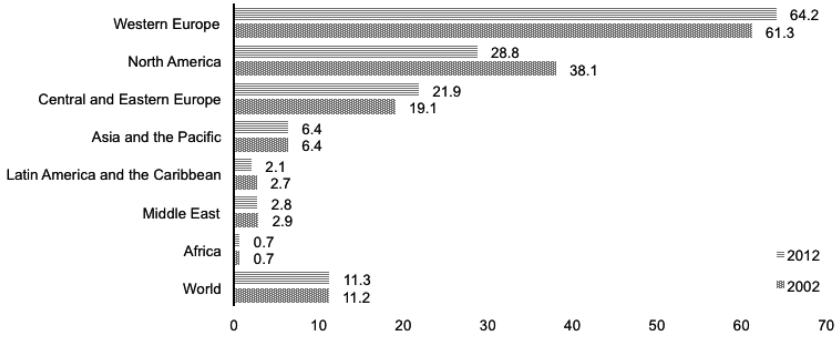
Building on the New Structuralist approach, this study highlights three key areas of factor upgrading that are critical to Africa's transformation process: human capital development (i.e., investments in health and education); investments in energy infrastructure; and leveraging mobile technology for financial inclusion and entrepreneurship.

4. Human Capital Upgrading

Without significant investments in human capital development, an economy cannot fully capitalize on investments in capital and technology. Indeed, the benefits of such investments will likely be captured by a small segment of the population, resulting in a widening of inequalities. Alternatively, skilled unemployed labor will seek greener pastures in other countries, leading to a brain-drain. Furthermore, investments in human development can nurture environmental consciousness and

promote buy-in for environmentally friendly technologies and policies. Indicators of human capital development in Africa are improving but fall short of the levels required to sustain growth and transformation. Primary enrolment rates improved markedly during the era of the Millennium Development Goals; however, enrollment at the tertiary levels remains low. Furthermore, enrolment is skewed towards the arts and humanities with disproportionately low enrolments in science and technology. The quality of educational facilities as well as the alignment of skills to the requisite needs of the labor market are other areas of concern.

Figure 7. Proportion of unemployed receiving unemployment benefits (percent)



Source: Author's own elaboration on the basis of the UNSD (2016)

Moreover, for those with educational qualifications, porous social safety nets coupled with the lack of decent employment opportunities contribute to poverty among the working class. Approximately 60 percent of jobs in Africa are considered vulnerable and less than 1 percent of the unemployed receive unemployment benefits (ILO, 2016). By 2015, one-third of the working population in Sub-Saharan Africa lived in extreme poverty and the incidence of poverty is higher among the youth and women (UNSD, 2016).

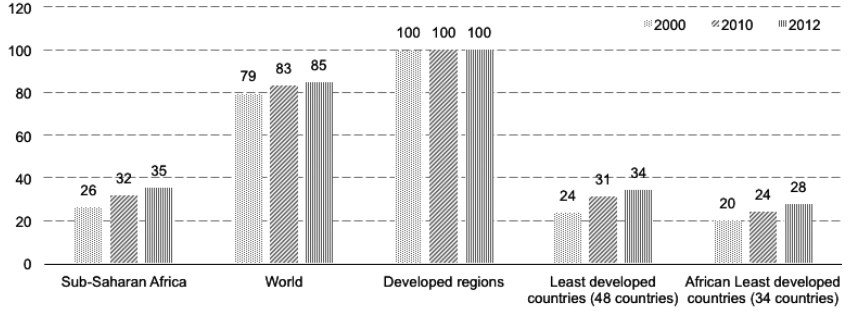
Besides skills development, investments in health are also critical for human capital development. There have been marked improvements in health indicators in Africa, particularly in the area of child and maternal deaths, malaria and HIV/AIDS. However, the levels remain high and constitute constraints to human capital development. Maternal mortality declined 35 percent between 2000 and 2015 while under-five mortality fell 46 percent over the same period in Sub-Saharan Africa. These developments are attributable in part to improved access to skilled

birth attendants, vaccinations and a decline in adolescent fertility rates. The latter declined by 21 percent between 2000 and 2015 even though as of 2015 Africa had the highest adolescent birth rate of 102 births per 1,000 women aged 15–19 globally. Notwithstanding these positive improvements, in 2015 there were 546 maternal deaths for every 100,000 live childbirths. In the same year there were 1.5 new cases of HIV/AIDS per 1,000 uninfected people. And for every 1000 live births 83 children did not survive their fifth birthday. In effect, poor health systems are taking a toll on Africa's labor force. Without concerted efforts to improve healthcare, the continent will not reap the full benefits of its human capital.

5. Energy

Energy is the lifeblood of socio-economic activity, with implications for the environment as well. Limited and unreliable access to energy and inefficiencies in transmission and use of energy in Africa constitute a binding constraint to development. The majority (i.e. 75 percent in 2012) of African households have no access to electricity (see figure 8). As a result, power consumption per capita in Africa is estimated at 0.57 MWh/capita in 2014, which is a mere 19 percent of the global per capita consumption of 3.03 MWh/capita (IEA, 2016b).

Figure 8. Proportion of population with access to electricity (Megajoules per constant USD 2011 PPP GDP)



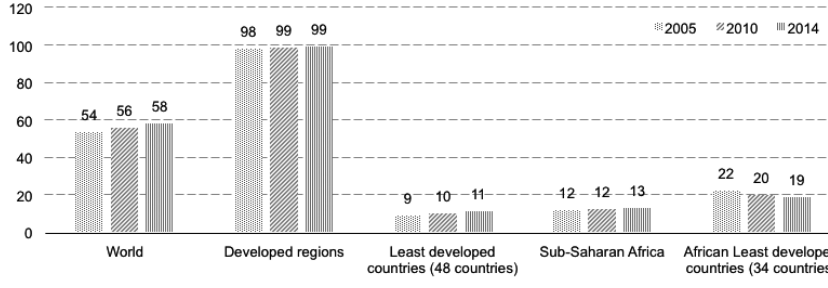
Source: Author's own elaboration on the basis of the UNSD (2016)

Energy inefficiencies (measured by energy intensity or megajoules per US dollar), particularly in Africa's least developed countries, are almost twice the global average. Inefficiencies stem from the fact that as much as 40 percent of power generated is lost in transmission and distribution. Improving energy efficiency can provide social benefits such as

reductions in the high energy cost burden faced by low income households and conservation of finite resources such as oil and natural gas.

The economic costs of unreliable access to energy is estimated at 2 percent of Africa's GDP (AfDB, 2014). But the energy challenge has both social and environmental consequences. As of 2013, only 13 percent of the Sub-Saharan Africa population had access to clean fuels, compared to the world average of 58 percent. The main source of energy supply in Africa is solid fuels (i.e., charcoal) and the continent accounted for 29.3 percent of the world's solid biofuels supply, second only to China (29.9 per cent in 2014) (IEA, 2016a).

Figure 9. Proportion of population with primary reliance on clean fuels and technology



Source: Author's own elaboration on the basis of the UNSD (2016)

The use of solid biofuels, however, has adverse implications for the continent's forest cover. Furthermore, the time spent, particularly by women, in gathering solid fuels for household use decreases the time they spend on educational activities, thus potentially compromising their educational outcomes.

Moreover, approximately 600,000 Africans (mostly women and children) die annually due to indoor air pollution associated with the use of wood fuel for cooking; and 30 percent of health centers operate without electricity, rendering lives at risk in hospitals, as life-saving equipment and services lie unused because of lack of electricity (AfDB, 2014).

Africa's energy deficits also have adverse implications for the education sector. Over 90 percent of Africa's primary schools lack electricity, which in turn affects the quality of learning through its impact on access to training materials such as computers, lighting and basic administrative support systems.

6. Opportunities for factor upgrading

Exploiting Africa's renewable energy potential

Globally, renewable energy accounts for 13.8 percent of the total energy supply, with hydro-power constituting the largest (72.3 percent) source of renewable electricity and 16.4 percent of global electricity supply. Solid biofuels/charcoal comprise the largest (66 percent) share of renewables followed by hydro-power (17 percent) and other renewables (i.e., geothermal, liquid biofuels, biogases, solar etc.) which account for a much smaller share of the renewable energy supply. However, solar energy constitutes the fastest growing component of the renewable energy mix. The latter grew at 46.2 percent followed by wind (24 percent) (IEA, 2016a).

The opportunities for addressing Africa's energy deficits are huge in light of its resource endowments. The continent has a significant share of the world's renewable energy: hydropower, bio-energy, geothermal, solar and wind power. Currently it is estimated that only 5 percent of Africa's vast hydropower resources are being tapped. The Democratic Republic of the Congo and Ethiopia alone have the capacity to supply most of Africa's energy needs. But this will require substantial investments in regional interconnection energy networks to enable the trading of electricity. For instance, the Grand Inga on the Congo river can generate 300TwH (Terawatt hours) of hydro-electricity per year, enough to supply 60 percent of the continent's energy needs (AfDB, 2014).

In addition to hydro-power, Africa has strong potential in geothermal energy. Besides Asia/Pacific, the east Africa rift valley has the greatest potential for geothermal energy, with Kenya leading in this area.

Beyond boosting the energy supply, African countries must improve energy efficiency by addressing losses in the generation, transmission and distribution of energy. In Africa, regular maintenance and upgrading of electricity generating plants as well as investments in modernizing transmission and distribution networks will be key to improving energy efficiency.

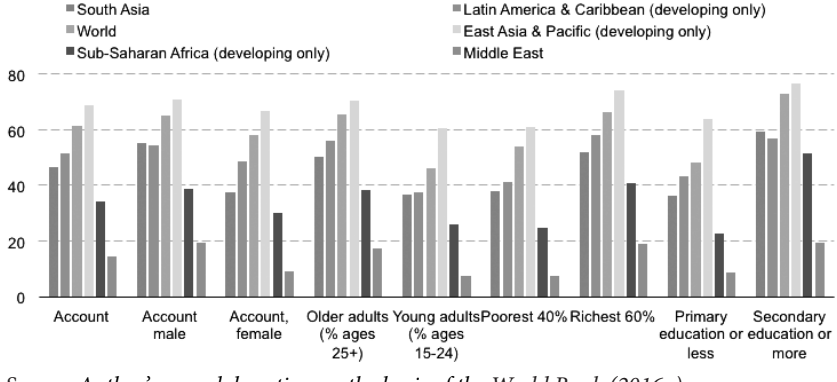
The decline in energy intensity in developed countries has been driven largely by improved energy efficiency in key end-uses such as vehicles, appliances, and industrial processes. In addition, governments have implemented a wide range of policies and programmes, such as funding research and development (R&D), energy efficiency standards, educational efforts, obligations on market actors and financial incentives to accelerate the development and adoption of energy efficiency measures.

Leveraging ICT for Financial inclusion and growth

Inadequate infrastructure and the lack of financial inclusion are the two most commonly identified constraints that inhibit the expansion of sectors that have the potential to create 'good jobs' (McKinsey Report, 2012). Financial inclusion improves the range, quality and availability of financial services to the unserved and under-served segments of society by promoting access and usage of financial services. It does so by ensuring access by vulnerable and excluded groups to appropriate financial products and services at an affordable cost and in a fair, transparent manner. Beyond access, financial inclusion promotes the usage of such services through financial literacy programmes.

However, most African countries lack adequate financial infrastructure (e.g., low numbers of bank branches and automated teller machines) to absorb the financially excluded, resulting in low levels of financial inclusion. For instance, the continent has the lowest population share of account holders despite a 10 percentage point increase (from 24 percent to 34 percent) over the 2011–2014 period (Demirguc-Kunt et al., 2015). It is noteworthy that account ownership improves with the level of education, reflecting a link between human capital development and financial inclusion (see figure 10).

Figure 10. Percent share of the Population with Accounts (15yrs +), 2014



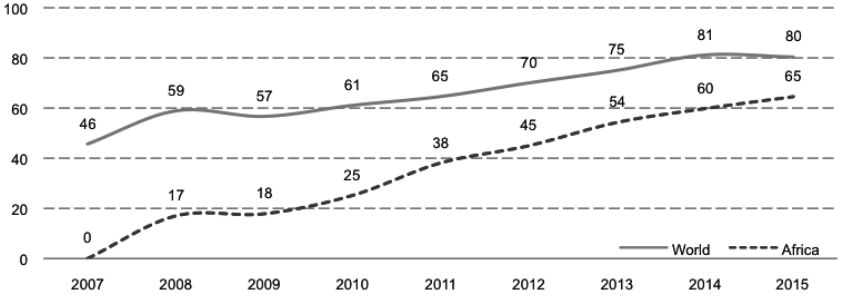
Source: Author's own elaboration on the basis of the World Bank (2016a)

Furthermore, at a coverage rate of less than 10 branches per 100,000 people, access to commercial banks is abysmally low. In addition, the cost of remittances in Africa is high and in some cases almost 5 times the 3 percent target stipulated in the Addis Ababa Action Agenda (World Bank, 2016a).

Technological innovations that facilitate the use of mobile telephones for financial transactions, coupled with increased access to mobile telephones and the internet, have provided a unique opportunity for Africa to improve financial inclusion and promote inclusive growth despite its weak financial infrastructure. Indeed, there is empirical evidence linking improvements in ICT, particularly mobile telephony, to increased financial inclusion and growth (e.g., Andrianaivo and Kpodar, 2011).

The proportion of the population covered by a 3G mobile network rose exponentially from almost zero in 2007 to 65 percent in 2015. This positive trend has contributed to Africa's leading position in mobile money accounts: just 2 percent of adults worldwide have a mobile money account only, versus approximately 12 percent (or 64 million people) in Sub-Saharan Africa (Demirguc-Kunt et al., 2015).

Figure 11. Proportion of population covered by 3G mobile network, 2007–2015



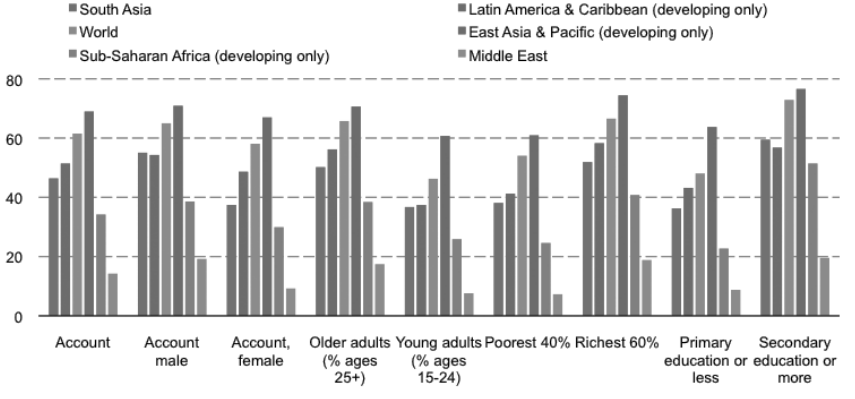
Source: Author's own elaboration on the basis of the UNSD (2017)

Access to mobile accounts has been made possible by increased access to mobile phones and advances in mobile technology for financial transactions. For instance, Safaricom, which is mainly a mobile operator, is the founder of M-Pesa and is supported by Vodafone in its application process. M-Pesa provides the opportunity to transfer funds to both M-Pesa customers and non-customers**,** apply for a loan, pay bills, and perform other financial services. M-Pesa is being used to transfer the equivalent of 25 percent of Kenya's total GDP.

Mobile money transfer is the preferred mechanism for the transfer of funds from urban to rural areas, although account ownership varies by gender, income and level of education; individuals with a secondary school or higher education are most likely to have a mobile account. The system has been a source of employment generation in Africa. For

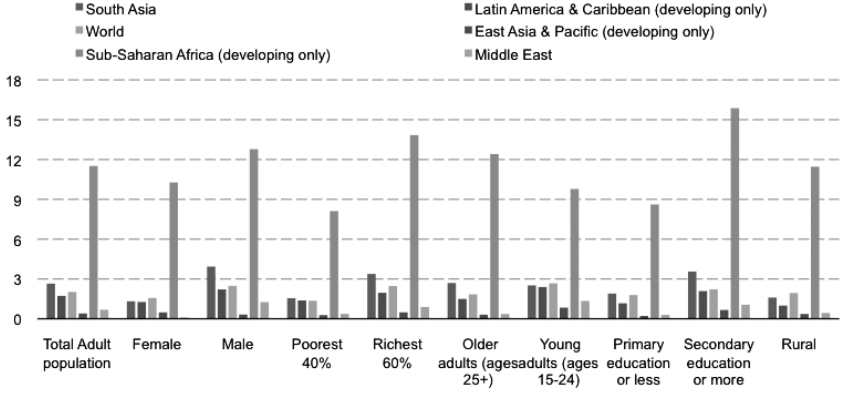
instance, Safaricom currently employs 40,000 agents in Kenya to serve 17 million of M-Pesa users. Safaricom has exported the system to Tanzania, Afghanistan and India. It recently introduced a version of M-Pesa in Ethiopia called M-Birr.

Figure 12. Percent share of the Population with Accounts (15yrs +), 2014



Source: Author's own elaboration on the basis of the World Bank (2016a)

Figure 13. Percent of Adult Population with Mobile Accounts, 2014



Source: Author's own elaboration on the basis of the World Bank (2016a)

The use of mobile telephones for financial transactions circumvents the financial infrastructure deficit by facilitating wireless access by underserved groups in developing countries to financial services. By obviating the need for physical bank branches, mobile telephony reduces transaction costs and contributes to the emergence of branchless banking services, thereby improving financial inclusion (Andrianaivo and Kpodar, 2011). In effect, innovations in the use of mobile telephones for financial

transactions have lowered barriers to financial inclusion and crowded in large segments of unserved and underserved groups in Africa.

7. Conclusions

African countries have made substantial progress in advancing socio-economic development in the past decade, but progress has been uneven and the benefits of rapid growth have not been broadly shared. As a result, several countries have prioritized structural transformation as a development objective. These objectives are reflected in the two internationally agreed commitments: Agenda 2063 and the 2030 Agenda for Sustainable Development.

This study examined the feasibility of achieving structural transformation in Africa while complying with the global and continental commitments to economic, social and environmental sustainability. The literature documents potential trade-offs in achieving the triple objectives of economic, social and environmental sustainability. Nonetheless, the empirical evidence underscores the role of proactive government policies in minimizing trade-offs and leveraging synergizes among the three dimensions of sustainable development. Building on the New Structural economics perspectives on transformation, we propose three catalytic and mutually reinforcing areas of intervention that can advance sustainable structural transformation in Africa: investments in renewable energy; investments in human capital development; and investments in financial inclusion.

Sustainable transformation requires a healthy and skilled workforce. In Africa the evidence points to rising primary school enrolment; however, the skills profile of students is skewed towards the arts and humanities with disproportionately low representation in the fields of science and technology. The quality of educational facilities, as well as the alignment of skills to the requisite needs of the labor market, are other areas of concern. Health indicators have also improved markedly, with substantial declines in child and maternal mortality due in part to increased access to skilled birth attendants, vaccinations and a decline in adolescent birth rates. Nevertheless, overall, access to quality healthcare services is limited.

A skilled and healthy workforce will likely emigrate to greener pastures if the conditions for employment and livelihoods generation are limited. Despite its energy endowments, access to energy in Africa is abysmally low and poses a key constraint to industrialization, enterprise

development and employment creation. Leveraging the continent's energy potential will be critical for promoting value addition and industrial growth and employment.

The potential for such growth to be inclusive will be further enhanced through measures to promote financial inclusion by facilitating access to financial services by the currently unbanked and underserved segments of the population. The rapid increase in access to mobile phones, coupled with innovations in ICT that make it possible for individuals to have wireless access to financial services, have made Africa a leader in mobile account holders. Policymakers can advance inclusive growth by further leveraging the opportunities provided by innovations in mobile telephony.

References

AfDB (African Development Bank) (2012) 'Income Inequality in Africa', Briefing Note 5. Available from: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/FINAL%20Briefing%20Note%205%20Income%20Inequality%20in%20Africa.pdf, accessed 7 June 2016.

AfDB (2014) Development Effectiveness Review: Energy. Printed in Abidjan.

Aghion, P. and Bolton, P. (1992) 'Distribution and growth in models of imperfect capital markets', European Economic Review, 36(3): 603–611.

Andrianaivo, M. and Kpodar, A. (2011). ICT, Financial Inclusion, and Growth: Evidence from African Countries. IMF Working Paper AFR Authorized for distribution by Peter Allum April 2011.

Armah, B., Keita, M., Gueye, A., Bosco, V., Ameso, J., and Chinzara, Z. (2014) 'Structural transformation for inclusive development in Africa: the role of active government policies', Development, 57(3–4): 438–451.

Armah, B. and Baek, S.J. (2015) 'Can the SDGs Promote Structural Transformation in Africa? An Empirical Analysis', Development, 58(4): 473–491.

Banerjee, A.V. and Newman, A.F. (1993) 'Occupational Choice and the Process of Development', Journal of Political Economy, 101(2): 274–298.

Bhattacharjee, S. and Iftikhar, U.A. (2011) Greening Human Development: Capturing Wins in Equity and Environmental Sustainability. UNDP Human Development Report.

Chang, Y.S. and Baek, S.J. (2010) 'Limit to improvement: myth or reality? Empirical analysis of historical improvement on three technologies influential in the evolution of civilization', Technological Forecasting and Social Change, 77(5): 712–729.

Collier, P. and Venables, A.J. (2012) 'Greening Africa? Technologies, endowments and the latecomer effect', Energy Economics, 34: S75–S84.

Dabla-Norris, E., Thomas, A., Garcia-Verdu, R. and Chen, Y. (2013) 'Benchmarking structural transformation across the world', IMF Working Paper WP/13/176. Available from: https://www.imf.org/external/pubs/ft/wp/2013/wp13176.pdf, accessed 3 April 2016.

Dasgupta, P. (2013) 'The nature of economic development and the economic development of nature', Economic and Political Weekly, 48(51): 38–51.

Demirguc-Kunt, A., Klapper, L., Singer, D. and Oudheusden, P.V. (2015) 'The Global Findex Database 2014: Measuring Financial Inclusion Around the World.' Policy Research Working Paper 7255, World Bank, Washington, DC.

ECA (Economic Commission for Africa) (2011) 'Assessing Progress towards the Millennium Development Goals'. Addis Ababa: ECA.

ECA (2014) 'Assessing Progress towards the Millennium Development Goals'. Addis Ababa: ECA.

ECA, AUC (African Union Commission), AfDB and UNDP (United Nations Development Programme) (2015) 'MDG Report 2015 — assessing progress in Africa toward the Millennium Development Goals: lessons learned in implementing the MDGs'. Addis Ababa: ECA.

ECA, AUC, AfDB and UNDP (2016) 'MDGs to Agenda 2063/SDGs Transition Report 2016: Towards an integrated and coherent approach to sustainable development in Africa'. Addis Ababa: ECA.

European Environmental Agency (2017) Official website. Available from https://www.eea.europa.eu/data-and-maps/indicators/eea-32-sulphur-dioxide-so2-emissions-1/assessment-3, accessed 25 May 2017.

Grossman, G.M and Krueger, A.B. (1995) 'Economic growth and the environment', Quarterly Journal of Economics, 110: 353–377.

Hamilton, K. and Clemens, M. (1999) 'Genuine savings rates in development countries', World Bank Economic Review, 13: 333–356.

Herzer, D. and Vollmer, S. (2012) 'Inequality and growth: evidence from panel cointegration', Journal of Economic Inequality, 10(4): 489–503.

IEA (International Energy Agency) (2016a) Key Renewables Trends. Excerpt from the publication: "Renewables Information (2016)".

IEA (2016b) Statistical database. Available from: http://www.iea.org/statistics/statisticssearch/report/?country=WORLD&product=indicators&year=2014, accessed 11 June 2017.

ILO (2016), World Employment Social Outlook, "Trends 2016".

Kaelble, H. and Thomas, M. (1991) Income Distribution in Historical Perspective. Cambridge: Cambridge University Press.

Kuznets, S. (1955) 'Economic growth and income inequality', American Economic Review, 49: 1–28.

Lin, J. (2012): New Structural Economics: A Framework for Rethinking Development and Policy, World Bank

López-Menéndez, A.J., Pérez, R. and Moreno, B. (2014) 'Environmental costs and renewable energy: Re-visiting the Environmental Kuznets Curve'. Journal of Environmental Management, 145(1): 368–373.

Mckinsey Global Institute (2012) 'Africa at Work: Job Creation and Inclusive Growth'. Available from: https://www.mckinsey.com/~/media/McKinsey/Global%20Themes/Middle%20East%20and%20Africa/Africa%20at%20work/b%20test/MGI_Africa_at_work_August_2012_Full_Report.ashx, accessed 4 May 2016.

McMillan, M. and Rodrik, D. (2011) 'Globalization, Structural Change and Productivity Growth', In Bachetta, M. and Jansen, M. (eds.), Making Globalization Socially Sustainable.
Geneva: WTO Publications.

Michaelowa, A. and Michaelowa, K. (2009) 'Does Human Development Really Require Greenhouse Gas Emissions?', In Palosuo, E. (eds.), Rethinking Development in a Carbon-Constrained World: Development Cooperation and Climate Change, Ministry for Foreign Affairs of Finland, Helsinki 2009, pp. 170–183.

Palma, J.G. (2011) 'Homogeneous middles vs. heterogeneous tails, and the end of the 'Inverted-U': it's all about the share of the rich', Development and Change, 42: 87–153.

Pearce, D.W. and Atkinson, G. (1993) 'Capital theory and the measurement of sustainable development: an indicator of weak sustainability', Ecological Economics, 8:103–108.

Perotti, R. (1996) 'Growth, income distribution and democracy: what the data say', Journal of Economic Growth, 1(2): 149–187.

Piketty, T. (1997) 'The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing', Review of Economic Studies, 64(2): 173–189.

Repetto, R., Magrath, W., Wells, M., Beer, C. and Rossini, F. (1989) 'Wasting assets: natural resources in the national income accounts'. Washington DC: World Resources Institute.

Simon, D. (2013) 'Climate and environmental change and the potential for greening African cities', Local Economy. 28(2): 203–217.

Smith, A. (1982/1759) 'The Theory of Moral Sentiments'. In Raphael, D. and Macfie, A.L. (eds.), Indianapolis, IN: Liberty Classics (first published in 1759).

Stiglitz, J.E. (1996) 'Some Lessons From The East Asian Miracle', World Bank Research Observer, 11(2): 151–177.

Timmer, C.P. (2007) 'The structural transformation and the changing role of agriculture in economic development: Empirics and implications', Wendt Lecture. Washington, DC: American Enterprise Institute. Available from: https://fse.fsi.stanford.edu/sites/default/files/Timmer_wendt_lecture.pdf, accessed 8 March 2016.

UN (2012) 'The future we want'. Resolution adopted by the General Assembly on 27 July 2012. New York: UN. Available from: http://www.un.org/en/ga/search/view_doc.asp?symbol=%20A/RES/66/288, accessed 18 November 2015.

UNCTAD (United Nations Conference on Trade and Development) (2012) 'Economic development in Africa Report 2012: Structural transformation and sustainable development in Africa'. Geneva: UNCTAD.

UNCTAD (2016) UNCTADstat. Available from: http://unctadstat.unctad.org, accessed 7 June 2016.

UNEP (United Nations Environment Programme) (2015) 'Building inclusive green economies in Africa: Experience and lessons learned 2010–2015'. Nairobi: UNEP.

UNSD (United Nations Statistics Division) (2016) Millennium Development Goals Database. Available from: http://mdgs.un.org/unsd/mdg/default.aspx, accessed 7 June 2016.

World Bank (2016a) Global Financial Inclusion Database. Available from: http://www.worldbank.org/en/programs/globalfindex, accessed 14 December 2016.

World Bank (2017) World Development Indicators Database. Available from: http://data.worldbank.org/data-catalog/world-development-indicators, accessed 5 April 2016.

World Commission on Environment and Development (1987) Our Common Future. Oxford: Oxford University Press.