

COOPERATION WITH AFRICA

World of Work in the 4th Industrial Revolution: Inclusive and Structural Transformation for a Better Africa

Witness Simbanegavi, African Economic Research Consortium (AERC)

Ashraf Patel, Institute for Global Dialogue (IGD)

Lemma W. Senbet, African Economic Research Consortium (AERC)

Rim Ben Ayed Mouelhi, Euro Mediterranean Network for Economic Studies (EMNES)

Julius Gatune, The African Center for Economic Transformation

K.Y. Amaoko, The African Center for Economic Transformation

Shingirirai Mutanga, Human Science Research Council

Tilman Altenburg, German Development Institute (DIE)

Brahima Coulibaly, The Brookings Institution

Anita Prakash, Economic Research Institute for ASEAN and East Asia

www.t20argentina.org



[/T20Solutions](https://www.facebook.com/T20Solutions)



[@T20Solutions](https://twitter.com/T20Solutions)



[/T20Solutions](https://www.linkedin.com/company/T20Solutions)



Abstract

Unemployment and underemployment are among the key development challenges confronting Africa, and they manifest in deepening poverty and inequality. These tend to disproportionately impact youth and women. In the absence of far-reaching reforms and transformations, these challenges will be compounded by the 4th industrial revolution, which is expected to “disrupt” markets, particularly labor. However, there is a window of opportunity that African countries, in partnership with the G20 countries, can exploit. First, African economies need to structurally transform, both within and across sectors. Second, African countries need to transform their education systems, and to build appropriate capabilities in readiness for the digital economy. There is need to reorient education systems towards STEM to better prepare populations for the digital economy. Third, countries will have to increase their R&D spending and strengthen national systems of innovations to give impetus to innovation. Inclusive finance for development, including digital financial services and fintechs, will play a pivotal role in enhancing financial inclusion and resilience, and thus ultimately reducing poverty. Partnership with G20 will improve likelihood of success in these endeavors.

Challenge

Unemployment and underemployment, and hence the need for creation of productive and quality jobs is a priority agenda in policy processes in Africa. It is estimated that by 2031, Africa's working-age population (aged 15-64) will pass the one billion threshold (World Bank, 2015), the bulk of which will be youth and women. In addition, Sub-Saharan Africa (SSA) has the youngest population in the world. Yet, an estimated 12 million increasingly well educated, but not adequately trained, young people are expected to join the African workforce every year for the next decade and more. The projected high growth in the share of working age population, while presenting a potential dividend for African countries, it also presents major policy and social challenges if the demand for labour continues to lag behind the supply. These challenges are likely to be compounded by the emergence of the digital economy, as will be explained further below. Inclusive development in Africa will, therefore, require substantial growth in opportunities available to, and accessible by, youth and women.

Studies have shown that women are more affected by unemployment and /or underemployment than men. Similarly, youth are more affected by unemployment relative to their senior counterparts (Africa Renewal, 2013). In Tunisia, for example, the female unemployment rate in 2016 stood at a whopping 23.1%, while the unemployment rate for men was only 12.5% (Tunisian National Institute of Statistics, 2017). Indeed,



in sub-Saharan Africa, where formal wage employment is the exception rather than the rule, women and youth form the bulk of the informal sector, where they work in vulnerable employment conditions and survivalist entrepreneurs.¹ As reported by Chakravarty, Das and Vaillant (2017) (based on a survey and report by the ILO (2014)), about 72 percent of working youth were engaged in self-employment, while women were more likely than men to be self-employed or family workers (61% for men and 74% for women).

Unemployment challenges are compounded by Africa's education system that is not living up to expectation. While on the one hand enrolment figures have improved, learning outcomes remain rather poor (Hanushek and Woessmann (2012); Winthrop and McGivney (2015)), with recent evidence pointing to deterioration in quality (Mohamedbhai, 2014). High enrolment rates, coupled with inadequate funding, have resulted in an education system that is over-stretched and failing to cope with the demands and expectations. This doesn't bode well for Africa's structural transformation, particularly in the era of the knowledge centred, 4th industrial revolution.² Africa's education systems do not prepare students for adapting to the nature of 21st century work. Hence, they need to transform in order to address the existing skills mismatch and the changing economic structure resulting from disruptive digital technologies.

Harnessing the demographic dividend requires both supply side (skills enhancement) and demand side (job creation) interventions to ensure that the youth and women are engaged in productive economic activities. As the global transformation of work is unfolding, so should Africa's education and knowledge institutions as they need to keep up with (if not lead) the transformations. The 4th Industrial Revolution will result in "major disruptions to labour markets in terms of the growth in wholly new occupations, new ways of organizing and coordinating work, new skills requirements in all jobs and new tools to augment workers' capabilities" (World Economic Forum, 2016). One of the policy questions confronting African policy makers is the extent to which investments made in education and vocational training are preparing citizens for the digital economy, and how governments and other stakeholders enable citizens to manage the transition.

Moreover, other challenges have dampened structural transformation in Africa necessary to ensure the continent's active participation in the global economy.

1 Filmer et al. (2014) estimate that 84% of sub-Saharan Africa's workforce is in informal occupations that are not properly registered and typically associated with instability, extremely low productivity and precarious working conditions, while 8% work in formally registered firms and another 8% in the public sector (see also SATRI, 2016).

2 The 4th industrial revolution is characterised by artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing (Schwab, 2015).

Modernisation of agriculture has not taken off, and the bulk of smallholder farmers remain trapped in poverty. This is fueled in part by scarcity of fiscal resources, with many African countries experiencing high levels of debt, limiting their capacity to borrow for productive investments. Manufacturing also hasn't taken off, and many countries continue to export raw materials, thus missing out on the opportunity to raise incomes through value addition. The weak manufacturing base is also reflected in low intra-Africa trade. In most African countries, growth has been driven to an appreciable extent by resources extraction, which tends to be highly capital intensive. The totality of these challenges largely explains high unemployment and underemployment, even in fast growing economies.

Lessons abound on the effects of technological revolutions on income inequality, wellbeing and societal cohesion. Technology tends to raise the demand for highly skilled workers while decreasing the demand for less skilled workers. In essence technological revolutions, if left to their own devices, tend to create a "winner takes all" economy, favouring the high end of the labour market. In the absence of transformational interventions, the 4th industrial revolution is bound to generate a skewed distribution of benefits, thus heightening inequality, which is already unacceptably high in Africa. In fact, unemployment and inequality could worsen as large numbers of existing jobs are lost to automation and artificial intelligence (AI).³ A winner-takes-all economy, that marginalizes the middle class and the poor, is a recipe for societal conflict and instability on the continent.

The main policy considerations are: What is it that African countries need to do to prepare their populations for tomorrow's world of work, in particular, their preparedness to manage the disruptions associated with the 4th Industrial Revolution? What kinds of structural transformations should African countries pursue, and how can these be leveraged to ensure inclusive growth and development, in particular, participation of youth and women in productive economic activities? How can African countries leverage their human and natural resources to ensure that Africans contribute meaningfully to the digital economy (i.e., helping to shape the digital economy)? How can Africa leverage the digital economy to develop inclusive finance for the youth and women? How can developed countries, and the G20 countries in particular, partner with African countries in realizing these objectives?

³ In addition, there is likely to be less relocation of manufacturing jobs from China and elsewhere to Africa as these jobs would also be directly replaced by automation in home countries - thus negating Africa's low labour cost advantage.

Proposal

The 4th Industrial Revolution, the World of Work, and Structural Transformation in Africa

According to the WEF Board (2016), the technology wave has finally crested. In particular, the WEF Board observed that “technology [has] shifted from a supporting role to the spotlight”. Thus, the world has already entered the digital economy. Sub-Saharan African countries and the rest of the world have no choice but to adapt. This includes getting the mix of skills right, putting infrastructure in place, putting the collaborative platforms/innovation systems in place and putting in place supportive financial and regulatory systems.

Inclusive Transformation

Effective transformation can be attained through building the capacity of the marginalised (youth, women, smallholder farmers and SMEs), the majority of whom reside in rural areas in Africa. This is at the core of Agenda 2063 (Africa) and consistent with Agenda 2030 (UN). This brief contends that even in the most optimistic scenario, where African countries aptly exploit the various emerging opportunities in agriculture and agro-processing, manufacturing, tourism, ICT, etc., creating productive employment opportunities for all Africans will take time. Better and productive jobs are needed not only for the many millions of young Africans entering the labour force each year, but also women and the vast majority of the existing workforce who are currently engaged in vulnerable employment or self-employed in survivalist entrepreneurships. In the short to medium term, there should be a role for informality in the economy, with attention being paid to enhancing productivity and improving working conditions (e.g., through regulations) to reduce vulnerability. At the same time, there is a role for the public sector in creating jobs for social development and the public economy (public works programmes), to both improve livelihoods and enhance skills of those engaged in these efforts.

By potentially allowing people to work from anywhere, the 4th industrial revolution and the digital economy provide more flexible job opportunities, thus limiting the constraints faced particularly by African rural women with family responsibilities and mobility difficulties. The preceding argument presupposes a high capacity to use digital instruments and deep insertion in the technological transformation. Such capacity and/ or technological literacy is not a foregone conclusion, however.

Inclusive transformation requires substantial investments in education and vocational training, access to finance, energy and business development services, particularly targeted to youth, women, smallholder farmers and Small, Medium



and Micro Enterprises (SMMEs). To overcome the current segregation of firms and labour markets, where informal enterprises are largely disconnected from modern business transactions, greater efforts are needed to establish productive linkages between large and small firms through reforms of business law and tax regulations, supplier development and franchise programmes, as well as know-how transfer from modern to traditional firms. Such policies need to be complemented with social protection schemes that enable the poor and marginalized to acquire basic skills; including public works and cash transfers. G20 countries should complement African countries in these initiatives for inclusive transformation. For instance, they can support business environment reforms in African countries; support productive capability strengthening for African SMMEs; provide technical and financial support for infrastructure development; support vocational and other skills training for youth, women, smallholder farmers, etc., paying special attention to enhancing preparedness for the 4th industrial revolution.

Inclusive Education and Skills Development

The starting point for African countries should be to enhance the quality of education and making it 'fit for purpose' to address the prevailing mismatch between education and the skills requirements of the job market, and thus reduce structural unemployment. The mismatch will be even more acute in the increasingly digitized economy unless it is addressed commensurately. This requires a concerted effort by all stakeholders, including governments, education institutions, private sector and development/G20 partners. Further, education systems themselves will need to be versatile, and adaptable to the changing environment (Vlieghe, 2016). Africa needs to, in addition to paying increasing attention to quality, strategically reorient towards science, technology, engineering and math (STEM) in its educational focus to enhance adaptability and innovation. This is being adopted by many African governments, although full implementation is still to happen.

Increasing graduates in the STEM focus areas would likely enhance Africa's capacity to innovate, and hence its global competitiveness. The canonical example of homegrown innovations is M-pesa, a mobile money service developed in Kenya to address the tremendous financial access gap in the country, but now adopted globally. To enable Africa to fully benefit from its human resource endowment, it is important to bring more women into STEM disciplines. This will, in addition to building a critical mass of talent, ensure equality in terms of access to new job opportunities and to adapt skills to future needs. Although women constitute the majority in Africa, they are grossly under-represented in science and technology disciplines across Africa. Where possible, therefore, women should be incentivised to enrol in STEM disciplines.

The education sector in Africa faces significant funding constraints.⁴ There is need to resource teaching and learning facilities with state of the art tools and equipment to enhance relevance of training to the digital economy. Partnerships are needed between government, private sector, G20 countries, and other stakeholders to ensure that education and training produce appropriately skilled graduates, ready to contribute meaningfully to the digital economy.

Reorienting education towards STEM is one important area where G20 countries can partner with African countries, both financially and through skills transfers and knowledge exchanges. Moreover, there is need to strengthen technical and vocational training to equip school leavers with the skills and competencies required in the job market. These initiatives should ideally be coupled with policies and incentives (from both African and G20 countries) to encourage production in Africa and facilitate internships for trainees so that the skills acquired can be put to use. Further, there is need to promote production of medium to high technology manufactures in Africa to help build capabilities, as learning by doing is critical. Policies, that encourage export of raw materials (e.g., zero tariffs) and discourage value addition in Africa (e.g., tariff escalation), are, therefore, counterproductive.

To enhance its effectiveness, STEM should be accompanied by strengthening of the national system of innovations – defined as the “flow of technology and information among people, enterprises and institutions which is key to the innovative process on the national level”. African governments need to increase spending on R&D and provide the necessary environment for private enterprises to invest in R&D.⁵ African countries should target to spend at least 1% of GDP on R&D. G20 countries could provide ‘matching grants’ for R&D to African countries. In addition, G20 countries should consider incentivising their firms to carry out some R&D, and development of some of the new technologies in Africa, and in partnership with African institutions, to help transfer skills and strengthen capabilities. Strengthening skills development and supporting increased value addition in production should reduce the brain drain from Africa and position Africa for a deeper structural transformation.

Structural transformation

Structural transformation implies that workers, as well as capital, shift from traditional low-productivity jobs in smallholder agriculture, artisanry and petty trade to new specialized occupations in high-productivity sectors, typically manufacturing and

4 Most educational and training institutions in Africa are woefully underfunded, making it difficult for these institutions to retain talented staff and also resulting in understaffing, which partly explains the observed decline in quality of outputs.

5 Presently, all African countries each spending below 1% of GDP on R&D (UNESCO Institute for Statistics, 2016).

related services.⁶ When large proportions of the workforce and resources move, the related boost in productivity also benefits those remaining in traditional sectors: their salaries rise as the oversupply of labour is reduced; they benefit from increasing demand for their products; and they receive remittances from family members with wage income.

Innovation is also important for high productivity. Infrastructure development for industrial agglomeration and urban amenities is essential for an industrial and innovative society. Adopting quality infrastructure is important to adapt to quality standards to mitigate environmental and social impact, and address sustainability issues simultaneously. The land locked countries of Africa especially benefit from infrastructure development, with enhanced access to economic opportunities.

African countries should exploit their mineral endowments in order to develop their economies. Experimenting with new industries and innovations adds new capabilities, which in turn create new opportunities for economic diversification. This cumulative process is most obvious in manufacturing, where the initial creation of capabilities in, say, metalworking, electronics and chemistry opens up an infinite spectrum of new opportunities. As production becomes more sophisticated, their service content increases, strengthening linkages between services and manufacturing sectors. Agro-processing is another manufacturing activity with strong backward and forward linkages, with the potential to substantially raise incomes of smallholder farmers if appropriate investments in infrastructure and related services are put in place.

Africa needs to guard against “premature deindustrialization” Rodrik (2015). This is critical to foster diversified capabilities which are important for economic development. Premature deindustrialization is driven by two forces. First, global competition – where latecomer countries are disadvantaged vis-à-vis competitors who have been able to accumulate capabilities and create economies of scale as well as network externalities decades before; and second, labour-saving technologies that are hollowing out the comparative advantages countries with low labour costs had enjoyed in the past. New studies suggest automation of routine activities will accelerate in the next 1-2 decades, thereby further eroding the opportunities for using labour-intensive light manufacturing for export as a springboard for development (Hallward-Driemeier and Nayar, 2018). Deindustrialization in Africa kicks in at extremely early stages of development with adverse consequences given the demographic challenge.

6 Although structural transformation has traditionally been viewed as economies moving from agriculture to manufacturing, emerging consensus is that transformation can occur in every sector with the attendant value creation, including full exploitation of agricultural value chains. Thus, structural transformation should be seen through a broader lens, to include transformations within sectors as well as across sectors. It is much to do with value creation as opposed to movement of resources from one sector to the other.

Emerging Opportunities

Numerous opportunities present themselves to African countries as they grapple with the potentially destructive effects of the 4th industrial revolution and the need to transform their economies for sustainable and inclusive development. These include:

1. Leveraging Regional and Global Value Chains. New opportunities for agro-industries arise as resources for agricultural production are being depleted globally (soil degradation, water scarcity, biodiversity) at the same time as the world population increases, becomes more affluent and demands more high-value food products and fossil fuel-based products are replaced by bio-economy. Fortunately, high-value agriculture, ranging from horticulture and floriculture to new bio-economy products, is highly feasible in the African environment (ACET 2017b). Furthermore, the new African Continental Free Trade Area (CFTA) provides further opportunities for development of regional and global value chains in Africa, providing opportunities to leverage the agricultural and manufacturing potential of the region. Through the WTO, G20 countries could, working closely with African countries, fast track implementation of trade and investment facilitation measures to enhance trade, and thus capability strengthening of African firms and producers.

2. Manufacturing Still Matters. Manufacturing is a driver of capability accumulation and generates spillovers and strong linkages with other sectors. The potential for manufacturing in Africa is strengthened by rapid urbanisation which creates a ready market. Africa is expected to import about \$110 billion worth of food by 2025, owing to rising incomes and growing middle class (AfDB, 2017). Furthermore, global demand for agriculture-based products continues to grow strongly. There is thus significant scope for both agriculture and agro-processing (manufacturing) in Africa. Urbanisation and rising incomes also provide economic space for non-agro-based manufacturing, especially light manufactures. In addition, changing patterns of urban development, including resource-efficient buildings, smart mobility and material reuse and recycling will create manifold new business opportunities. G20 countries could support efforts by African countries to revitalize manufacturing by encouraging FDI flows from their countries to Africa; working with African countries on creating a conducive business climate; supporting value addition in Africa (e.g., levying tariffs on some raw material exports or allowing use of export taxes by African countries in the Economic Partnership Agreements).

3. Evolving Digital Technologies. Structural transformation in Africa does not necessarily imply shifting from agriculture to manufacturing. As Page (2018) observes, ICT-based services (e.g., Business Process Outsourcing), tourism, and transport are outpacing the growth of manufacturing in many African countries. Between 1998 and 2015, services exports grew more than six times faster than merchandise exports (Foresight Africa, 2018). New digital technologies greatly increase connectivity, breed

new business models such as electronic trading platforms, automate routine tasks and impact on supply chains in multiple ways. Digital technologies can enable Africa to participate extensively in the 3rd unbundling.

There is scope for G20 countries to support African countries through enhanced technology and skills transfers in the digital field.

4. Tourism and Creative Industries. Tourism, which directly employs more than 5 million Africans, has a large unexploited potential to absorb more, including women and youth. Creative industries (producing movies, music, arts and games that build on the uniqueness and the diversity of African cultures and the beauty of its nature) have huge potential to create productive and sustainable jobs. In partnership with African countries, G20 countries can help promote and facilitate tourism in Africa by their nationals. G20 countries should share in the responsibility to improve the image of the continent in their own countries, which would encourage tourism.

Recommendations for G20-Africa Partnership

Africa has manifold opportunities for boosting productive employment, but subject to certain preconditions being met. African economies need to embark on economic transformation that is both future-proof and inclusive, providing opportunities particularly for women and youth. The G20 can play an important role in supporting experimentation and development of new business models by African countries. In general, initiatives by African countries can be enhanced by knowledge and technology transfers from G20 countries. Moreover, support could come in the form of technology forecasting models and procedures to help African countries optimize on investments and to better anticipate trends, as well as develop coping strategies.⁷ Below specific recommendations are outlined for the G20-Africa partnership in the area of future of work and inclusive transformation in an increasingly digitized world as per 4th industrial revolution.

A. Reform Africa's education and skills training to better equip Africans to partake in the digital economy. There is urgent need to reform and strengthen educational systems in Africa. Such reform initiatives should bring together representatives of government, education institutions, private sector, development partners, particularly those in G20 countries, for shared vision for education and skills that are fit for purpose. Specifically, the G20-Africa partnership should have education and skills development as a priority agenda. Further, G20 countries should support the drive by African countries

⁷ Altenburg, Kleinz and Lütkenhorst (2016) offer a methodology that allows governments to anticipate new trends of structural transformation and thereby give direction to their national coping strategies.



to implement STEM curricula, as this will lay a sound foundation for quality education, skills development, and innovation in Africa.

B. Spend in R&D in view of gross under investments in knowledge generation and capacity building. African governments should increase spending on R&D to at least 1% of GDP and strengthen national systems of innovations. G20 countries should support R&D investments by African governments (e.g., through matching grants).

C. Foster pro-development agricultural policies in G20 and other developed countries. Conditions in the global economic environment permitting, Africa has the potential to feed the entire world, owing to its favourable climatic conditions, and thereby also creating important employment opportunities. There is a need for fair global agricultural and trade policies. In particular, G20 countries should make progress in reducing agricultural subsidies.

D. Promote innovation and entrepreneurship. African governments should create a more enabling environment for innovation and productive entrepreneurship. There are emerging and home-grown private sector led innovations and entrepreneurship in various sectors, including agriculture and finance. Such initiatives should be scaled up and not stifled by inordinate costs of doing business. This is an area calling for private-public partnership. Support and partnership from the G20 countries are needed on this front, but they must be aligned with national programmes rather than setting up donor-driven programmes in parallel to existing institutions and initiatives. Twinning arrangements for research and training institutes, knowledge transfers and financial and technical support to African research centres can facilitate development of innovations that are appropriate to the African context (e.g., M-pesa)). G20 countries could also help to scale up “bottom up” innovations developed in Africa. Moreover, there is need to develop a cadre of entrepreneurs who can leverage the digital economy. G20 support for twinning arrangements is vital for skills development and transfer of technical know-how to Africa. Further, G20 countries should partner with African governments to support entrepreneurship training in African countries and also provide technical support to domestication of these trainings in local universities and other knowledge institutions.

E. Develop finance for inclusive transformation and growth: Finance in Africa tends to be primarily bank-based with limited scale for private credit provision characterized by heavy crowding out by government debt. Stock exchanges have proliferated in Africa, but they lack scale with very limited provision of liquidity and other functions, including information production and price



discovery. For African countries to be self-reliant as envisioned by Agenda 2063, there is need for sufficient capacity for domestic resource mobilization. This is ultimately accomplished through the development of well functioning, inclusive and sustainable financial systems that support the agenda of transformation and inclusive development. In the more immediate time period, there should be promotion of investment financing, private equity finance, and participative finance, dedicated to youth and women, as well as smallholder farmers to address the lack of equity and guarantees constraining access to finance by these groups. In addition, new digital financing instruments (fintechs), such as crowdfunding platforms, blockchain, etc., are emerging opportunities that can be seized by entrepreneurial youth and women. Financing inclusive growth and transformation is also an area for public-private partnership under which risk-sharing arrangements and innovative products can be devised and implemented to make entrepreneurial youth and women more bankable and insurable. The G20-Africa partnership is crucial and vital, particularly in terms of technical support, as African countries carry out the development of financial systems that support the transformation agenda at the heart of which is empowerment of youth and women.

F. Accelerate regional integration and harmonization. There are a variety of regional cooperation and integration initiatives in Africa. This is vitally important, given that most countries lack scale with a myriad of cross-border barriers, including disharmonized regulations and rules. Thus, the G20 members should support initiatives aimed at investment facilitation, streamlining regulations and harmonising them across the region. These harmonizations foster integration in markets, such as labor, finance, as well as regional infrastructure and agricultural value chains. It should be noted, though, that investment climate reforms are important and necessary, but not sufficient. There should also be more attention placed on investments in specific skills and infrastructures for establishing new competitive advantages. This includes investment promotion; promotion of domestic resource mobilization, special economic zones and other supporting activities tailored to the needs of country-specific development pathways.

G. Efficiently resolve the looming debt crisis: Public debt has been rising in SSA, and even accelerating since 2014. On average, the public debt/GDP stood at 42 percent in 2016 (median 51 percent; IMF SSA Outlook, 2017). This conjures up the memory of the earlier SSA debt crisis and the resulting HIPC initiative for debt relief. The major difference now is that the credit base has become more diffuse involving new external players (e.g., China) and private sector creditors both internally and externally, making it difficult to construct coordinated resolution mechanisms. This should be an urgent



area of the G20-Africa cooperation. The positive of the sharp indebtedness is that financing of development investment needs, such as infrastructure. There is continuing tension, though, between debt sustainability and large scale investment needs. However, managing the liquidity crisis arising from the mismatch between the debt service and the periodic revenues from projects and the insolvency crisis in the event of requires technical assistance and coordination among the SSA countries, G20, international financial institutions, and key private sector creditors.

References

1. Camdessus Report (2003). Financing Water for All. Report of the World Panel on Financing Water Infrastructure. World Water Council. 3rd World Water Forum. Global Water Partnership Chaired By Michel Camdessus. Report Written By James Winpenny. http://www.worldwatercouncil.org/fileadmin/world_water_council/documents_old/Library/Publications_and_reports/CamdessusReport.pdf
2. CCAFS (2016). 2016 Annual Report. Program Climate Change, Agriculture, and Food Security (CCAFS) <https://cgspace.cgiar.org/rest/bitstreams/118452/retrieve>
3. CCAFS, CIAT, MAGA (2015). Agricultura Sostenible Adaptada al Clima (ASAC): Alternativas para el Corredor Seco en Guatemala. Cali, Colombia: Programa de Investigación de CGIAR en Cambio Climático, Agricultura y Seguridad Alimentaria (CCAFS). <http://hdl.handle.net/10568/80719>
4. Devarajan, S. (2015) Shame on me: Why it was wrong to cost the Millennium Development Goals. Monday, March 2, 2015. <https://www.brookings.edu/blog/future-development/2015/03/02/shame-on-me-why-it-was-wrong-to-cost-the-millennium-development-goals/>
5. Díaz-Bonilla, E. (2017) Scaling up. Money.. that's what (we) want. CIAT 50th Anniversary November 8-9, 2017, Cali, Colombia. <https://www.slideshare.net/CIAT/presentacion-diaz-bonlla-v3>
6. ELD Initiative (2015). The value of land: Prosperous lands and positive rewards through sustainable land management. Available from www.eld-initiative.org
7. IPBES (2015). "Intergovernmental Platform on Biodiversity and Ecosystem Services." Scoping for a 2002 Thematic Assessment of Land Degradation and Restoration Assessment.
8. McKinsey Global Institute (2011) Resource Revolution: Meeting the world's energy, materials, food, and water needs. November 2011. <http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/resource-revolution>
9. Nkonya, E., A. Mirzabaev and J. von Braun (eds) (2016) Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development. International Food Policy Research Institute and Center for Development Research (ZEF). University of Bonn. Bonn. Germany. Springer Open. Springer Cham Heidelberg New York Dordrecht London



10. Ringler, Claudia (2017). Investments in irrigation for global food security. Washington, D.C.: International Food Policy Research Institute (IFPRI). <http://www.ifpri.org/publication/investments-irrigation-global-food-security>
11. Sadler, Marc Peter; Millan Arredondo, Alberto; Swann, Stacy A.; Vasileiou, Ioannis; Baedeker, Tobias; Parizat, Roy; Germer, Leah Arabella; Mikulcak, Friederike (2016). Making climate finance work in agriculture. Washington, D.C. World Bank Group. <http://documents.worldbank.org/curated/en/986961467721999165/Making-climate-finance-work-in-agriculture>
12. Schmidt-Traub, G. (2015) Investment Needs to Achieve the Sustainable Development Goals. Understanding the Billions and Trillions. SDSN Working Paper. Version 2. 12 November 2015. <http://unsdsn.org/wp-content/uploads/2015/09/151112-SDG-Financing-Needs.pdf> Data in <http://unsdsn.org/resources/publications/sdg-investment-needs/>
13. US Office of the Director of National Intelligence, ODNI (2012) Global Water Security. INTELLIGENCE COMMUNITY ASSESSMENT. ICA 2012-08, 2 February 2012. https://www.dni.gov/files/documents/Newsroom/Press%20Releases/ICA_Global%20Water%20Security.pdf
14. World Economic Forum Annual Meeting 2017. System Initiative on Shaping the Future of Food Security and Agriculture. Summary Report. March 2017. Davos-Klosters, Switzerland 17-20 January. http://www3.weforum.org/docs/IP/2016/NVA/AM17_FSA_summaryreport.pdf?ET_CID=1648402&ET_RID=001b0000002mX9HAAU

T20
ARGENTINA 2018
THINK 20

CARI / CONSEJO ARGENTINO PARA LAS
RELACIONES INTERNACIONALES

CIPPEC®