

Examining the Challenges and Opportunities for Africa amidst Global Technological Transitions

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ABSTRACT

The Sustainable Development Goals (SDGs) recognize the need to leave no one behind. Africa, a continent of about 1.5b people is confronted with widespread poverty and insecurity without which, African States and Governments cannot curb poverty and sustainably holistically appreciate the progressive technological transitions taking center stage globally and create wealth for and amongst Africans. As such, the continent cannot sustainably develop partly due to the lack of innovations, this is the epoch in which the continent needs to take keen interest in its full involvement in the technological transitions that are occurring globally. Without sustainable development, the continent will continue to face challenges in maintaining peace and security because the widespread poverty stricken populations in African states continue to disrupt peace and stability by agitating for an inclusive development process. Governance is a key corridor that could enhance democratic and inclusive governance on the continent. Africans, in this quagmire, are being left behind out of the global transitions occurring in the context of globalization, climate change mitigation, environmental management, technological advancement, etc. This Chapter therefore seeks to examine the opportunities and challenges that Africa is confronted with amidst the global transitions that are occurring as the SDGs near their end by 2030. The qualitative research methodology is utilized for this research.

Keywords: Poverty Alleviation, Climate Change, Environmental Management, Global Transitions, Climate Change Mitigation, Inclusive Governance, Regionalism, Globalization, and Innovation.

INTRODUCTION

This article is a contribution towards a groundbreaking debate on the issue of Globalization - From Technological Transition to Climate and Geopolitical Challenges" in Africa. Historically, Africa is the second largest continent in the world. The continent approximately has a population of 1.5 billion people (Worldometer, 2025). With such a population, the continent's demography shows that its population is largely young. However, there is widespread poverty across Africa. Therefore, this chapter explores the Challenges and Opportunities for Africa amidst the Global Technological Transitions that are occurring. Very rapid global transitions are taking place. Some of these transitions are focused on technological innovations. For instance, mobile phones, computers, internet, etc. have taken over globally. Other inventions are making headway. For instance, Artificial Intelligence (AI) is ubiquitous now. These global innovations are mainly occurring in the global North while Africa that is in the global South, remains behind. This simply means that Africa is being left behind as opposed to what the SDGs term as "leave no one behind" (SDGs, 2016).

Research design

This research uses a qualitative research methodology. It is specifically an Afrocentric research using a Case Study approach for the continent of Africa as a single case using the African Union as a lense. Creswell (2009) asserts that the qualitative method is the most appropriate for such studies. Truly, this research methodology is appropriate for this study because it will properly unearth deeper perspectives about ongoing transitions

globally and how Africa is catching up with them regionally. According to Cleland (2017), qualitative research methods are important because they address the how and why research questions. This method makes understanding of the phenomenon, experiences, and contexts easy. The qualitative method enables the researcher to ask questions that cannot be converted to numbers to facilitate people's understanding of human experiences (Leavy, 2017).

This method of data collection also includes analysis of documents such as websites, peer-reviewed articles, books, arts and official records. Such secondary sources have been utilized to conduct this study. Researchers usually use the qualitative methodology to explore meanings; investigate and study social phenomenon; or unpack meanings ascribed to activities, situations, events, or artifacts; and build a depth of understanding about some dimension of social life with detailed information from a small sample. For the purpose and timing of this study, no primary data was collected on the continent. Qualitative research is appropriate when one's primary purpose is to explore, describe, and explain (Leavy, 2017).

Current situation of globalization in Africa

There are several opportunities and challenges impacting global technological transitions around the world. Some authors have written about such transformations in Africa. For instance, in their "Pioneering Digital Transformation in Africa: The Path to Maturity Amidst Unique Challenges and Opportunities", Edwin Omol, Lucy Mburu , and Paul Abuonji (2024) utilized a scoping review methodology to investigate the challenges and opportunities that define digital transformation in African organizations. They examined some critical dimensions, including technological infrastructure, governmental commitment, organizational culture, human capital development, regulatory environments, market dynamics, and economic factors that impede or enhance these transformations. Their study provides an in-depth analysis against the backdrop of Africa's burgeoning economies and the transformative aftermath of COVID-19 (Omol, Mburu , and Abuonji, 2024).

They use a comprehensive approach to examine literature, align key variables and essential terms with relevant literature sources to conduct their study. Their findings illuminate and indicate that both the transformative potential of digital technologies in Africa and the persistent hurdles, such as the digital divide, skills shortages, and infrastructure deficits grossly impact technological transformations on the continent (Ibid)). The synthesis of these insights not only underscores the imperative for indigenous innovation and widespread global adoption but also emphasizes the necessity of societal restructuring to fully realize the impact of digital technologies in Africa. Their analysis concludes that there is a need to advocate for collaborative solutions bringing together governments, private entities, and educational institutions in strategic alignment with the global discourse on Africa's role in the digital economy.

Their research concludes that the Digital Transformation Strategy for Africa is structured around foundational pillars (Enabling Environment, Policy and Regulation, Digital Infrastructure, Digital Skills and Human Capacity, Digital Innovation and Entrepreneurship), key sectors (Digital Industry, Digital Trade and Financial Services, Digital Government, Digital Education, Digital Health, Digital Agriculture), and overarching themes (Digital Content & Applications, Digital ID, Emerging Technologies, Cybersecurity, Privacy and Personal Data Protection, Research and Development) to steer the digital transformation, with cross-cutting themes providing support to the digital ecosystem ((Omol, Mburu , and Abuonji, 2024, p.36).

In similar pattern Jakkie Cilliers (2021) argues that human and economic development prospects in Africa evolve around three questions. According to this author, the questions paraphrased are: where is Africa today, what explains the current state of the continent, and given historical trends, and given what we know about the world today, where do we think the continent will be in 2040?" And there is a fourth that needs to be asked. What can Africans do to create a better tomorrow? This fourth question has been answered by this researcher in his PhD dissertation that "Africa's future for a better tomorrow lies in improved regional integration focused on deeper economic integration under the aegis of the African Union Commission (AUC)" (Kaydor, 2024). In that groundbreaking open access book entitled "The Future of Africa: Challenges and Opportunities" the author argues that Africa models ambitious progress in health, demographics, agriculture, education, industrialization, technological leapfrogging, increased trade, greater stability, better governance and external support now than in the past.

The fact that the author refers to technology as something that leapfrogs on the continent speaks to the veracity that technological transitions on the continent are not progressing at the rate like they do in other parts of the world due to factors including poor technological infrastructure, weak governmental commitment, dismal organizational culture, poor human capital development, weak regulatory environments, stagnant market dynamics, and sluggish economic growth that mostly impede transformations as earlier indicated (Omol, Mburu, and Abuonji, 2024). The book also reviews the future of jobs, poverty and the impact of climate change in Africa. It presents a scenario about closing the Gaps in these sectors and forecasts what could be possible by 2040. For this researcher, deeper economic integration holds the magic bullet for Africa's success, peace and sustainable development (Kaydor, 2024).

In a related development, Joseph, Amankwah-Amoah(2019) argues in his “Technological revolution, sustainability, and development in Africa: Overview, emerging issues, and challenges” that silent technological revolution in sub-Saharan Africa are happening focusing on emerging issues and challenges. In view of the centrality of technology diffusion in fostering local innovations and economic development in developing countries, it is surprising that our understanding of the challenges and opportunities in scaling-up technologies in Africa remains limited. This article draws on the ongoing silent technological revolution in sub-Saharan Africa to present an overview of how new technologies have been adopted and utilized to achieve sustainability, though sluggishly. The study identified a host of factors such as weak regulatory enforcement systems, lack of financial credit availability, and limited banking services that have created sluggish conditions for technological innovations such as mobile phone-based banking, mPedigree, “cardiopad,” and M-PEPEA to emerge on the continent. Also, he examines the public policy implications and directions for future research. Africans could do more in the innovation domain, when given the rightful tools and support.

Samuel Chukwujindu Nwokolo, Eyime Echeng Eyime, Anthony Umunnakwe Obiwulu, and Julie C. Ogbulezie (2023) authored a thought-provoking article that explores the significant role of technological advancements, strategic policies, and collaborations in driving Africa towards a more sustainable future. In their “Africa's Path to Sustainability: Harnessing Technology, Policy, and Collaboration” they draw attention to how the continent's increasing adoption of innovative technologies, such as renewable energy solutions and digital infrastructure, coupled with well-crafted strategic policies and international collaborations, is transforming various sectors and fostering a sustainable future. The major question remains that are these innovations locally groomed or borrowed? It is important to support locally groomed technology transitions to be dependent on global collaboration although Africa cannot do it all alone. Africa needs to take full responsibility of its own internal growth and development processes.

They contend that these technological advancements have not only improved access to basic services like healthcare and education but have also created new opportunities for economic growth and job creation on the continent. Their article emphasizes the importance of ongoing collaborations between African countries and international partners in sharing knowledge, expertise, and resources to accelerate sustainable development efforts across the continent. This partnership fits within the context of Global Partnership for International Development under SDG 17 (SDGs, 2016). The article also discusses different international organizations that have collaborated with and assisted Africa in the areas of technical innovation, finance, and knowledge exchange necessary to achieve a full-scale sustainable future. The continent faces tremendous challenges and hurdles in attaining a sustainable future. These challenges range from a lack of access or poor road connectivity to weaker technology and absence of digital infrastructure in rural areas, and difficulties in harnessing technological advancements due to infrastructure and connectivity constraints. For instance, there is limited access to electricity and internet connectivity on the continent.

Most of these challenges have hindered the African Continent's ability to leverage the potential of technical innovation and digital solutions for a sustainable future. The limited financial resources and investment opportunities have further impeded progress in achieving the necessary infrastructure and connectivity upgrades. The continent is highly vulnerable to the deleterious impacts of climate change that further undermines and hinders Africa's development progress. Therefore, it is crucial for ongoing collaborations between African countries and international partners to address these challenges collectively and work towards long-term solutions for a sustainable future in Africa in the context of SDG 17.

Equally, in a Policy brief entitled “The Energy Transition Amidst Global Uncertainties: A Focus on Critical Minerals” by Rim Berahab (2022), the author argues that:

“as the world prepares to reach the goal of net-zero emissions, countries are stepping up efforts to limit the global temperature increase to align with the Paris Agreement. Whilst the world seemed to be moving in the right direction, the COVID-19 pandemic broke out in 2020 and spiraled worldwide, causing severe health, humanitarian, economic, and energy crises. Two years later, the outbreak of war in Europe between Russia and Ukraine has further fueled the uncertain global context, casting doubts about the pace of energy transition. Yet balancing short-term energy security with the long-term energy transition remains crucial, as developing countries, particularly in Africa, are already bearing the brunt of the disastrous consequences of climate change. Therefore, postponing action on climate change will be catastrophic, as the damage caused would be irreversible (Lienard, 2022). Efforts to achieve the energy transition must, thus, be pursued through a holistic and comprehensive approach that ensures a just, equitable, and secure transition, and considers the context of broader socio-economic and geopolitical realities.” (p.2)

The author contends that pursuing efforts to decarbonize economies and increase energy systems’ resilience is crucial to stay within global warming limits and fight the consequences of climate change, which are becoming increasingly acute. The transition to a net-zero economy will be commodity intensive and require significant quantities of critical minerals, defined as metals and nonmetals essential to high-tech sectors (Rim Berahab, 2022). Africa abounds in the mineral resources that can be used to spark innovations on the continent. As the shift to cleaner technologies progresses, the supply of critical minerals for the energy transition will be challenged by the needs for large quantities.

If supply does not meet demand, prices of these minerals could skyrocket, leading to a new type of vulnerability. Thus, the interdependence and price volatility that characterize hydrocarbon markets would not disappear entirely in a decarbonized world. Therefore, many prerequisites must be in place for minerals markets to function effectively, including credible and globally coordinated climate policy, high environmental, social, labor, and governance standards, and reduced export trade barriers. This would allow scaling-up of investment to sufficiently increase the supply of critical minerals while preventing the rising cost of low-carbon technologies, thus supporting the transition to clean energy. In this domain, Africa needs to sustainably manage the environmental effects of making use of natural resources on the continent.

Transition to cleaner energy is important for innovation in Africa and that should come out of the technological transition that this chapter is about. To innovate, the innovators would need stable and cleaner energy, and in this case the continent needs to engage in sustainable resource management. That the African Continent still lacks adequate supply of clean energy; and innovation will steadily leapfrog on the continent; hence, Africa needs to utilize clean energy sources like solar and hydro power to speedily advance technology transitions rather than rely hugely on hydrocarbons as energy sources in Africa.

How Might Africa Achieve Sustainable Technological Transition

Although this research is focused on technological transitions in Africa, the researcher studied about Africa during his PhD research. Therefore, it would be fantastic to tie in his previous research findings with this one for Africa’s forward movement. The PhD dissertation topic for the research in Slovenia at the New University was “reconceptualizing Africa’s regional integration for peace and sustainable development”. That research provided the researcher with an opportunity to examine regional integration as an international relations theory. The researcher defined and discussed some theoretical aspects of regional integration as a process, and he examined whether the process impacts sustainable development in Africa or elsewhere. Also, this topic permitted the researcher to analyze the benefits and challenges of regional integration in Africa. The research provided an opportunity to the researcher to assess and evaluate Africa’s regional integration processes using the African Union (AU) as a case study, and the AU member states as the unit of analysis to find out whether the continent’s regional integration processes have enhanced or hindered poverty alleviation and promoted sustainable development on the continent (Kaydor, 2024).

The research found out that the most prominent regional integration theorist is Ernst Haas (Ibid). He defined integration as “the process whereby political actors in several distinct national settings are persuaded to shift their loyalties, expectations and political activities toward a new center, whose institutions possess or demand jurisdiction over preexisting national states” (Kaydor, 2025, p. 595). This means that integration is a process that leads to a certain situation. In his *‘The Uniting of Europe’*, Haas observed and wrote about the integration process of the European Coal and Steel Community (ECSC) (Haas, 1968). He wrote about the logic of sector integration wherein he predicted that the ECSC would evolve into the European Economic Community (EEC). According to Haas, liberalization of trade within the customs union would lead to harmonization of general economic policies and eventually spill- over into political areas and lead to the creation of a new political community (Haas, 1958).

Regional integration has mainly had political benefits on the continent. Since the formation of the OAU, all African countries or states have agreed to be part of the Union. They have fought colonialism on the African Continent and apartheid in South Africa. To date, all African States are politically independent of Western Colonial Powers. This simply means that the OAU met one of its key objectives, but the AU has not met its objectives of Peace, growth, and Sustainable Development. Therefore, the researcher has established that unless the continent engages in deeper economic integration, regionalism will not lead to regional peace, and development in Africa (Kaydor, 2024). This finding is important to all research on the African Continent. For example, technological transformations that are the crux of this chapter cannot easily take place in Africa when there is no peace on the continent. Peace and stability are very paramount to all development priorities in the continent.

The previous research concludes that the Organization of African Unity (OAU) now the African Union (AU) started as a political union, and it is presently trying to become an economically integrated union. It is anticipated that the AU will achieve deeper economic integration because this is potentially the magic bullet to peace, growth, and sustainable development on the continent. Technological transitions leading to increased innovation must occur if this deeper economic integration must take root. In fact technological transitions and transformation could enhance deeper economic integration in Africa. When Africans experience deeper economic growth, their basic needs could be addressed. Technological advancements could lead to economic growth. With economic growth opportunities will come a reduction in poverty, crimes reduction, peace promotion, wealth creation and then the leaders on the continent will need to sustainably manage the socio-political, economic, and environmental processes that amount to sustainable development. Technology must be utilized to bolster the anticipated deeper economic integration that should lead to economic growth on the continent. In fact, technology itself is an economic growth corridor that Africa needs to pursue.

In 1991, the Abuja Declaration or Treaty was reached (Abuja Treaty, 1991). This regional agreement somehow divided the African continent into regional blocks (economic zones) to advance sub-regional economic integration through which the entire continent would achieve economic integration. The Treaty Establishing the African Economic Community (Abuja Treaty) was adopted on 3 June 1991 and entered into force on 12 May 1994. The treaty has been signed by all member states of the Organization of African Unity (OAU), except Eritrea. South Africa later signed the treaty on 10 October 1997. African states are working together to address common challenges and harness their shared strengths to fully realize the benefits of the continent's potential market of more than 1.5 billion people.

The World Bank Group in collaboration with its continental partner, the African Development Bank (AfDB), is a key contributor to Africa's regional integration processes. The four main levels of economic integration are customs unions, free trade areas, common markets, and economic unions. Africa's free trade area consists of countries working to remove trade barriers as they conduct business processes. Technology could play a key role in this process. On 28th May 2025, the Heads of State and Government of the Economic Community of West African States (ECOWAS) were celebrating the 50th anniversary of that regional body. It is my hope that they have reassessed progress made on Africa's Economic Community in the context of the 1991 Abuja Treaty earlier mentioned.

Africa allows other countries to conduct business with non-African members freely. This helps the continent's developing nations take advantage of the economies of scale. Africa is trying to fully roll out the AfCFTA on

the continent. The continent is trying to expand production capacities through diverse processes and create new opportunities; support international specialization; lead the development of new products with quality output and pursue the free flow of labor, capital, and goods. While COVID-19 slowed down regional integration on the continent, Africa was not performing well even before the pandemic, as documented in the previous African Integration Reports. According to the 2020 and even the 2021 African Integration Reports, the level of integration on the continent is low overall.

The first important challenge in the economic integration process in Africa is political stability. Not all countries enjoy an enduring political stability. Political instability in its subtle form has been expressed in stresses and strains in the political system and at the other extreme in civil disorder and war. Regional integration in Africa, however, can play a vital role in diversifying economies away from dependence on the export of just a few mineral products and deliver food and energy security; generate jobs for the increasing number of young people; alleviate extreme poverty and deliver shared prosperity thereby increasing cooperation, peace, and security among countries on the African Continent. This will increase the region's level of global competitiveness, and enhance the free flow of labor, capital, and technology to the most productive areas in Africa.

There are more than 1.5 billion people living in Africa — that's about 18% of the global population (Worldometer, 2025) — and they account for around 2.9% of global economic output” . Hunger and poverty are rife in Africa. Hunger is currently a global phenomenon; and Africa has been particularly vulnerable: about 21% of people on the continent suffered from hunger in 2020, a total of 282 million people (Kaydor, 2024). Between 2019 and 2020, in the aftermath of the pandemic, 46 million people became hungry in Africa. No other region in the world presents a higher share of its population suffering from food insecurity compared to Africa. Also, African households spend a larger portion of their income on food. According to a recent note in the Financial Times, citing estimates from the IMF, food represents 17% of expenditure in advanced economies, while in sub-Saharan Africa, the figure is about 40%. Most part of African farmlands is used to grow tree crops such as coffee, cocoa, cottonseed oil for export, parts of African fertile lands are used for mining, while crops of the African diet, wheat, and rice, mainly come from outside of the continent as imports.

With 60 percent of the world's uncultivated arable land laying in Africa, it is estimated that if all the arable land in Africa were to be nurtured, with the right information and knowledge to farmers from credible research institutions and other technical expertise, Africa would be capable of feeding over 60 percent of its own continent. This makes the case of Agricultural investment on the continent a compelling argument. Sustainability is wisely managing the social, economic, and environmental affairs of today so that tomorrow's generation and those generations that will come subsequently in the future will live and survive as well. The environment is therefore important to global and Africa's sustainable development. We all live in the environment and have got to take good care of it now and tomorrow for future generations to survive. Sustainability therefore remains a compelling consensus in and out of Africa.

In Africa, some states and peoples and countries still harvest and trade round logs to foreigners as export products while Africans input materials like beds, ceiling tiles and other domestic products from countries their governments sold round logs to. Also, some Africans mine today as though future generations would not need to survive. Environmental degradation is the order on the continent. To survive now and in the future, Africans must take care of and judiciously manage the environment now and tomorrow. Can the continent feed itself? Indeed, Africa can feed herself if the rightful investment in agricultural productivity is made. African states should therefore train local food producers in climate-smart production and avail the necessary technology and infrastructure to them to produce. The AU must make it compulsory for all states to be self-sufficient in food production. AU policy states, “through CAADP, African governments are expected to increase investment levels in agriculture by allocating at least 10% of national budgets to agriculture and rural development, and to achieve agricultural growth rates of at least 6% per annum”. African countries must deliberately exceed this continental requirement.

How can a continent that is endowed with abounding natural resources be dependent on other countries for help before doing development? Sustainable peace and stability are lacking in Africa. In this environment, ODA is still necessary for Africa; however, AID effectiveness remains fragile. Despite this risk and Aid

fragility, the AU needs to make it a continental policy that 80 percent of ODA in African states must go towards infrastructural development and investment. The AU must set up a regulatory entity to regulate this policy. Several politicians corrupt ODA. In fact, some of the donors are not transparent and accountable, hence ODA and some stolen local wealth end up in Western Bank Accounts leaving the locals poorer. Finally, peace and Security are the pre-requisite to economic growth and economic development. All the national and regional development issues being discussed here are dependent on peace and security. Some African States see no peace and security. Somalia, Central African Republic (CAR), Democratic Republic of Congo (DRC), Ethiopia and the Sudan.

Some West African States are under military seizure as this research progresses. They include Guinea, Mali, Burkina Faso, and Niger. With the military in control, it is unpredictable that peace and stability will reign in those countries. The questions of peace, stability, transparency, accountability, and public corruption remain unanswered in many African States. The crises of identity, distribution, and participation are still very high on the continent. Peace and Security are needed in Africa. If regional integration must take root in Africa, the AU must put in place peace and security mechanisms through which the contentment will make peace and keep peace. In addition to peace and security, the other vexing questions of transparency, accountability, identity, distribution, participation, and public corruption must be addressed systemically by the AU.

How might Africa attain enhanced Technological Transitions and Sustainable Development

Sustainable Development is a development approach to growth and human development that aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. The aim is to have a society where living conditions and resources meet human needs without compromising planetary integrity. Africa is still struggling to meet Sustainable development; however, the continent has developed its own regional development plan called the “Agenda 2063”. Sustainable development concentrates on social, economic, and environmental development issues. A sequence of shocks beyond its borders diminished Africa’s ability to develop and led to fast increasing debt levels. With nearly 1.5 billion people, or approximately 18% of the world’s population, Africa’s importance in the global economy is growing. Yet, since the turn of the century, the continent has been faced with several shocks that have arisen largely beyond its borders. Beginning with the global financial crisis of 2008 and, more recently, the COVID-19 pandemic, the ongoing Mpox pandemic and the war in Ukraine, Africa’s vulnerabilities have been brought to light. Thus, the continent needs to increase its resilience and become truly independent of itself. Technology transformation and transition can help the continent to progress in this direction.

The United Nations recommends that Africa needs to address its huge debt burden, and to address this huge debt burden, the continent’s approved road map of multilateral actions to address the global debt burden and achieve sustainable development should be meticulously followed. Africa’s roadmap to overcome this debt burden has been laid out in its “Our Common Agenda Policy Brief on Reforms to the International Financial Architecture and the SDG Stimulus”. This Policy focuses on three areas of action: i) tackling the high cost of debt and rising risks of debt distress, ii) massively scaling up affordable long-term financing for development, and iii) expanding contingency financing to countries in need. The implementation of these recommended actions is crucial to unleash the resources needed to build a more prosperous, inclusive, and sustainable regional and global development. Financing technology and investing in technological hubs in all of Africa’s sub-regions to help to spur innovation and economic growth is a must.

Recently, the UN Economic Commission for Africa (UNECA) released a strategic report that highlights opportunities for just and sustainable transitions (JSTs) in Africa. The 2024 Economic Report on Africa argues that “youthful population, arable land, renewable resource endowments, huge deposits of strategic minerals, and latecomer advantages from emerging technologies position Africa to shape the sustainability transition at the global level while closing its own gaps in energy availability (UNECA, 2024). Themed, ‘Investing in a Just and Sustainable Transition in Africa,’ the report makes the case for investing in a just and sustainable transition while achieving energy access for all. It contextualizes the imperative of JSTs for Africa, highlights opportunities for JSTs along the economic, social, and environmental dimensions of sustainable development, including financing for JSTs, and offers policy recommendations for Africa to successfully pursue such transitions including in the technology sector.

Realizing the significance of the African region's abundant renewable energy resources can pay off in enabling the continent's achievement of African states and their development objectives, the report acknowledges that, "guided by African-informed narratives and needs, the transition away from fossils needs to be gradual" (Ibid, p.24). Africa's current investment in its 'sustainability transition' and in renewables remains negligible, according to the report. The report identifies the need for fundamental shifts in the economic, governance, and technology systems in Africa to achieve JSTs. It recommends relying on forward-looking visions and strategies to maximize the continent's benefits from emerging economic and technological opportunities, noting that financing JSTs in Africa is crucial to ensure inclusive development of low-carbon resilient economies without compromising prosperity."

The report also recommends strengthening strategies and policies for the JSTs in Africa by integrating national priorities with the SDGs and Agenda 2063, facilitating the key role of the private sector, and balancing growth and strategic public investment while maintaining fiscal sustainability. It also calls for mobilizing new financing while making smarter use of available financial resources and for establishing a dedicated national mechanism for financing JSTs. Governments in Africa need to develop strategies for sustainably managing natural capital to foster investment in JSTs; support multilevel collaborative governance, human capital development, and leapfrogging technologies to guide JSTs; and build effective multistakeholder partnerships and coalitions at national, regional, and global levels.

A globally "just and sustainable transition including technological transitions, promoting accelerated, inclusive, and sustainable growth, as well as diversification and green industrialization will help Africa reach its potential", the Under-Secretary General and UNECA Executive Secretary, Claver Gatete, asserted in the foreword of the JST. For this to materialize, however, African countries need holistic development plans and strategies that fundamentally redirect their production, consumption, governance, technology, human capital, and financial systems, he also underscored. The report's "recommendations will go a long way in contributing to improving human well-being and the welfare of future generations by fulfilling basic needs, creating productive jobs and sustainable livelihoods, and establishing a healthy ecosystem," the UNECA Deputy Executive Secretary and Chief Economist, Hanan Morsy, indicated at the report's launch. Within this chapter, several issues have been discussed regarding how Africa could utilize technological transition mechanisms to foster growth and attain sustainable development now and in the future. Specifically, the researcher believes that some measures should be taken by the African continent under the aegis of the African Union Commission to be able to achieve peace and stability, profitable technological transitions and sustainable development on the continent. These measures include:

1. To have a rising, technology savvy and sustainable Africa, a "United States of Africa" under one army, one government, one passport, one foreign policy, one recognized language and one currency, is desired to focus on continental sovereignty. This United States of African will have the responsibility to cater to the wellbeing of all Africans as a single state under a Confederacy and promote technology advancement and innovation. Individual African States will still retain their national governments and constitutions. The AUC would be the Confederal Government.
2. Africa should become a member of the United Nations Security Council because a continent of about 1.5 billion people must and should be represented on the peace table of the globe. The African Union Commission should strive to represent the continent on the UNSC as such.
3. The 1991 Abuja Treaty needs to be fully implemented because it calls for Africa's economic integration. The continent achieved political integration but needs to deeply integrate economically for regional peace, technology advancement and sustainable development.
4. Arm, fully equip and effectively support the African Standby Force to make peace and keep peace in all member states on the continent so that the continent can have its own homegrown peacekeeping force.
5. The AU needs to make it a continental policy that 80 percent of ODA in African states must go towards infrastructural development and investment in innovation and technology. This regulation could compel African states to invest in addressing the infrastructural deficit within African states specifically, and the continent at large.
6. Set up an African Union sovereign fund to which all Africans or African descents or their states, on behalf of each citizen, should contribute a dollar for infrastructural development of the continent. For

- instance, to fund intra Africa infrastructure across the continent like the fast train between Addis and Djibouti etc.
7. Appropriately manage the environment on the continent to ensure that environmental degradation is minimized. Ensuring environmental integrity will protect the environment and the interest of future generations.
 8. Focus on agricultural productivity, value addition and provision of safe drinking water to address extreme hunger, malnutrition, water problem and poverty on the continent. The 1.5 billion population of the continent will grow annually; therefore, the continent needs to provide adequate food, clean water, sanitation environment etc. for all. Technology is pivotal to the advancement of the objectives and program.
 9. If Africa must achieve the Agenda 2063 aspiration for “A prosperous Africa based on inclusive growth and sustainable development” (as enshrined in Aspiration 1) as well as all other aspirations of the continent, Africa needs to invest in modern agriculture for increased productivity through technology transitions and advancement and as well as exploit the vast potential of Africa’s blue economy. In addition, action needs to be taken to address climate change issues and other environmental factors that pose a great risk to the agricultural sector. Technology has a cardinal role to play here.
 10. Merge modern health science based on technology on the continent with acceptable, good, or transformed traditional African health systems to cure diseases or pandemics on the continent because African traditional medicines are mostly ignored in the mainline health sector in many African States; and
 11. Harmonize Africa's educational system to allow mobility of teachers, professors, and students to focus on integrated research on Africa's Development priorities in the continent and to engage in technological innovations to advance education on the continent.

SUMMARY AND CONCLUSION

Technological transitions are taking place globally. Africa is an intrinsic part of this but faces some challenges including weak market dynamics, limited technological infrastructure, poor governmental commitment, inadequate organizational culture, limited human capital development, weak regulatory environments, and poorly performing economic factors that impede these transformations and transitions. Omol, Mburu, and Abuonji (2024) conclude that there is a need to advocate for collaborative solutions bringing together governments, private entities, and educational institutions in strategic alignment with the global discourse on Africa's role in the digital economy. For his part, Joseph Amankwah-Amoah (2019) asserts that poor and weak regulatory enforcement systems, lack of financial credit availability, and limited banking services have created sluggish conditions for technological innovations such as mobile phone-based banking, mPedigree, “cardiopat,” and M-PEPEA that have emerged on the continent.

The African Continent stands at the precipice of a transformative digital era, where challenges and opportunities intertwine in shaping the trajectory of digital maturity. The unique character of Africa’s digital transformation journey influenced by weak technological infrastructures, poor economic conditions, and stagnant cultural nuances, demands a nuanced approach. As the continent hosts seven of the world’s fastest-growing economies and embraces digital strategies, there is a unique opportunity to leapfrog into a new era of development (Abdulqadir and Asongu, 2022). However, this journey is not without hurdles. The technological infrastructure deficit, particularly in terms of high-speed internet accessibility, poses a significant barrier. Bridging this gap requires concerted efforts in deploying fixed-line broadband connections and fostering innovative solutions to enhance digital inclusion (David & Grobler, 2020; Peter et al., 2023). This makes the cultural integration of technology within organizations emerge as a critical factor. Inclusive governance and leadership must play a central role in fostering a culture that supports technological adoption, innovation, and adaptability (Modiba & Kekwaletswe, 2020). The unhindered development of human capital is a linchpin for Africa’s digital future.

There is a need to bridge the digital skills gap, address generational gender disparities, and prepare the burgeoning youth on the continent to evolve a job market through technology. Africa needs to place a strategic focus on flexible education systems, continuous learning, and the development of both Digital Skills

and Digital Complementary Skills. Technological advancement is vital for unleashing Africa's workforce potential in this digital age (Abebe & Maalim, 2020; Rass et al., 2023). Navigating is tricky and complex landscape; it is vivid that a holistic and collaborative approach is important. The private sector, national governments, and educational institutions must join hands to invest in technology and its related infrastructure, nurture a supportive organizational culture, and prioritize human capital development. Africa can not only overcome the challenges posed by digital transformation and technology transitions but also position itself as a global player in the digital economy, contributing to sustainable development and inclusive growth on the continent. Addressing Africa's digital transformation requires and demands a strategic focus on technological infrastructure.

African governments and the private sector on the continent should collaborate to extend high-speed internet access to majority of the African people, particularly in remote areas where over 300 million residents lack fiber or cable broadband connections (David & Grobler, 2020) . Efforts should be made to prioritize the deployment of fixed-line broadband connections beyond capital cities, ensuring widespread and affordable connectivity across the continent (David & Grobler, 2020; Peter et al., 2023). National governments play a cardinal and essential role in fostering digital and technological transformation. Adopting a whole government approach, the AU member states should coordinate efforts to enhance responsiveness, transparency, and citizen trust. Political dedication and the establishment of unified pan-African digital ID systems are crucial to overcoming the current challenges in digital governance. Emulating global e-government development trends can help to drive Africa forward in this terrain (Attaran, 2023; Madi Odeh et al., 2023). Going forwarding, it is the researcher's anticipation that other researchers will conduct quantitative research on this very important matter. Mix-methods studies are also encouraged to bring to light additional insights that might have been left out for now during qualitative study.

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