

16. Converging Forces: Navigating Climate Change and the Future of Work in Developing Countries

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Abstract

Climate change and the Future of Work are inextricably linked, and their collective force will lead to new challenges and opportunities in developing countries, which will bear the brunt of the fallout of climate change. The more pronounced climate change impact is on developing countries, the more difficult, yet also more critical, it is for them to have productive labour markets and equitable economic growth, especially for vulnerable populations. For example, female populations across developing countries are often faced with fewer economic opportunities than men, and many who do have jobs work in industries that are highly susceptible to climate change. The forces of climate change and the Future of Work must be treated as part and parcel of any national development strategy. In doing so, developing countries can build environmental as well as socio-economic resiliency, as well as navigate climate change's unprecedented challenges while ensuring continued growth.

Keywords: climate change, low carbon technologies, climate-tech, future of work

Introduction

Climate change and the Future of Work (FoW) are inextricably linked, and their collective force will lead to new challenges and opportunities in developing countries. A mixture of exposure to extreme weather, geographic positioning in coastal areas, reliance on agriculture, pre-existing

development challenges, and a lack of economic resilience are creating what may be a recipe for disaster in many low-income economies (Wijaya 2014; Ludwig et al. 2007). The impact could be particularly dire for marginalized and vulnerable populations, including women in developing countries, who have historically had far fewer economic opportunities than their male counterparts and are arguably more exposed to climate-induced shocks and damage.

In parallel to mitigating and adapting to the effects of climate change, developing countries must still pursue economic growth that helps them maintain pace and position within the global economy (Reddy and Assenza 2009). As developing countries contend with climate change, they must also ensure that they continue to integrate into an evolving global economy that demands new skills and embraces new technologies. The advent of low carbon technologies (LCTs) could help in navigating this equation—e.g., new technologies could lead to employment and wealth creation, while also helping to address climate change's growing effects. However, ensuring the proper infrastructure and skills needed to leverage LCTs, as well as successfully procure them in general, are not small orders, particularly when factoring in the need for protecting those most vulnerable in developing countries.

Understanding how climate change interacts with the Future of Work (FoW) in developing countries is part and parcel of this narrative. They cannot address this in isolation, yet doing so can lead to important opportunities for developing countries to more effectively unify climate and labour trends in policy decision processes, prioritize cost-effective and targeted technology development and transfer, hone climate-resilient skills in education and vocational training programmes, as well as generally strengthen alliances across public, private, and non-profit sectors.

Impact of Climate Change on Developing Countries

Climate change poses a massive threat to developing countries—both because of their geographies and their low-income status; meaning that developing countries face greater threats due to climate change, but have fewer financial resources to address those threats. The below data points provide a succinct summary of how climate change is expected to affect developing countries: approximately ninety-nine per cent of deaths due to climate change occur in the developing world (Dar 2012); natural disasters cost about \$18 billion a year in low- and middle-income countries through

damage to power generation and transport infrastructure alone (Hallegatte, Rentschler and Rozenberg 2019); and eighty per cent of countries most affected by extreme weather events were low-to-middle income countries (Eckstein, Künzel and Schäfer, 2021).

Examples of how these trends play out are abundant. For instance, altering precipitation patterns trigger heat waves, cause sea levels to rise, and increase the salinization of land. Health, nutrition, housing, transportation, and jobs are all threatened in this scenario. Similarly, in 2015, tropical storm Erika caused \$400 million in damage to Dominica—equal to ninety per cent of the small island state's GDP.¹ Trade and general commerce are also highly vulnerable in this equation. For example, major commercial ports in Rio de Janeiro, Mumbai, Guangzhou, and Dar es Salaam are at risk of being submerged by rising sea levels.² Even a minor disruption in economic activity can have significant negative impacts, while prolonged interruptions can lead to extended and even permanent employment loss.

The impact can also be seen through adopting a gender lens. For instance, while developing countries will experience disproportionately high fallout from climate change, women in these countries are in a particularly vulnerable position. The bulk of the world's poor are female, meaning that negative shocks due to climate change can have an acute effect on their already economically marginalized lives.³ Additionally, women are often more dependent on the procurement of natural resources for sustaining their livelihoods, particularly in rural areas. As more natural forests and water sources, among others, come under threat due to shifting climate patterns, female populations are increasingly at risk (Ibid.). With this added lens, climate change's full effects not only threaten to disrupt and even halt economic growth in developing countries, but they will also have a direct, profound impact on women's inclusion. Thus, the direct impact that climate change has on labour markets and livelihoods in developing countries is real and can be increasingly severe.

1 Kambon et al. The Commonwealth of Dominica, Social and Livelihood Assessment, Following Tropical Storm Erika. Government of the Commonwealth of Dominica with the Technical Assistance of the UNDP, Barbados and the OECS, 2019. https://reliefweb.int/sites/reliefweb.int/files/resources/UNDP-RBLAC-TropicalStormErikaBB_o.pdf

2 Climate Change and the Developing World: A Disproportionate Impact. March 2021. US Global Leadership Council. <https://www.usglc.org/media/2021/03/USGLC-Fact-Sheet-Climate-Change.pdf>

3 Women, Gender Equality and Climate Change – Fact Sheet. United Nations, 2009 https://www.un.org/womenwatch/feature/climate_change/downloads/Women_and_Climate_Change_Factsheet.pdf

FoW in Developing Countries

Climate change aside, developing countries were already beset by the tall order of adapting to other dominant global trends. New technological advances are necessitating fast and vast upskilling, and are essentially a prerequisite for taking part in the global economy. This parallel narrative, often referred to as the Future of Work (FoW), is another phenomenon that developing countries have been, and will continue to contend with, as they seek to provide meaningful employment and equitable economies for their people. Women and youth are in a particularly precarious situation, given the lingering barriers that they face to economic inclusion. Understanding how the most salient FoW trends are playing out in developing countries is critical to the larger conversation regarding climate change in these nations as well.

It may be becoming trite, but globally, there is a rapid technological transformation occurring that has profound effects on how people work, learn, and build their livelihoods. For example, McKinsey estimates that as new technologies and working methods become ingrained in employers globally, upwards of 160 million women may need to make career transitions by 2030.⁴ As they come to terms with the sweeping effects that the FoW will bring, governments as well are finding these trends embedded in policy discussions and decisions. Generally speaking, this trend is catalyzed by innovations such as artificial intelligence (AI), machine learning (ML), blockchains, and big data. Collectively, these technologies and methodologies serve as the connective tissue in what many call the Future of Work. Indeed, unprecedented efficiencies and wealth are natural byproducts of these fast-moving trends, yet not all countries are equally capable of absorbing them in the near-term, and many developing nations in particular lack the resources needed to adequately respond to and create the policy frameworks for adoption.

Lingering labour challenges in developing countries predate the concerns surrounding the FoW. While estimates vary, 600 million jobs at least need to be created by 2030 to absorb the number of youth projected to enter the market.⁵ Moreover, there will be 1.3 billion youth worldwide by 2050,

4 Madgavkar et al. *The Future of Women at Work: Transitions in the Age of Automation*. McKinsey Global Institute, 2019. <https://www.mckinsey.com/featured-insights/gender-equality/the-future-of-women-at-work-transitions-in-the-age-of-automation>

5 *World Youth Report: Youth Social Entrepreneurship and the 2030 Agenda*. United Nations Department of Economic and Social Affairs, 2020. <https://www.un.org/development/desa/youth/wp-content/uploads/sites/21/2020/07/2020-World-Youth-Report-FULL-FINAL.pdf>

many of whom will be in developing countries (Chandy 2017). Much of this population will not reach tertiary education, and even those that do will have to contend with long traditions of educational systems not matching with current labour market demands. This mismatch will be compounded by the aforementioned technological evolutions, which will expedite the development of industries, requiring new skill sets that must be acquired in short order. Moreover, these forces are converging when safeguarding good jobs, and general economic inclusion for women in developing countries is a longstanding imperative. Women's labour force participation is significantly lower than men's in most countries around the world, often earning and working far less.⁶

As FoW forces become more prevalent in developing countries, there is potential disruption on already perilous labour market conditions for women. Put differently, developing countries have historically faced large unemployment challenges, with their education systems unable to effectively absorb growing populations, and in turn, produce employable workers. Major trends in the FoW will likely magnify these deficiencies.

At the moment, developing countries are unprepared to adapt to automation, due to low wage levels, limited availability of workers with highly technical skills, high technology costs, and regulatory barriers. These technological advances will disproportionately reward highly skilled workers and owners of capital (Chandy 2017). Technology will have an outsized role to play in the FoW, with large implications for education and technical skills learning in developing countries.

Climate Change and the FoW in Developing Countries

Climate change is forcing both developed and developing countries to examine the impact of the natural environment and weather patterns on every facet of the economy. While each country will need to procure a solution set that is tailored to its unique socio-economic climate, consensus is building around four main ways in which climate change will impact the future of work in developing countries.

Resource depletion: One major way climate change will disrupt the FoW in developing countries is through the depletion of resources that serve

6 World Employment and Social Outlook: Trends for Women 2018 – Global Snapshot. International Labor Organization, 2018. https://www.ilo.org/global/research/global-reports/weso/trends-for-women2018/WCMS_619577/lang-en/index.htm

as inputs in the economy. Climate change is causing soil degradation, the destruction of coral and marine ecosystems, and pollution and worsened air, soil, and water quality. The destruction or damage of these inputs may result in the destruction of certain industries, or might lead to the increased cost of inputs due to scarcity. On net, the 1.2 billion jobs globally that depend on the natural environment, are at risk (Montt, Fraga and Harsdorff 2018).

Extreme weather events: Climate change is making extreme weather events more common, and as these events damage infrastructure and create more hazardous living and working conditions, they will naturally have a negative fallout on labour markets. For example, 2020's cyclone Amphan caused \$13 billion in damage in India.⁷ Beyond the destruction of infrastructure, severe weather can also influence the ability of workers to perform their jobs. By 2030, the total number of hours lost to rising temperatures will increase to two per cent, equivalent to 72 million full-time jobs (Ibid.). As climate change becomes an increasingly present force, agriculture and food sectors will face crises, creating vast uncertainty and potential disaster for many developing countries. Damage due to extreme weather can also be viewed from a sectoral lens. For instance, the tourism sector, an important source of revenue for many developing countries, is at high risk due to extreme weather events. Flooding and droughts may render many formerly frequently visited locations damaged or inaccessible. Many women also rely on tourism for jobs in developing countries—roughly forty-six per cent of the tourism workforce, globally, are women—meaning that as activity is curtailed in this sector, both the sector and women working within it will be at risk.⁸

Health and safety of workers: Additionally, climate change will also have an impact on the health and safety of workers—both due to losses in productivity, as well as work-related health risks. The decrease in air quality will impact workers as low-quality air will cause increased incidences of health problems (Ibid.). This can cause lower productivity and lost hours, both from workers who are themselves impacted, as well as the increased need for healthcare labour when relatives or friends become ill, a responsibility which disproportionately belongs to women. In addition, climate change will lead to more work-related injuries and illnesses. In particular, rising temperatures will increase the incidence of heat stroke, as well as the amount of time workers will need to rest to avoid heat stroke or exhaustion (Ibid.).

7 “CDC Emerging Economy Climate Report 2021,” CDC. <https://www.cdcgroup.com/en/news-insight/insight/articles/cdc-emerging-economies-climate-report-2021/>

8 Green Jobs: Improving the Climate for Gender Equality Too! International Labour Organization. Bureau for Gender Equality; International Labour Office. Policy Integration Department.

Pressures on the agriculture sector: According to the World Bank, approximately 1 billion people work in agriculture globally, representing twenty-eight per cent of the population employed; however, the percentage of people employed in agriculture has been trending downward. For instance, in 1991, forty-four per cent of global employment was in agriculture.⁹ In developing countries, many farmers rely on rain-fed agriculture, forests to prevent floods, fertile soil, the pollination of crops, and the control of agricultural pests. Similarly, coastal fishing relies on the biodiversity and ocean's ability to renew fish stocks, as well as tidal marshes, mangroves, and coastal reefs for storm protection. As climate change causes changes in rainfall patterns, droughts, soil degradation/erosion, salinization of arable land, sea levels, and ocean temperatures, the agriculture and food sectors will face crises—as yields may decrease and techniques for food cultivation may no longer be suitable. Here again, women stand to be disproportionately impacted by climate-induced damage to agriculture sectors. Women tend to play a greater role than men in farming and planting, demonstrating women's heavy reliance on agriculture for their livelihoods in developing countries. Yet, women also tend to have lower levels of access to important agricultural inputs, including land and credit.¹⁰ As maintaining farms, forests, and other sources of natural resources becomes more and more untenable, women will acutely feel the brunt (Ibid.).

Climate change will have a profound impact on labour markets. Moreover, climate change will directly determine the FoW as well, as no industry, job, or skill set will be left untouched by increasingly changing climate and environmental conditions. Thus, policy agendas will need to acknowledge the linkage between the two. Much like how technology is driving the FoW, it is also critical in climate mitigation and adaptation efforts. Innovations in renewable energy, carbon sequestration, natural capital monitoring, and weather forecasting, among many others, are becoming increasingly mainstreamed. These LCTs are part and parcel of any country's climate change agenda as well. New technologies that support in mitigating as well as adapting to climate change's effects can also open new employment opportunities. In doing so, LCTs can help in providing potential “win-win”

9 World Bank data, retrieved on August 29, 2022. <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS>

10 Green Jobs: Improving the Climate for Gender Equality Too! International Labour Organization. Bureau for Gender Equality; International Labour Office. Policy Integration Department. Geneva: ILO; 2009. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---gender/documents/publication/wcms_101505.pdf

scenarios for countries, as they are forced to navigate climate and labour-related challenges. That said, the degree to which these technologies can be a legitimate lynchpin to boost labour markets, including helping to maintain and enhance economic inclusion of vulnerable populations, is still up for grabs.

Low Carbon Technologies—A Force for Climate Mitigation/Adaptation and Job Creation?

LCTs could create millions of jobs worldwide. Currently, the costs of LCTs are decreasing.¹¹ For example, between 2010 and 2018, solar energy's cost per gigawatt fell by eighty per cent, followed by fifty-four per cent for energy storage, and twenty-two per cent for onshore wind power.¹² The International Labour Organization (ILO) predicts that the energy transition will create 24 million jobs globally and destroy 6 million jobs, creating a net of 18 million jobs added (Montt, Fraga and Harsdorff 2018). However, ensuring that LCTs are legitimate job creators in developing countries will require addressing some sobering realities.

For starters, job loss could be a natural byproduct of introducing LCTs, when workers in outdated industries and those that are more susceptible to automation, attempt to transition to jobs for which they are not properly skilled. However, this will not be the norm across countries and industries. Much of the factories and machinery required to produce LCTs are complex and require engineers and other specialized skill sets (Bulmer and Rutkowski 2021). Advanced skills in LCT-specific domains will likely require formal education. Globally, only thirty-eight per cent of people receive a tertiary education, with that number dropping to nine per cent in Africa.¹³ While LCTs are by no means a staple in either developed or developing countries, the need for advanced skill sets, against the backdrop of labour and educational challenges across developing countries writ large, is bound to hit a snag. As such, there is a real risk that LCT-driven job creation will not align with the pre-existing or readily learned skills of displaced workers in developing

11 Lorenczik, Stefan and Keppler, Jan Horst, *Projected Costs of Generating Electricity 2020 Edition*. International Energy Agency and Nuclear Energy Agency, 2020. <https://www.iea.org/reports/projected-costs-of-generating-electricity-2020>

12 CDC Emerging Economies Climate Report 2021. <https://www.cdcgroup.com/en/news-insight/insight/articles/cdc-emerging-economies-climate-report-2021/>

13 Tertiary Education in Sub-Saharan Africa. World Bank, 2020. <https://thedocs.worldbank.org/en/doc/764421611934520379-0090022021/original/OneAfricaTEandCovidupdated.pdf>

countries, impeding the potential of LCTs to create local jobs for the average worker.

While indeed the costs of LCTs are lowering and becoming competitive with traditional fossil fuel-powered incumbents, there are still high upfront capital requirements for acquiring and implementing them.¹⁴ In fact, the bulk of LCTs are built in high-income countries, and never make their way into low income ones (Pigato 2020) (Ibid.). For instance, for India to reach net zero by 2050, there is an estimated price tag of \$1.4–1.9 trillion, roughly half of India's current GDP (Kenny 2021). Of course, this cost consists of many line items, and LCT only constitutes a portion of it.¹⁵ Yet, the gaps in global climate finance are still vast, to the tune of several trillion, according to some estimates, annually.¹⁶

Compounding the high cost of LCTs are the global financing gaps in climate finance. Although the Organisation for Economic Co-operation and Development (OECD) governments are upping their climate finance commitments, the funding needs are still astronomical.¹⁷ To limit global warming to 1.5°C, by 2030, annual climate finance must increase by 588 per cent to \$4.35 trillion.¹⁸ Developing countries face acute financing gaps, both in bilateral assistance, as well as through the insufficient flow of private capital, as total climate finance spending is split between public and private actors.

Recommendations

Governments in developing countries must make challenging decisions in balancing immediate gains for citizen well-being versus combatting the

14 Pigato, Miria; Black, Simon J.; Dussaux, Damien; Mao, Zhimin; McKenna, Miles; Rafaty, Ryan; Touboul, Simon. 2020. Technology Transfer and Innovation for Low-Carbon Development. International Development in Focus, Washington, D.C.: World Bank. © World Bank. <https://openknowledge.worldbank.org/handle/10986/33474> License: CC BY 3.0 IGO.

15 "CDC Emerging Economy Climate Report 2021," CDC. <https://www.cdcgroup.com/en/news-insight/insight/articles/cdc-emerging-economies-climate-report-2021/>

16 Buchner, Barbara, et al. Global Landscape of Climate Finance 2021. Climate Policy Initiative, 2021. <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/>

17 COP26 Presidency Compilation of 2021–2025 Climate Finance Commitments. UK Government and UN Climate Change Conference UK 2021, 2021. <https://ukcop26.org/cop26-goals/finance/>

18 Global Landscape of Climate Finance 2021. Climate Policy Initiative, 2021. <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/#:-:text=The%202021%20edition%20of%20Climate,out%20annual%20fluctuations%20in%20data>

long-term threat of climate change, particularly when taking into account the needs of the most vulnerable. While each country's precise experience with these challenges will vary, the below action areas can help in focusing efforts.

Action Area 1: Establish the understanding that labour is embedded in the larger conversation of climate change mitigation and adaptation. Climate change will need to be seen as not just an environmental challenge—but also a labour issue. This means that the popular understanding must shift to reconceptualize climate change as a multi-sectoral issue that requires key actors to work across silos. Policymakers should consider where and how climate change needs to be integrated into existing policy/programming frameworks surrounding education, small and medium enterprises, healthcare, etc. In doing so, climate change must be mainstreamed into the core objectives and activities of these policies/programmes rather than as an addendum to projects.

Action Area 2: Developing countries need to prioritize cost-effective and targeted tech transfer. Many national governments may be enticed by the prospect of acquiring the latest technological advances, which often come at a high cost. Because of the financing gaps in climate finance, tech acquisition and tech transfer should be targeted towards technology that is affordable and easily scalable to maximize the impact of limited finance.

Action Area 3: Prioritize climate-resilient skills development in education and vocational training programmes. In order to prepare the workforce for climate change and its economic implications, developing countries need to place climate-resilient skills and knowledge at the forefront of their pedagogy and curricula in schools and vocational training centres—both public and private. Using climate as the guiding principle for upskilling the current workforce and priming the future workforce will allow developing countries to cultivate the human capital needed to facilitate LCT transfer and respond to climate change.

Action Area 4: Build strong alliances across public, private, and non-profit sectors. Given that both climate change, as well as labour markets and the FoW are relevant across industries, policymakers need to build relationships with stakeholders across industries as well. This is especially salient because of the key role of the private sector in climate change adaptation and mitigation. In doing so, policymakers will need to gain buy-in of industry leaders and understand how the mixture of climate and labour-related challenges and opportunities affects their domain.

Action Area 5: Address the needs of the most vulnerable populations, including women and youth. Marginalized demographics in developing countries risk being left even further behind, as the full effects of climate

change and the FoW take root. For instance, climate change is set to magnify historical gender inequities globally. Developing countries, home to long-standing economic marginalization of large percentages of their female and youth populations, could see these gaps widen as industries evolve and are disrupted, by changes in climate and the FoW. Thus, these groups will require tailored support in navigating these forces.

Conclusion

Climate change and the FoW are inextricably linked, and these twin forces cannot be considered in isolation from one another. The more pronounced climate change's impact is on developing countries, the more difficult, yet also more critical it is for them to have productive labour markets and, overall, equitable economic growth. Despite the current warning signs and sobering forecasts, it is not uncommon for climate change to be positioned as an opportunity for developing countries (Tsitsiragos 2016). Moreover, considering the labour dimension within the larger climate agenda can help policymakers in identifying these opportunities. Unifying climate and labour policies and funding programmes, optimizing the usage of LCTs, and building the skills necessary to create and maintain them as well as enhancing coordination between sectors, are all steps that developing countries can take to build both environmental and socio-economic resiliency, help to navigate climate change's unprecedented challenges, and ensure continued growth.

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