



**The Brookings Institution
Africa Growth Initiative
*Foresight Africa Podcast***

**“What African countries risk if they don’t accelerate
their digital transformation”**

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Guest:

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Episode Summary:

African countries lag behind G20 nations in their digital infrastructure and risk falling behind in their economic development and exacerbating existing inequalities. Host Landry Signé and his guest Haroon Borat of Cape Town University—co-authors of new research on how to foster an inclusive digital economy in Africa—discuss the indicators of digital infrastructure and policy recommendations for accelerating digitalization in Africa.

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SIGNÉ: I am Landry Signé, senior fellow in Global Economy and Development and the Africa Growth Initiative at the Brookings Institution. Welcome to *Foresight Africa* podcast, where I engage with contributors to our annual *Foresight Africa* report, as well as with policymakers, industry leaders, and other key figures. You can learn more about this show and our work at Brookings dot edu slash Foresight Africa podcast.

If you missed the previous episode, I have had the honor of taking over the host microphone from Aloysius Uche Ordu, who is stepping down from his role as director of the Africa Growth Initiative. If you listen to that episode, you will learn more about his exciting new opportunity.

Today on the podcast, I am pleased to welcome Doctor Haroon Borat. Haroon Borat is a nonresident senior fellow at Brookings and a professor of economics and the director of development policy research at the University of Cape Town. Professor Borat is a labor economist whose research primarily focuses on poverty and the income distribution. Haroon and I co-authored an essay titled “Fostering a Digital Inclusive Economy in Africa” in *Foresight Africa 2024*.

Welcome to the show, Haroon.

BHORAT: Thank you very much, Landry.

SIGNÉ: Haroon, you are a world-renowned economist, and everyone wants to engage with you. But I want to know, what drew you to economics?

BHORAT: An interesting question, Landry. We don’t often get asked that question. So, I think, you know, ironically, at high school it was a joint fascination and interest in two subjects: history and mathematics. And I was torn, ironically, at university between the two subjects. And economics, in my view, combines the two beautifully, in a manner where we’re trying to understand both societal change, societal upheaval, transformation in a society. But with the tools being primarily numbers, statistics, causality, graphical interface.

And it’s only economics in the social science disciplines, despite being the dismal science that it is, that is able to do that, I think, better than most other disciplines. So, that was the perfect match for me. And I guess the rest is history. I’ve never looked back.

SIGNÉ: Fantastic. When we say digital transformation, what exactly are we talking about?

BHORAT: Yeah. So, I mean, in many ways, you know, it’s a very pervasive term, digital transformation, the digital divide, and so on, Landry. And I think, again, just keep in mind that the current sort of wave of digital technologies we live through has its roots in the ICT, the information, communication, technology, advances that ensued already in the 1970s. Right? And if one thinks of the rise of the personal computer and so on.

And now we live through what we would call the sort of heart of the digital transformation period where we have technologies such as artificial intelligence, the internet of things, big data, blockchain, 5G, 3D printing, robotics, drones, all of that sort of stuff. That in many ways represents the notion, represents the idea in, in, in sort of real examples of a digitally transforming society, the fact that for everyday life, for productive activity, for leisure, we are constantly engaging, using some form of digital platform or another. And as I said, it can be everything from using the internet through to drone technology, and so on.

SIGNÉ: I like the illustration that you have shared. Can you give a few additional example[s] of the type of infrastructure and technology that goes into these transformations?

BHORAT: Yeah. So, we can talk a little bit about that later. But I mean, the type of infrastructure is essentially around where everything from sort of cloud servers through to baseline infrastructure, whether it's cellular phone towers, you know, internet servers, and so on. So, I think that kind of digital infrastructure lies at the heart of actually thinking through digital transformation.

That for me is where the debate around and particularly the work that we've done around sub-Saharan Africa and digital divides and the digital gap, those are the sort of baseline provision of infrastructure that you're looking to when you're thinking about digital transformation.

SIGNÉ: Very insightful. What is at stake for this transformation? What is to lose if African countries or society fall behind in digital transformation? What would African countries and society and eventually even the world will gain by transforming successfully?

BHORAT: Yeah. So, in many ways, you know, we have we have in economics a sort of what we call this Solow growth model. Right? So, in economics, the heart of any societal transformation attempt, if you like, lies in the sort of pursuit of high levels and consistently high levels of economic growth. Yes, there are lots of debates about whether GDP is the appropriate measure and so on, but certainly must feature in any debate, any discussion around increasing the standards of living in a society. So, by that we mean ultimately, we want to improve standards of living in the society, reduce poverty, reduce inequality levels. GDP needs to be at the heart of that.

Now, how do you achieve GDP? The Solow growth model said, yes, you need inputs of capital, labor, land, and so on. But actually, the residual, the residual is what drove economic growth over decades for society. Bob Solow did mainly for the U.S., others replicated for other economies. So, what sits in the residual? Landry, what sits in the residual is technology. And throughout the errors of human history, what we find is that technology is that key ingredient that raises the productivity of firms, of individuals, and ultimately of societies. And with productivity growth, we get raising standards of living.

And so, what is at stake ultimately is we either, we either as a society, particularly as African economies, we either find ourselves on this journey in terms of both technology adoption and technology production, and we're participating fully in both

those forms of adoption and production. And in doing so, that residual, if you like, that that technology, becomes a core component of our growth story.

If we don't do that, we will fall behind. We we will be as we show in our paper, we run the risk of becoming growth laggards because of our lack of participation in these new technologies and sort of marginalization in the whole technology revolution that we are currently going through.

So, I think that is ultimately what is at stake. I would argue that technology adoption and production remains critical to sub-Saharan Africa's growth success.

SIGNÉ: Fabulous. Your work primarily focuses on the labor market and inequality in the income distribution. How can the digital transformation occurring in Africa potentially exacerbate existing inequalities?

BHORAT: Yeah, so in many ways answered by the previous question. Right? So, to my, you know, if one thinks of technology and growth as that as technology, as the generator of higher levels of growth, ultimately what it means is let's take, let's say Africa relative to the G20. So, or emerging markets, right? For now, not the rest of the world, and certainly not advanced economies. But if you find that there's a large rump of sub-Saharan African economies—and that's what we do show, although there's a heterogeneity in the sample, we do show it in the paper—there's a large number of economies that are lagging behind on specific indices around digital transformation. What that ultimately means is those economies are more than likely to grow more slowly. If you grow more slowly, right, as we know from from basic interactions between growth, poverty, and inequality, low growth is not good for poverty. So, it constrains the ability to reduce poverty levels in the society. And under certain assumptions is more than likely to to increase in-country inequality.

However, growing low-growth rates, high levels of poverty in an African context, where there's low technology adoption and production compared to economies where you have high levels of technology adoption and production, I would argue, would only grow the gap between those economies in terms of GDP per capita or any other form of sort of measure of standard of living.

So, I think what's what's likely to happen is technology plays a key role in both convergence—so, growth convergence. So, we'll hopefully, if high levels of technology adoption and production we'll see African economies' income levels increasing at a rate that will start approximating, let's say, emerging markets. But if that doesn't happen, and that's a serious challenge in many African economies, that gap will grow.

And I think that inequality between let's call it low-technology adopters and producers versus high-technology adopters and producers is a serious risk that many African economies face.

SIGNÉ: Will you mind elaborating on some cases or even about South Africa?

BHORAT: Well. So so so, what we find in in the paper and not necessarily elucidated in in the *Foresight* article—but listeners can actually go to the full article—is we do note by measuring this Africa digitalization index gap, which we can turn to

later in more detail, we find that there's outlier economies such as Mauritius, South Africa, Tunisia, Namibia, Rwanda, that actually perform much better, right, on a digitalization index measure relative to economies such as Niger, Malawi, and Madagascar, and Benin. Those are sort of the poorest performing economies in terms of how far below the G20 average, if you like, or the average for G20 economies in terms of their digitalization score are far below African economies are. And we find that Niger, Malawi, Madagascar, and Benin are the furthest below, whereas as I said, Mauritius, Tunisia, South Africa, Namibia, Egypt, Rwanda do much better.

SIGNÉ: Fabulous. Policymakers in Africa have competing priorities and a variety of challenges to tackle. Why should policymakers be concerned about inclusivity in the digital economy? What is at risk if policymakers don't foster inclusion and stick to the status quo?

BHORAT: Well, I think economic growth is at risk. I think economic growth is seriously at risk if African policymakers do not see the centrality of technology adoption, the centrality of potentially even becoming a producer of new technologies and finding the means to get there. Right? And one can discuss that in more detail. But I think what is at clearly at stake, if that's overlooked, is potential high levels of growth. Right? But with it, by extension of course, is the ability to significantly reduce poverty and inequality levels in in one society. And I think the quantum leaps that are available through technology adoption should be grasped with both hands by policymakers.

SIGNÉ: Fabulous. Haroon, we co-authored, and you mentioned it, a digitalization and digital skills index. And we found that African countries lagged behind other G20 countries on digital infrastructure indicators. So, what is included in the digital index? Digital digitalization and digital skills index?

BHORAT: Right. So so, let's be, clear, Landry, what we what we propose in the paper is a slight tweak, an extension of a World Bank what the World Bank calls five dimensions of digitalization. So, what we do is we lean and extend slightly this dimensions of digitalization and we develop what we call a digitalization gap index. So, that's the first thing we do.

And then the second, of course, is to derive the index using the Alkire Foster methods of multidimensional measures in this area. And again, the paper details that.

So, what goes into the digitalization gap index is really important. We have five dimensions: digital infrastructure, digital entrepreneurship, digital finance, digital public participation, and digital skills. So, those five—again infrastructure, entrepreneurship, finance, public participation, and skills—all have individual indicators. And we don't have the time to go through all of them, Landry, but I'll give you a flavor. They all have individual indicators that then coalesce into a single index.

So, what are the kinds of things in infra in digital infrastructure? Well, it would be mobile cellular subscriptions, secure internet servers, per million people, for example.

In entrepreneurship, digital entrepreneurship, we have venture capital availability or ICT services, exports as a percentage of total trade. Digital finance would be, for example, did and what the proportion of individuals that made digital payments in the past year, the proportion of individuals in the society that used the internet to pay bills.

Digital public participation is the one word example or one-word explanations that we're trying to assess whether a government is servicing its population using digital means, and the citizenry are using those digital means to access government services.

And then digital skills are slightly harder because of the data quality. And we end up using mean years of schooling, tertiary gross enrollment rates, and so on. We don't have detailed information which would be ideal, for example, of the number of individuals taking technology-relevant courses, although we can talk a little bit later about some of the data we do have on STEM degrees.

SIGNÉ: Fantastic. And what would it take for Africa to catch up?

BHORAT: Well, so again, we go back to what our data found. Right? And so, if you if you look at the headline results from the index that we built, so in other words, we would we look at again all the individual indicators across infrastructure, finance, entrepreneurship, public participation in government, and the skills indicators, and then we say, well let's then collapse that into one gap index, if you like. And the first thing we do find is that on average for the countries that we have data in Africa, every single on every single indicator the sample of African economies is below the mean for, for the G20. And that's worrying.

But the good news is that what we call that vulnerability in digitalization has actually declined over time. But where do the biggest problems or challenges lie? And we find that in terms of, again, if I just repeat it, skills, finance, infrastructure, entrepreneurship, and digital platforms, what we find is that digital infrastructure in particular has been the key contributor and driver of the aggregate digitalization gap on the continent. And so, what that so that accounts for 26, 27% of the overall digitalization gap relative to these other factors.

The implication, right, Landry, is essentially that one then needs to looking needs African economies need to focus a little bit more on these digital infrastructure components. And so, that, if we go back to our index, means in essence, when you look at infrastructure, it's things such as mobile cellular subscriptions, secure internet servers, and individuals using the internet are just three examples where the lag and the gap is the largest, which needs to be a focus.

What this suggests, if we just step back a little bit, is it's a process of digitalization that you first need to build the infrastructure. You cannot have people paying bills on their mobile cellular phones, you know, bills for electricity or to vendors on their mobile phone if the infrastructure is very poor. Right? There's no way an average resident in Benin can be using their mobile phone to make bank transfers if the cell phone tower doesn't exist or it's poorly functioning.

And so, in many ways, that's the real challenge, is first build the infrastructure, both in terms of availability, in terms of efficiency, in terms of speed. And then, arguably with the appropriate investments, the rest will follow.

So, that's, that's fairly logical. But I think what our paper shows explicitly on the basis of, of, of data, is that that's where the biggest gap lies.

SIGNÉ: Absolutely Haroon. So in, in And in *Foresight*, we summarize some of those insights in three category for policy recommendation for leaders, whether from the public and private sectors. And in the first category, as you highlighted beautifully, is digital infrastructure, especially bolstering access, affordability, usage, and competitiveness, going through whether expanding fixed broadband or addressing broadband affordability and increasing the access to digital infrastructure.

And then the second dimension you also highlighted is the digital skills development. How do we accelerate skilling, upskilling, and reskilling for the future of work, including prioritizing investment in updating primary and secondary education and focusing on curriculum and or delivers, on developing socio-emotional skills?

And finally, with digital finance, how to advance access, well-being, empowerment, and productive usage, including through enabling financial sector, deepening addressing threats to fraud, cyber security, and high transactional cost. And further formalizing the informal sector.

But I want to do a deep dive on education. How large, Haroon, of a factor is education in increasing inclusivity and digital transformation?

BHORAT: Yeah. So, I think we've possibly as a sort of development community, although it has changed recently, focused correctly on primary and secondary schooling as a means to improving standards of living and so on, but possibly under-appreciated the role and importance of tertiary education. And in fact, in our digital skills indicator, the largest gap, if you like, across the four indicators—so we look at gross enrollment rates in secondary schools, mean years of schooling, and tertiary gross enrollment rates, and indeed internet access in schools—the largest gap actually is in tertiary gross enrollment ratios between sub-Saharan Africa and the G20.

What that means in principle, is that the highest level of inequality, at least by by this data here, that exists in the educational system is at the tertiary level between Africa and the G20. Where again the G20 is sort of a proxy for emerging markets together with some advanced countries. So, the key point there, Landry, is that if you're thinking about education in terms of technology, you have to have individuals that are enrolling at the tertiary level.

Now, to add on to that, what our paper does also in trying to get to a little bit more fine-tuning estimate of tertiary enrollments, or the needs within the tertiary curricula, we looked at using what is called the Quacquarelli Symonds, the QS, as they call, QS World University Rankings database. We dipped into that, and we looked at the top 500 educational institutions by STEM fields. So, that would be engineering and technology, natural sciences, life sciences, and medicine. And we asked the question of the top 500 STEM-offering institutions, what share of those are in sub-

Saharan Africa? And the answer of the top 500 institutions in each of the fields, Landry, is anywhere across the fields between 7 and 10 out of 500. So, effectively, what you're looking at, is a one if you aggregate it across all the fields, about 1.5% of all institutions in the top 500 STEM-offering universities around the world are in Africa.

That's a massive challenge. That would suggest that even as we try and embark, right, on this journey to, if you like, using education as the complementary tool to upgrade technology adoption and technology production, particularly production, but also adoption, as sort of high functioning, educational, or a high functioning set of individuals in the population, in terms of high levels of educational accumulation is absolutely critical. And this human capital doesn't exist in sub-Saharan Africa.

And so, it's a massive factor in inhibiting digital transformation. And currently we don't have fit for purpose technology appropriate, if you like digital transformation, appropriate curriculum. Nor indeed tertiary institutional setup within the continent.

SIGNÉ: That is very insightful. What does that inclusive education system look like?

BHORAT: Well, so, I think the inclusive education system in the technology debate is about ensuring that investment. So, if you think about budget allocations across African governments, it does mean taking, A, the most obvious point is taking tertiary enrollment more seriously. And so, funding of tertiary education should be given higher priority I would argue than is currently the case where there's far more priority, as important as it is, but to schooling relative to tertiary education, number one.

Number two, though, is to get that subsidy, the relative subsidy allocation across fields correct. Now what do I mean by that? If you're thinking about technology appropriate or technology complementary human capital, you need individuals accumulating human capital in the STEM fields: engineering and technology, natural sciences, life sciences, and medicine. And I don't think current subsidy allocations by ministries of finance through their education ministries take care of that what we call relative pricing. And I think that's a problem.

The final comment around getting this right is, yes, it's a very long run return investment. So, getting, you know, engineers and and computer coders out is anything upwards of sort of 4 or 5 years. The other option is for African governments to re-explore what I call almost the Asia or China strategy, which is find access in universities around the world where such STEM fields are on offer but make it an explicit strategy of government and of course, of an African government, but also link it to, at least some kind of a return policy, if you like, for graduates of those foreign universities.

And so, you'd need to come back in at least spend five years back in your country and so on and they're examples of those. But I don't think they, they've been given enough airing, if you like, in public policy debates, at least in in our continent.

SIGNÉ: Fantastic. Africa is a continent with diverse economies and policies. Which countries are especially vulnerable to falling behind during the digital transformation, and which countries are taking the lead in designing effective policies?

BHORAT: You know, we have the specific list, if you like, by the individual index scores. So, we have a digital gap score for skills, digital platforms, entrepreneurship, digital financial infrastructure by each country. And you can actually eyeball which country is lagging the most relative to others and so on.

In essence, though, Landry, it's very strongly correlated with GDP. So, effectively, richer economies on the continent, those upper middle and lower middle-income countries and the few high-income countries we have, are far better digital adopters and producers. They are, They have lower digitalization gap scores. And those that are low-income countries or those that have slipped dramatically through to fragility, civil war, and so on have much lower digital adoption and production scores, and therefore their gaps are larger.

Those countries are in particular danger of falling further and further behind. And what do I mean? It's a non-linear thing. So, if you've built the infrastructure, the baseline is available to you. And as long as other policies are complementary and kick in to encourage digital adoption, say such as tertiary enrollment rates in the appropriate courses, the catchup is possible with leaders in advanced economies.

But if those lagging have been unable to build their infrastructure or if, for example, due to collapse in other forms of infrastructure such as energy, the pathway to digitalization is limited or being actively destroyed, if you like, then these set of economies run the risk of falling even further and further behind this fast changing, digital transformation path that the world economy is on.

SIGNÉ: Looking forward and beyond today's current digital landscapes, what are the other trends policymakers should be paying attention to? AI or others?

BHORAT: So, I think, again, you know, we're in this world, whether it's large language models, the internet of things, big data, blockchain, I've repeated them, you know, 3D printing, drones. I think the big challenge though, Landry, if you listen to the message that sits behind our *Foresight* piece, is get the infrastructure set in place first. And the infrastructure is not just for a limited part of the population. So, even within a country like South Africa, like Egypt, where, you know, you score quite highly on these digital indices, the point is make sure that the infrastructure is A, available physically for every member of the population. It's priced accordingly. Right? So, there aren't these massive monopoly profits, particularly in telecoms that are preventing access. And thirdly, ensure that you have the complimentary infrastructure—as I said, energy, in some cases can even be road infrastructure, the old infrastructure—to support new technology infrastructure.

I think if you're looking forward, in terms of building a pathway to digital adoption and production, the infrastructure must be built. It must be fit for purpose, and it must be at a price point that that is affordable for consumers and enhances welfare. And I think there're clever ways of doing that and certainly we highlight some of those in the *Foresight* piece.

But I think, that for me, instead of instead of African governments focusing too heavily on the next best thing, whether it's large language models and, you know, ChatGPT, and robotics and so on, first, get the infrastructure in place. And I would argue that the rest infrastructure that would include I should have added sorry, I

should have added infrastructure includes ensuring you have the skills infrastructure. So, individuals that have come through very strong, high quality STEM programs, together with the let's call it the traditional physical infrastructure, builds the foundation for taking a pathway to digital transformation.

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And I think without that platform, none of the new sort of technology advances can be appropriately exploited by African governments.

SIGNÉ: Thank you so much, Haroon, for sharing your words of wisdom with our audience.

BHORAT: Thank you. Thanks very much, Landry. Thanks for the conversation.

SIGNÉ: I'm Landry Signé, and this has been *Foresight Africa*. To learn more about this show and our report, visit Brookings dot edu slash Foresight Africa podcast.

The *Foresight Africa* podcast is brought to you by the Brookings Podcast Network. Send your feedback and questions to podcasts at Brookings dot edu. My special thanks to the production team, including Kuwilileni Hauwanga, supervising producer; Fred Dews, producer; Nicole Ntungire and Alexandria Cordero, associate producers; and Colin Cruickshank, audio engineer.

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