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INDUSTRY 4.0 IN AFRICA: HELPING OR HINDERING?

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P R O C E E D I N G S

MR. COULIBALY: Good morning, everyone. Thank you for coming.

I'm Brahima Coulibaly, senior fellow here, and the director of the Africa program.

So, we are really pleased to have you with us, and to also, being able to partner with UNIDO to hold this event on the industrial revolution and its implications for Africa. It's otherwise known as Industry 4.0.

Now, what we are noticing is that much of that discussion hasn't really touched on what this really means for Africa. And we thought today's event would help us at the very beginning to get that conversation going.

So, as you know, Industry 4.0 is defined as a very wide range of factors including artificial intelligence, robotics, cloud computing, internet of things, et cetera. And it has been really disruptive in various sectors around the world, and Africa hasn't really been an exception.

One example is mobile penetration which has been quite rapid, but now that platform is being used to deliver ICT-based services and creating new jobs in services.

So, then there -- but it's also been having some unwelcomed effects, at least as far as automation is concerned, and what it's doing to jobs. And we know in Africa job creation is really the top priority.

So, if automation is taking away some of the jobs, how does Africa basically take advantage of the opportunities of Industry 4.0 while at the same time managing its unwelcome -- its unwelcome effects.

I believe that the challenges we have in Africa are daunting, and to know linear challenges will really require the kind of non-linear solutions that technology

affords.

So, then we have a really great, excellent panel with us today, of experts, who will help us sort of unpack this issue. But before we turn it over to Jake Bright, the moderator, who is also an expert in business and technology in Africa, I welcome my colleague from the U.N. office of UNIDO, to provide brief remarks.

MR. MASELI: Thank you very much. My name is Paul Maseli. I'm the director of UNIDO's office in New York. It's a great privilege for me to be here with you this morning, at this event which brings together the public-private sector, and development practitioners to discuss the implications, challenges and opportunities of Industry 4.0 for Africa; and also to proffer policy recommendations on how African countries can harness the transformative potential of this new development to tackle the huge development challenges facing the continent.

I would like to express my sincere gratitude to our host and co-organizer, the Brookings African Growth Initiative. We are proud to partner with this Institute that have been at the forefront of research aimed at finding innovative solution to Africa's most pressing issues.

Distinguished guests, ladies and gentlemen! Africa today is at a crossroad, we are at a nexus period where the global scale of the Internet, the ubiquity of mobile devices and the ever-decreasing cost of cloud services working together to create an increasingly interconnected world, and in the process revolutionizing all spheres of human activities, be it politics, society, culture and the economy.

This digitalization of the economy through increasing use of digital technologies is changing the global landscape of manufacturing, and has ushered in what is now known as Industry 4.0.

However, as with any new trend, it also brings new challenges and

opportunities. And we've deliberately chosen the title of this event, "Industry 4.0 in Africa: Helping or Hindering It" to indicate that the outcome for Africa is not given, that I mean choices have to made, and it will depend in the end, on whether the continent embrace and prepare for this new development or just stand as a passerby.

Let me state from the outset that it is imperative for Africa to industrialize. History shows that no country has reached an advanced stage of economic and social development without an advanced industrial sector.

The question then is: how can Africa industrialize within the context of increasing digitalization? We've assembled a formidable panel to discuss these issues. And without attempting to preempt the discussion, please allow me to just posit about three issues that I think would be very critical for African countries as they confront this challenge.

First, they must address the infrastructure challenges. Manufacturing in any form will not thrive without adequate infrastructure, using Internet penetration as the proxy for digitalization developing countries still -- developed countries still dominate the Internet economy with a staggering 78 percent share overall.

Of the countries with less than 10 percent Internet penetration most are African. In fact, the Internet economy contribution to GDP in developed countries is more than three times that of African countries.

These statistics suggest that the capability of African countries to be competitive in a digitalized trade is low. African countries will therefore have to strengthen its traditional infrastructure as well as develop the digital and technological ecosystem that will be essential to compete and participate in the 21st Century economy.

Second, they must have the right policies in place, and these polices must be able to reconcile the tension between the present state of industrial

development, the low state of industrial development today and the high requirement of a digitalized economy.

As many countries in the continent are still on the path of industrialization the impacts of increased digitalization may be limited in comparison to that of their developed counterparts.

If you take the deployment of robots, for example, these may not necessarily be economically competitive for African countries. And Africa, abundant cheap labor may still constitute an important comparative advantage, at least in the short term.

In the textile and garment manufacturing, which is usually the starting point for late industrializers, the estimate is that only about 20 to 25 percent of the apparel industry will eventually be automated.

Having said this, the power of technology to bring disruptive change must not be underestimated. Digitalization can indirectly impact African countries in the long run by affecting global competition, and changing the criteria of what constitutes an attractive manufacturing location.

I think already we are seeing some signs of it with reshoring as we have the case of Adidas and Philips, I mean reshoring operations back to the North. It is thus essential for African countries not only to adopt and implement the right policies to boost manufacturing, but also to adapt to the changing nature of manufacturing. In short, they must be prepared for a digital future.

Finally, Africa has to find a niche in manufacturing that will adopt a dual-track track approved by strengthening their position in high value-added manufacturing in its less automated sectors like textile, food, beverage, tobacco, metals, wood and paper industries, and at the same time building their industrial capabilities while preparing for

the digital future by investing now in the Internet, digital technologies and targeted skilled developments and innovation.

My organization, UNIDO, stands ready to assist African countries with fostering Industry 4.0 through our knowledge-sharing and project development platform, through retrofitting established industrial systems, as well as fostering innovative collaboration between the public and the private sector.

I look forward to a stimulating discussion with this distinguished panel of experts. Thank you very much. (Applause)

MR. BRIGHT: Well, I'll get started. Good reception? Everybody can hear me?

AUDIENCE: Yes.

MR. BRIGHT: Great. Thank you, Brookings. Thank you, Brookings Africa Initiative, Brahima, Christina. I'm so happy to be here today for the topic "Industry 4.0 in Africa: Helping or Hindering?" And I consider this topic to be if, you know, we are doing things with 4.0 and numbers, I consider it to be kind of cutting-edge squared, and that we are talking about very cutting-edging topics, AI, nanotechnology, digitization, electronic industry.

But we are also talking about it in a cutting-edge way, and that these things are probably, by many accounts some of the least-associated terms that many people would connect with Africa. So, that's great.

What I'll do today is I'll start by just introducing, very quickly, the panelists. And then I'm also going to let them introduce themselves and say a couple things about what they've been working on most closely to this topic. And then we'll dive into a discussion, Q&A, and then there will also be some time for Q&A for all of you.

So, let's get started. Just to do a quick flyby on the panelists, I'll go from

left to right, or I'll go from my left.

We have Susan Lund, who runs actually, McKinsey Global Institute.

And then we have Julius Akinyemi, who is entrepreneur in residence at MIT Media Lab.

Then we have Mary Hallward-Driemeier, I got it right, who is the senior economic adviser in finance, competitiveness and innovation at The World Bank.

And then we have Olga Memedovic, who is chief -- I'll let you do the rest of your title -- but chief at UNIDO, United Nations Industrial Development Organization.

So, why don't we start with Susan? Susan could you just say a little bit, you can say a little bit about yourself, and then some of the work that you've done that's most closely affiliated with these Industry 4.0 topics in Africa?

MS. LUND: Okay. Well, thank you, first of all, for inviting me. It's wonderful to be here today talking about this topic. So, my interest in Africa goes back many decades now. I was Peace Corps volunteer in West Africa, and that started my long-term interest in the continent.

I was in Guinea Bissau, which I bet most people in this room cannot say they were in. And sadly Guinea Bissau is not at the cutting edge of Industry 4.0.

But now I'm an economist by training, I work at the McKinsey Global Institute. We are the economics research arm of the global consulting firm.

My own research focuses on two areas I think are related to this topic. The first has been on the impact of digital finance, to promote financial inclusion and women's empowerment, and the potential for mobile money, digital financial accounts, et cetera, to really have a revolution in financial inclusion in a way that bricks and mortar banking don't.

And the second topic is about the impact of automation, and robotics,

and artificial intelligence, the future of work. And in that area my work has focused mainly, we've really done very detailed work on what it means for the U.S., and Europe, and advanced economies where it's very pressing, but I think that there are ripple effects on what this means for the future of industrialization in Africa, as a result.

MR. BRIGHT: Thank you. Julius?

MR. AKINYEMI: Sure. Good morning, everyone. It's a great pleasure to be here as an African boy. And I know it's a long way from a small village in Nigeria, compared to MIT. Obviously we cannot take out the effect of MIT. So, you can take the boy out of the village, but not the village out of the boy, so to speak.

A lot of -- coming from Africa, my grandfather was a farmer, I would know by experience and, you know, in terms of how difficult it is for rural farmers to have connectivity, to be able to get adequate price for their produce, and now we talk about financial inclusiveness, which I believe is one of the key missing elements, you know, in the industrialization 4.0, and also to be able to build trust. And I'm kind of trying to lay out some of these issues, because lack of trust is one of the pillars of poverty.

And because of that, there are now technologies that are enabling us to be able to remedy that. So, one of the things we are doing out of MIT, is of course, you know, there's the connectivity at the backend. If you can't connect, regardless of how good, or how efficient the Internet is, if you don't have connectivity you cannot do anything on it.

And we still have a lot of lack of connectivity on the African continent today. So, we are working on that in terms of the last mile connectivity leveraging different kinds of technology.

Secondly, looking at how the rural farmers actually function, one of the key assets of the continent is the agricultural produce. Africa still has the largest arable

land on the planet today, so if you are thinking in terms of productivity, feeding yourself, biodiversity of the planet, it has to be in Africa.

And fortunately I was privileged to be talking with about 400 doctorate and post-doctorate researchers at MIT last week. And everyone is anxious to go to Africa and do their research. And I said, why? They said, well, you know, that's the last mile, that's the last place where we can still have pristine areas to be able to partner.

So, in terms of that, how we actually empower the producers is another key issue, so we are leveraging the new technology, the blockchain, and will talk more about that in future, in order to allow the farmers to be able to register their assets, so we call that the digitization of the asset. And also allow them to be able to trade that. I used to tease my friend that I don't need to be in Chicago Mercantile Exchange to be able to sell my goat at the market.

So, that's the kind of platform we are providing, when you combine blockchain with mobile platform, and also building trust and I will talk about the trust issue later. That, basically, empowers you to be able to move forward. So, let me stop there for the time being then.

MR. BRIGHT: Okay. Thank you. Mary?

MS. HALLWARD-DRIEMEIER: Great. Thank you very much. Likewise, really pleased to be here today. So, I have been at The World Bank now for 20 years, and working on Sub-Saharan Africa probably for 12.

My area is more on sort entrepreneurship and private sector development, and most recently really looking at this intersection of new technology. And what does it mean for jobs? What does it mean for entrepreneurship? And what it mean for the sort of historical, traditional development model of going from agriculture into light manufacturing, and sort of heavy manufacturing, into services?

So, with a co-author, I had book to this fall called "Trouble in the Making? The future of Manufacturing-Led Development" and that question mark being a really key part of the title.

And I think for Africa it does -- there's sort of two different dimensions, one is sort of how disruptive it is given the current state of the economy now, and how disruptive might it be, given what countries and other regions are doing?

And I think the issue within manufacturing, in part, because it still is a fairly nascent sector in most countries in the region, is it's much less a concern of current jobs being disrupted and automated away, which is something that is more likely to be happening here, and much more a question about the onshoring.

Or, say, if China, which is at this point produces 25 percent of global manufacturing value added, and is very heavily invested in automating in a lot of new technologies, you know, if there is more of this onshoring and automation in upper, middle or high-income countries, you may not have the same sort flying geese pattern of manufacturing moving into lower-cost areas.

So, what does that mean for Africa? And I think in your introduction you had a number of really important points of differences across sectors, new technology is being used very differently across different sectors, so there is still opportunities using Industry 2.0, even if not 1.0, which gives the window of opportunity to get some of that industrialization happening.

Because one of the things we've been looking at is this potential for leapfrogging, and often when people say leapfrogging they pick up their mobile phone. And I think in the services the potential for that is much greater, and in manufacturing it's not as clear.

And so then we are looking at: Does that matter? And what are the

scopes, still, for progress within manufacturing, but how can services be a new engine for development; and a lot potential for in the region?

MR. BRIGHT: Thank you. Olga?

MS. MEMODOVIC: Thank you. Thank you for inviting UNIDO, and working with UNIDO on a very important topic. And I have been in touch with this topic most recently in the context of the G20 work on industrialization in Africa, under the China's presidency, and most recently under the German presidency, and within the context of developing a working group. The issue was to produce a report on industrialization in Africa and LDCs.

And the critical question also was, okay, whether the positive question: industrialization is important for Africa, yes or no? And if it is important, what to do about it? So, that's if you go business as usual, linear models, then what are the instruments of industrial policy for that?

And then comes the new industrial revolution which is challenging even these linear parts, and we work and live in very compressed development, there are no stages of economic development. So what would be the normative side of prescriptions for Africa to go in the future?

So, this report has a very big challenge to answer this question, because in developing a working group would also address the issues of new industrial revolution and what would be the consequences for Africa.

I must say that I agree with; first of all, I agree with all the other panelists, that it is neglected topic, and not discussed very well in international fora discussion. And I came from the role of discussion on Industry 4.0 in the last three weeks. And whenever they ask the question of what will be the -- let's say, the sense of foresight for the other panelists, we receive very -- almost none in answer, because people have under-

researched this topic.

There are practitioners that have been working in Africa, and they are pessimistic, and there are those that are optimistic. But one could conclude one thing, that you cannot marginalize Africa from new technological trends. They are happening, they are happening very fast, and exponentially, so Africa will have to embrace this, slowly.

And as you said, Industry 1.0, 2.0, 3.0; there is a slot of scope for improvement even on the 3.0, guides on technology and the level of manufacturing can go hand-in-hand with new sensors, and technologies.

On the positive side, also technology is not so expensive, it's cheap that has a lot of embedded knowledge it. So, if you need a little training to use this new technology, you don't need to repeat the whole cycle of innovation to be able to use this technology.

The point is that Africa should not be marginalized in terms of learning this new technology. Building awareness, what does it mean for Africa? For different groups of countries in Africa, there are two diversified groups of countries from upper-middle-income countries, to middle-income countries, low-income countries, then you have LDCs category, among LDC you have high-income countries, and so on, oil-rich countries, resource-rich countries, and so forth.

But what is definitely true that contribution of manufacturing to GDP has been decreasing over the years, so if solution for our Africa is industrialization, one has to look on: what is the future of manufacturing on the global level? And then what is the future of manufacturing for Africa?

MR. BRIGHT: Thank you, Olga. So, we'll definitely come back to manufacturing. I wanted to start with a question for Julius, and anybody else can add if

they would like, but it has to do with connectivity. So, you know, so frequently we talk about digital industries, and technology in Africa, but the baseline for all of this is connectivity.

There are some high points. You have some countries that have done a pretty good job at getting high Internet penetration, getting PDA penetration up to around 50 percent, getting costs down. But at the same when you look at Africa as a continent, it still is roughly at about one-third of the continent's Internet penetration or access to the Internet. So, it's still pretty bad on a global perspective.

So, Julius, you know, your sense of the state of connectivity, Internet connectivity on the continent, and maybe models that have worked, or what you think should happen to increase the state of connectivity and affordability of Internet in Africa?

MR. AKINYEMI: All right. Thank you very much for that. Oh, definitely, that's one of the key elements of infrastructure, and we cannot get too -- further too, without connectivity. Connectivity in terms of -- it enables us to be able to digitize, it enables us to be able to connect, and when mobile technology first came on board, everybody thought, well, that's too expensive for Africa. And I would give a specific example for Nigeria, as for example.

I remember when I believe Motorola -- or Nokia actually, when they went to Nigeria, they say, well, you know, we just give them the little, you know, talk phones. And they find out that the little talk phone doesn't work because they, all of a sudden, the people find out that, well, they need a better phone to be able to perform a lot the functions. And most of all, would take days to accomplish, not take minutes on the phone to be able to get done.

So, the value of connectivity has been cemented on their head, that look, I have to connect to be able to do anything. Things that took a long time to do, I can now

do in seconds.

So, that in mind, and then you catapult yourself into where we are at today. Yes, you're right, about 67 percent on average on the continent is the penetration that you have levels that are even less than 10 percent, and because of that, you don't have all the advantages. When we talk about infrastructure capabilities, you need those connectivity to be able to make the infrastructure work.

And to be able to connect people that are selling, you know, to the people that want to buy, and in terms of bridging that information asymmetry that allows you to be able to gain the benefit of pricing, and the revenue, and so on.

So, when I talk about trust, all of that is also embedded in that, because if I don't see you, and I can't transact with you, there's no trust. But if I can call you, and I know you, and I connect with you, that trust is there, and that builds a relationship that catapults us into a different level of business dealing.

So, on each business dealing we have improves the GDP, and I mean most recently, part of what we are doing on that level is, most of you may not know, you know, up to today, there is no intellectual property assigned to indigenous plants around the world, Africa inclusive.

But these are big assets, so how does that connect to connectivity? Now, in the past, you know, when we talk about big data and, you know, I think that was the report I was just talking about that this morning.

You know, 2011 we wrote a report on, Personal data: A New Class of Asset. I think it was McKinsey, there were a few of us from MIT, Harvard, and so on. But the point about that is, you need that data, and you cannot get that data without connectivity.

The moment we started mobile connectivity, there were huge amount of

data, from rural areas, you know, from health, from agricultural farming, you know, maybe not as much, but we were able to collect all that data that now gives us an insight in a lot of things.

So, data, as someone said, is now the new oil of the economy, because when you have the data you can mine it, you can predict, there is predictive analysis, and there are things that will benefit our lives.

So, connectivity becomes key. Some of the key solutions that we are trying to put in place, there's a company by the name of Vanu Bose that I've worked with in the past, they are doing a portable, remote backend which will actually connect, you know, to your main line in partnership.

MR. BRIGHT: What's the name Julius?

MR. AKINYEMI: Vanu, Vanu Bose, V-A-N-U. Actually, most of you know Vanu -- I mean, you know the Bose speakers, B-O-S-E, and Vanu Bose is the son of Dr. Vanu who, by his own right, actually is a software engineer, and was a close friend of mine. Unfortunately, he passed away a couple of -- I think about six months ago, you know, unfortunately.

But he came up with this portable radio, which is the backend of your connectivity. It's being piloted in Rwanda, and also in Zimbabwe, where you can connect most of the rural area, and then you just truncate it to the main -- you know, to the main supplier in the city.

So, that's a whole technological capability and enableness that is going on at the backend, because we all recognize that if you can't connect them, then we lose them. So, and in order to bring all of the benefit of what I just talked about, you can't have a prized discovery of your produce at the remote area if you cannot connect. So, that becomes key, and we are trying to solve that problem.

MR. BRIGHT: Okay. Thank you.

MS. LUND: I want to add to that.

MR. BRIGHT: Susan?

MS. LUND: Even in the cities, like the cost of data access in Africa is some of the highest in the world, so there's a bit need. The poorest people, you know, are paying the most to get 1 gigabyte of data. So, there is a really big challenge, in upgrading the speed of networks and the cost of data really throughout the continent, and I think to capture a lot of the benefits, I guess we are going to talk about.

MR. BRIGHT: Right.

MS. LUND: We are starting with the pessimism, first.

MR. BRIGHT: Right, right.

MS. LUND: It's a big challenge. I mean, it's as important as roads, and ports, and energy. Well, energy is the other point. The Internet doesn't work without electricity, so those of us who live in Washington and our power goes out regularly understand this. So, you know, building out the electrical grids in a way that's cost-efficient and reliable, remains a huge challenge.

MR. BRIGHT: Yes. The two work hand-in-hand. Mary?

MS. HALLWARD-DRIEMEIER: So, then there's two pieces of this, and you can optimistic or pessimistic about it, but part of it, so there's an investment gap, right? There's an enormous amount of resources that still need to be put into, I don't know, so some of these infrastructure sectors, but it is estimated by some work from colleagues at The World Bank that half of that gap is actually due to regulatory costs.

So, there is a gap on infrastructure, but there's incredible cost because of the nature of regulations, the lack of competition, the nature under which certain companies are able to operate.

And so I think there is clearly a need for investment, there is a lot of initiative being put to kind of bring more private investors in, the terms of that matter enormously. But then also working on the political side to change some of the regulations that would, likewise, introduce a bit more competition and sharpen those incentives to be able to extent the services in price-competitive ways to a larger share of the economy and the population.

MR. BRIGHT: Yes. You often hear that framed under creating the enabling environment for these kinds of things to flourish. So, thank you. I want to move back to manufacturing; and a bit of a technical point for Mary and Olga. At what point do you or don't you consider manufacturing in Industry 4.0 a practice or sector?

MS. MEMEDOVIC: Should I? Okay. I'll just give you a flavor of the last big discussion in Bonn, initiated by the German government, of whether we can still call manufacturing, manufacturing today. So, there is dilemma how the sectoral classification in a linear way, as you put it, are still valid in the digital economy, which is very disruptive in the sense blurring the differences between the sectors, the economic sectors, from agriculture, we are witnessing industrialization of agriculture.

You can say nano agriculture, or whatever going, we can use it. And I have visited recently also vertical farms in China, there is no land at all, it's just like this space is full land -- of earth in the space like this, and they substitute, I don't know how many hectares of land, but they produce tons and tons of tomato, which is all using Industry 4.0.

So, the same holds now, also if you consider that, then the services part of manufacturing is also taking over some functions from manufacturing like logistics, they are also doing assembly. And then we have also blurring the differences in academic sciences, so you nano and bio, cogno, and that are also penetrating in

agriculture, in manufacturing, and so on.

So, in the world without sectors, how we can say what is the future of industrialization in Africa? I think what one should not ignore is that the industry today is driving by global value chains, globalization of production, and globalization of production is driven by new technologies, and then we will witness restructuring in the global value chains, offshoring, inshoring will be changed due to these new technologies.

So, can you imagine, first of all, one example, there are a lot of labor-intensive investments in Ethiopia in leather industry. And China is investing there, while at the same time China is leading in robotics. And what is the advantage of producing things with robots is, first of all, there is a lower production costs, low level of mistakes, so that means very high quality of products, and most importantly, customization.

I don't know if you are aware of the fact that young generation wanted to have a Nike that is customized to their now needs, and they order this through the Internet, it costs like $360 a couple of years back, but now it is $30. So, you can customize it.

And now there is a lot of investment in Ethiopia, and I ask also my colleagues in Germany, can Ethiopians produce Nike for my daughter? Are they going to be able to do this just in time? So, lots of investment in that, but connecting to the global value chain in leather, they should be very, very fast in uptake of these new technologies advancement. And again, this is driven by big capital.

And the next issue is whether China would continue to invest in Ethiopia in low-cost production of shoes and leather products? Or, their products produced in China will compete with those products in Ethiopia, because they will be much cheaper. And this is the crucial issue, because one day if machines are taking over to produce these things, then all the investments there will be -- you can question it, okay, but they

will be produced because it's cheap labor force in Ethiopia and in Africa, but the things will be cheaper for them. It will be more expensive to produce in Africa than in other parts of the world.

So, therefore Africa should never be marginalized under these circumstances. They have to be part of the whole system, and to think how they will adopt quickly, and use whatever they have learned in this stage of development, industrial development in these countries, and adapt again, to the next stage. Whatever this is, it could be that they can customize product to the local needs, but with the help of new technology.

MR. BRIGHT: I just want to pause there, and we'll come back to that, because that starts to touch upon the other half of this topic, in terms of, you know, Industry 4.0 as a hindrance.

Mary, we talked a little bit before the event about, you know, your thoughts on when or if manufacturing is actually something that's considered Industry 4.0, and I was hoping you could share that.

MS. HALLWARD-DRIEMEIER: So, I think -- I mean, there's a range of definitions, which is presumably why you are asking this question, but often it's sort of seen as this interface between the cyber and physical worlds. So, if 3.0 was somewhat bringing in ICT, and some of the more advanced robotics, then 4.0, and this is sort of all connected, so they are smart robots, and they have the sensors, and it's much more digitally driven in sort of feedback loops.

And so that sort of -- I mean, plus you have the nano and all kinds of other different things, so it is sort of a level of sophistication and use of technology that would sort of set it on one side.

But I think Olga raises a number of really important points which, other

kinds of things, to think the sort of distinction of agricultural services in manufacturing absolutely are blurring, and Industry 4.0 explicitly sort of blurs a chunk of those lines, because it brings a lot of services very much embodied and embedded into manufacturing.

It's not unique to 4.0, and I think that is actually something that's important to think about when you think about a development path for Africa is increasingly important synergies between these different sectors.

So, with this customization there's more room for design and tailoring of different products for local tastes, for local inputs, and those are, in some sense services. If you're building on agricultural products or their natural resources, some of that can be in this agri-processing.

There's all the marketing, and the financial services, and the insurance, and different things that go afterwards, and to the extent if it is a sort of 4.0, and you have a sort of digital technology, sort of looping back, those are, you know, all services that come after purely the putting it together, industry part. So the sort of service components even within manufacturing, are an increasingly important scope for it.

So, when Africa is thinking about industrializing, it shouldn't only be thinking about sort of making components, and assembling components, increasingly where the value is, is in the services before and after that. And so they have what they call a smile curve because it has a very sophisticated U-shape, like a smile.

But basically the low point of that, in terms of where the value added comes, is in that manufacturing production; and the upper sort of smile parts are these services that are embedded. And that that shape has been sort of deepening over time.

So, when Africa thinks not just of industrializing but moving up in the value chain, increasingly that means moving into these kinds of services. So, even within

Industry 4.0 that's got to be a big part of the agenda for Africa.

MR. BRIGHT: So, one quick thing, and anybody can follow up on this. But on the hindrance, side, is there a threat -- is there a possibility that the global development of automation of, you know, robotic manufacturing could be a hindrance to manufacturing that's taking root in some African countries like Ethiopia, or even in Nigeria, before they are able to really turn these things into employment drivers?

MS. LUND: Can I?

MR. BRIGHT: Sure.

MS. LUND: Who do you want to answer this?

MR. BRIGHT: Anybody. Go ahead, Susan, and we'll come back.

MS. LUND: I would say, we talk about manufacturing, but it's important to think about the different sub-segments, and I know this is in Mary's book, and it's in the work we did. The types of manufacturing that we call globally footloose, are labor-intensive textiles, shoes, toys, and then consumer electronics.

But in everything that's produced, that's only 20 percent of the global value added in manufacturing, is truly agnostic of where it's produced. And it could be in Africa, it could be in China. So, that's a small piece.

There's a lot of manufacturing that happens, like food processing, commodities processing, et cetera, that's tied to a location, so food processing where the food is grown, where the consumers are. Commodities processing, where commodities are dug out of the ground, which Africa has a lot of.

So, we think that there is opportunity, even if you say, okay, robots are going to dominate production in China, global value chains are not going to move, they are just going to substitute people with robots for these very tradable goods. There's still opportunity in Africa for the things that are heavy and difficult to ship around.

So, I'd like to say, I think there is some opportunity, particularly in the short term, but even in the very long term there will be manufacturing in Africa. It's going to be a different development path than what you saw in China, where they really use this export industry to drive growth. It's going to be more regionally focused.

MR. AKINYEMI: Let me piggy-back on that?

MR. BRIGHT: Go ahead.

MR. AKINYEMI: As we were talking about the 4.0, I agree with everything we've said so far, however, I think when we, just like we look at 1.0, 2.0, 3.0 and so on, the implementation of 4.0 in African countries is going to be different.

Yes, different in the sense that, yes, there are the robotics, all of the technologies, enabling technologies are going to be there, but there will be a different process of implementation that says, okay, we are not just going to throw in, you know, robotic, for example, to go and harvest, you know, on the cocoa farm, a cocoa farm that has never had any digitization before. So, that's not going to happen.

Where we have a high population of youth that are unemployed, that's not going to happen. Part of what we are trying to do is to make agriculture -- I mean a tech-savvy environment where the youth will be proud and energized to be able to go to the farm.

Today, almost close to zero of any graduating student wants to go back to the farm, because they believe the farm is, you know, is a poor job to do. If you empower that with technology, yes, I see for the zero as an empowerment capability. Give them transparency, give them valued -- you know, I mean, less labor-intensive values that is going to help them.

But by the same token, you know, to your point, when we look at the enormous amount of opportunity and, you know, are we earning more on the commodity

side. Just to give you a sense of it, so a couple of years ago, I started a project, we looked at the two commodity produced and traded in the U.S., and in the year 2011, some of you may be aware of this, if you trade in commodities that's about $3.5 trillion of physical commodities.

And I want to be very specific on that, 3.5 trillion only, of physical commodities. If you have to deliver that commodity tomorrow, you have it in physical terms and you can deliver them.

But guess what? The notional value of those commodities, meaning all of the financial transactions associated with it, futures, contracts, and so on, it amounts to $37.5 trillion.

I mean, do you get -- I mean, I want that point to sink in. From 3.5 physical commodities to 37.5 notional value of commodities, that's more than ten times.

Now, Africa hasn't traded in that yet. So, if you look at the capabilities, and the commodities that are available for Africa to trade, and the enabled technology you can bring in to trade that commodity, let's say we only one-tenth of that, one-tenth of that with the power of let's say 50 percent --

MR. BRIGHT: Right.

MR. AKINYEMI: -- that would change the GDP of Africa forever, poverty will be gone. I mean, not absolutely. But when you are looking at a multiplier of more than ten times in commodity trading, that's not something you need to go and find, they are already there, and all you need to do is empower the people with technology to be able to do that. And that's why we are bringing some of the -- you know, the blockchain, and when you combine blockchain with the power of mobile capability that have been so pervasive in the continent.

Again, we all talk about Internet. The Internet is not just one technology;

it's the sum of components of technologies, the high-tech protocol, the hardware, the software and so on. So, we will need all of these technologies that come together to be able to empower that, and unleash that hidden agenda, or hidden asset that I believe is just sitting in African countries.

MR. BRIGHT: Let me break to, kind of a critical question here, in terms of this topic. Because we are really talking about, you know, improving people's lives, and we've seen that there's been a lot of progress, especially in some particular countries in Africa over the last decade, but I just want to ask the panel, and we can solve the panel question right here.

On a net basis, in terms of improving people's lives in Africa, and bringing African -- certain African countries to the global economic stage, does anybody see Industry 4.0, on a net basis, as a hindrance to the continent or countries? On a net basis, we are not talking particular example.

MS. MEMEDOVIC: Let me ask -- one important dimension that we've all ignored --

MR. BRIGHT: Yeah, right.

MS. MEMEDOVIC: -- about demography in Africa.

MR. BRIGHT: Okay.

MR. BRIGHT: And urbanization trends. For most people in Africa will go to live in cities, not in rural area. And on a net basis, what will be the effect of not embracing new technologies if you live in cities, if all Africans are going to live in cities. So, you have to embrace in technologies because if you don't do that, Africa will remain the weakest link in economic development scene, and no Sustainable Development Goals to be realized.

And this high concentration of population will have to use this technology

to live better, to have a better wellbeing of the cities, and the city in terms of utilities, in terms of producing goods. What goods that they are going to produce in produce in urban area? That's the issue.

MR. BRIGHT: Yes?

MS. HALLWARD-DRIEMEIER: So, my answer is a little complicated.

MR. BRIGHT: Okay.

MS. HALLWARD-DRIEMEIER: So, if you take the sort of digital piece of it, which isn't necessarily the industry, but can be seen as part of the quote in technology, disruptive technology. I think the scope to increase people's welfare and quality of life is large, right? From a range of services that can be delivered far more inclusively and efficiently and low cost, it can be government services, it can be transfer payments, it can be information about prices, it can be some health services, some education services.

You know, and the marginal cost of delivery can be almost zero, right. So, I think all of that has enormous potential to improve the quality of life.

Do I think it makes the bar higher in terms of pure sort of manufacturing? I do. So, do I think it is going to harder for Africa to really industrialize and have that be a big part of their development strategy? I think the challenge is higher.

Now, that may motivate some countries to make some of these other kinds of changes which could inspire and change things, but I think it does raise the bar.

On the other hand, I think there is really a lot of scope in some of the agri-processing, in some parts of manufacturing that aren't as 4.0, and in services, so I don't think -- I think on net it can be positive, but I think that the little industry part is probably a bigger challenge.

MR. BRIGHT: Thanks Mary.

MR. AKINYEMI: Let me just say quickly?

MR. BRIGHT: Okay.

MR. AKINYEMI: I believe in answer, it has to be positive, it has to be. And the reason I believe it has to be is because you can't start at such a low level without significant increment. Okay, it may not be, you know, in absolute terms, it may not be comparable to the Western world, but let me just hit on key things.

Transparency, when you bring technology that gives you transparency, transparency in the sense of, for example, gender equalization, you have a lot of women that are working on the farm, breaking their backs, selling the product, most of that you don't record anywhere. What if we record that in the GDP? What impact would that be?

Then secondly, again, as we said before, you have price transparency, you have, you know, we are bringing in agri-tech, that is making it far more attractive to the youth that are coming out of schools. And when you run all of that up, and the -- you get the private sector involved, it has to be positive.

I'm not saying it will be, you know, far beyond expectation, but I'm a maybe eternally optimistic guy from Africa. It has to be positive.

MR. BRIGHT: It's good to be positive. I think a follow-up panel, if there's a flipped side of this mixed bag tech equation; maybe a follow-up panel, Brahima, is on data privacy in Africa, but we'll save that for another day.

I wanted to get to -- to move into some specific examples, and I wanted to ask Susan a question about fintech. And you know, we've seen fintech actually be one of the first things to really register in Africa with global application and, you know, people are probably tired of hearing about M-Pesa. But there are a lot of other fintech applications that are scaling.

And the question would be to Susan, I know you've done work on this. The power of fintech, fintech platforms to unlock economic potential to the continent and,

you know, this huge group of people who are unbanked on the continent.

MS. LUND: Yes. Well, good, I'm glad we are getting to be optimistic on things. So, why are even talking about this? Because it does offer entirely new models of business, so you've all heard of M-Pesa, the mobile money service in Kenya that's really taken off. And here is an example of the technology that's much more advanced, I'd say, in Kenya than it is in the United States.

So this is a perfect example of leapfrogging, of an entirely different way of doing financial services. It starts with, not even Internet access; all you need is a dumb phone, a flip phone, and mobile phone connectivity, which there is very high penetration of, higher than Internet access.

So, without a smart phone, you can already start to send and receive payments on your phone. Now, it's clumsy, you have to type in a whole string of numbers to get your payment going towards going, or receiving it, but it's a way for people who don't have a access to a branch bank, which is very expensive, to start accumulate sums of money.

So, on top of this basic platform, there's been an explosion of other applications. When you add a smart phone to the mix, it all gets much easier, and then you start to track the digital data. So, now there are startups that will say, we can assess your credit score based on how you're using your smart phone.

Sometimes it's tracking your payments, in and out, sometimes it's just tracking who you're calling. Do you call your mother? Do you call your friends? And using big data analysis, figuring out that you can somewhat accurately predict people's credit scores, people who never had a credit score, who had no access to a loan, can now get a loan. So, if you're a merchant in a market, you now have access to loans for your business.

Another application, if you're a small shopkeeper, and you start to collect digital payments via a smart phone application, kind of like Square in this country, so you can take digital payments as you sell goods, well, this opens up a whole array of business applications for that small shop owner. Because now he has a record of what he sold, he can start to analyze it, he knows at the end of the week he needs to reorder X-amount of these shampoos versus, you know, these apples, et cetera.

He can start to analyze and do some simple marketing. What days of the week does he sell shampoo versus apples? He can start to suddenly understand, who are his best customers? So, all these application that big companies literally took the last 20 years, it's called enterprise software development, and they've spent hundreds of millions of dollars being able to analyze the stuff.

If you are Coca-Cola or Pepsi, you can now do with the smart phone, if you have the payment of digital, if you have the record of digital payments in and out of your shop.

So, that's the potential, is that this is where digital and the internet is breaking open to small companies, and small businesses that don't have the money to get their in-house team of developers to develop proprietary data that the huge companies do. Suddenly, you can improve your productivity, and then of course also go to the bank and show them what your revenues are to get a loan.

So, those are just two examples of like the suite of things that are built on top of mobile payments and digital finance that makes it really transformative.

MR. BRIGHT: And the other thing, a really great example off the back of this, you talked about secondary applications to payments platforms, the example I like to use is that you now also have credit rating apps in platforms sprouting up in places like Nigeria.

And the example that Julius always hits me about, you know, untapped or locked-up economic potential, is that renters in Nigeria, because of the lack of credit ratings, they are often required to give up to two years of a forward deposit for the properties they are renting.

MR. AKINYEMI: That's right. Mm-hmm.

MR. BRIGHT: And the excuse that many of the proprietors give is that, because of a formal -- lack of a formal credit rating process, we need that kind of security. So, think about how much unlocked, for a country, you know, reaching 200 million people, how much unlocked economic potential there is of people leaving two years of rent just locked in some proprietor's account. Yes, Mary?

MS. HALLWARD-DRIEMEIER: So, I think the other dimension which we haven't talked about is the skills question.

MR. BRIGHT: Yes. Absolutely!

MS. HALLWARD-DRIEMEIER: And the question is: what kinds of skills are needed? So, often the first thing people, you know, oh, technology, more skills. And certainly, if you want to be the one programming this and, you know, developing the apps, or developing sophisticated devices, you need STEM skills, right? And it's very skill intensive.

But we don't need to make the phone or make the app to use it, and this ability to use a number of these apps may require a certain basic sort of numeracy or literacy but it provides, in the app, all kinds of skills that you no longer have to acquire, right?

You don't need the MBA to be able to do this kind of analysis, and not necessarily on the flip phone, but on even basic smart phone, you don't actually have to be that literate or numerate, because it does a lot of the payments for you. It can do

these projections for you, it can use a lot of icons.

So, in some sense it's an incredible skill booster and productivity booster for those really at the lower end. So, this idea that everybody has to be more skilled, I think is actually not true. It's going to be empowering a lot of people without very high skill to be far more product than they would otherwise, so it can be really inclusive on that dimension as well.

MR. BRIGHT: Thank you. I just want to, just on a point of housekeeping. Brahima, how much time do we have before Q&A?

MR. COULIBALY: I think we have little bit more than half-an-hour.

MR. BRIGHT: Okay.

MS. MEMEDOVIC: Well, just add to the --

MR. COULIBALY: If you can get in that time (crosstalk) --

MR. BRIGHT: Okay. Okay. Why don't we do -- why don't we do two more questions. Olga, I'll let you get in.

MS. MEMEDOVIC: I want to add to this one, a very good point, because it's this polarization of labor force that everybody is discussing, that you will have a high wage -- demand for high wage paid jobs, and very low skill, but nothing in between, which will tremendously hurt the middle class. And the middle class is very bad if you don't it for democracy, for example.

And therefore they said, okay for this new digital economy you need STEM qualification, but there is an ongoing debate that this is not true, particularly the robots, they don't have creativity, and robots they don't have emotions, so this is where humans are more, let's say, superior over machines and tools. And therefore, they are discussions of STEMs, that art should be part of this, that the creativity part should be also used, and particularly for specialization, and for adaptations, to the taste of localities.

So that means Africans have a lot of potential there. You don't have the resources but you have a lot of creativity. Creativity should be leveraged in this new context, they should not be ignored.

But I agree with Susan, so that means education system, regional innovation system, science technology innovation system, completely had to be revisited in African countries, and also educational system should be revisited. So this is extremely important, and I think also global community should work together on this.

This could be a very negative externality for the global community; therefore, we should have some collective actions on this, education, education, and connectivity.

I think we didn't touch this communication protocols and Industry 4.0, traditional one of 5G and how wireless technology is expensive or non-expensive for Africa to leapfrog in this, I think is a very, very important one.

MR. BRIGHT: Yes, so, much to cover on this topic. Just one or two more questions, and then I want to open it up to the audience. So, I want to throw this at the panel. In terms of maybe one or two African governments, or countries, that you think have done the best, both at the private sector level, and at the policy level, to enable Industry 4.0 development sectors. I'd be curious to see which two -- one or two countries our panelists would name?

MR. AKINYEMI: Well, I'll take the lead on that. So, I'm reluctant, I would say, to even name anyone better. Since I have to name one, I would say Rwanda seems to be doing well, and I would tell you my reason why. I'm not the type that would just point on a country.

One of the key undervalued assets on the planet today I think is the land asset of African countries. Okay, if you look at the African countries today, if anybody

ever read Hernando de Soto's' "Mystery of Poverty" the most recent, you know, we work with him directly, the most recent publication he had, they had somewhere like $20 trillion of assets, mostly in developing world.

I would say, conservatively, one-third of that on the African continent that are just sitting. They call them dead assets, I call them, coming from banking, dormant assets, they are dormant, they need to be awaken up and mobilized.

So, if you take that and you look at the value of that, and we talk about leveraging the asset, being able to go to the bank, those are things we could leverage, we can put to motion, okay, that we are not doing yet. That's why I strongly believe, you know, 4.0 is going to enable us to be able to do that.

Rwanda, you know, we are working with Rwanda to actually record those assets on the blockchain, and it's a project I've been working on for more than five years, even long before blockchain. Now, blockchain is over, so we are going to pour that into blockchain, we are going to mobilize it, and then let the owners be able to monetize that and then use it for, you know, a better life.

So, I would think that they are getting there. I mean, are they really there? By my standard, I think they are below average, but they are still the best.

MR. BRIGHT: Any other thoughts on top one or two countries that are definitely getting Industry 4.0 development right, or even wrong?

MS. MEMEDOVIC: What about South Africa?

MS. LUND: I would say --

MS. MEMEDOVIC: South Africa has a lead in automotive industry, yeah?

MR. BRIGHT: Yes.

MS. MEMEDOVIC: In parts and components, so they are going to

establish very soon, center for Industry 4.0. We are working with them on this. They are very keen to have a strategy, a digital strategy for the future of the country, and infrastructure is quite well in South Africa, and attracting foreign direct investment there. So, big data is going to work in automotive industry in South Africa.

MR. BRIGHT: Susan?

MS. LUND: I would say Morocco, although I'm hesitant to name a single country.

MR. BRIGHT: Okay.

MS. LUND: But I would say Morocco, and not so much because of Industry 4.0, but Industry 1.0, 2.0 and 3.0, that they've really gotten right, in a very systematic way, that now has positioned them to compete.

MR. BRIGHT: Okay. Mary?

MS. HALLWARD-DRIEMEIER: So, sort of two things. Certainly on one hand, this is less the industry than the digital -- I mean, so Kenya came up, in part, because of M-Pesa.

MR. BRIGHT: I was surprised nobody raised Kenya, but yeah.

MS. HALLWARD-DRIEMEIER: And it has a very lively sort of Internet entrepreneurship culture, a lot of incubators, a lot of foreign investors sort of looking at this, and NGOs looking at it. So, in the sort of digital space, it's quite good.

You also raised the policy question, and I think that's important because while M-Pesa on the one hand is the poster child, they've had some anti-competitive behavior, and really trying to shut out other companies from being able to offer rival services. It became a legal issue and a political issue, and it has been resolved I think in a way for the most part that actually is a good thing for Kenya going forward, to allow more interoperability of data, and some more competition.

MR. BRIGHT: I mean, they have 70-plus percent of the market share and that's pretty rare that one provider would have that.

MS. HALLWARD-DRIEMEIER: So, does it have the industry piece of it? Not as much. So, at least for -- at The World Bank there are now 10 countries that have come, sort of, wanting to really take part in the digital economy for Africa Initiative. And Senegal is one which, again, may not be on people's radar as the prime one.

MR. BRIGHT: Yes. (Crosstalk) --

MS. HALLWARD-DRIEMEIER: But they are really wanting a digital strategy, and so they are coming, everything from the infrastructure and the connectivity, to the services, to the payments, to the whole sort of set.

And they really are coming, politically, very open to: okay, we want to take this agenda seriously. They are not a manufacturing powerhouse, it's only manufacturing but they really want to see: what would it take for Senegal to be transformed?

Ghana is on the list, Kenya is on the list, Côte d'Ivoire is on the list. So there's a range of potential in it, but it is a whole -- just even compared to a year ago, let alone before that, it is something that has caught lot more policymakers' as well as the public's and private sector investors' imagination.

So there's an opening to really sort of think, okay, so if one takes this seriously, and as a large-scale agenda, and not just tech in this specific area, it's a really interesting opportunity to see how transformative as a development strategy it can be.

MR. BRIGHT: So a good concluding point of -- go ahead, Susan.

MS. LUND: I wanted to, I wanted to actually add. I wanted add like, when you talk about countries, so I was on a panel on this topic, I think six months ago, or 12 months ago, and there was a venture capitalist based in Washington who invests in

Africa. And this was his clue for the audience, it was: I'm really bullish on Chad. (Laughter) Like so, this is the point, it's that there are entrepreneurs and startups, there are pockets of opportunity everywhere. And he was going big on Chad, right? So this someplace like South Africa --

MR. BRIGHT: I haven't heard that before, but I'm like, all right --

MS. LUND: -- Nigeria and Kenya that's, you know, five years ago. So, there are pockets of opportunity everywhere, so regardless of what governments are doing right or not right, like there is potential.

MR. BRIGHT: Well, good concluding point. And, you know, I'll just before we move to questions, a great on this is, in my book I talked about how you're starting to see African governments compete and feel a sense of competition and pressure from investors and their people that actually compete on these factors. On technology, on their ability to foster ICT, you know, foster entrepreneurs, you know, bring in foreign investment, and I think, by and large, that's a pretty positive development.

So, on to questions, I'll ask that if people could identify themselves, and hopefully put their statement in the form a question that would be great. So, why don't we start? We'll start with this gentleman here.

MR. BEECH: Good morning. Thank you. You have a very, very interesting discussion. My name is Dr. Malcolm Beech, and I'm with the Africa Business League. And I have a simple question. Recently 44 African nations signed a Continental Free Trade Agreement. Do you think that's going to have any impact on the standards, and the processes that you're talking about with Industrialization 4.0?

MR. BRIGHT: Who wants to take that?

MS. LUND: Absolutely!

MR. BRIGHT: Yeah, Susan, go ahead.

MS. LUND: I think that's hugely important because no individual African country, maybe Nigeria is the exception, is really big enough to have a vibrant market, particularly for industry that gives economies of scale. So, having groups of countries create a free trade zone is just hugely important.

MR. AKINYEMI: I agree with her, but let's be clear though. There are free trade zones already in different areas of Africa, the South, the ECOWAS, the East, the North, and all that kind of thing. Even with that, even with that, we have roughly, if I remember the figure correctly, that's about 26 percent of total African trade within Africa.

Meaning, you know, you have the 74 percent that is Africa to outside of Africa, so having a unified, open border I believe that will increase that element. It's not that it's new, but the more universal they make it, the better it becomes, then you can have inter-continent trades, which I think is critical.

You don't need to have flowers made in Ethiopia, shipped to Europe, and then shipped back to Nigeria, which is what happens, you know, currently. So, by having that open trade policy, I would say across the whole continent, not just the original segments; that's not enough. It's a good thing, but it's not enough. So, if we have it for the total continent, I would say, yes, that will have a big impact.

MR. BRIGHT: Why don't we go do parity here? The gentleman in the back, please.

QUESTIONER: Hi. My name is John Jeneki and I work on digital solutions for agriculture. I think some of the panel --

MR. BRIGHT: Can you bring the mic up closer, please?

QUESTIONER: -- some of the panel members emphasized the role of young people to get into agriculture in Africa, where productivity levels are extremely low compared to, say, even 10 years ago. So, what can be done to improve the digital skills

of the young people and also to improve efficiency along the agricultural value chain all the way from farm planning, to land preparation, to end products where the efficiency levels are extremely low, to marketing of agricultural products?

There are many digital solutions in each of these spaces, where it can generate a lot of data and also provide them with real-time advisory services. So, what more can be done to improve that (crosstalk)?

MR. BRIGHT: So, digital skills in agriculture in particular?

QUESTIONER: And increasing efficiency along the value chain.

MR. BRIGHT: Okay. Who wants to jump at that one?

MS. LUND: So, I think there's a whole range of things, right. From sort of satellite information that can pinpoint, you know, the quality of soil, and what kind of fertilizer, and the rights sort of based on weather patterns, the right time to be planting, to harvest. There's all kinds of big data that can be harvested, you know, with again, simple apps that can be used to increase yields.

There's a lot being done on platforms both in terms of sort of renting farm machinery, right, that can be very capital intensive and doesn't make economic sense for individual farmers to have, but it helps with the sort inefficient distribution, so there's sort of services in renting the machinery to the sort of Uber for harvesting to get to market.

And this comes back a little bit to this regulatory point again, that logistics and transportation, as well as on the ICT, are often one of the most regulated sectors in many countries in the continent to the detriment of many, including farmers.

And so in terms of, you know, the share of harvest that is lost getting to market is the highest in many African countries than in any other -- than in many other regions. So, really being able to have a much more efficient platform in getting trucks to the farmers and to market on a good working timetable, are all things where digital could

help enormously.

MS. MEMEDOVIC: We have been learning by doing this.

MR. BRIGHT: Olga?

MS. MEMEDOVIC: We have forgotten about that, so I think they have just to do it. And this is what I said, this machine -- do not need a lot of knowledge to operate, but through operating big machines and robots you learn a lot. I think that the multinational companies that are working in Africa should be also stimulated, incentivized by government to transmit this knowledge also through local labor force, to young people, and then also international organization, we are also trying to develop curricula for the young people, the young entrepreneur also in the digital skills, how to digital means.

I think also big multinational companies like Alibaba is trying also to establish the digital platforms, eco-platforms, digital free trade zone even, in connection with the question on WTO issues, which will make trade facilitation cost minimum. And also covers transaction costs, so young people can have the possibility to learn that by doing it, and lifelong learning for everybody.

MR. BRIGHT: And I'd also just throw in look at drone surveillance, which is actually starting to play a role in many countries in terms of agriculture, and there's a company called Rocketmine in South Africa that's a good example.

The next question, let's take the lady right here.

MS. SEGURO: Unless you are forgetting ladies are supposed to be first. Good morning, ladies and gentlemen. Thank you so much for your presentation. My name is Rosemary Seguro, I'm the president of Seguros International Group. I forecast on small and medium businesses and agriculture looking at manufacturing in -- here in America; state, and part of the U.S. Congress, Manufacturing Caucus, Making America Great. But I want to talk about Africa now.

How do we, looking at your wonderful presentation, during The World Bank's Spring Meetings, we listened to the UNCTAD Secretary, Dr. Mukhisa Kituyi, on industrialization and the robots, talking what we are talking here. And I am asking the same question.

While I focus on small and medium businesses, we have a missing link here, we are talking here, there's no collaboration between The World Bank, the UNCTAD, the U.N., The World Bank, the farmers and the civil society like me, and the Diaspora. We have wonderful universities in Africa, wonderful universities, who don't need to come for this, like to America to know what they want to do.

How do we make this collaboration between the civil society, the African Diaspora themselves, the experts and the policymakers, like you here, Brookings, and the people with money, World Bank, to invest more into small and medium businesses, farmers and work with me, because we are talking here, the farmer doesn't know that he's a small business, doesn't know, and if we are talking here when we leave here it's ended, until the next meeting.

So, how can this collaboration be there, on the ground, with the leaders themselves? From the president, the ministers of agriculture, the ministers of trade, the ministers of finance? How do we make this happen? Because when the robots come, there will be no jobs, the same news we are talking about, there will be no jobs, so and then they'll be fighting people. And you call that terrorism, and there are no jobs there, the robots have taken over.

So, we should look at this very, very well, looking as an African woman, who grew up on the farm taking, and then you bring in robots, there's no job for me, there is no job for the youth so how -- we need that collaboration and coordination. We want from now, take my card. If you don't call me from tomorrow I'll put you on the air -- on

media. So, thank you so much. So, how do we collaborate?

MR. BRIGHT: All right. Julius, sure?

MR. AKINYEMI: Well, I mean one thing that I know for sure, and that's the SME Forum, and I'm a member of that, and that, actually that's headed by The World Bank. You know, it's under the IFC, IFC which is part of The World Bank. And I know there's a lot of activity. As a matter of fact, I know we'll be talking about some of the issues in RIAT, I believe in July timeframe.

So, there's the connectivity in terms of, you know, disseminating the information on how people can help. Then personally, what I think is missing is this, yes, we have a lot of universities in African countries, yes we have a lot innovation and inspiration. I believe what is missing is the fact that the private sector does not see your research institutes and the innovators as partners.

Instead, they see that, oh, they are academicians, we'll just leave them on the side, but these are people that are researching the problem of today, and that's supposed to provide the solutions. If the private sector is not collaborating with them, it's a loss-loss situation because the private sector cannot do a lot of the research they can afford to do, because they are built to do those research, and they are built to fail sometimes, and they can have some failure.

Private sector cannot do that. The way you create solution to an existing problem, is by taking chances. Private sector, because of investor, cannot take all of those chances. The USME or not, you need to connect with an environment that will be able to help you minimize the risk of loss that gives you a high return on investment, which is what research institutes, like the MITs of the world, you know, the Harvard, the Stanford, private sector invest in them, you know, in order to provide solutions to their problems. They don't just stay away.

And that's why we don't do enough in African countries. We think academia is separate from private now, and we just leave them along, which is a mistake.

MR. BRIGHT: Okay. This side of the room, we'll go all the way back to the gentleman waving his hand. But we can't hear.

(Discussion off the record)

MR. AJAYI: Hi, everyone. My name is Seyi Ajayi, and I'm the CEO of Africorp Group International. We facilitate trade in Africa, supply chain management, procurement and events (inaudible) of Africa, and most importantly getting into a new market. My question to everyone is: is America really ready to do business?

And why I ask that question is because we've had Indian families in Nigeria for years that have been doing businesses, like the Hathiramani family that owns Dana Group, the Vaswani families that own the Stallion Group. So, I feel like I want everyone to take the step forward in America to come, because everyone keeps talking and nobody is taking the walk.

China is taking the walk, and my company helps you get into the market. We help you to register your company, acquire the land, get you the HR that is going to help you employ people who are actually going to do the best jobs for you. So, we are open for business.

Xi spoke about, I don't know, Xi spoke about labor, and in regards to labor, in Nigeria, people make $200 a month, so, in the U.S. I don't see anyone who is going to live by $200 a month. So, anyone can be employed in Africa. The talk about making things in China and shipping them to Africa, that's not true. The minimum wage in Africa is so low that when you convert your dollars, then you can live with that money in these parts of the world.

But over there, people live there with that amounts of money. So, we want companies to come and set up, because in the near future, my generation would to accept shipping goods down to Africa, we want it made there.

Boeing Company sets up a brand new aircraft, and completes the aircraft in China, the interiors, the avionics, the painting of the aircraft, which can be done in the U.S. But China signs an agreement, that we want the aircraft completion done in China, so our people can be paid.

The same thing goes down with other brand aircraft from Africa, Kenya Air, with South African Airways, and we also want completion centers in Africa that's actually going to help our people with skills. In the aircraft parts of it, we buy business jets from Nigeria from these parts of the world --

MR. BRIGHT: Can we do, just to break up the question in the two parts, just so that (crosstalk)?

QUESTIONER: Okay. And when we try to sell those jets back it's no good for us in the market. The price is always going down, and so we need people down there to set up factories and to put people into work. And the end of it, the salary you are paying people is just very, very low, so there's no excuse. Thank you very much.

MR. BRIGHT: So, just to, I think break it down. One part was how to get more American companies to take advantage of African business opportunities. And then there was a second part on -- help me out -- and I think it was to Olga on labor, or?

MS. MEMEDOVIC: We have cheap labor in Africa competing with the robots, or products produced somewhere else. It's a good --

MR. BRIGHT: why don't we start with the second part, Olga?

MS. MEMEDOVIC: On? On labor?

MR. BRIGHT: On labor, yeah.

MS. MEMEDOVIC: Well, this is a very important one, and as we started the discussion about it, the issue is that you have to produce cheap goods, but quality goods, and compare yourself with China 10 years, ago, a lot of cheap goods on the market, people were buying, but after certain point of time, they don't want the things that are cheap, and can break in no time. They want quality stuff to buy because it's more durable.

So, in that sense, yes, Africa can use cheap labor, but it should produce very good quality stuff based on demand of the situation, the demand that is today, that is quality and fast, just in time. If Africa can do that, as I said, I go back to Nike, if you can produce Nike that can be ordered electronically for young people that want to buy it, why not. But just to have -- to be able to do it.

MR. BRIGHT: Now, I'm going to have to -- we'll keep it open for everybody. So, why don't I take the first part of the question, and Susan, McKinsey has done a lot of work and highlighted a lot of American companies have actually worked in Africa. Maybe an example of two of -- you know, those companies, and what you think drew them in?

MS. LUND: Well, there are U.S. companies doing business there, but in general, I was telling some of the panelists earlier, American companies are far behind. Even far behind relative to European countries. And I hate to say it, but I think the Colonial ties of Europe, and maybe the time zone, like Europeans are just much more attuned to the opportunity in Africa than Americans have been.

It's just a little bit of a blank (inaudible). So, a lot of the -- a lot times I do presentations to large companies, and I say: what's your Africa strategy? And they look at me, like, what? It's like, yeah, you need an Africa strategy, because, guess what, population growth in China is now over, and by 2030 or 2035 Africa is going to have the

largest number of people, more than China, or India. So, the demographics are there anyway.

So, I just echo your point that it is -- it takes you and the job you're doing to go tell companies about it, and me, and there are some, you know, GE, and there are many, and many of the agribusiness companies of course have big operations in Africa.

And that's a matter of them seeing the opportunity, GE a lot in power and energy, agribusiness, you know, and obvious commodities. So, I think it's changing, but yeah, U.S. businesses, this is not a part of the world that they have -- really historically, had any experience in.

MR. BRIGHT: And the lady right here?

MS. WILKINS: Thank you. I'm Dianne Wilkins. I'm a CEO at Development Financing International.

MR. BRIGHT: We'll get the mic for you, so everyone can hear.

MS. WILKINS: Is my voice not loud enough for you back there? (Laughter)

MR. BRIGHT: It is, but (crosstalk).

MS. WILKINS: I'm Dianne Wilkins, president and CEO of Development Finance International. Thank you all. Susan, you didn't mention Lions on the Move II, which is really important for folks new, and for you, ma'am for Germany.

I've spent a lot of time in Africa and was in Ethiopia in particular, so my question relates to that. And congratulations to GIZ and KfW now, for how much you're getting involved in the higher skills, and it's really important. And of course the Trade and Competitiveness Group, work closely with PVH Corp. and their investment in Awasa.

So, here is my question. That's garment and textiles, and the largest industrial park for garment textiles on the continent. Ethiopia thinks it going to generate

500,000 jobs over the next, I think at this point, three years, in garment textiles. Africa is adding a billion people, I'm glad you brought that point up.

So, what's your crystal ball? If Africa 4.0 comes in there will be some subset who is creative and can do the digital economy. There will be another subset of young people who might move back to the farm and get inspired. But for global and political stability, what's your crystal ball? What do we see for the other 995 million people?

MR. BRIGHT: Well, just to add a really quick example to your question to tee off to the panelists. I had a very cut and dry conversation with Ethiopia's minister of industry, where he said: look, for us manufacturing, it's a really simple equation, and even then we have a problem.

We have this growing youth labor force, and it's growing this much, and even if we do manufacturing we are only going to be able to employ X-percentage of that. So, you know, it's the only choice for us, but even with that, we still have a huge youth unemployment problem, which I think, and maybe the panel can elaborate on this, you know, employment is a global problem now, but maybe seemingly bigger for Africa. So, who wants to jump in on that?

MS. MEMEDOVIC: Sure.

MR. AKINYEMI: I see, I've worked over, I've traveled over the continent, there's no doubt that we have youth unemployment, and there's a lot of root problems that is causing that. Not just because of technology displacement. I mean, actually I think that's the very, very minimal, if at all, impact.

The standard of education is a problem, okay? Even within countries, you know, I remember I was at -- for Nigeria I talked with the minister of finance, and this and that, you know, over the years. We used to debate that, look, we have a high

unemployment problem, because some of the private sector companies within the country will not hire them, because they don't have all the qualifications they need. They would rather hire somebody from outside.

So, that's not native to Nigeria only, I done that all -- you know, South Africa, everywhere. So, we need to improve the quality of the education, and I have to admit that the education for Africans were not tailored for Africans, therefore, they don't solve our problem. And we don't learn the way we are supposed to learn, because we have a foreign system of learning, where we don't learn by our own language, which has been proven years and years, that when you learn in your own language, you are better off.

Now, those are all kind of on the side, but important. But more important to me is now, you know, if you look at Africa you have a lot of innovation hubs all over the place. Innovation hub is supposed to bring in the full ecosystem of entrepreneurship, and business development, which will solve the unemployment problem.

We want people to go out and create businesses and employ as opposed to looking for a job. To do that you need a nurturing environment that will help them to do that. Meaning, you know, you need private sector to partner with them, you need, you know, angel investors to be able to trust them, and invest in them.

As I just mentioned, you have research and development that is totally disjointed from the private sector when they need to work together. So to me, I see it as a community effort, from all sectors, the unemployed, the government, the private sector, we need to bond together, we need to create the environment that we -- admit that will promote entrepreneurship and then, of course, there will be people that will take into -- I mean agri-tech, or fintech, or all the other capabilities, but below that, I believe there has to be private sector support.

MR. BRIGHT: Mary?

MS. HALLWARD-DRIEMEIER: To me, Ethiopia raises a range of really interesting questions, because the model is one that is very state-led. It's not been sort of, the foreign investor seeing a real market opportunity, and it's too state-led, right? So, on the one hand is the Ethiopian government that has done this, but it's also China.

So this has been a very intentional, both government, and encouraging certain of their leading companies to come and invest. So, it's both been the railway to the Djibouti Port, which has been critical to be able to export. It's the construction of the industrial zone in particular, and there have been some interesting choices made.

So, Ethiopia now has a number of them. Some of them are a little bit closer to urban areas than others. Some of them are really out in the middle of nowhere, and so and almost always they've brought the entire supply chain. So this is not linked into the domestic Ethiopian economy, so you're not going to get the kind of spillovers, ideally, that you would want in attracting FDI.

So, you are underscoring the jobs, and that has been a prime motivator. I think the idea is that it would snowball, and it would eventually attract local firms and have the dynamic spillovers, but at the moment, some of that investment has not been set up very well for it, and some of the concerns on the jobs, is the enormous turnover.

And so to me that has been question, and partly the wages are incredibly low, and if wages were a little bit higher, that might change some of it, but you've got a lot of people having to move from home to live and work there, and that's had some social cost dimensions as well.

So, it has had some success in terms of attracting some investors, and are exporting, it hasn't yet reached that tipping point where it's clear that the sort of market forces are really going to make it all sustainable.

MR. BRIGHT: So, we have time for two --

MS. HALLWARD-DRIEMEIER: I'm not sure it's something for a lot of others to copy.

MR. BRIGHT: -- two quick responses, and then we have to wrap. Olga, and then Susan?

MS. MEMEDOVIC: It's about the market forces. I don't know, again we are going into this direction, where the market forces, where the role of government -- the role of market forces and digital economy, that's number one. And in the case of Africa, because they were drivers, government is driving the whole process in Ethiopia, and there is also the role of government to China, which I agree.

But what about the role of Germany in supporting Industry 4.0, it's a very strong power of the government who was initiating the whole term of Industry 4.0 to mobilize stakeholders around the project of Industry 4.0. It's the (inaudible) society, it is also Siemens, it is the government. You have a lot of subsidies invested into it, it's not market forces, it's a lot of government.

But what I want to say is collective things are very important, it's just not our role of government, collective efficiency, of mobilizing all stakeholders is extremely important, and particularly not only for Africa, but different countries developing countries, LDCs.

And how do you do that? Because what are the keystones in certain, let's say, business digital ecosystem? What will be the keystone in Africa is Ethiopian government, but on the whole continent, you have this regional integration schemes. You can talk whether they are successful or not, how they can mobilize this collective (inaudible) for the whole continent. That's the issue, because it's a lot of capital in Africa, but you have to leverage it for the benefit of all people.

MR. BRIGHT: And Susan, we have one moment for you, if you had something?

MS. LUND: I was just going to build on Mary's point that economic development is about the spillover effects. You're never going to have everyone employed in agriculture or manufacturing, but if it works you're going to be building an economic cluster that has suppliers, it has downstream customers, then you need bankers and financing, you need accountants, you need lawyers, you need a whole set of services.

And so the hope, if it works, is that industrialization and manufacturing is the spearhead that then has these ripple effects, and you have a whole diversified economy. And that's where most of the young people get their jobs.

And I think as Mary pointed out though, to have that work, and it's what you saw in China, right, they started out with special economic zones on the coast, but those turn into major cities. So, when people have wages, then they wanted better apartments, and better food, and so on.

So, they've got to somehow be linked to the local economy, if you are going to capture that. Otherwise it's going to be like so many special economic zones around the world that have actually failed, because there were isolated enclaves that didn't do -- didn't have any connections to the broader local economy.

MR. BRIGHT: All right. That wraps up our Industry 4.0 Africa discussion at Brookings. I just want to thank the panelists and Brookings for the discussion. And I'm sure we've hit a lot of points to continue discussing after. Thank you. (Applause)

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