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Let's Not Talk About Agriculture, but Agri-Business

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Strengthening Africa's economic performance

THE BRENTHURST FOUNDATION

Let's Not Talk About Agriculture, but Agri-Business

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Executive Summary

The Brenthurst Foundation, Tel Aviv University, the Olusegun Obasanjo Presidential Library, together with the Agricultural Research Organisation (ARO) and the AJC's Africa Institute recently staged a dialogue on 'Agriculture and Technology for Development' in Abeokuta, Nigeria. Two questions determine the course for African economic growth in the future: where will burgeoning populations find jobs, and which industries will remain or emerge to provide them? From what we know now, it is likely that food production and processing will grow in importance. Could clever adoption of localised technology turn Africa into its own breadbasket, and provide a bridge from agriculture to agribusiness?

Introduction

Africa's demographic changes and pressures are immense. Over the next generation the continent is projected to double its population to 2.5 billion. Jobs, already at a premium, will depend on Africa creating more opportunities, by training its people with more than just rudimentary skills, providing necessary infrastructure, and creating an attractive value proposition to investors.

Already un- and under- or self-employment in Africa is over 80 per cent. With 70 per cent of employed youth qualifying as 'working poor', the problem is particularly pronounced among Africa's young, who comprise more than 60 per cent of the continent's population.[1] This is not going to be made any easier by the impact of technology, which will likely lead to the loss of some (traditional) jobs while inventing new ones. For example, robots, remote sensing and machine learning will change our lives as they shift from being manual and repetitive to cognitive and non-repetitive.[2]

How exactly this will play out is of course uncertain, and itself subject to change from events we can today discern (like climate change) or some we can't yet identify.

Putting heads together: Lesotho's Finance Minister Moeketsi Majoro, Olusegun Obasanjo, Greg Mills and Malawi's Vice President Saulos Chilima, Presidential Library, Ogun State, Nigeria, 29 October 2018

But it is likely that competitiveness will be needed to thrive, within and between societies, and between men and women. If they position themselves correctly, less developed countries may be able to leapfrog technologies in robotics just as happened with digital mobile technologies. The transfer and origins of wealth may also change dramatically, as is hinted by Bitcoin and blockchain technology.

The future may or may not be bleak, but it is unlikely to look like what it used to be.

Israel offers some pointers on how Africa might best navigate this perilous journey.

From Agriculture to High-Tech

A drive down the West Bank of the Jordan Valley is a trip through a pop-up Bible. Here, there, everywhere are historic sites, from Jericho to Jerusalem, the Dead Sea to Tiberias on the Sea of Galilee, the road north to Nazareth, and that to Nablus, the home of the Samaritans.

With so much history and not a little emotion, little wonder this earth is so fought over. As one descends through 300 metres below sea level south from Jerusalem, there is little greenery in sight. Caramel hillsides rise up like giant blobs of ice-cream slowly melting in the baking sun, the landscape broken only by the odd camel, a few Bedouin, and Route 90 snaking up from the Negev. Pass the road to Qaser al yahud, where John baptised Jesus in the Jordan, today little more than a stream, and the opposite turn off to Jericho and, suddenly, the desert comes to life, greenhouses and shade cloth hiding tomatoes, grapes, peppers, herbs and melons, where Arab and Jew work side-by-side for the European table.

Just 13 per cent of Israel is arable. Yet, since its independence in May 1948, the country's agricultural output has increased 16-fold, many times the rate of population growth. This is down to a lot of perspiration and, more importantly, a large dollop of innovation and co-operation. This is nothing new. Close to the Desert Plant Research Station in Be'er Sheva is a farm cultivated by the Nabateans, the earliest desert farmers. Using sophisticated terracing, every drop of runoff water was collected and diverted to the fields and orchards.

Fast-forward 2 000 years and today Israel produces close to 95 per cent of its food requirements. Agriculture exports are worth over US$2 billion, more than half of which is fresh produce, including flowers, vegetables and exotic fruits.

Israel's progress is down to smart development. In agriculture, for example, it has used technology to reduce water usage and increase output, and higher-yield crops to increase both volumes and financial sales values. Drip and direct-feed computerised irrigation systems are the norm, saving water, increasing yields and improving returns. Just 40 per cent of the fresh water used for agriculture 60 years ago is used today, with some 85 per cent of sewage water recycled for agriculture. Between 1999 and 2009, farmers have grown 26 per cent more produce using 12 per cent less water.[3]

It's all a far cry from 1948, when the Jewish state seemingly had little going for it. Not only was it a piece of dry, rocky and theologically and militarily contested countryside, but it had neighbours who wanted to wipe it off the map, enemies within and without the domestic population, and a citizenry of just 800 000, many of them traumatised from their war experiences.

Smart Water: Irrigation, particularly drip irrigation (like these irrigation trays by Israeli company Tal-Ya, top), has been one of the most important revolutions in agriculture in the last century, allowing for more effective water use, less runoff and higher yields. Servicing just 15 per cent more farms with irrigation could lead to a doubling of global yields.[4]

Despite rapid population growth (now over 8.7 million) Israelis enjoy a per capita income of US$40 258, putting them in the top 20 worldwide, between New Zealand and France. Their direct neighbours, Egypt, Jordan, Syria, Lebanon, and the embryonic Palestinian state have incomes respectively of US$11 360, US$9 110, US$5 090, US$14 690 and just US$5 560.

There are multiple other indicators of transformation and success. Israel is the world's 25th largest economy, and aims to fill the number 15 spot by 2025.[5] It ranks 22nd out of 189 nations in the UN's Human Development Index as a 'very highly developed' country. A member since 2010 of the Organisation of Economic Co-operation and Development (OECD) group of higher-income countries, it has struck a range of free trade agreements, including with Europe, the US, Mexico, Canada, the Mercosur trade bloc in Latin America, and even with its more complicated partnerships in Jordan, Egypt and Turkey.

Israel is the world's 25th largest economy, and aims to fill the number 15 spot by 2025

Although it depends on imports for nearly all of its raw materials from oil to diamonds, Israel has become a global industrial hub. Not only is it a world leader in diamond polishing and cutting, processed foods, electronic and medical equipment, and, more recently, software, semiconductors and telecommunications, where the concentration of high-tech start-up industries has given it the monikers 'Silicon Wadi' and 'Start-Up Nation'.

Israel boasts the highest-density of start-up ventures by population in the world, one for every 1 400 Israelis.[6] By comparison, France has 0.112 start-ups for every 1 400 people. Germany has 0.056 start-ups for every 1 400 people, and the UK has 0.21 start-ups for every 1 400 people. Israel's start-up density is almost exactly 100 times South Africa's, with one start-up for every 140 000 people. Nigeria, with the highest number of start-ups in Africa, has one for every 33 000 people.

After the US and China, Israel has more companies listed on the NASDAQ than any other country and more than Europe.[7] Put differently, by 2008, per capita venture capital investment in Israel (some US$250 per person per year) was 2.5 times greater than in the US, 30 times than in Europe, 80 times than in China and 350 times greater than in India. Israel attracted close to US$4.8 billion in venture capital, about the same as the UK (with nearly eight times the number of people) or France and Germany (20 times) combined. While many fail (and are expected to do so), some Israeli start-ups have gone on to be high-profile financial successes: Among many examples, Waze sold to Google for US$1.3 billion, and Mobileye sold to Intel for US$15.3 billion. Israel boasts 18 unicorns (privately-held start-ups worth over US$1 billion), including international workspace empire WeWork, and cab service Gett. Africa has only one unicorn, internet company Jumia.

It's a long way from the grainy images of *kibbutzim* farmers as the pioneering, rural ideal of happy socialist co-operation in the Jewish homeland.

The easy shorthand to explain Israel's success is that there is a concentration of educated, motivated, brighter than average people facing an existential threat in a small geographic space – at 370 people km^2 about the same density as Rwanda, Holland and India.

Performance driven through adversity is important, though Israel is not unique in this regard. US assistance, some US$3 billion annually, is another oft-cited reason. Not only is much of this spent on military kit, but Egypt gets the same chunk under the 1977 Camp David terms, and this tranche is seldom used to positively define that country's circumstance. Moreover, this figure amounts to 1.5 per cent of Israel's and Egypt's GDP, even though the latter has more than ten times as many people as the former.

While Israel's trade deficits are covered by large transfers from abroad and by foreign loans, such imbalances and mechanisms are not uncommon across a range of African and other developing countries. And while the fragility of African countries is, too, often explained by their difficult inheritance and regional circumstances, such factors seem to matter more for them than it does for Israel.

The explanation for Israel's recent success in the high-tech field lies in a combination of human and other factors, one of which is the very high levels of civilian and military Research & Development expenditure. Israel's civilian R&D is 4.3 per cent of GDP, while Japan's is 3.3 per cent, the United States' 2.8 per cent, the UK's 1.7 per cent and China's 2 per cent.[8] No African country spends even 1 per cent of GDP on R&D, with Kenya leading at 0.79 per cent, followed by South Africa and Egypt with 0.72 per cent.[9]

To this has to be added military R&D. This is difficult to quantify, but the military has historically accounted for as much, in the worst security years, as 40 per cent of the national budget. The military, the regional threat and limited international friendships have combined to drive innovation in military technology: As the first Israeli Prime Minister David Ben-Gurion was reportedly fond of saying, 'in the army it is not enough to be up to date; you have to be up to tomorrow'.[10]

Israel's civilian R&D is 4.3 per cent of GDP. No African country spends even 1 per cent of GDP on R&D

More important perhaps than money from the military was the culture it engendered, of accountability no matter the rank, agility, questioning and problem-solving rather than uniform rigidity, and a can-do, risk-taking attitude. Major General Aharon Ze'evi-Farkash headed up a variety of units during his 40 years in the armed forces, including the elite Unit 8 200 signals intelligence unit and, from 2002 until his retirement from active duty in 2006, the Military Intelligence Directorate (known as 'Aman'). Farkash says 'It is also a bottom-up process since it is dependent on taking young, brilliant soldiers who are highly motivated because they understand what is at stake, and we give them a budget, a target and a short time-frame.'

Money and even technology is, however, not enough. To be effective it has to form part of

a system of skills and the funding to translate ideas into business ventures. It has, to use academic terminology, to be a 'cluster' of universities, companies large and small, suppliers, talent and capital in close proximity.

Here the government offers a funding bridge through the Israel Innovation Authority, which provides US$430 million in annual grants to 1 115 worthy projects. Much of this money is given to projects in the 'proof of concept' and 'pre-seed' phases. This money is paid back in the form of royalties (with nominal interest), though as many as half of the original projects fail to deliver. It's high risk and high return for Israel, but it is a bottom-up process in that, as Gil Shaki in the office of the Chief Scientist says, 'it is what the market throws up, where excellence and competitiveness win out. We are not picking winners and directing things top-down.'

Its services and high-tech edge is linked to a dynamic venture capital market, formed originally with government intervention around *Yozma* (meaning 'initiative' in Hebrew) in 1993 which, says Gaddy Weizman, 'opened the floodgates and created a venture capital industry'. Ten *Yozma* 'drop-down' funds with US$200 million in funding were set up by 1996. By 1999 a second fund had been listed on the NASDAQ. Today, the Israeli VC market is reportedly worth more than US$4.4 billion.[11]

> Money and even technology is not enough. To be effective it has to form part of a system of skills and the funding to translate ideas into business ventures

High-tech is, however, not the whole economy. Comprising more than 50 per cent by value of Israeli exports, for all of its earning power, this capital-intensive sector only provides employment for 9 per cent of the workforce. The bulk of jobs still lie in more traditional sectors and in services.

Israeli industrialisation initially followed the creation of a textile industry, itself based on cotton growing, with this sector comprising around 12 per cent of merchandise exports in the 1960s, second to diamonds and agriculture. However, with competition from Southeast Asia, many enterprises relocated into Jordan and Egypt. Today industry accounts for 21 per cent of economic output and services one quarter.

While not as high-profile as start-ups, Israel thus continues to exploit its comparative advantages, fusing the aspects of technology, capital and skilled labour. For example, Israel remains a major tourist destination, with 3.6 million annual visitors in 2017 bringing in US$5.8 billion.[12]

> While not as high-profile as start-ups, Israel thus continues to exploit its comparative advantages

And although agriculture accounts for less than 3 per cent of GDP and employment, it is a major export earner, as Israel moved away from farming low value grain to higher-value fruits and vegetables for the European table. It's not only the yields, but the number of varieties which has increased dramatically in the search for market advantage. 'Fifty years ago there were just 15 types of vegetable. Today there are more than 70 grown', says Yitzhak Kiriati, who was in 2011 the Director of Israel's Export and International Co-operation Institute. 'But there have been lots of failures along the way.' But this is part of the job since 'Modern agro-business is not about what are the right crops to grow in a particular region based on tradition, but rather what will sell – what the market wants. Technology has been absolutely key in this, and much of it is of a systemic rather than revolutionary nature.

Today Israel holds the world record for the amount of milk produced by a single cow in a year: 12 000 litres. But this has been achieved, smiles Kiriati, 'by knowing the performance and yield of every single cow in the country. That way breeding

and feeding is carefully controlled and improved.' The improvements are best summarised by a single statistic: In the 1950s, one farmer supplied food for 17 people; today this number is more than 100.

The lesson from agriculture, he maintains, is the same as start-ups. 'If you want to succeed, you need to take care of the whole food chain: Producer, market, post-harvest and, critically, to find the right model to integrate the farmers with each other and the market.'

Another key lesson here for Africa and other developing nations is that this all has to start somewhere.

Thinking outside the box: One suggestion tabled at the Dialogue in Abeokuta was the creation of a 'sand box' to tweak Israeli technologies (often primed for large-scale farming) and business models to African realities, to better address the challenges of smallholder famers. Here, a student trained by Tel Aviv University speaks to other students.[13]

Israel's agriculture growth in the face of severe water shortages is no accident. Again, it involves close co-operation between researchers, farmers, university and other research centres, and extension officers. As former Israeli president and Nobel Prize winner Shimon Peres said, 'Agriculture is ninety-five per cent science, five per cent work.' It is based on extensive market research about customer's needs and wants, in Israel and outside. And new products have created additional business opportunities. Improvements in yields and crop quality have demanded innovations in irrigation and 'fertigation', machinery, automation, chemicals, cultivation and harvesting. As a result, the country has ten major companies producing irrigation and filtration equipment, while Israeli agro-specialists ply their trade across the world.[14]

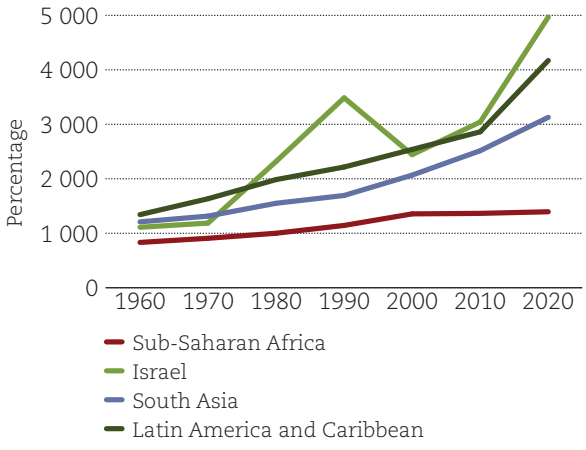
If Israel had failed to develop and remained aid dependent, all of the reasons given above – a difficult region, nasty neighbours, fraught internal politics, little water and so on – would be testimony for failure.

Applying this to Africa

Compare this to Africa. Thirty of 49 sub-Saharan African countries are net food importers, despite the continent having 400 million hectares of arable land, the greatest store worldwide. Africa's annual food import bill is US$35 billion, and is expected to rise to US$110 billion by 2025.[15] Exports are worth 65 per cent the value of imports, resulting in a trade deficit of US$22 billion on food and agricultural products.

Africa's failure to feed itself can be summed up in a single word: yields. These are too low to create a virtuous cycle of farming, profit, investment in personal education and healthcare, further improved yields, and more profit.

Cereal Yield: kg per hectare

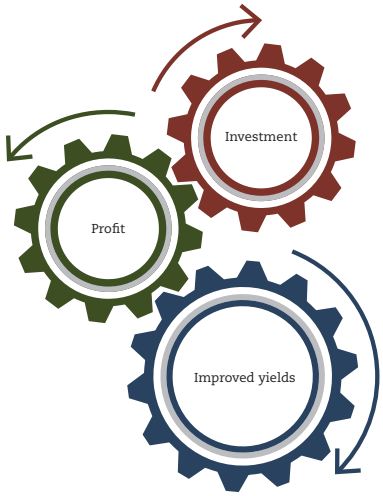


Data: Food and Agriculture Organisation (FAO)

This relates to an absence of certainty around title, insufficient access to financing, and the relative absence of technology and mechanisation – all of this reflecting, overall, a lack of skills, systems and investment. These challenges are disconcertingly intertwined, with tenure insecurity preventing collateralisation, which in turn limits access to finance. Weak infrastructure (such as roads, warehouses, internet and processing facilities) limit

access to markets, which constrains competitiveness. Lack of skills means that technologies which could lead to improved yields are not taken up. Any solution aimed at addressing Africa's low yields should therefore be holistic and multifaceted.

A Virtuous Cycle for Smallholder Farming



Six Necessary Components

Israel's story provides a grocery list of the six necessary components of such a solution.

The first is scale – or economies of scale. Economies of scale allow for a level of efficiency which otherwise would not be possible. The second is the appropriate technology, grounded in scientific research. Third, for technology to thrive, a VC-ecosystem which ensures funding and support to entrepreneurs. Fourth, policies which support farmers, smallholders in particular, through secure land rights, training and subsidies to promote the adoption of yield-improving technologies. Fifth, microfinance and insurance for farmers to derisk the process of adaption to new technologies, and sixth, a healthy dose of good stories and the ability to learn from them.

But this is perhaps where the comparisons end. Africa needs technological solutions developed for the African context, not simply imported from elsewhere. Often, when the seemingly 'right' technologies are not taken up by smallholders, it is said that they are unable to adapt due to lack of skills, or internet access. The converse is more true: if the technologies are not adopted, they are not the right technologies for the context.

Since technological solutions exist to most problems, the challenge is twofold: Ensuring the governance and ownership issues that stand in the way of its adoption are removed and also changing the incentives – for example, that if African farmers produce more that the means existant for them to profit from this, to get the surplus to market at a fair price.

Top: **A meeting of minds**: Delegates from Africa and Israel arrive at the Olusegun Obasanjo Presidential Library in Abeokuta, Nigeria, to discuss partnerships for technology and agriculture. One result of this has been a newly-formed partnership between Tel Aviv University and the Federal University of Agriculture in Abeokuta
Bottom: **From president to president**: President Olusegun Obasanjo accepts a gift from Professor Joseph Klafter, President of Tel Aviv University

Some have begun to address this challenge by bringing subsistence farmers who produce surpluses into the economy. These include Khula (South Africa), connecting smallholders with local markets, WeFarm (Kenya), a peer-to-peer knowledge sharing platform for smallholders, and Wala (Uganda), which provides loans to smallholders

through crypto-payments. Meanwhile Nigeria's FarmCrowdy allows mobile investing (or pledging) for smallholder farmers from private investors both locally and abroad. In 2017, 159 African start-ups collectively attracted funding of over US$195 million. This figure is dwarfed by the US$12 billion invested in European start-ups, and more than US$70 billion in the US for the same year.

Africa's start-up ecosystem, although growing, remains relatively weak. African entrepreneurs face some of the toughest business conditions in the world. This is the result of inefficient bureaucratic processes, limited access to funding, and weak patent laws and IP protection. Scaling is limited by small and heterogeneous markets, with the result that businesses in Sub-Saharan Africa are on average 24 per cent smaller than in other parts of the world, and less productive.[16]

Africa's start-up ecosystem, although growing, remains relatively weak

If we are to develop localised, bespoke, high-tech solutions to the challenges outlined above, developing the right African VC climate will be key. This requires yet another grocery list. The components of a healthy VC ecosystem are government support (to kick-start the funding process, and provide infrastructure and the appropriate legal framework for patent protection); an active start-up market with regular investments, entries and exists; academia for research and development; and finally, incubators and accelerators to support young start-ups.[17]

There are currently 442 active tech hubs on the continent, the large majority in either Lagos, Cape Town or Nairobi. This figure has grown by 50 per cent since 2016, with 47 African countries now boasting at least one hub.[18] While the supply of tech-accelerators and start-ups themselves are clearly growing, the available funding seems to be slow to keep up. This is where both government and the private sector has an important role to play. With Africa's food market projected to be worth over US$1 trillion by 2030, this presents a substantial investment opportunity.[19]

Israel's example is not without its challenges, particularly the difficulty of translating 'start-ups' into 'scale-ups' to becoming more than an incubator for the global economy. Israel will also have to gear its technological solutions not exclusively to the US, but to developing world markets, where big, long-term opportunities lie.

One of the main synergies between Africa and Israel in the start-up space lies in Ag-Tech. Specifically, Israel's proven strength in high-tech agricultural solutions, but need to scale up and mature into new markets, and Africa's demands for mechanisation and improved efficiency. Israeli start-ups like Taranis (precision agriculture), FarmDog and FieldIn (pest control), CropX and GreenOnyx (yield improvement) and BactuSense (food safety) are ripe for partnership with African entrepreneurs and farmers. But these cannot simply be transferred to the African context: they must be tailored through local partnerships and learning.

Getting connected: With smartphone adoption in Africa expected to double (from 34 per cent to 67 per cent) by 2025, and mobile broadband connectivity set to increase to 87 per cent (from 38 per cent in 2017), start-ups like OKO Insurance can provide crop insurance to farmers in Mali by SMS *(Photo: Simon Schwall, OKO Insurance)*

Unless solutions are translated into local contexts and undertaken in partnership with local actors, they will fail. Entrepreneurs coming into Africa from abroad are often plagued by weak relationships with local authorities, financing lags, travel restrictions, weak digital infrastructure and even mosquitos,[20] altogether making for a very tough business environment.

Local is best: Equipment like this planter, developed in South Africa by Cape Town-based manufacturer Equalizer, is ideally suited to local soil conditions. While global trends move towards larger tractors, smallholder farming in Africa lends itself to smaller equipment

Good Ideas into Best Practice?

How then do we translate good ideas into practice, and how do we transfer lessons across geographies? Here, the fundamental ingredient is a localised approach. We should try to establish small, regional centres for the development of technologies through interaction with farmers, to solve issues both agronomically and socio-economically. It is not sufficient to simply import solutions that have worked elsewhere. Perhaps existing tech-hubs can fulfil this role, but more active involvement from academia and government is undoubtedly needed.

The paradigm needs to be changed from 'agriculture' to 'agribusiness', as this is the only way to move from subsistence farming to farming for surplus. This is why, for example, smallholder outgrower farming schemes in Malawi and Mozambique around tobacco have prospered, given there is an underlying commercial imperative and system, which does not go away when a donor shifts attention.

Two questions determine the course for African economic growth in the future: where will burgeoning populations find jobs, and which industries will remain or emerge to provide them? From what we know now, it is likely that food production and processing will grow in importance, as will tourism. The challenge for food and agriculture is to provide mechanisation for greater efficiency without sacrificing labour. On a continent with nearly one billion dependents on smallholder farmers, it is no surprise that entrepreneurs are increasingly moving into Ag-Tech. As the example of Israel shows, providing the appropriate funding to these start-ups could kill three birds with one stone: ensure the relevance and productivity of the agricultural sector while providing jobs, and bolstering Africa's food security.

It's a trend worth betting on.

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