Digital Development

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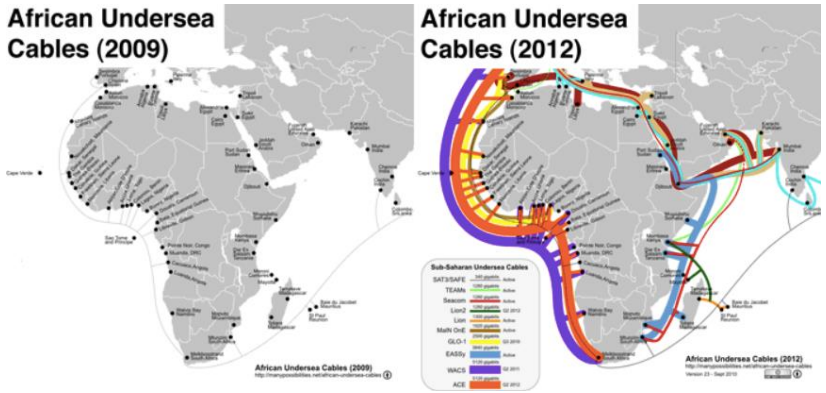

2011- 2014: Postdoc on ESRC-DFID project with University of Oxford, National University of Rwanda and University of Nairobi

Impact of the arrival of fibre optic internet connectivity in Kenya and Rwanda on:

- Tourism
- Tea
- **Business Process Outsourcing (BPO)**

2018- 2022: Recent ESRC funded project on digital agriculture.

Studying how actors within agricultural value chains in Kenya and California, US are using digital systems:

- coffee and avocados in both
- almonds in California, US
- potatoes in Kenya

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3 Cautionary Notes

Things I wish policy-makers are aware of when they are conceiving of ‘digital’ policies…

1: Many of the key digital technologies are hidden/embedded.

Within concrete value chains, **many 'digital' components are not fancy platforms or apps, but internal systems within companies, business associations and regulatory organisations** that automate processes, restructure production/skills, collect and monitor data and orchestrate value chains and marketing/compliance.

Much academic/**theoretical work on "digitization" arguably over-focuses on social media platforms and then extrapolates to other areas**, but in my own research, I have found that digital systems are shaped by the **commercial interests/power relations of concrete sectors and value chains** (See also Butollo and Schneidemesser, 2022 for discussion of manufacturing platforms, Tin El Kadi, 2022 for discussion on the globalisation of China's digital industry).

For 'digital' policies, a good starting point is to look within the sectors that already exist and speak to **the savviest actors about how they understand these hidden forms of digitization** and what support and training might be appropriate.

2: Be careful about what you read!

- What is **technologically possible isn't always practically/politically possible**: Scaling is very, very difficult in practice and many digital projects fail (both in our fieldwork in Kenya and California, very few farmers are using all the apps and precision agriculture technologies you read about in the news! Huge disconnect between venture funding and practical relevance/use in both places). Accounts often give the impression that these firms are already scaled up but there is often little or no evaluation of how many users and how successful they have been.

- From my research, I have found that **start-ups have more success building applications for existing clients/institutions than trying to go 'viral' alone**. In Kenya, shift away from lots and lots of small agricultural start-ups towards platformisation strategy using the dominant telecom, Safaricom's mobile money agent network and immense market power to scale applications.

- Many of the broader claims about the presumed benefits of digital technology in mainstream publications are **based on data from high income countries and the evidence from low/middle-income countries is more mixed and context-specific (Mukiri-Smith et al., 2022).**

World Bank's World Development Report, 2021

WDR 2021 claims: **"[n]umerous studies have found that broadband infrastructure boosts economic growth, increasing productivity and employment while enabling digital enterprises" (158).** This claim is supported by **seven studies, five of which draw on evidence exclusively from high income countries.** In the case of the Minges piece- one of the two pieces that includes analysis from developing countries, the cited author discusses caveats and highlights problems with determining causality (Minges, 2015: 12 and 16), describing how **"particularly for developing countries" the positive economic impacts from fixed broadband "were sometimes not statistically significant" (Ibid: 11)."**

Mukiri-Smith, H., Mann, L., & Azmeh, S. (2022). A DC state of mind? A review of the World Development Report 2021: data for better lives. *Development and change*, *53*(6), 1421-1439.

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2: Be careful what you read!

There is a skewed 'politics of knowledge' operating in the background of all discussions about digital development (both in terms of the interests of high-income countries as well as tech firms themselves).

- Concerted **push by high income countries to secure binding multilateral/bilateral rules on digital trade('e-commerce') and digital taxation** with important implications for policy space and revenue (Azmeh et al., 2020; Banga and Beyleveld, 2024) .

- **Pay attention to context when it comes to success stories.** An example…

The authors discuss the **Business Process Outsourcing (BPO) sectors of India and the Philippines to justify the claim that the "boom in data-enabled services creates opportunities for new entrants in global trade"** (100).

The European Journal of Development Research (2020) 32:1057–1079
https://doi.org/10.1057/s41287-020-00256-1

ORIGINAL ARTICLE

Check for updates

Capturing Value amidst Constant Global Restructuring? Information-Technology-Enabled Services in India, the Philippines and Kenya

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India- 1980s

Long-term investment into **engineering skills and labor migration** to US- establishing networks and reputation with US/EU.

Role of **ISI in establishing domestic conglomerates in 70s**. When telecommunications liberalized, they went into BPO and software.

Successful **job creation and upgrading**, but inequality issues (few linkages and urban-rural inequality).

As India has upgraded, it has reconstituted and automated production, retaining higher value activities and outsourcing less valuable activities, and thus made it hard for others to emulate its trajectory.

Philippines- early 2000s

Almost **entirely foreign owned BPO**. More interest in how the country slots into their multinational network.

Hugely successful in terms of employment creation, but foreign dependence means little upgrading and leaves sector vulnerable to shifts.

Domestic profits from sector have flowed into real estate and urban services.

Kenya: late 2000s

Domestic ownership and national strategy to launch country- but inexperienced and struggled to gauge value (taking on more exploitative work)/ manage production and damaged reputation as a result.

Government support was not targeted. In focus groups, industry groups wanted closer monitoring/performance criteria for subsidies.

More recent shift to attracting foreign BPOs, software/startups, social impact sourcing.

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3: Investing in infrastructure and digital training do not make a knowledge intensive economy alone!

Digitisation…

1) Increases **efficiency/productivity/predictability** of markets (when you can get digital systems to scale!)

BUT… dangers of…

2) **Concentration of market-power through network effects and potential for centralization of data/knowledge**.

Who captures the value of digitally-enabled economies depends on broader context and control over intangibles (Intellectual Property and brands and market power). Impacts are likely to be sector- and context-specific.

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Example: Kenyan Agriculture.

Agricultural R&D (more hidden)

- Use of NGS, bio-informatics/breeding platforms and potential use of field/market data for more 'demand-driven' breeding
- Use of precision agriculture in field studies

Benefits for Kenya:

- potentially more appropriate/climate sensitive inputs
- But… broadly speaking intellectual property and skilled employment not being captured by Kenyan actors (Agricultural R&D dominated by MNCs and international research organizations).

Agricultural Production

- Use of digital extension, fin-tech and crop-specific coordination tools.
- Limited precision agriculture (on bigger farms).

Benefits for Kenya:

- Potentially easier access to advice and finance, less waste and more transparent pricing.
- But… scaling!!!
- Profit-motive skews firms towards those at the 'top of the pyramid'.
- If publicly controlled/operated, perhaps use of same systems to better understand and serve poorer farmers (but how to do this without private sector networks/infrastructure?).

Marketing/compliance (more hidden)

- Use of digital technology to meet greater phytosanitary standards, and greater transparency and traceability within GVCs.

Benefits for Kenya:

- Agriculture is potentially becoming more knowledge intensive. Chris Cramer's 'industrialization of freshness' (Cramer et al., 2018; Cramer and Chisoro-Dube, 2021)
- But… Success often involve industrial policies (as it is often sector-wide coordination, infrastructure and training).
- Without domestic strategy, danger of market concentration and value capture by brand-name retailers.

If you invest in 'digital skills' and don't have a parallel industrial policy/strategy to absorb those skills, you are either going to create:

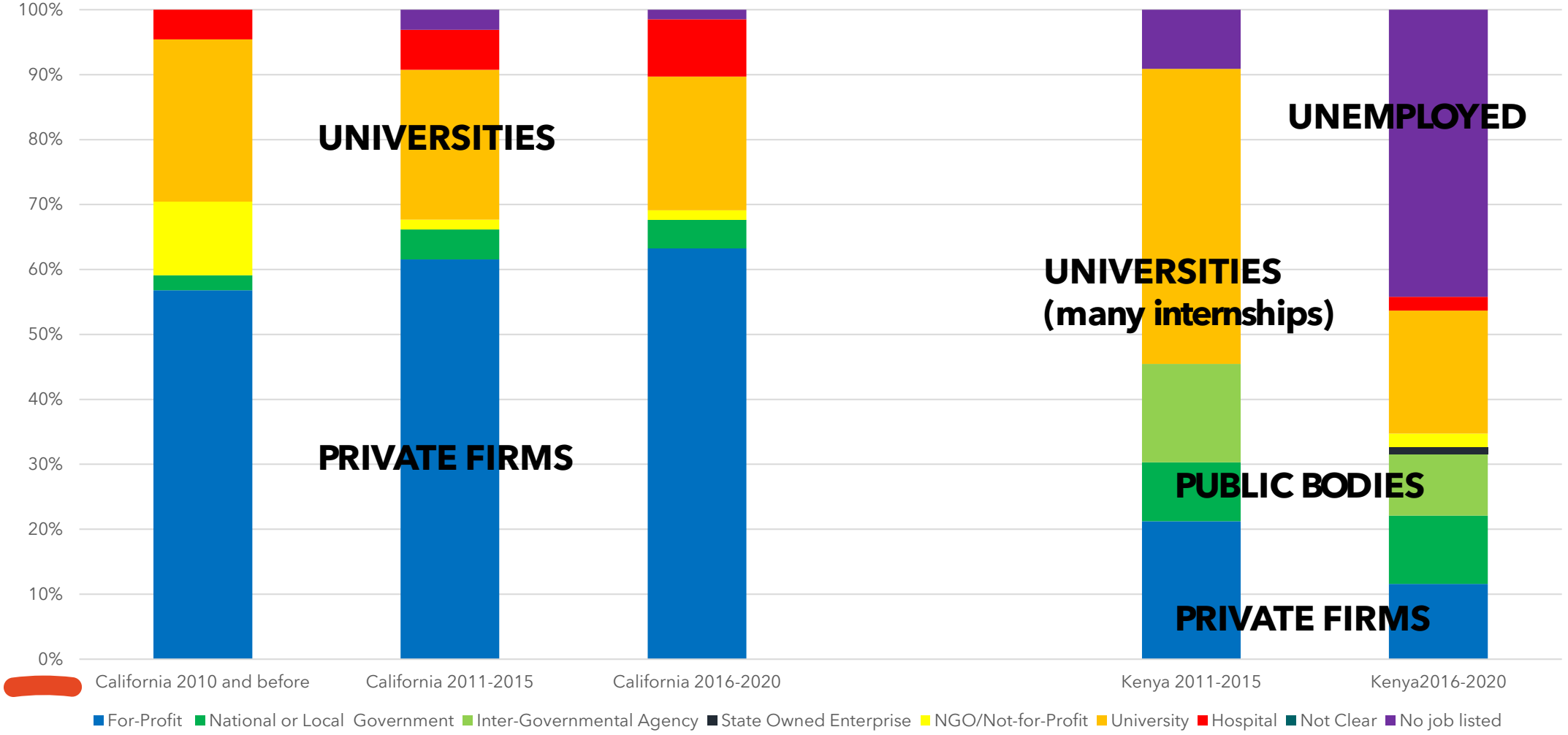
- Graduate/skilled **unemployment**
- **Brain drain** (if those skills are recognized abroad)
- Skills that feed into **multinational firms and international research networks enabling value capture by high income countries**.

Where do bio-informatics (computer science + biology) graduates get absorbed after graduation?

University Name	Degree Name
K1) Pwani University	MSc Bioinformatics
K2) University of Nairobi	MSc Bioinformatics
K3) JKUAT	MSc Molecular Biology & Bioinformatics
K4) Masinde Muliro University of Science and Technology	MSc Bioinformatics
C1) UC Berkeley	MSc Bioengineering with concentration in Bioinformatics and Computational Biology
C2) UC Riverside	MS Cell, Molecular and Developmental Biology (CMDB) Also have a program called Genetics, Genomics and Bioinformatics that has some Masters graduates
C3) UC Irvine	MSc Mathematical, Computational, and Systems Biology
C4) UC Davis	Ms Biostatistcs
C5) San Jose State University	MSc Bioinformatics
C6) California State University, Channel Islands	Master of Science in Biotechnology & Bioinformatics

LinkedIn data to code jobs immediately after graduation and a few years later.

First Employer: California vs. Kenya, over time



		Number of Sample Employed	Type	Category	Size	% of Staff Employed in Research Roles
California	**Top First Employer**					
	Amgen	13	Private	Biotechnology	10,001+ employees	18
	UC Davis	8	University	University	10,001+ employees	24
	Thermo Fisher Scientific	7	Private	Biotechnology	10,001+ employees	11
	Eurofins	7	Private	Biotechnology	10,001+ employees	32
	Top Most Recent Employer					
	Amgen	9	Private	Biotechnology	10,001+ employees	18
	Agilent	4	Private	Biotechnology	10,001+ employees	8
	Genetech	4	Private	Biotechnology	10,001+ employees	24
	Thermo Fisher Scientific	4	Private	Biotechnology	10,001+ employees	11
Kenya	**Top First Employer**					
	Kenya Medical Research Institute (KEMRI)	8	National or Local Government	Research	501-1,000 employees	40
	Jomo Kenyatta University of Agriculture and Technology	7	University	University	1,001-5,000 employees	8
	International Livestock Research Institute (ILRI)	5	Inter-Governmental Agency	Research	1,001-5,000 employees	37
	International Centre of Insect Physiology and Ecology (ICIPE)	5	Inter-Governmental Agency	Research	201-500 employees	42
	Top Most Recent Employer					
	Jomo Kenyatta University of Agriculture and Technology	4	University	University	1,001-5,000 employees	8
	International Livestock Research Institute (ILRI)	2	Inter-Governmental Agency	Research	1,001-5,000 employees	37
	Institute of Primate Research (IPR)	2	Inter-Governmental Agency	Research	201-500 employees	45
	Kenya Medical Research Institute (KEMRI)	2	National or Local Government	Research	501-1,000 employees	40

KENYA PRIVATE SECTOR EMPLOYERS

Type	List of Job Titles
Very small Kenyan Media Company: **Typically 1-2 people but up to 10.**	7 jobs: General Manager, CEO and Founder, Chief Executive, Co-founder, Programs Manager, Consultant (X2)
Mid-range Kenyan Food and Beverage Manufacturer: **51-1,000 employees**	2 jobs: Quality Controller Microbiologist and Technical Assistant
Mid-range Kenyan owned Pharmaceutical Company: **51-1,000 employees**	8 jobs: Medical Sales Representative, Key Accounts/Field Supervisor, Quality Assurance Manager, Production Supervisor, Molecular Applications Specialist, Company Pharmacist, Regulatory & QA Head/ Company Pharmacist, Field Sales and Application Specialist and Product Specialist
Multinational biotechnology/life science company: **10,001+ employees**	5 jobs: Plant Health Consultant (Contract), Central & East Africa, and Technical Sales Specialist, Account Manager, Medical Representative

CALIFORNIAN PRIVATE SECTOR EMPLOYERS

Category	Sample of First Job Titles	Percentage of First Jobs	Percentage of Recent Jobs	Average Size
Biotechnology	Research Associate, Scientist, Data Scientist, Manufacturing Engineer, Computational Biologist. In some cases, Senior Scientist	66.36%	53.97%	Mostly 10,000+
IT	Software Engineer, Research Associate, Data Scientist. In some cases, Senior Scientist	16.82%	19.05%	Changing over time, a large number of 10,000+ but growing numbers of mid-range and start-ups
Pharmaceuticals and Chemicals	Process Scientist, Bioinformatician, Research Associate	4.67%	17.46%	Mostly 10,000+, some mid-range
Medical Devices and Health	Data Scientist, Data Engineer, Research Associate, Data Analyst, Scientist	6.54%	4.76%	Mostly 10,000+
Investment, Banking, Finance	Senior Associate	0.93%	3.17%	Mostly 10,000+
Food and Packaging	Food Safety & QA Manager	1.87%	1.59%	Mid-range
Freelance	Consultant, Freelance Biotechnologist	1.87%	0.00%	Small

Key Take-Away:

Investment in infrastructure and training needs to be coordinated with broader productive strategies!

1. What do existing firms need in terms of digital skills/infrastructure?

2. What kind of work experience/internship programs can be used to absorb skills and make training more relevant to concrete development goals?

You can't expect training alone to create more knowledge intensive economies!!

Instead, governments and universities should be thinking about how to build digital capabilities within the context of their firms/sectoral capabilities.

Conclusions

- Don't get **distracted by 'digital' and lose sight of development.**

- Rather than treat digital as something separate, **think about the usefulness and capabilities of digital systems within the existing sectors** where you have capabilities and experienced, savvy managers and workers who (with some guidance) can help scrutinize the benefits and risks. Craft sensible digital policies that **enable those firms and workers to compete, grow and innovate** into new areas and capabilities.

- Understand the **short and long-term implications of international agreements** that might reduce your policy space and revenue base to craft and fund such policies.

Cartoon adapted from: ©marketoonist.com

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See also: Aileen Kwa (South Centre) and Parminder Jeet Singh (IT for Change).

You can contact me if you cannot access any of these studies: l.e.mann@lse.ac.uk

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