Environmental upgrading and digital integration in value chains: insights from East and South Africa

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MULTI-YEAR EXPERT MEETING ON INVESTMENT, INNOVATION AND ENTREPRENEURSHIP FOR PRODUCTIVE CAPACITY-BUILDING AND SUSTAINABLE DEVELOPMENT, TENTH SESSION

| Who	environmentally upgrades?
Why	Environmental upgrading is hard!
What and how?	To achieve twin transitions on green and digital
What next?	Diffusing green norms

Key sectors:

- Agtech,
- Foodtech,
- Agriculture
- Clothing/apparel
- Waste
- Solar PV

Who environmentally upgrades in value chains?

- Lead firms: predominantly large firms (fewer than 10% across East and South Africa) (NEPAD 2022)

- Suppliers:
  - Micro-small-medium enterprises:
  - *Born Green (e.g.* clean ag/foodtech, renewables, green chemistry, recycling);
  - Retrofitted green (e.g agriculture, transportation, textile and apparel)
  - Farmers: conservation agriculture, platformized

  - *Data*: 142 MSMEs, 2175 Farmers, 25 lead firms/final buyers (17- regional; 8- global)
  - Countries: Kenya, Uganda, South Africa

  - *Value chains*: Global VCs where final buyers based in Europe, Regional VCs: final buyer within SSA
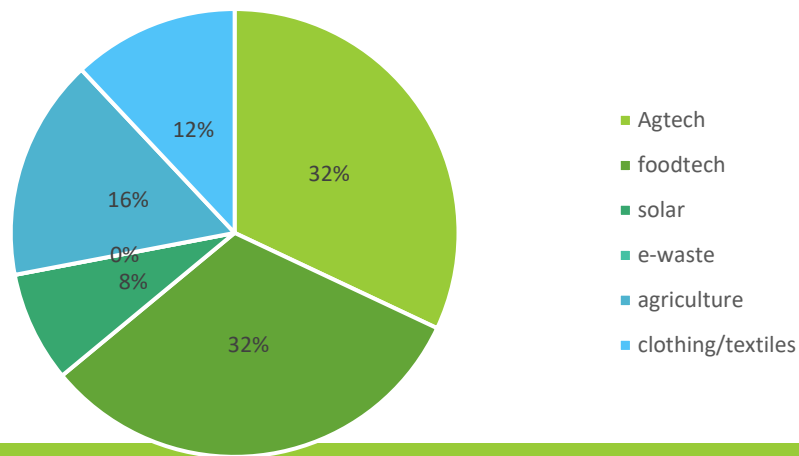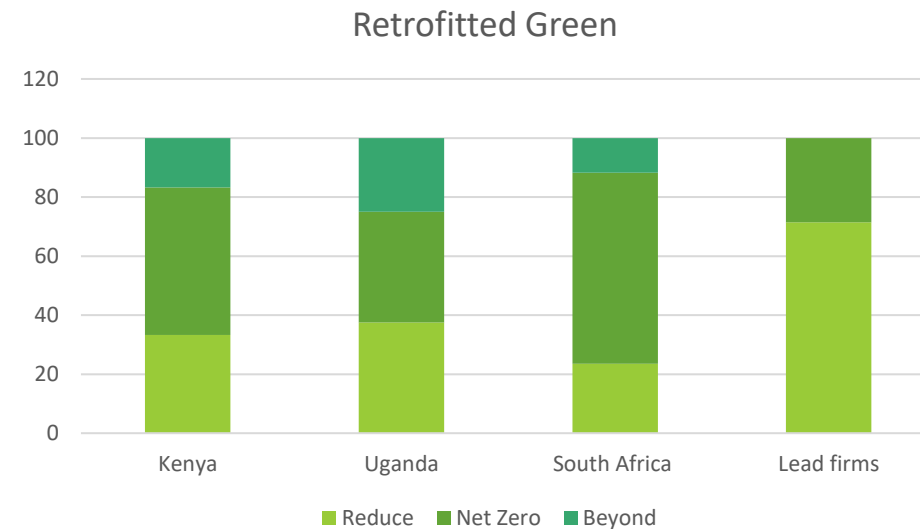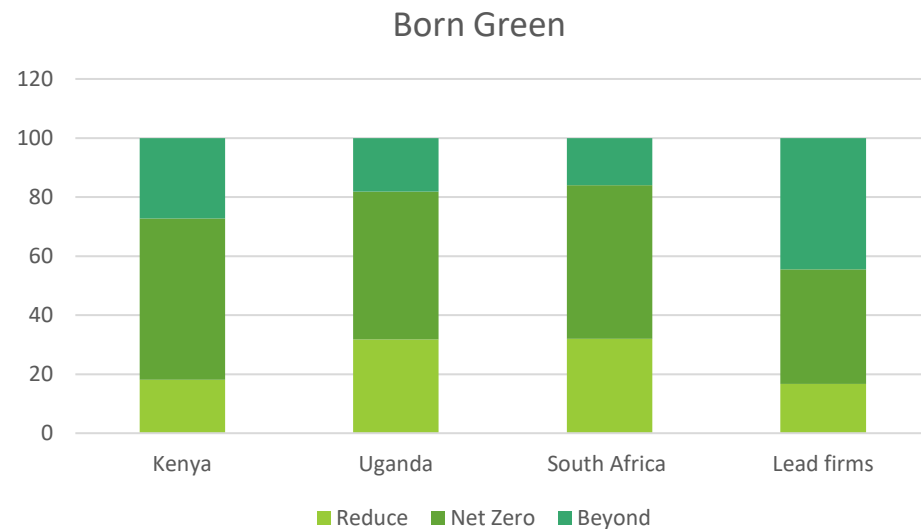
Born Green
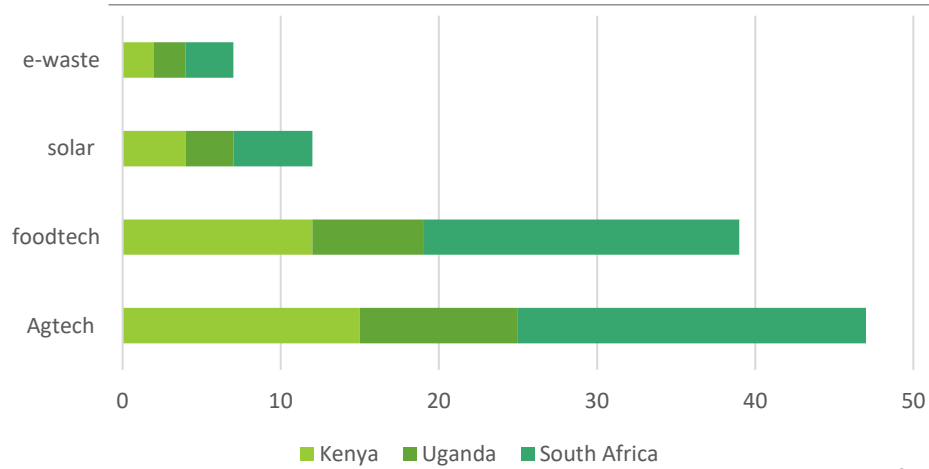
Retrofitted Green

Lead firms/final buyers

Ambition Priorities Mis-Match

At the goal-setting/ design stage: different for different actors

Reduce damage/emissions; Net Zero; Beyond net zero (net positive)… but what do these mean in a VC context→ for an actor, for the chain?

Why environmental upgrading is hard!

Useful Measures: Green potential, economic complexity, relatedness (e.g. Mealy et al. 2022)

But in a value chain context: definitions become fuzzy

-alter/modify process and products (incremental),

-overhaul processes, overhaul processes with circularity/recycling/repair (more radical)

- how do such environmental upgrades impact environmental outcomes (territorial) or net env outcomes in value chains

For instance, which actor is accountable for environmental damages? Who pays the bigger price?

Public Governance: Role of the State

Country level studies

- Green preferential trade agreements, stringent national regulation-> increase green exports (and reduce dirty exports)/ increase ecological footprints (e.g. Brandi et al 2020, Kolcava et al 2019)

- Carbon leakage occurring due to strong regulations/ pollution havens (e.g. Levinson and Taylor, 2008; Cherniwchan et al 2017; Aichele and Felbermayr 2015, Li and Zhou 2016)

Firm level studies: command and control regimes

India: extensive margins(investing in pollution control and reducing the entry of new firms): national action plans; but did not effect use of non-renewables or productivity) (e.g. Harrison et al 2015)

China: quasi experimental studies on VAT reform, show average effect of the VAT reform reduces firms' sulfur dioxide emission intensity of Chinese firms. VAT reform and environmental regulation interaction incentivizes firms to additionally reduce SO_2 emissions (Qi et al 2023).

Latin America: Environmental standards improve environmental conduct of farmers (compared to non-certified) (e.g. Giuliani et al 2017)

Regulatory and implementation gap

Kenya:

- *Waste management*: Kenya National Environnemental Policy 2013; Waste Management Nationally Appropriate Mitigation Action 2017 propose fiscal incetives for recovery, reuse, recycling. Not implemented. No tax holidays on recycling plants or subsidies to purchase waste management tech. In 2002, NATIONAL GREEN FISCAL INCENTIVES POLICY FRAMEWORK draft.
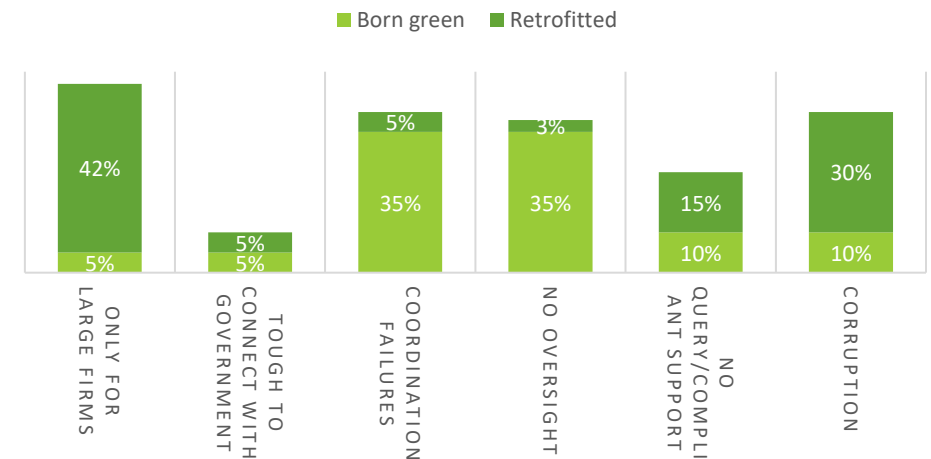
- *Renewables:* facilitative policy instruments including the Feed-in Tariff (FiT) policy, Green Energy Fund, Tax incentives (VAT exemptions) for geo-thermal, PV cells, hydraulic turbines

South Africa

-*Renewable* energy tax incentive scheme (corporate tax deduction), for wind, concentrated solar, and hydroelectricity generation, PV.

Issue: there is almost no mention of significant support for SMEs in this space in the key documents, or in interviews conducted with SMEs.

TENSIONS WITH GOVERNMENT

■ Born green ■ Retrofitted

42%		5%	3%		30%
	5%	35%	35%	15%	
5%	5%			10%	10%
ONLY FOR LARGE FIRMS	TOUGH TO CONNECT WITH GOVERNMENT	COORDINATION FAILURES	NO OVERSIGHT	NO QUERY/COMPLIANT SUPPORT	CORRUPTION

Private-social governance for environmental upgrading

Filling Voids: Private governance

Developed an Environmental upgrading index: spectrum (incremental and radical)

Does lead firm pressure increase environmental upgrading for suppliers?

Env Upgrading (suppliers)	Model 1	Model 2	Model 3
No. of buyers	+*		+*
No. of dev buyers		+***	
No. of devp. buyers		+	
ESG Stringency of buyers	+***	+***	+***
No. of buyers*ESG stringency			+**

Environmental upgrading: what and how?-I

Regional value chains:

The metric matters!

Outcomes versus the strategies!

RVCs: suppliers stewards, reputation, belief based

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Examples	Yield (%)	Income (%)	Resource use (% of cost savings)
Precision Ag	6%	0.50%	-6%
Blockchains for weather-crop ins	+3%	0	0
Trade Facilitation (paperwork)	NA	4%	0
Foodtech: ghost kitchens	NA	4%	10%
Ag-platforms	4%	0	-3%
Ag-processing	5%	1%	-5%

Environmental upgrading: what and how?-II

So, is digital tech a channel?

Ag-Processing firm 1 (Kenya)

Sensors new server (part of requirement for traceability)- report scope 1, 2 and 3.

Upgraded the process: new capabilities and costs (overall cost increase fixed and variable: 22% of turnover)

Ag-Processing firm 2 (Kenya)

Environmental upgrading strategy: reducing downtime - operational efficiency

Env outcomes: Net emissions reduction estimated to total turnover (%) GHG MT/USD Mill

Firm 1: 8%   **Firm 2: 6.5%**

What about global value chains? Tensions!

SME/Farmers	Yields (ag relayed)	Productivity (non-ag)	Resource efficiency	Environmental standard	Env learning transfer	Soil/Air/water
Kenya	Increase (slight)	No change	Decrease or no change	Increase	No change	Decrease
Uganda	Increase (slight)	Mix between no change to decrease	Decrease	Increase	No change to decrease	Decrease
South Africa	Increase (slight)	No change	Increase (slight)	Increase	Decrease	No change

Source: Author's Compilation from interviews

What is next?

o Who benefits most?

o What about net environmental upgrading in the value chain? Is that even possible? How would one measure this?

o All this data excludes scope 3, which means the externalities are far higher than we think!

o Are Digital green passports a solution?

o Does the African Continental Free Trade Area hold promise:

o Minimal references to the environment

o Coordination with existing policies at reginal level (e.g. Africa Climate Change Strategy, Africa's Green Recovery Action Plan 2021-27) , global level (e.g EGA)

o Norm diffusion: there is little evidence in the African context- mostly propagating uneven development and inequality (e.g Alger and Dauvergne 2020).

Should we be worried about the future?

o Green patents for the greater good?

o Using OECD green patent classifications, looked at text from patents (U, ORBIS IP) from what are considered southern countries.

o Framing text of public value expression (PVE) where it indicates societal benefits.

o Used *topic modelling*: words e.g. equality, equity, sustainable, welfare, well-being, net zero, mitigation, adaptation, adaptive capacity, ecological footprint, trust etc.

o Topics covered: security, privacy; well-being; sustainability, efficiency; net zero, mitigation, adaptation

o Topics revealed: green growth, transparency and accountability, digital trust, decoupling,

o Strong: words like 'will', 'must', : less than 10% of text

o Weak: 'can', 'support'

Thank you for your time

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