



**Paper 3:
Building Private Sector
Businesses in Adaptation
in Africa**

Highlights

Private finance is critical to Africa in changing how it lives and earns to adapt to climate change. Yet private investment accounts for less than 2 per cent of climate finance

A critical brake has been the positioning of private finance as an extension to public finance

This has put development goals to the fore, often eclipsing strong private sector value propositions and a necessary focus on viable markets with critical mass

As a result, the most significant areas of impact investment in adaptation are struggling to achieve commercial uptake and sustainability

However, products such as solar pumps demonstrate that strong, direct benefits for bottom-of-the-pyramid consumers deliver robust returns

Thus, the value propositions for African consumers need to be conceived separately from gains in public goods, as a prerequisite for sustainability

Where this is happening, adaptation solutions are expanding rapidly and effectively driving widespread climate adaptation, and social and public gains

Moreover, opportunities exist for solid value propositions in almost all the continent's priority areas for climate adaptation



The role of private sector finance in adaptation

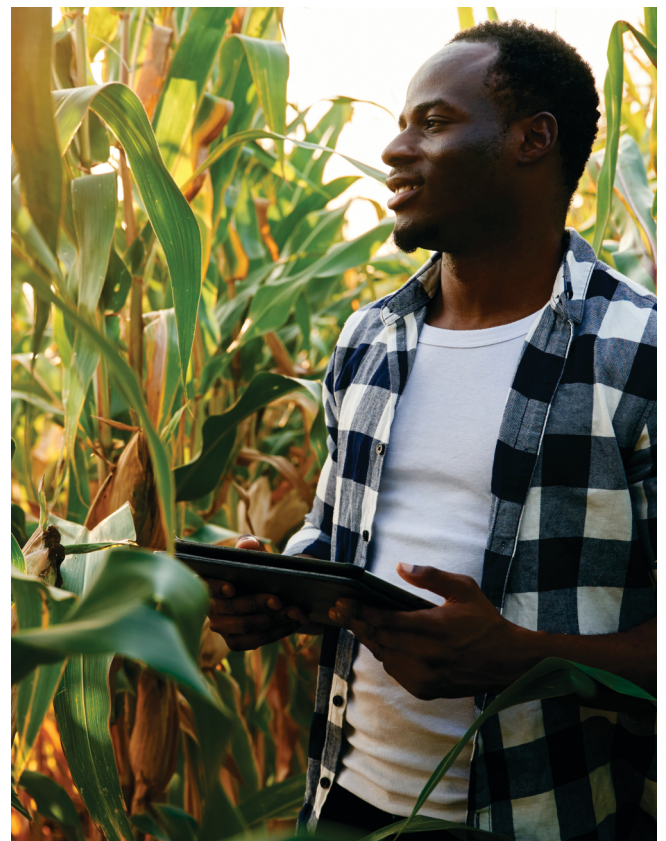
Climate change has buffeted Africa, with temperatures rising more quickly than was anticipated and agricultural seasons splaying, disrupting food production. With rising sea levels and coastal subsidence, increasing vector and water-borne diseases, and carbon leakage from its degraded lands, Africa has emerged as the region most affected by climate change globally.

This has generated a need for funding to facilitate adapted behaviour. However, the estimated sums are far beyond the reach of global aid budgets or government spending. In 2021-2022, just \$13bn of climate adaptation finance was directed to Africa, compared with estimates that annual needs likely to be running at over \$100bn a year, equivalent to some 5 per cent of GDP.

The prospects of African governments filling this shortfall based on tax-to-GDP ratios of around 15.6 per cent, are dim. Likewise, with total ODA to Africa running at \$53bn, this total need is unreachable. This has driven repeated and increasingly urgent calls for new injections of private finance into climate adaptation investments.

Yet, this rationale has begun from a public sector shortfall rather than from the perspective of an emerging business sector. This has shaped the nature of private sector engagement in ways that have fuelled the perception that adaptation businesses in Africa cannot achieve robust business models or sustainable commercial returns. As a consequence, private finance flows continue to account for less than 2 per cent of global climate adaptation finance, mostly from philanthropists as grants.

This paper examines the current positioning of private sector adaptation businesses within development finance and the business models that framing has engendered. It then reviews the adaptation businesses with the highest potential for private-sector investors based on traditional business drivers of value proposition, market demand, and core financial model.





Chasing a private sector route to development financing

Adaptation finance aims to equip populations to adapt to the impacts of climate change and maintain or improve their well-being in the new climate realities.

However, prevailing definitions of adaptation finance have created profound challenges for African private-sector adaptation businesses. Lightsmith Group's Adaptation SME Accelerator Project, based on the EU adaptation taxonomy, defines adaptation SMEs as those that "actively reduce vulnerability and build resilience of a wider system, or systems, such as a community, ecosystem, or city," including 'removing barriers to adaptation'.

These systemic aims are hard to measure. Moreover, the framing within resilience has broadened the focus of adaptation finance in Africa since the continent is acutely vulnerable to climate change due to its levels of development - almost all development issues are now 'adaptation barriers' and sources of increased

vulnerability and reduced resilience. Thus, climate adaptation targets and measures now frequently address gaps in infrastructure, education, health systems, farm management, and the entire agenda surrounding securing Africa's SDGs.

All these issues are pressing in their own right. Still, this systemic approach has diluted the allocation of adaptation funding towards direct behaviour changes to cope with rising heat, flooding, and erratic weather.

Instead, private sector adaptation investment has developed as a hybrid public-private investment sector driven by the mission of advancing development.

This has created an investor array substantially dislocated from market returns, as captured by the World Bank in Figure 1 below.



Figure 1: World Bank definitions of private sector adaptation investors and return expectations

Entity Type		Returns Spectrum
Real sector (corporations, private companies of all sizes)		Market-rate returns
Commercial banks		
Institutional investors (e.g. pension funds, insurance companies, sovereign wealth funds, other asset managers)		
Bilateral, multilateral, national development banks (private sector arms)		Quasi- or blended returns
Impact Investors	Impact investors Impact Investors (seeking impacts & return)	
	Impact investors Impact Investors (not seeking impacts & return)	
Family offices/Philanthropies/ NGOs		Below market returns by design
Bilateral, multilateral, national development banks (public sector arms)		
Governments		

On this basis, the principal ‘private-sector’ flows have been primarily from philanthropists or aid-funded private-sector actors.

For these actors, the need to measure reduced vulnerability has seen many draw on development indicators as a ready infill, using measures such as inclusion or income to capture the outcome of ‘reduced vulnerability’. This has further disconnected adaptation businesses from the climate impacts they address. It has also moved this hybrid adaptation investment private sector towards DFI theories of change and away from business value propositions.

Carbon mitigation, meanwhile, has walked a very different path, resulting in ballooning private-sector investments.

Mitigation finance is not defined or confined to tackling systemic development but as investments that reduce the emission of greenhouse gases, which can be measured and even monetised as carbon credits. The clarity of this sector’s specific, climate-related metrics is due to the development of the carbon markets. While carbon finance flows are relatively limited, with the greatest mitigation finance flows going into

renewable energy at market returns, the carbon market has driven the development of carbon accounting as a metric.

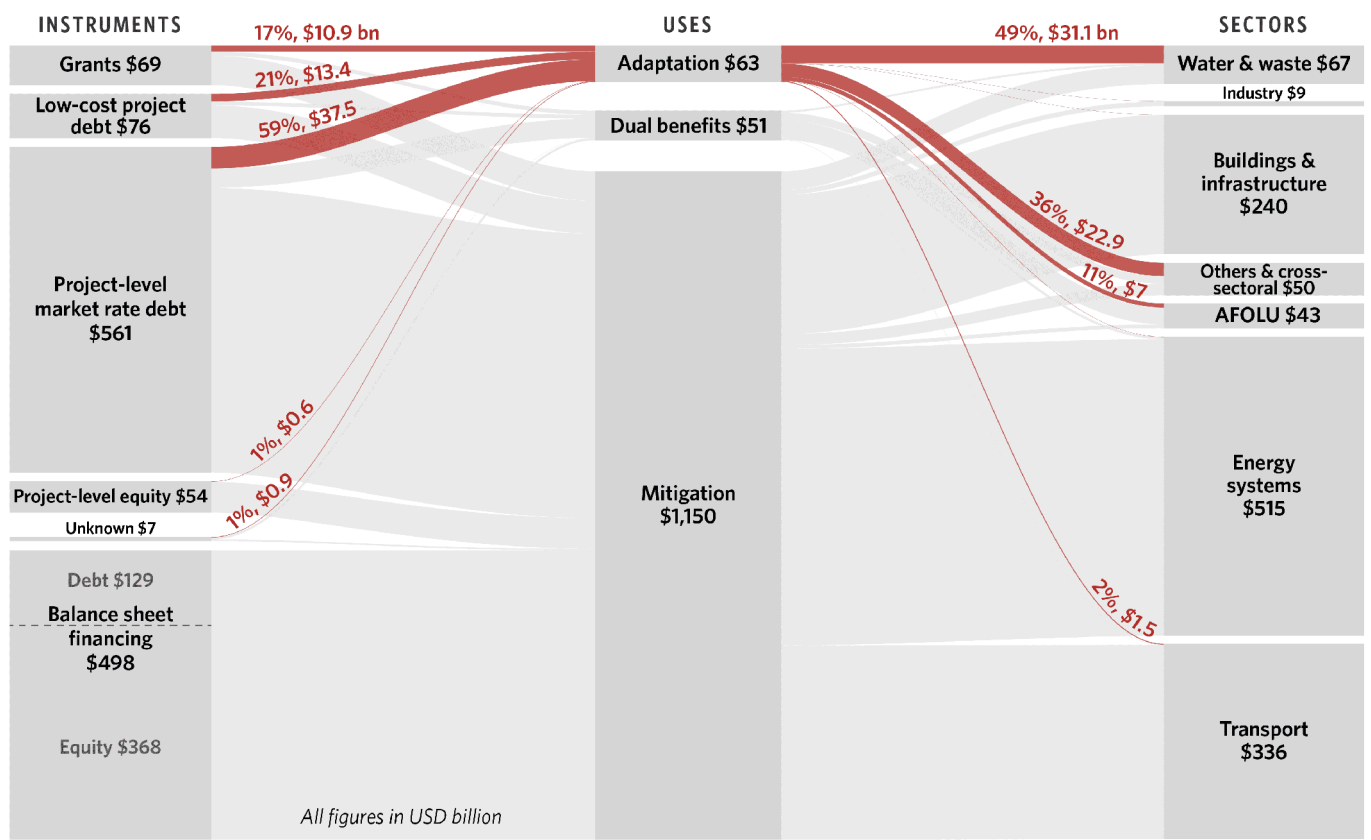
The impact of tightly outcome-defined and business-oriented pathways in carbon mitigation versus the development-oriented pathways in climate adaptation is evident in the world’s climate finance flows, as shown in Figure 2 below.

The small flow of adaptation finance, substantially into water and waste, is financed with grants and debt. In contrast, mitigation secures substantial balance sheet funding and \$523.5bn of market-rate debt versus the \$37.5bn invested into adaptation.

Thus, the systemic definition and public-sector stimulation of private investment flows into adaptation has changed its nature rather than expanding it.

Yet, once unpaired from ‘systemic’ development and linked directly to adaptation—as the mission to reduce the financial and non-financial losses from climate-related hazards—adaptation businesses also gain a clear and measurable private-sector-oriented purpose.

Figure 2: The global distribution of climate investment by instrument and sector



Source: Climate Policy Initiative



The private sector's returns on adaptation investment

For this paper, we have analysed businesses that support adaptation by looking at three aspects of the business model, being:

1. Their value proposition to their target markets
2. The available market for their product or service
3. Their financial model - being how they achieve financial revenues.

The development focus of adaptation literature has resulted in a need for more evidence on successful adaptation business models in developing markets. However, the Boston Consulting Group has identified several categories of commercial adaptation investments.

A large base in this are investments by existing companies to protect their assets, operations and supply chains.

These are typically MNC investments in developing markets.

They are concentrated in greater water efficiency and recycling, with a benefit-to-cost ratio of

3:1 → 6:1

Infrastructure flood-proofing at ratios of

4:1 → 7:1

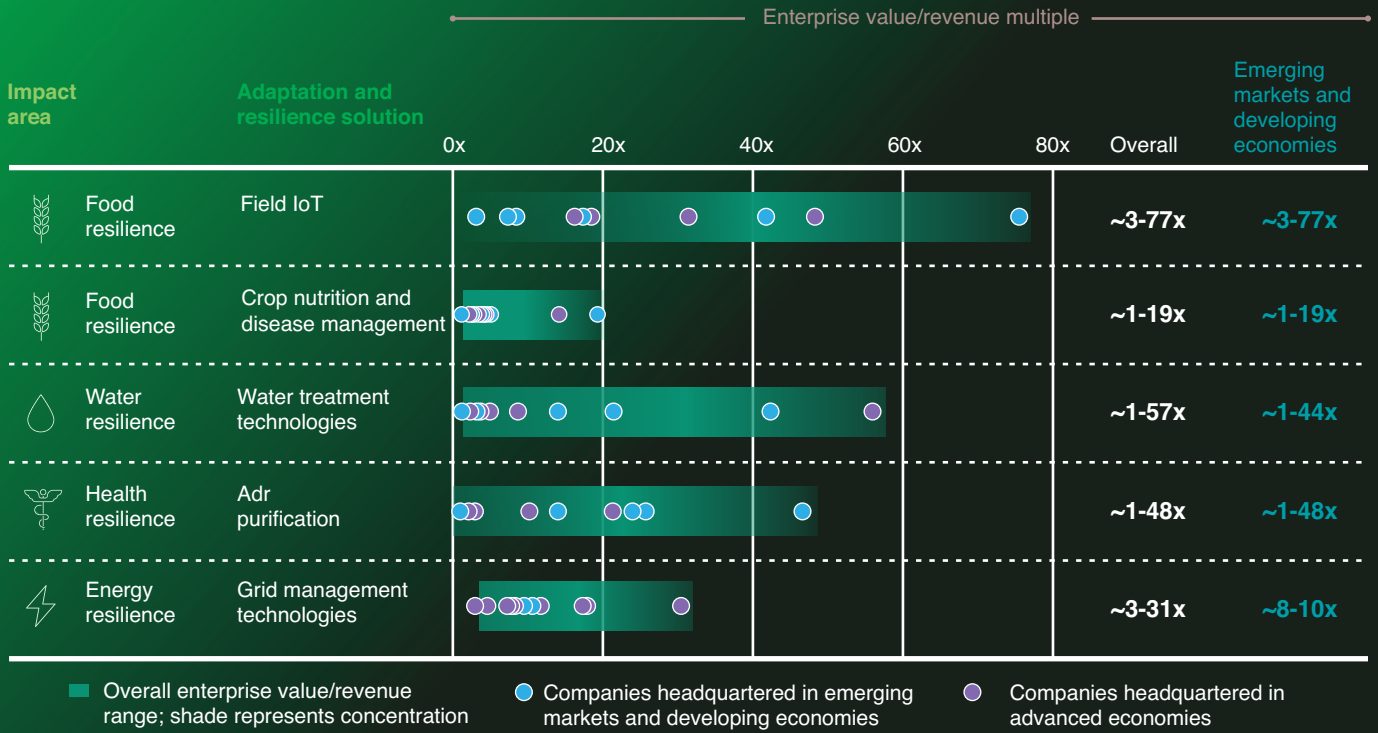
These MNC investments flag up niche business-to-business (B2B) opportunities for developing market providers of water recycling and flood protection technologies and demonstrate returns from adaptation activities for businesses that have already achieved a sustainable business model.

However, that prequalifying condition is critical, as returns on adaptation investments by existing businesses reduce costs inside firms that have already established a viable business model and market. The challenge for adaptation start-ups is to create a sustainable business model that specifically targets adaptation outcomes from its products or services.

In pursuing these aims, BCG identified the adaptation business start-ups attracting the highest valuation multiples, as shown in Figure 3, below.

Figure 4: Demonstrated short-term crop yield increases with various weathering materials

Transaction analysis showing the range of enterprise value/revenue multiples for a sample of companies across five types of adaptation and resilience solutions



Source: BCG analysis based on data from PitchBook Data, Inc. and Tracxn (data not reviewed by PitchBook analysts).

Note: The revenue data covers a 12-month period. All financial information is post-2020. Data illustrates the ranges of valuation multiples observed in this analysis and does not imply expectations of future valuation multiples.

The valuations in these areas show a vast spread. The drivers of the lower-end valuations are not presented. However, two poles stand out at the upper end: field IoT, which is marked as ranging up to 77x, and air purification, which is marked as ranging up to 48x.

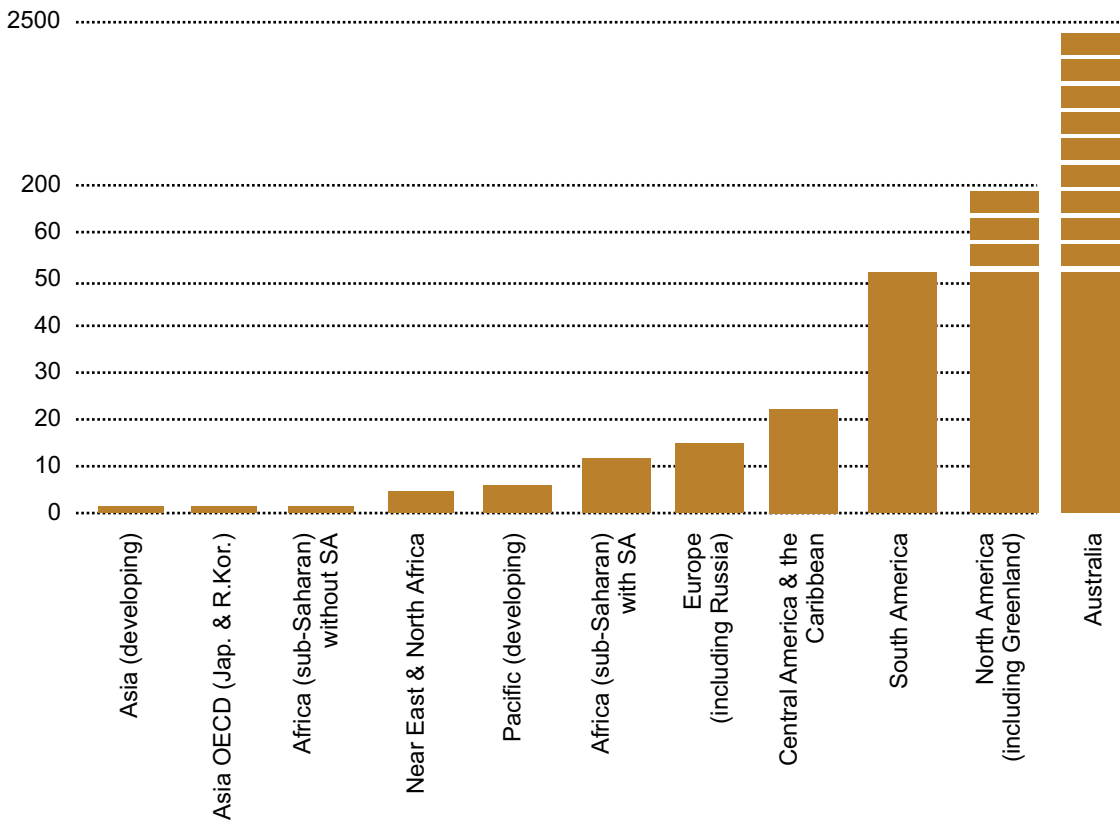
These are two of the leading areas in current adaptation impact investment, with precision agriculture accounting for the largest share of PitchBook’s globally tracked private-sector adaptation investments. However, both raise significant insights for business models in Africa.

The front-running start-ups and why they are failing, or tiny, in Africa

01 Precision farming

Precision farming has been a core activity funded by private adaptation investors. A prominent example is the Lighthouse portfolio company Solinftec, which provides farmer software and hardware in Brazil and has scaled up into the US and Canada. However, in satisfying the business model's need for market demand, precision agriculture faces very different farming markets in Africa, with the relative farm sizes of these other regions shown in Figure 4.

Figure 4: Average size of farms in hectares, by region



There is also a vast difference in Africa's agricultural output structure. In Kenya, for example, over 90 per cent of domestic food and over 70 per cent of agricultural exports are produced by smallholders on farms of less than 4 hectares. Large-scale farms occupy just 45,000 hectares of the country's 27.6 million hectares of agricultural land, or under 0.2 per cent.

By contrast, in Brazil, farms below 5 hectares account for just 36 per cent of all farms and produce only 7 per cent of total agricultural output, with the country's agricultural land use and production dominated by large and medium-sized farms.

Yet a dominant adaptation sector narrative is that precision agriculture "is fast developing to revolutionise the African agrarian industry". While this may be true technologically, it represents a degree of market myopia.

A 2021 review of 128 studies on precision agriculture in Africa found it had, in fact, only been adopted by large commercial farms in South Africa, observing: "While PA has found success in farming systems generally characterised by large land holdings, monocropping, and highly mechanised systems, smallholder farming systems in Africa are frequently characterised by highly fragmented small land holdings with diverse cropping systems and minimal mechanisation. Such conditions pose a challenge to the implementation of PA in Africa".

These differences affect all the components of the business model being examined in this paper.

Concerning market demand, fruit farmers' adoption of

Fruitlock ICT in the Western Cape has been widely presented as evidence of commercial uptake in Africa. However, it reflects adoption by a niche market segment similar to non-African markets in its structure as larger, mono-cropping. At the same time, other projects frequently flagged as demonstrating PA's market potential, such as the use of Chameleon and Wetting Front Detector Sensors in Mozambique, Tanzania, and Zimbabwe, have seen these technologies issued to farmers in research projects.

Farmers who can access donated equipment—frequently alongside project-based extension and technical support—may reduce resource use. However, this does not demonstrate a value proposition for the farmers or a viable commercial market.

A 2023 analysis of Nigerian farmers' poor uptake of precision agriculture reported that the technology was unaffordable to the country's farmers.

However, underlying this cost barrier is a deeper issue.

The value of PA is the diagnostics it delivers on crop and soil conditions over large areas without human monitoring. In Africa, agricultural labour is abundant, and almost every smallholder starts their day by 'walking their plot,' examining crops and soil on a plot that is typically less than one hectare in size. Replacing this walking with satellite photos or a software system has far lower utility in Africa than in Brazil on 50-hectare farms.

This same disjuncture of value proposition and demonstrated market exists for biodigesters.

02 Biodigesters

Biodigesters offer substantial carbon mitigation but remain challenged in finding adaptation-based business models in Africa due to difficulties linking financial revenues to target market value propositions.

An example is Sistema.bio, a company based in Mexico with operations in Kenya. Sistema.bio sells biodigesters to smallholder farmers, utilising cattle and pig dung to generate methane for cooking and produce organic fertiliser for crops. The company has identified a market of 1.3 million livestock-owning farmers in Kenya.

However, according to the FAO, Kenya's smallholder households earn an average of \$3130 a year or \$260 a month and support an average of 4.5 people, meaning the income they have available for cooking fuel and fertiliser is very limited.

In understanding the accessibility of biodigesters for this market, Sistema.bio advises that its own prices for biodigesters are only available on enquiry, but reviewers suggest biodigesters cost around \$500 to \$700 per system in Africa. The difficulty for smallholders in reaching its prices has prompted Sistema.bio to offer credit terms to farmers who live within two hours of the company's central Kenyan offices. However, there is no information on the value proposition for farmers, except that the biodigesters have a lifespan of around 10 years.

Many smallholders already use home-made slurry and dung as an organic soil fertiliser. Thus, their main gain is cooking fuel, which spread over 10 years at the biodigester cost, generates a cooking fuel expense equivalent to \$50 to \$70 a year, or around 2 per cent of their annual income.

The third benefit of a digester is that it captures methane. Methane does not harm humans at normal levels. It matters as a greenhouse gas. However, as some of the most financially strained consumers in the world, African smallholders have not yet begun investing heavily in reducing global emissions versus their own food and shelter.

Finally, there is the issue of maintenance and safety. Biodigesters fail without maintenance and become dangerous, raising safety issues around gas storage and use, odours, sludge management, gas leaks, and gas explosions.

Thus, for smallholders, biodigesters provide little value and are potentially dangerous, and they have been buying few of them, even on credit terms.

From a development perspective, the gains to farmers are much greater, including time saved collecting firewood and health gains from moving away from wood burning. But this captures a disjuncture in context between the target market's calculation of value and a development perspective of value, in that, for farmers, money is short, time is not, and there are many far cheaper replacements for wood-burning.

However, development perspectives have not tended to capture business-model value propositions for target markets, and generally conclude that poor market uptake is a product of insufficient income combined with poor awareness and education.

From a global investor perspective, the value

proposition for biodigesters shifts substantially towards a mitigation business earning carbon credits with Sistema.Bio securing blended finance that includes carbon credit sales, grants, and concessional financing. Development literature also typically includes GHG savings as a benefit, but this does not touch upon the value proposition for purchasing farmers.

This blurring between benefits and business value proposition is consistent with a tendency within carbon-credit literature to objectify farmers, valuing their behaviour changes as a source of carbon streams, with scant focus on the gains for farmers themselves.

However, the 'North Star' for adaptation finance must necessarily be improving farmers' lives and livelihoods. The IPCC raises this as a matter of ethics, observing:

"The selection and implementation of specific adaptation options has ethical implications (very high confidence). Adaptation decision making involves the reconciliation of legitimate differences about how adaptation resources are distributed and the values that adaptation seeks to protect. For example, the costs and benefits of different adaptation options, such as insurance schemes or large-scale infrastructure projects, may be inequitably distributed among different actors and stakeholders. Such inequities may generate ethical questions regarding who is advantaged or disadvantaged by adaptation actions."

The sparsity of analysis on smallholders' returns from precision agriculture and biodigesters reflects a pervasive absence of 'reconciliation' of who is advantaged.

This lack of focus on adapting businesses' value propositions for their target markets then undermines the strength of market demand and the financial model.

03 Niche markets

Precision agriculture and biodigesters are prime magnets for private-sector participation, often generating a value proposition for the continent's niche market of large farms, large firms, and wealthy consumers.

These sometimes pivot away from the advertised gains for the mass market. For instance, the value point for biodigesters in replacing firewood for indoor cooking needs to be stronger for large farms that use bottled gas for cooking. However, biodigesters can benefit these large-farm customers by managing large volumes of manure and dung.

However, serving the niche large-farm market also removes economies of scale, confining such businesses to small-business status, albeit in readily accessible markets for higher-priced and bespoke solutions.

This may also deliver marginal adaptation impact but can yield secondary consequences contrary to the impact of investors' development-defined aims. For instance, if businesses enhance the output of large farms, this may add to food security. Still, any significant shift in the balance of food production towards large farm producers would exacerbate the poverty of smallholders, who need more financial reach to pay for food.

In sum, impact businesses without a strong value proposition for a broad base of African consumers offer limited market potential as small businesses, mixed development impact, and the potential of diverting adaptation resources from other, higher impact gains.

This is not solely the case for agriculture. The same market and business model issues arise in many other areas of adaptation business need, from cooling paint for the tin roofs of mass housing to health and sanitation.



The bottom-of-the-pyramid adaptation value propositions that are expanding rapidly

The challenge of a bottom-of-the-pyramid market is not unique to adaptation finance. As the Harvard Business Review reports:

“During the past decade, many multinationals have come up short trying to make a profit by solving the pressing needs of low-income communities. Preoccupied with their social missions, companies have optimistically taken on challenging projects, only to be surprised when weak consumer demand and obstacles such as bad roads keep revenues low and costs high. Overstretched and disillusioned, many switch gears and reconstitute their ventures as break-even social investments that are destined to remain small.

Profits are critically important for ventures targeting the bottom of the economic pyramid—the more than 4 billion people who individually earn less than \$1,500 per year. Compared with a social responsibility project, a profitable business stands a better chance of being able to increase its scale and impact. It can command resources and be sure of continued support.”

The HBR identifies the two critical challenges for bottom-of-the-pyramid businesses as changing customers' behaviour and how products are made. Planning and budget are needed for both. Opening direct sales channels, most frequently through home visits, can be critical, but the underlying necessity is 'demonstrable value' for consumers.

An example of adaptation achieved is solar pumps, which cost from \$350 to \$1,500 per pump. Clasp market surveys report that the pumps deliver financial gains for farmers versus fuel pumps at year 5, yet they have achieved substantial uptake in African markets. Kenya, for example, is reported to have a 69% market penetration for off-grid products, including solar water pumps.

The driver is this level of uptake has been analysed also cited in surveys by Clasp that place the farmer payback per solar pump at 1.5 years or less.

This rapid payback from a broader analysis of costs and benefits is a result of pumps enabling farmers to add income in three ways by:

- ✔ Assuring crops during their two main seasons
- ✔ Producing for off-peak harvests - which secures prices up to 8x higher than peak season pricing,
- ✔ Introducing a third agricultural season in the long dry season.

As a result, the solar pump industry has expanded at speed, with Clasp finding:

25% of sales were to those in poverty, earning less than \$3.10 a day

83% of buyers believed their solar pump had represented good value for money

81% reported their quality of life had improved because of their solar pump.

Moreover, while the sector includes companies such as SunCulture, which offers ready instalment plans that convert an irrigation kit costing around \$1000 into 30 \$45 payments, lower-cost options without formal credit terms have also increased.

In the face of such a powerful value proposition, farmers pool funds, supported by family savings, and draw on local co-op loans through organisations such as the SACCOs in Kenya that draw a small monthly contribution for the rotating right to a larger loan.

This further affirms the critical success factor of high returns to consumers. On this basis, the Lightsmith Group already sets demonstrated market demand as entry criteria for its portfolio, which holds just five businesses. However, these may have demonstrated demand in Brazil rather than in Africa.

The often different nature of needs and values in Africa is spawning multiple sectors that are often invisible within the adaptation investment landscape. These businesses are generally now in the first quadrant of the sectoral lifecycle, at the Problem Child stage of the Boston Matrix. However, some leaders are beginning to accrue market share.

Based on our grid of priority needs, these invisible businesses are summarised in Figure 5 below.

Figure 5: Successful adaptation sectors in African business

Priorities	Impact position	Impact clusters	Invisible growth sectors
HIGH	Essential to mass survival	Pest control	Organic pest control products
		Water supplies	irrigation equipment, including solar pumps
		Soil innovation	Organic fertilisers, biochar manufacturers
		Circular sanitation	
		Data gathering	Ad-revenued free apps
MEDIUM	Key to recovery and damage limitation	Drought resistance	Drought resistant seeds and seedlings
		Weather forecasts	Ad-revenued free apps
		Flood protection	Flood barriers, controls, gates, control systems
		Urban cooling	Cooling paints
LOW (But still significant)	Important to reduce costs and damage	Early warnings	
		Subsidence remediation	New technology opportunity
		Heat-proof building materials	Polymer roads
		Coastal protection	
		Cyclone recovery	

The clusters in red are those where private sector financial models are less advanced. In all other areas, producers are earning revenue directly from sales, or adapting their financial models to generate revenues aligned with the perceived value of their goods and services in the African market.

An example of this alignment is data businesses. Market evidence suggests that information designed to minimise production risks and increase future opportunities is accorded low value in African markets. Thus, revenue streams are challenging as a pay-as-you-go business for companies such as Nigerian start-up Zenvus, which collects and analyses soil data to provide farming advice for farmers.

However, uptake is greater when the same market can access more immediate gains. Thus, the weather forecasts provided by the AgroCenta platform to Ghanaian farmers might not be readily monetisable. Still, these have been enhanced by enabling farmers to trade directly with large buyers such as Nestlé and Diageo, which has substantial farmer value.

Other successful variants in monetising information and advisories are free apps offering live prices, or data monetised through audience volume, with advertising revenue, just as Accuweather is globally.

Even in some of the red areas in Figure 5, where financial models are more challenging, business model innovations have delivered success. An example is Kenya's now largest forestry company, Kamaza, which began as a youth business that offered coastal residents free tree seedlings to protect the land owners from coastal winds and erosion, which the group planted and tended on the condition they could harvest the fully grown trees in decades ahead. This model gained free land for wood crops while providing coastal protection. This demonstrated the power of innovation in areas that might sometimes be sidelined as public goods: creating financial revenue from the harvested wood.

In the AVPA report on priming private-sector investment in adaptation, we further identified private-sector financial opportunities in the B2B supply chain for public projects, such as recycled plastic pellets for heat-resistant polymer road surfaces - although these were found to fail where public policy was not yet aligned to novel purchasing. However, legislation and policy changes can rapidly convert public goods into large business sectors, a case in point being that of catalytic converters.

Business models in Africa can still deter investors due to the timelines required to break even. Agricultural businesses are sometimes tied to agricultural seasons in achieving revenues. Moreover, many adaptation businesses require physical production and premises that need more significant support at set-up and during early operational costs than digital businesses.



Key findings

Our findings are that successful adaptation business models in Africa invariably offer:

High utility and high returns in an exceptional value proposition for customers

Possible credit and financial access support

Bottom-of-pyramid marketing/engagement, preferably with feet on the ground

Revenue streams that match payment to value, either supplier or consumer-side

Small market viability, when directed towards high-return niche markets

The White Paper Series

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