

Zambia



Zambia 2022 Constraints Analysis Report



MILLENNIUM
CHALLENGE CORPORATION
UNITED STATES OF AMERICA

An analysis prepared by the Government of the Republic of Zambia and the Millennium Challenge Corporation of the United States of America for the Development of a Millennium Challenge Compact Program.

Publication Date: February 2024

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Authors and Acknowledgements

MCC undertook this Constraints to Economic Growth Analysis (CA) under its second Compact Program engagement with Zambia from January to April 2022. Over this period, MCC consulted with representatives from Government of the Republic of Zambia (GRZ), including from the Ministries of Finance and Agriculture, as well as local research institutions, members of civil society, and the private sector. The valuable contributions of Zambia's Country Development Team economist Crane Muleya are also gratefully acknowledged. Peter Glick and Mesbah Motamed were the economists for the country team that included Jaime Shabalina, Nilufar Ahmed, Doug Mason, Deidra Fair James, and Jessica Glick. Development of MCC's second Compact Program with Zambia was led by Steven Marma.

Abstract

Sustained poverty reducing growth has eluded Zambia's economy over the past several decades. The country's fortunes swing with the price of its top export, copper, enriching a few but leaving over half its population entrenched in poverty and food insecurity, particularly among its rural smallholders. Much of Zambia's future prospects depend on diversifying away from its mining sector and tapping the unrealized potential of its agriculture and agro-processing (AAP) activities. AAP offers a path of growth that capitalizes on Zambia's vast land and water resources, diversifies its economy, and creates off-farm jobs for the rural poor. Moreover, AAPs links to large and growing food markets, both domestically and across the wider region, present an opportunity for Zambia to become Africa's next breadbasket.

Numerous constraints limit the growth of Zambia's AAP sector, however. The country's inadequate agricultural

inputs and policies, specifically its low rates of irrigation and the government's distortive and inefficient subsidy and food storage programs, limits the sector's growth. Poorly maintained roads impose prohibitive transport costs and add risks to investments. And the lack of gridded electricity, particularly in rural areas, compels farmers and processors to rely on costly diesel generators for irrigation and other manufacturing functions. Additional constraints include the high costs of bank finance and inadequately trained workers for AAP jobs.

This report offers an overview of the AAP growth path and presents evidence supporting the identified constraints. The findings reflect the collaborative efforts of MCC and the Government of Zambia and the inputs of a variety of stakeholders, including private sector, civil society, the research community, and other donors.



Country Context

A landlocked country of twenty million inhabitants and over thirty ethno-linguistic groups, the Republic of Zambia stretches across southern Africa's central plateau and occupies an ecologically diverse swath of grass, wood, and wetlands roughly the size of Texas. Zambia achieved its independence from the United Kingdom in 1964, at which point it embarked on a socialist economic agenda, centering its growth strategy on the extraction of copper and other minerals. Over the following three decades, mismanagement of state-owned enterprises and low copper prices earned Zambia on average negative annual per capita growth as its population remained mired in poverty. Fortunes reversed in the early 2000s as copper prices rebounded, but following the recent presidential election of Hakainde Hichilema, the government of Zambia (GRZ) has signaled its intentions to reduce the country's dependence on volatile copper exports and pursue a more diversified growth strategy built on private sector-led investment.

In 2018, MCC concluded its first Compact in Zambia, a \$332 million investment in water supply, sanitation, and drainage infrastructure in Lusaka, the capital, aimed at reducing water-borne disease incidence and vulner-

abilities to floods. Prior to that, MCC implemented a Threshold Program over the period 2006-2009, establishing one-stop shops for automating business registration and tax payment processes as well as efficiency enhancements to customs operations.

The MCC board deemed Zambia eligible for a second Compact in December 2021, leading to the present growth diagnostic or Constraints Analysis. For this report, MCC met regularly with the GRZ-appointed Country Development Team to explore questions of growth opportunities, diagnostics, and constraints. Beyond this close collaboration, MCC engaged with stakeholders in the private sector, academia, think tanks, donors, and US government to deepen its appreciation of the landscape of Zambia's economy and critical actors. Supplementing this effort was a mission by MCC to Zambia in Spring 2022 to consult with government, local businesses, NGOs, trade associations, and other civil society organizations, as well as visit farms, including the sugar plantation in Mazabuka, Southern Province, as well as agro-processors in Lusaka.

What is a Constraints Analysis?

MCC’s evidence-based approach begins with a constraints-to-economic growth analysis (CA). In a CA, MCC works with a partner country to examine and prioritize the issues that constrain its economy. The CA approach builds on the “growth diagnostic” framework put forward by economists Ricardo Hausmann, Dani Rodrik, and Andrés Velasco (HRV). As HRV point out, all developing countries face significant economic and development challenges, but these challenges do not all equally restrict growth. The diagnostic framework provided by HRV helps to structure the investigation of potential binding constraints. It has been refined through application, both within MCC and the broader economic development community.

Why Does MCC Use Constraints Analysis?

Identifying the most binding constraints to growth helps MCC target its investment on the areas that, if addressed, are most likely to promote sustainable, poverty-reducing growth in a given country. Prioritization helps maximize the limited financial resources and implementation capacity needed to effect change. As HRV also argue, focusing on the most binding constraints helps to minimize the risk that development interventions create negative unintended economic consequences.

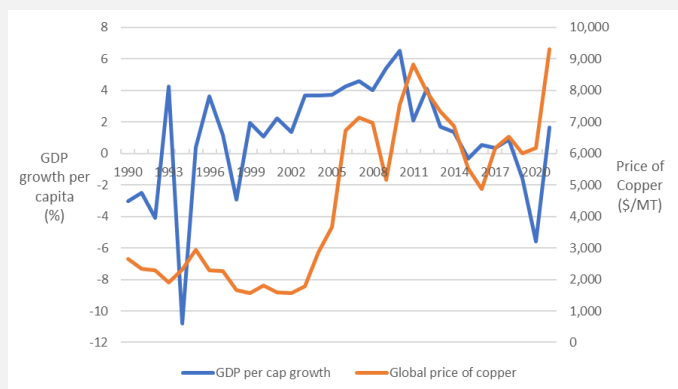
Growth, Poverty, and Inclusion

Zambia’s economic output, valued in 2022 at about US\$29.8 billion or US\$1,500 per capita, continues to revolve around mining. Revenues from Zambia’s copper exports drive its topline indicators of growth, current account balances, foreign reserves, and government expenditures, but fluctuations in international prices induce volatile swings in the economy’s performance (Figure 1). Buoyed by rising copper prices beginning in the 2000s, the GRZ borrowed roughly \$17 billion from international lenders, including China, to pursue a variety of infrastructure megaprojects. But as returns on these costly investments failed to materialize and falling copper prices eroded government revenues, Zambia quickly fell into arrears. In 2020, the government defaulted on one of its Eurobond issues, triggering an IMF-led restructuring relief conditioned on critical fiscal and financial reforms (IME, 2023b).

It is often observed that extractives-based economies generally do not deliver broad-based benefits, and this has been the case for Zambia. The copper mining sector is capital intensive, generates relatively few jobs, and lacks significant backward or forward linkages to the wider economy. Consequently, the country has gained little in the way of economic spillovers or technological diffusion from its copper endowments. Meanwhile, the heavy dependence on copper exports—copper and other minerals account for more than three-fourths of Zambia’s export basket (Figure 2)—exposes its economy to volatile world prices and exchange rate fluctuations, injecting substantial instability into the economy.

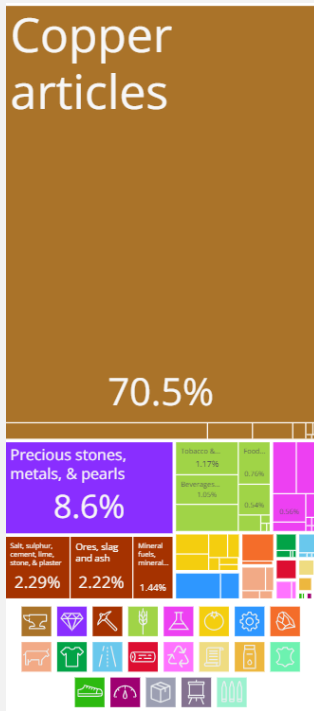
Far removed from the realm of debt negotiations and global copper prices are Zambia’s farmers, who make up over 50 percent of the country’s labor force but account for less than 5 percent of its GDP. Another third of Zambia’s workers work in services that are largely informal and low productivity. Services now account for the dominant share (60 percent) of Zambia’s GDP, having grown threefold over the last three decades. Although the growth of

FIGURE 1 Per capita GDP growth and Copper Prices



Source: World Bank WDI and IMF (2023a)

FIGURE 2 Zambia’s exports, led by copper products, reached \$13.4 billion in 2021.



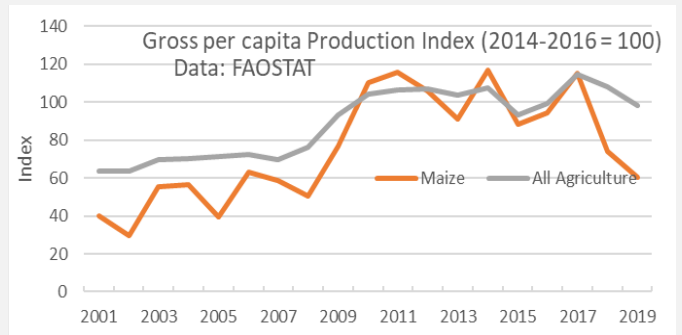
Source: Observatory of Economic Complexity

the service sector is typically tied to urbanization, Zambia’s urban population share grew only slightly, from 40 to 45 percent, over the same period. All in all, Zambia’s structural transformation from rural, subsistence agriculture into a modern urban economy has been halting at best.

Research shows that in many countries a key driver of such a transformation is agricultural productivity growth. But in Zambia, this driver has been missing. Subsistence farmers growing Zambia’s staple crop maize achieve yields of around 2 metric tons per hectare, roughly half the rate of South Africa, and one-seventh the achievable rate, indicated by levels obtained in local trial plots. Further, per capita production has stagnated or even fallen in maize and in agriculture overall over the past two decades (Figure 3). Numerous barriers to on-farm productivity, particularly the lack of irrigation, explain a large portion of the sector’s underperformance.

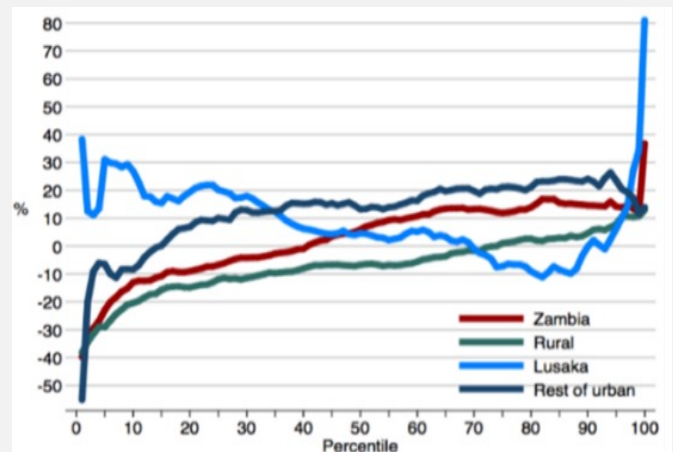
As a consequence of its very low agricultural productivity, the enclave nature of mining, and the failure of the

FIGURE 3 Trends in Agricultural Productivity 2001-2020



Source: FAOSTAT

FIGURE 4 Zambian Growth Incidence Curves (2010-15). Note: percent change in per capita consumption (left axis) by income percentile (right axis).



Source: World Bank (2018)

rest of the economy to generate high productivity jobs, poverty in Zambia remains entrenched—particularly in rural areas, which account for roughly half the country’s population. Based on the most recent Living Conditions Monitoring Survey, administered in 2015, 60 percent of the population lived below the US \$1.90 per day poverty line; in rural areas, the rate was 76 percent. Furthermore, during Zambia’s growth episodes, incomes per capita rose only among the upper half of Zambia’s income distribution, while those in the bottom experienced not merely stagnation but actual declines (Figure 4, red line for all Zambia). High rates of food insecurity persist, with 50 and 25 percent of the country experiencing moderate and high levels of food insecurity, respectively (Zambia Statistics Agency et al., 2018; LCMS, 2015). Nearly half the population is malnourished, and over one-third

of children are stunted. The food share of household budgets in rural areas exceeds 50 percent, heightening sensitivity to rising food prices.

A high incidence of poverty in the face of a mean income that is high enough to accord Zambia lower middle income status points to a very high level of inequality. Indeed, the country has one of the highest rates of income inequality in the world (Gini index = 0.56) (WDI) —sobering evidence that the benefits of Zambia’s copper economy and of its recent borrowing spree have gone widely unshared.

Apart from its rural dimension, Zambia’s poverty is also manifested disproportionately among women and youth. Women make up 64 percent of the agricultural labor force, the vast majority of which consist of rural subsistence smallholders, and nationally, female participation in formal employment is very low (14.6 percent), less than half the male rate (WDI, 2023). With regard to youth, Zambia is a markedly young country, ranking sixth out of all countries globally in the share of the population under age 19 (55 percent). Among youth ages 15 to 29, nearly a third are not in education, employment or training (NEET). These conditions underscore the need for job growth in sectors that are technologically feasible, market-driven, and accessible to a broad swath of the population.

Climate Change Vulnerabilities

Zambia is highly vulnerable to climate change and is poorly prepared to adapt to it, with a ranking of 130 out of 185 countries on vulnerability and 141 out 192 countries on readiness according to the Notre Dame Global Adaptation Initiative. The country has experienced increasing variability in rainfall during the agricultural season and shifts in the timing and duration of the rainy season, as well as increasing frequency and severity of extreme weather events such as droughts and floods. These trends carry implications for poverty in a country where more than half of the population relies on rainfed agriculture for its livelihood. In response to shifting rainfall patterns, agricultural production is gradually

migrating from Zambia’s increasingly hotter, drier South to its cooler, wetter North.

Climate change also significantly impacts hydropower, which currently accounts for around 85 percent of Zambia’s electricity generation. Severe drought in 2015 depleted reservoirs, leading to a 7 percent reduction in overall power supply and large scale loadshedding, with costly disruptions to economic activity, including mining and manufacturing. Tourism is similarly affected as climate change shortens the length of the tourist seasons and threatens wildlife and natural attractions.

Growth Question

Identifying an Inclusive Growth Path for Zambia

As described above, previous episodes of growth in Zambia failed to deliver benefits to most of its population, and the country’s economy remains undiversified and dependent on volatile international commodity markets. Therefore, rather than proceed immediately with an economy-wide assessment of constraints to growth, MCC and its Zambian counterparts first sought to identify potential inclusive growth paths; doing so became the specific “growth question” informing the diagnostic exercise, as discussed in Hausman et al. (2008). A growth path refers to the expansion of specific sectors, clusters, or a sequence of activities in an economy that can drive major, dynamic increases in the productivity of workers and firms. A growth path must of course be feasible, that is, within reach given the country’s current endowments of skills and technology and for which demand, domestic or external, is elastic enough to support its expansion. An inclusive growth path satisfies these conditions while also ensuring that the benefits to growth are broad-based and reach the poorest or economically excluded segments of the population.

MCC and Zambian counterparts considered four candidate growth paths in Zambia: (1) mining, (2) tourism, (3) digital and IT economy, and (4) agriculture and agro-processing. With carefully constructed—and enforced— incentives and rules, Zambia’s mining sector could

potentially expand its local input sourcing and introduce downstream processing of raw materials, thereby diversifying the economy and employing a wider segments of the workforce. However, experience across the globe shows that developing countries with large extractive sectors struggle to achieve these outcomes, resulting in enclave sectors with limited benefits. Zambia's tourism sector boasts a generous and largely unexploited endowment of nature and wildlife sites, and unlike mining, could generate many low-skill jobs. But tourism offers few linkages to other high value-added sectors in the economy, similarly limiting its impact across the broader economy.

With respect to services, Zambia's English-speaking workforce could capitalize on access to UK and USA markets to develop business processing outsource opportunities, as several other Anglophone countries in Africa have done, while achieving widespread productivity benefits of digitalization and expanded digital skills. However, jobs in the sector are generally not low-skill and do not reach the poor, at least in terms of direct job creation. Further, Zambia's competitiveness in digital service exports lags well behind regional leaders Kenya and Ghana, suggesting weak competitiveness, hence difficulty in breaking into these markets.

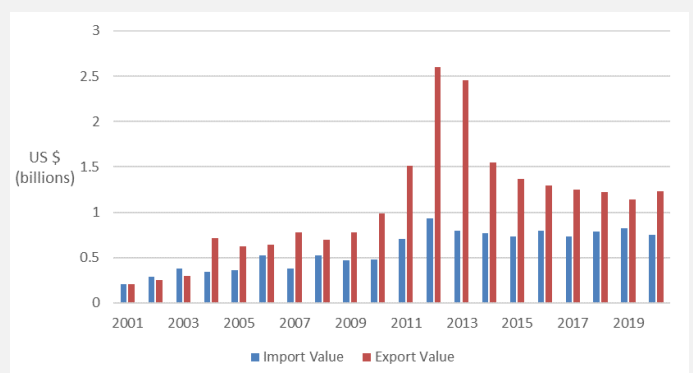
Agriculture and Agro-Processing

The final growth path considered was the agriculture and agro-processing (AAP) value chain. AAP spans on-farm production (agriculture) and value-added manufacturing activities (agro-processing), e.g., milling, storage, cold-chain, processing, packaging, and marketing. Agro-processing uses raw materials from agriculture to add value to food and non-food products, including prepared, canned, and packaged foods, condiments, beverages, and refined sugar, as well as animal and plant-based products such as wood, leather, and textiles. Critically, despite facing significant constraints to expansion, Zambia's array of agro-processors already accounts for 60 percent of the country's manufacturing output and the bulk of its non-mineral exports (Chitongwe, 2021).

The AAP pathway emerges as Zambia's most promising growth path, for several reasons. On the supply side, Zambia enjoys highly favorable conditions for agricultural production, including vast areas of suitable land, year-round temperatures conducive to plant growth, and substantial ground and surface water resources. Despite these advantages, however, average yields in Zambia remain low and stagnant as noted above. Smallholder, largely subsistence growers (with farms of up to 5 hectares) dominate the sector, accounting for ninety percent of farms. But, as in other African countries, a segment of more productive and commercially oriented medium size "emerging farmers" farms is growing by 10 to 15 percent annually in recent years, pointing to a path toward greater productivity and growth in the sector.

On the demand side, rapidly growing urban populations and incomes, both in the region as well as in Asia and the Middle East, are leading to skyrocketing demand for AAP products. Continental Africa's GDP is expected to rise by an average of 4.4 percent annually over the next ten years (USDA, 2022), and the World Bank projects a 60 percent increase in the demand for food in Sub-Saharan Africa from 2015-2030 (World Bank 2018). Zambia, which shares borders with 8 countries, is especially well-positioned to expand its regional exports of food and will be aided in doing so by its membership in free trade agreements with other countries in the region, including the African Continental Free Trade Area (ACFTA). Zambia actively exports agricultural and agro-processing products with partners throughout the region, exporting over US \$1billion in 2020 (Figure 5). Exports have fallen

FIGURE 5 Zambia AAP-Related Trade



Source: FAOSTAT

since their peak one decade ago, in part a consequence of specific agricultural export bans imposed by the GRZ (discussed below), pointing to room for resumed growth. Moreover, many of Zambia’s AAP imports, particularly horticulture crops and processed foods, overlap with goods that are or could be produced domestically, suggesting a strong potential for import substitution.

In terms of inclusive growth prospects, AAP value chains offer Zambia strong poverty reduction potential not only through the demand for farm labor in rural areas, where poverty primarily concentrates, but also through the generation of large numbers of low-skill manufacturing jobs in agro-processing, particularly in towns and secondary cities that are accessible to rural workers (Chitongwe, 2021). The adjacency of agro-processing to agriculture reduces the distance, both economically and

geographically, that the poor must traverse when transitioning to off-farm opportunities. Wage employment in nearby agro-processing facilities also promises benefits to women and youth who otherwise may not have the resources or independence to migrate to larger cities.

The Government of Zambia, donors, think tanks, and researchers, have endorsed and promoted this sector’s potential for inclusive growth. Zambia is commonly described as the potential “breadbasket” of Africa.¹ Notably, AAP-focused expansion was a springboard to industrial development in several Southeast Asian economies, including Malaysia and Thailand, which, like Zambia, are rich in agricultural resources. Given its potential for supply-side growth, expanding regional markets, and its inclusive qualities, the AAP value chain offers an especially promising inclusive growth pathway for Zambia.²

¹ The GRZ’s 8th National Development Plan lists AAP as a critical element of the country’s growth strategy, a message echoed in various reports from the World Bank, the United Nations and by academic scholars.

² It should be stressed that MCC’s focus on AAP does not imply a dismissal of Zambia’s other economic sectors, and indeed each of them features in GRZ’s 8th National Development Plan. Copper mining is poised to expand with the take-off in demand for electric vehicles, while tourism has significant unrealized potential. This analysis, however, focuses on a growth path that is sustainable and inclusive and hence aligned with MCC’s broader mission.

Discussion of Constraints

Upon selecting the AAP growth path, MCC and its Zambian counterparts proceeded to analyze the binding constraints particular to this value chain and, through desk review, interviews, consultations with government officials, experts, and stakeholders, as well as an early mission to Zambia, identified the following binding constraints to growth and private investment. Five factors emerged as important barriers:

Inadequate agricultural inputs and policies

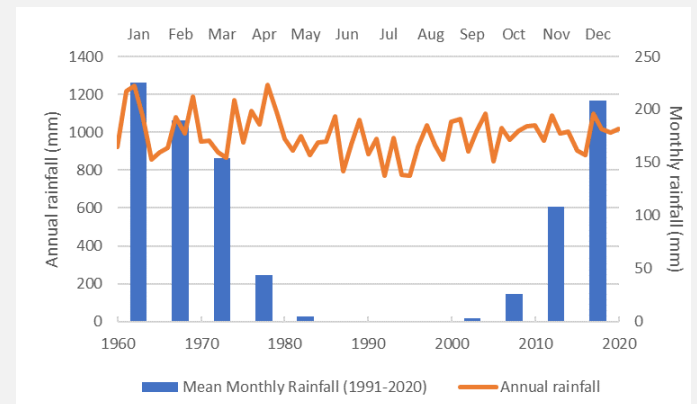
- Poor roads and transport
- Low access to credit
- Lack of skilled labor in agriculture and agro-processing
- Low power access and reliability

A discussion of these constraints follows below. Parts of the analysis rely on comparisons of Zambia to five countries with similar economic, geographic, and demographic traits (Angola, Senegal, Tanzania, Kenya, and Zimbabwe) based on a “closest distance” methodology to detect indicative outliers in performance.³

Inadequate Agricultural Inputs and Policies

As discussed above, productivity in Zambia’s farm sector remains very low. Use of inputs is inadequate and the inputs themselves are often low-quality (e.g., unimproved seed varieties, fertilizers unsuited to local growing conditions). Additionally, most farmers are unskilled and struggle to adopt new technologies and management practices, private finance for agriculture is exceedingly scarce, and the policy and business environment creates distortions and inefficiencies that stifle the sector’s growth. While Zambia’s farm production function is

FIGURE 6 Rainfall variability within and across years.



Source: World Bank Climate Change Knowledge Portal

constrained in many ways, this analysis identified two elements that are particularly binding: (1) lack of irrigation and (2) a distortive agricultural policy and institutional environment.

Irrigation

The analysis suggests that low agricultural productivity in Zambian agriculture is driven significantly by lack of irrigation. Zambia’s rainfall is abundant but is highly seasonal and variable (Figure 6), and as the effects of climate change continue to unfold, the frequency and severity of drought episodes will grow—all of which impinge on producers’ ability to improve and stabilize yields.

Zambia is fortunate in that it possesses abundant surface and ground water resources of more than 6,000m³ per capita per year, vastly exceeding comparable producers Zimbabwe and South Africa. On average, irrigated cultivation yields three times its rainfed alternative, in addition to conferring resilience and stability in production and facilitating multiple crop seasons per year. High-value horticulture production, in particular, relies on

³ Comparator countries were selected according to the Mahalanobis Distance methodology which generates a multi-dimensional “distance” between each country in the world and Zambia. Dimensions include 5 variables describing physical geography (average distance to the coast, soil quality, tropical climate indicators, percent GDP derived from extractives, and distance to Zambia) as well as 4 demographic and economic variables (ethno-linguistic diversity, population density, poverty gap, and GDP per capita). Angola, Tanzania, and Zimbabwe emerged as the countries with the shortest “distance” to Zambia. Senegal and Kenya were added as “aspirational” comparators.

consistent water availability, without which these crops cannot be profitably grown. The implications of better access to irrigation for farmers’ incomes and national food security are straightforward, as is the potential for diversified exports.

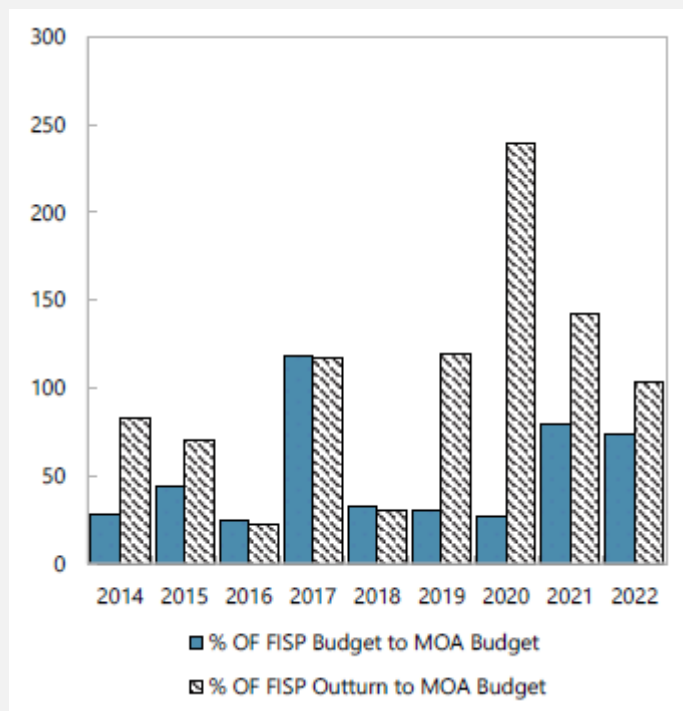
Yet less than 2 percent of Zambia’s cultivated land is irrigated. This low uptake is due significantly to the high costs of irrigation equipment—whether boreholes on small plots, center-pivot installations for large commercial operations, or large-scale dams that supply entire communities—combined with an inability to access credit. Installation of borehole pumps powered by solar units, for example, can exceed US\$5,000, a sum that is three times greater than Zambia’s per capita GDP. Separately, as will be discussed below, the low availability of gridded electricity compels operators to rely on prohibitively costly sources of energy, namely diesel fueled generators, to power pumps and conveyances.

Policy and Institutional Environment

Apart from the input-related constraints to production, a complex and unfavorable policy environment looms over the sector, constraining and distorting production and marketing decisions. Zambia’s agriculture policy is dominated by two major programs: the Farm Input Support Program (FISP) and the Food Reserve Agency (FRA).⁴

FISP subsidizes kits of fertilizer and seeds for Zambia’s farmers in an effort to reduce costs of production for rural smallholders and boost rural food security outcomes. These kits, however, often do not reach the neediest producers, while many other producers collect kits for which they are ineligible. Within cooperative groups that channel FISP-subsidized inputs to their members, patronage systems often dictate the allocation of received goods according to seniority or connections, further diminishing the impact of the program on its intended poor beneficiaries. Moreover, the state-supplied fertilizer and seeds are primarily geared towards maize production, incentivizing producers away from other potentially high return crops, and are not tailored to the

FIGURE 7 FISP Impacts of Ministry of Agriculture Expenditures



Source: IMF (2023c)

biophysical planting conditions facing growers in specific areas of the country, greatly diminishing their benefits. The distribution of subsidized FISP kits also crowds out private input suppliers from entering the market, depriving growers of the full range of high-performing seeds, fertilizers, and other inputs available. Finally, consultations with stakeholders revealed that FISP’s operational logistics often leave farmers waiting to receive fertilizer and seeds well past ideal planting times, to the point that many end up selling their late-arriving kits for cash rather than using them.

Separately, budgeted funds for FISP compete against the Ministry of Agriculture’s other priorities, including productivity-boosting research and extension that rely heavily on public sector support. And in recent years, owing to political demands to ensure social protection, FISP expenses actually exceeded budgeted amounts, straining GRZ’s general coffers. In 2022, actual expenditures (so-called “outturns”) reached \$300 million, and earlier years saw even greater budget-busting sums. (Figure 7).

⁴ Since the conclusion of this Constraints Analysis, GRZ introduced a broader Comprehensive Agricultural Support Program (CASP) that pursues the same input subsidy objectives as FISP and includes other support elements.

Meanwhile, on the marketing side sits the parastatal FRA. Originally tasked with purchasing and storing maize to ensure Zambia's food security needs, FRA's mission has broadened markedly in recent years. In addition to maintaining national stocks, FRA now operates as a buyer of last resort for remote smallholder maize farmers, making it a tool for rural income security. At the same time, FRA sells maize at subsidized prices to millers with an eye towards keeping processed maize prices low for final consumers, reflecting its original food security objective. Given its maize storage mandate and its purchasing reach, the FRA dominates the maize market and disincentivizes more efficient private actors from engaging in purchasing and storage. Further, as with FISP input subsidies, the focus on support for maize discourages diversification into other potentially lucrative crops.

Neither the price FRA pays farmers for maize nor the price it subsequently charges millers are market driven. Rather, a committee of stakeholders from government and the private sector determine a price behind closed doors, which obscures but does not resolve the obvious tension between the interests of growers, millers, consumers, and the government itself. Such an opaque and conflicted price setting mechanism creates uncertainty in the market, as sellers and buyers cannot know whether the FRA will undercut or otherwise displace them, uncertainty which further discourages private entry. Meanwhile, limited budget support for FRA has squeezed the agency's ability to pay farmers on time, leaving its targeted rural beneficiaries in the lurch for months after taking delivery of their production.

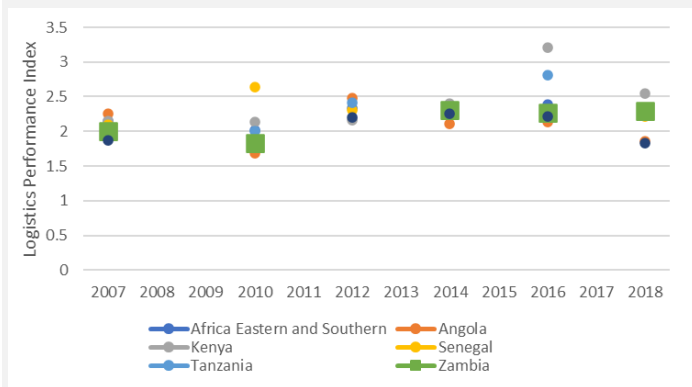
Perhaps most problematic is FRA's management and monitoring of its food reserves. FRA is obligated to maintain stocks at or above a specific threshold, currently set at 500,000 MTs. However, for both FRA's own stocks and the total amount of maize available in the country, GRZ lacks accurate and timely stock monitoring. As a result, FRA has often found itself suddenly confronting an unanticipated apparent shortage of reserves in relation to perceived domestic needs, triggering the Ministry of Agriculture to suddenly impose a ban on maize exports to ensure available domestic supplies. These export bans—and in particular, their unpredictability—impose

intolerable risks for maize traders and large-scale growers, e.g., by threatening to upend any contracts signed with foreign buyers. In the face of these risks, major commercial growers have abandoned maize almost entirely in favor of soybeans and wheat, at once diminishing Zambia's foreign earnings and reducing the potential supply of domestic maize, thus undermining FRA's food security goals. Another implication of FRA's stockholding uncertainty is the resulting tendency to purchase in quantities beyond the mandated threshold, thereby burdening the government's budget and crowding private traders out of the market.

Poor Roads and Transport

A major constraint emerging from consultations with stakeholders was the critically degraded state of roads linking farmers to key arterial corridors. Poor roads add significantly to the transport costs of accessing markets—both for farm outputs and inputs—and effectively render some markets inaccessible. Direct costs are high due to greater wear and tear on vehicles from rough and potholed roads; higher time costs; and the need to use smaller, less cost-efficient modes of transport on poor roads. Further, the quality of agricultural cargo is degraded by mechanical vibrations from bad roads, prolonged exposure to elements (e.g., heat), and high rates of spoilage (the last two factors reflecting excessive time between harvesting and arrival in markets). This problem is particularly serious for highly perishable and delicate horticulture foods. Losses from damage and spoilage can approach 50 percent, depending on the crop, eroding profits and discouraging investment in many high-value products (IAPRI/WFP, 2018). Separately, road impassability, arising from unpredictable episodic floods and washouts, introduces risks of catastrophic losses, inasmuch as goods will fail to reach markets in a timely fashion or at all. The threat of impassability can discourage investments in high-value crops that rely on consistent and rapid access to final markets as well as timely delivery of key inputs such as fertilizer, stifling diversification and ultimately suppressing farm incomes. In Zambia, only 17 percent of the rural population lives within 2 km of an all-season road (World Bank, Rural

FIGURE 8 Quality of Trade and Transport-Related Infrastructure (1=lowest, 5=highest)

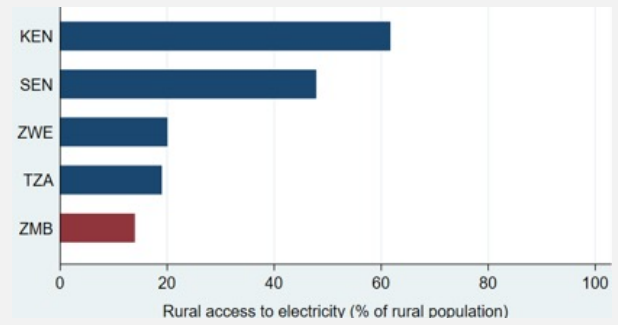


Source: World Bank Logistic Performance Index

Access Index, 2016). Zambia’s overall roads and logistics performance is low, though similar to its comparators (Figure 8). Interviews also pointed to trade impediments arising from inefficient border crossings.

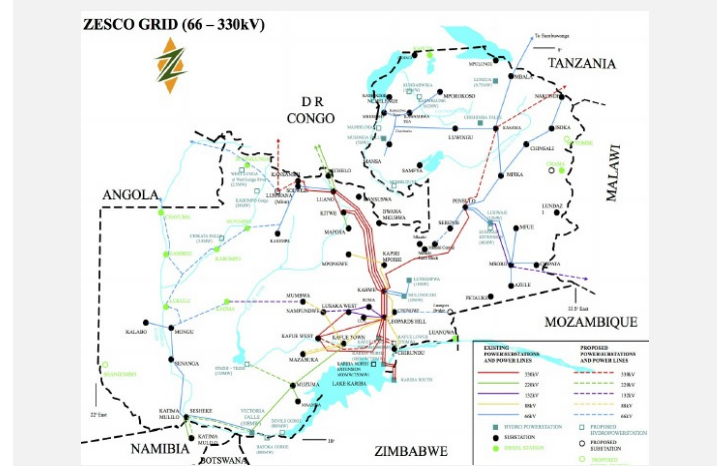
In contrast to the perspectives of primary agricultural producers, surveys of Zambian manufacturers, including agro-processors, do not point to roads as the biggest obstacle. But most processors are located in Lusaka, Zambia’s largest domestic market, where agglomeration economies are strongest and well-maintained major highways are easily accessible. The relative scarcity of processing firms outside Lusaka likely reflects the role that costly rural transport plays in the spatial distribution of economic activity. Otherwise, all things being equal, transporting unprocessed goods shorter distances, i.e., carrying out processing in closer proximity to farmers, would be more cost effective. Consultations and interviews confirmed that both national and local budgets for maintaining and repairing rural roads are inadequate and that political incentives favor building new roads at the expense of periodic, less visible upkeep of the existing network. Zambia’s vast geography and low rural population density also contribute to the challenge, pushing up construction, maintenance, and repair costs per numbers of residents served.

FIGURE 9 Zambia Rural Access to Electricity and Comparators



Source: WDI

FIGURE 10 Map of Zambia’s Electricity Transmission Network



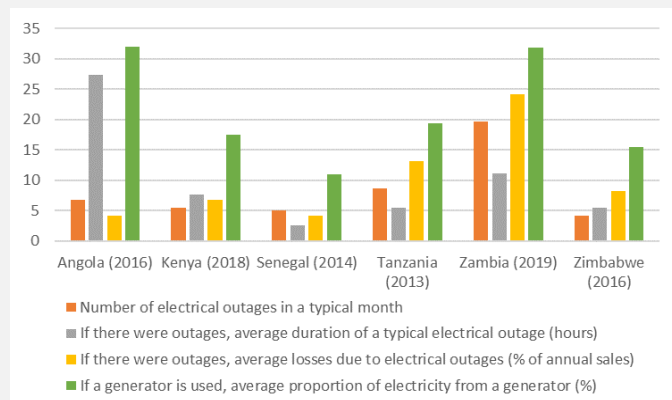
Low Power Access and Reliability

Stakeholders repeatedly stressed limited access to power, a primary input into AAP both in processing and in primary production (especially for irrigation), as a constraint to growth and investment. Without gridded electricity to operate water pumps, factory machinery, and IT equipment, farmers and firms lack the ability to employ many modern productivity-enhancing technologies.

In Zambia overall, only 40 percent of the population has access to gridded electricity. In rural areas, this share falls to 15 percent, the lowest among comparators (Figure 9). A major cause of these poor rates of access is the low density of Zambia’s rural population, which increases the costs and reduces the payoff to any public infrastructure investments.⁵ Zambia’s transmission network, operat-

⁵ Low access and reliability aside, Zambia’s cost of electricity service is surprisingly among the lowest in Africa, estimated around \$0.08 cents per kwh.

FIGURE 11 Zambia Power-related Performance Indicators for Food Manufacturers and Comparators



Source: WB Enterprise Survey

ed by the state-owned utility ZESCO, runs primarily along the corridor between the capital Lusaka and the Copperbelt region, where mining activity is concentrated (Figure 10). As described above, one consequence of low rural access to power is the inability of producers to affordably irrigate areas under cultivation. Farms that do irrigate generally must rely on costly on-site diesel generators and solar installations, the latter of which is also saddled with high technical maintenance requirements. These problems push investment and profitability in farming further out of reach.

For their part, manufacturing firms, particularly small and medium enterprises engaged in food processing, report lack of reliable power as a major obstacle to expansion (Chitongwe, 2021; WB Enterprise Survey). Among comparators, Zambian food product manufacturers report some of the worst outcomes in terms of electrical outage frequencies and durations, as well as outage-driven losses (Figure 11). Moreover, the share of power obtained from generators among Zambian food firms is roughly 30 percent, substantially higher than in comparator countries and reflecting the extent to which businesses in Zambia try to circumvent the unreliability of the network. Consultations with food manufacturers confirmed these survey data results. One agro-processor in Lusaka, for example, lamented that multiple production shifts were not feasible due to off-peak (evening and overnight hours) load shedding.

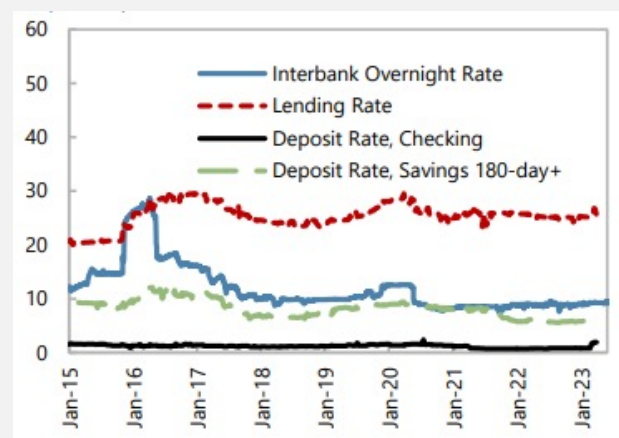
The unreliable nature of the power supply stems mainly from ZESCO’s inability to generate adequate electricity from its hydropower plants. The reservoir that charges its biggest plant, located on the Kafue River just south of Lusaka, relies on seasonal rains to recharge its capacity. But climate change has undermined the plant’s generative capacity through more volatile precipitation and more persistent drought episodes, translating into greater unreliability in the entire network’s supply. As a result, load shedding is a common occurrence. Meanwhile, the costs of maintaining back-up power, in the form of solar installations or diesel-powered generators, remain prohibitive for many or most firms, which often choose simply to temporarily shut down operations.

Low Access to Finance

While finance constraints arise in almost all developing country settings, the conditions facing enterprises in Zambia are particularly difficult. Currently, rates of interest on loans exceed 25 percent in nominal terms (Figure 12). Consequently, private rates of borrowing remain very low (Figure 13). Zambia’s credit-to-GDP ratio (15.8 percent, averaged over the period 2016-21) is lowest among comparators, and far below the average for sub-Saharan Africa (40 percent) (IMF, 2023).

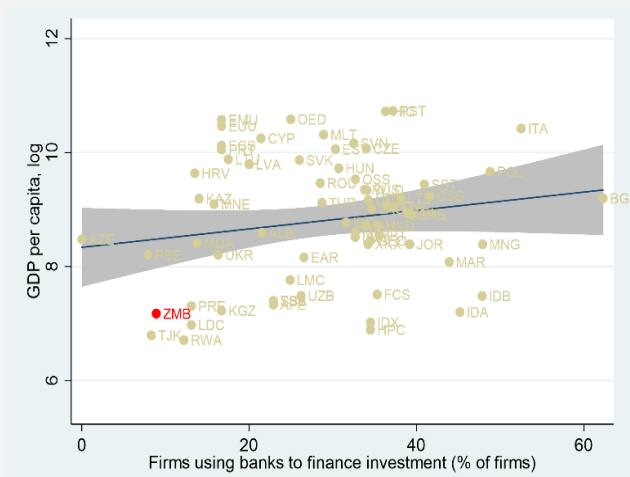
A major driver is the GRZ’s high rate of borrowing which effectively crowds out funds to the private sector, insomuch as banks simply prefer the safe and profitable returns of government bonds over the uncertain payoff

FIGURE 12 Average Lending and Deposit Rates in Zambia.



Source: IMF (2023)

FIGURE 13 Zambian firms borrowing from banks at rates below all comparators and most countries.



Source: WB Enterprise Survey (2019)

to private lending. AAP firms also report difficulties securing terms of lending that accommodate unique features of agriculture, including with regard to overall loan tenures, repayment schedules that accommodate seasonality, and risk assessments. For their part, banks report high rates of non-performing loans, inadequate record keeping, and unvetted business plans, all of which make them reluctant to provide finance to the sector. Banks’ perceptions of risk only grow when considering on-farm enterprises, and farm groups report little to no ability to access credit through traditional bank channels. Instead, stakeholder consultations reveal that many farm businesses, particularly small and medium enterprises, turn to cooperative-led “village banking” services that funnel modest sums of credit to members, particularly women.

Lack of Skilled Labor

Consultations with food manufacturers revealed that the domestic labor pool lacks trained machine operators, food technologists, and food scientists. Local universities struggle to prepare students for careers in food manufacturing, extension, and farm management. Specialized vocational training centers for the sector are similarly ill-designed and poorly funded. Enterprise

survey data suggest that Zambia’s workforce training is not particularly bad in relation to comparators, but as one Zambian food manufacturer explained, “My own production manager is from Zimbabwe. I could not find a food processing technologist able to operate the modern equipment here in Zambia...One of our biggest issues in Zambia right now is skills, though we have tons of universities skilling in the wrong way” (Chitongwe, 2021). Low human capital also constrains on-farm production, particularly in smallholder settings, in which the skills to apply modern technologies and management practices are in short supply.

Other Constraints Considered

Within the AAP growth path, additional constraints arose but ultimately were judged to be less binding. Consultations pointed to the sub-optimal application of seeds, fertilizers, and other on-farm inputs, particularly in smallholder settings, resulting in diminished yields. Underlying this inadequate use was not constrained availability but rather low human capital and a poorly funded and trained agricultural extension service. The limitations of the FISP program, described earlier, also work against the goal of more site and crop-specific input use.

The team also considered constraints on land use, particularly those arising from smallholders’ insecure land tenure in rural chieftaincies. In many developing country settings, the lack of tenure prohibits farmers from collateralizing their land asset for purposes of finance, discourages long-term planning and investments, and ultimately results in lower production. In Zambia, however, despite these institutional barriers, land remains abundant. Most of the country’s arable land remains uncultivated, reducing competition for land. Virtually all stakeholders, including agriculture investors, reported little to no difficulty securing sizeable areas for cultivation, although for small farmers, access to land via traditional systems does not translate into ownership and ability to collateralize land, and some reports suggest smallholders in rural areas have been sidelined by commercial investors with direct connections to local chiefs.

Conclusion

This analysis suggests that agriculture and agro-processing (AAP) offers Zambia a path to rapid, inclusive, and sustainable growth and poverty reduction, a conclusion shared by stakeholders in Zambia's government, multi-lateral institutions, think tanks, researchers, and the private sector. MCC's analysis of constraints to the AAP growth path serves to narrow the focus of its investments and thereby achieve concentrated impacts on growth, employment, and incomes in the country. With the collaboration of the Government of Zambia, the

analysis identified five key constraints limiting production and investment along the AAP value chain. The GRZ subsequently decided to prioritize three of these constraints—inadequate agricultural inputs (namely irrigation) and policies, poor roads and transport, and unreliable and low access to power—for further attention in the form of root cause analysis and the development of projects to address the constraints.

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