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POLICY ARENA

MINING FDI AND INFRASTRUCTURE DEVELOPMENT ON AFRICA'S EAST COAST: EXAMINING THE RECENT EXPERIENCE OF TANZANIA AND MOZAMBIQUE[1]

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Abstract: Since the turn of the century, Tanzania and Mozambique have emerged in Africa's foreign direct investment stakes as leading performers. In both countries, the demands placed on infrastructure to enable these investments have presented some significant challenges. Caught amid high debt, low state revenue and weak capacity, the performance of infrastructure has been widely reported as a constraint to growth. Lessons learned from how these countries have responded to these challenges provide some insight as to the degree to which potential synergies can be crafted around inflows of mining-related foreign direct investment and enhancements to the infrastructure networks.

Keywords: mining; commodities; infrastructure; investment; policy

1 INTRODUCTION

The year 2000 was the first year of growth in extractive industries' share of world foreign direct investment (FDI) after more than 50 years of decline (UNCTAD, 2007). Despite a modest share of total world FDI inflows, many countries in Africa have appeared on

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FDI performance charts almost exclusively because of the extractive industry-related investments associated with the higher commodity prices, underpinned by sustained demand from leading developing country economies such as China. The period has also witnessed a parallel surge of interest in the condition of infrastructure for economic activity as growing FDI, as well as policy pressure to reduce trade barriers, has identified infrastructure shortcomings as a constraint to further growth and development. For sub-Saharan African countries such as Angola, direct interest by China in accessing crude oil reserves has seen oil-for-infrastructure-type deals that have enabled the exploiting of resource endowments to modernize some aspects of physical infrastructure (Zafar, 2007; Corkin, 2011). For other countries without any apparent economically accessible oil reserves, the commodity boom associated with mining projects has seen less clear associations between FDI or resource revenue flows and infrastructure development. However, recent developments suggest that this might change with the influence of new players from China.

This paper seeks to cast some light on the experiences of some recent top African mining FDI performers, Tanzania and Mozambique, in order to understand some of the factors that might inform interrelationships between mining FDI and infrastructure development. Despite both countries displaying impressive FDI performance[2] relative to their immediate past and to the region as a whole, the demands placed on infrastructure to enable these investments have presented, and continue to present, some significant challenges. These countries have found themselves caught in a web of high debt servicing obligations, low state revenue and both domestic and Official Development Assistance-financed budgets that have tended to be shy of 'economic infrastructure', with the result that the performance of infrastructure in the period leading up to the recent growth in FDI flows has in many instances been worse than it was in colonial times.[3]

Lessons learned from how these countries have responded to the challenges faced and the factors impacting on the character of these responses provide some insight as to the degree to which potential synergies can be crafted around inflows of mining-related FDI and enhancements to the infrastructure networks. This paper begins with a discussion of the literature on infrastructure and growth, including the subset of issues around FDI and infrastructure. This is followed by an overview of the recent mining and infrastructure experiences of the two countries before concluding with some policy-oriented reflections, including some limited speculation on the possible role of China or other leading developed country economies in this environment.

The paper draws on 20 interviews with respondents from mining companies, their suppliers, representatives of private sector organisations, government and parastatal entities, multi-lateral organisations and researchers. The bulk of these were conducted through semi-structured interviews with a handful supplemented by additional electronic communication. Respondents were selected through a process that sought to identify relevant decision makers influencing infrastructure issues in the mining sector, and in the case of

[2]Tanzania and Mozambique emerged from their status as also-ran's in the continent's FDI stakes to becoming, with the exception of South Africa and the oil producers, leading performers (UNCTAD, 2009a). In the case of Tanzania this has been almost exclusively the result of significant flows of investment into gold mining and exploration in the north-west of the country (UNCTAD, 2007, 2009a). In Mozambique, beyond the initial FDI shocks of the Mozal aluminium smelter and Pande gas fields projects, its sustained FDI performance has been increasingly driven by minerals investment and in particular mining of coal in the northern Tete Province (UNCTAD, 2007, 2009a).

[3]A situation which was, in the case of Mozambique, aggravated by a destructive civil war, which was, at least in part, externally engineered.

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suppliers and private sector organisations, through a snow-balling technique. Further insights were drawn from interviews conducted in a parallel study by Mjimba (2011). Material was also drawn from a range of official and commissioned reports covering related issues. Although quantitative measures were discussed in interviews and considered in the examination of supporting documentation, the focus of the interviews was around qualitative matters.

2 EXPLORING THE LITERATURE ON INFRASTRUCTURE AND ECONOMIC DEVELOPMENT

The condition of transport infrastructure is often seen as a proxy for the state of infrastructure-for-economic-activity in countries, and notions of development have long been closely associated with the development of modernized and modernising infrastructure and especially transport systems (see among others the writings of North, 1961 and Rostow, 1961). This approach has been influential in much of the discourse on colonial development in East Africa. For example, Pollock argued in a 1960 article in Economic Geography that, 'Kenya's modern history, and indeed that of East Africa's too, may be said to have begun when the Kenya railway was completed in 1901 from Mombassa to Kisumu.' (Pollock, 1960: 344). However, some observers, such as Cardoso and Faletto (1979) painted a picture, informed by their Latin American experiences, of an 'enclave' development model — whereby much of the infrastructure planning and development in many developing countries was aimed largely at servicing foreign-owned industries and, as such, the patterns of investment rarely brought broader development gains. Nevertheless, this infrastructure still provided an important legacy that was highly relevant to the economies concerned and their future development prospects through forming something of an infrastructure backbone, even if it happened to be one carrying the burden of the inequities of the past into the post-colonial era.[4]

Theorists on the development of infrastructure in developing countries such as Taaffe, Morrill and Gould (1963 — cited in Pedersen, 2001a) suggested that post-colonial countries would witness the evolutionary development of more integrated transport networks over time as demand for connectivity between nodes increased. However, a look at the evidence during much of the last third of the 20th century suggests that while initially stagnating, infrastructure and more specifically transport infrastructure, in many countries lost functionality (Pedersen, 2001a, 2001b). As an example, Pedersen quotes Mwase (1994) as stating that the passability of Tanzania's roads declined from 70 per cent in 1970 to 30 per cent in 1991 (Mwase (1994) in Pedersen, 2001a: 12).

The reasons for this decline in infrastructure investment and maintenance in the latter half of the 20th century are complex and varied but many countries do share some common features including declining receipts of state revenue arising from the commodity price declines of the 1970s, political and economic instability, curtailing of state-led capital programmes under Structural Adjustment Programmes, rising debt burdens and weak

[4]For instance, although colonial-era projects such as those of the East African Railways and Harbours Company were geared primarily to secure the outflow of raw materials to industrial centres of Europe and to reinforce models of colonial control and administration, this infrastructure remained crucial to the development prospects of countries in the region, in the absence of meaningful alternatives.

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economic performance. Estache (2005) reinforces these factors and also points crucially to the fact that the Millennium Development Goals paid little attention to the importance of infrastructure in meeting the priority targets resulting in both governments and donors delaying the correcting of underinvestment in infrastructure. In many cases, a lack of investment and maintenance was aggravated by problems in the management of the infrastructure systems.

Before leaping from this discussion of the past into more contemporary considerations in Tanzania and Mozambique, it is important to dwell somewhat more generally on perspectives of the impact of infrastructure on economic growth. A brief discussion of some of this material will be followed by a look at literature on infrastructure and its relationship to FDI. This is necessary to help build a policy case, as advocated in this paper, that enhancements in infrastructure need greater attention and further that there is potential value in encouraging synergies between infrastructure needs and mining-related investment of developing countries, despite what might have been a somewhat chequered past of association between the two. After all, in other contexts, economic historians have pointed out that infrastructure development — what Rostow referred to a 'social overhead capital', often related to commodity-extraction type activities — has played an important role in the development of economies such as that in North America (North, 1961; Rostow, 1961).

A variety of relatively recent studies,[5] with a focus on the developing world, beyond the influential World Development Report of 1994 (World Bank, 1994) have reached some similar conclusions about the centrality of infrastructure delivery and quality to the development process. Escribano *et al*. (2010:2) point out; 'Infrastructure quality has a pervasive influence on all areas of an economy. Low-quality infrastructure and limited transport and trade services increase logistical and transaction costs, rendering otherwise competitive products uncompetitive, as well as limiting rural production and people's access to markets — with adverse effects on economic activity and poverty reduction.' The World Bank, a major funder of developing country infrastructure projects for much of the latter part of the last century, has made the case that appropriate investments contribute to economic growth through enhancements in productivity (Calderon, 2008, 2009; Kessides, 2004; World Bank, 1994). Calderon goes on to point out that authors examining the African context have drawn on extensive empirical work to demonstrate that inadequate or dysfunctional infrastructure has substantially hindered the growth performance of many countries, noting that since around the early 1970s, there was a sharp decline in infrastructure investments influenced by Structural Adjustment Programmes and the like, which expected reinvestment to be secured through private sources. The author goes on to note that specific research has demonstrated that countries investing in infrastructure have seen greater improvements in their trade performance and that access to infrastructure is also associated with reductions in income poverty. As with much of the literature in the field, Calderon

[5]'A large number of empirical studies illustrate the impact of infrastructure on economic performance, including those of Calderón *et al*. (2003a and b), Calderón and Serven (2003), Canning (1998), Reinikka and Svensson (1999), Prud'homme (2004), Escribano and Guasch (2005), Escribano *et al*. (2005), and Guasch (2004). All suggest that Africa's infrastructure gap is an important growth bottleneck with a negative impact on productivity and the overall competitiveness of the region. Furthermore, several studies using the methodology of Escribano and Guasch (2005, 2008) and Escribano *et al*. (2008a and b and 2009) have found empirical evidence — in cases such as Brazil, Chile, Costa Rica, Mexico, Turkey and several southeast Asian countries — that improvements in investment climate (IC) conditions in general and in infrastructure quality in particular, may lead to important gains in productivity and in other economic performance measures: employment, real wages, exporting activities and foreign direct investment (FDI) inflows.' (Escribano *et al*., 2010: 2).

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emphasizes the twin imperatives identified in the literature — namely the quality as well as the quantity of infrastructure — noting that in some cases, attention to matters of quality in infrastructure is likely to yield significant gains without the necessity of very large capital investments.

The work of Calderon, drawing on multi-country time series data, suggests that all regions in Africa have a lower infrastructure stock than Europe and North America (and also for Asia, bar some exceptions from North Africa). Similar trends are seen in the data presented on infrastructure quality. Of critical interest is that, in almost all regions in Africa, there has been an observable decline in the quality measures over the period 1990 to 2005 and, in some cases, a decline in infrastructure stock over the same period relative to the stock in the international comparator region areas (Calderon, 2008: 7). As others have also pointed out, the most significant change in the period for the three infrastructure fields that are investigated (Roads, Energy and Telecommunications) has been the advent of cellular telephone networks, which has seen an absolute improvement in the stock and, in many cases, also the quality of telecommunications infrastructure. Drawing on econometric techniques, the author argues that infrastructure stock growth and quality are not just coincidental to growth but also demonstrate causality (Calderon, 2008: 19). Interestingly in scenarios developed in the Calderon study, the countries with a combination of a low stock and low quality of infrastructure illustrate the strongest growth responses from changes in investment and quality of the stock. For the purposes of this study, it is notable that the countries of Tanzania and Mozambique in the East African region are among the weakest performers in both stock and quality.

Escribano *et al*. (2010), citing Brunel (2004), note that under these conditions, 'the colonial period has had a lasting effect on the use of space in the region, resulting in a productive structure that consists, in most cases, of coastal cities connected inland by railways designed to carry raw materials to main ports. This and other factors that are progressively modifying the continent's productive structure — such as continuous urbanization, the movement of economic activity from the agricultural to manufacturing and service sectors and the increasing openness of African economies — has caused both a quantitative and qualitative mismatch between the current supply of infrastructure and the ever-increasing demand.' (Escribano *et al*., 2010: 2) For much of the continent today, there remains a heavy reliance on systems and a stock of infrastructure that has seen only marginal changes since the colonial era. Contemporary demands in a highly integrated global economy leave many of these countries at a severe disadvantage.

Of some considerable relevance in these discussions is the recurring qualification made in many studies that physical provision of infrastructure without attention to quality, efficiency and governance matters is highly problematic. This is further elaborated in studies, which point out that, in many cases, physical infrastructure constraints to trade and economic activity more generally are of lower importance to many firms than transaction-type barriers associated with such infrastructure including administration of border posts, customs clearing, certification of transportation loads and the like. It is for this reason that it is widely suggested that physical infrastructure development is a necessary but not sufficient condition to sustain economic growth and attract FDI. Some also suggest that the enhancing of these, often public delivered services, could in fact make infrastructure investment more attractive to private investors and is often more of a priority than more costly capital projects (Raballand and Macchi, 2008).

Looking more closely at the relationship of FDI to infrastructure in developing countries, it is notable that, beyond the historic points made about how infrastructure was

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previously developed, with a focus on colonial-era commodity extraction activities, there are also relevant contemporary correlations. In Sawkut *et al's* (2008) discussion on the broader literature on factors influencing firms' choices to engage in FDI, they cite Dunning's (1981 & 1988 cited in Sawkut *et al*., 2008) 'electric theory' and its focus on three factors: firstly, endogenous advantages a firm might have over potential rivals such as that around a production technology patent; secondly, the benefits that would accrue to a firm entering a market without dispersing various roles to other players to act on its behalf; and thirdly, the host country specific conditions, which might be attractive in drawing an investor to a country. Others suggest that FDI, in the short term, is driven by macro-economic factors such as growth performance whereas in the longer term matters of cost advantages in other serving markets, accessing inputs or producing becomes more important (Bende-Nabende & Slater (1998) cited in Sawkut *et al*., 2008). Yet other studies stress the point that factors influencing FDI differ not only by region but also in terms of the character of the activities that the FDI firm seeks to engage in (Sawkut *et al*., 2008). FDI is also seen to be influenced by the character of institutions, tariff barrier differentials and the political climate in countries.

The issue of infrastructure in these studies is tackled mostly within the framework of business environment matters cited by some of the authors. Castro *et al*. (2007:3) point out that; 'In principle, public infrastructure should have a significant influence on foreign firms' costs and revenues and hence on their location decisions'. Once again, the relevance of different types of infrastructure to different types of FDI must be noted in this discussion. Castro *et al's* (2007) study into Argentina suggests that FDI performance across provinces is impacted by infrastructure, mainly in the form of roads. Khadarooa and Seetanah (2007), in writing about sub-Saharan Africa, have cited a range of studies[6] that 'have argued that good infrastructure is a necessary condition for foreign investors to operate successfully. Poor infrastructure or unavailable public inputs increase costs for firms.' (Khadarooa and Seetanah, 2007: 2). These perspectives are reinforced by investment climate assessments conducted in countries through a World Bank programme, which identifies factors that are seen by business leaders to constrain ongoing or new investment commitments.[7] A scan of these in many African countries demonstrates the high importance attached by both domestic and foreign investors to matters of infrastructure performance. This is further reinforced by a range of empirical work, which suggests significant relationships between patterns of FDI and infrastructure coverage and performance. For example, in a study using time series data from sub-Saharan African countries, it was identified that 'transportation capital has been an important ingredient in making the countries attractive to foreign direct investors both in the short and long run, and the same is observed for the case of non-transport infrastructure.' (Khadarooa and Seetanah, 2007: 27). It is also worth noting that, in the context of the growing presence of private sector role players in infrastructure provision, the issue of governance and regulation is growing in importance as an issue in the general field of infrastructure and its relevance to investors (Kirkpatrick *et al*., 2006).

Before moving onto a discussion of the specifics of the Tanzanian and Mozambican cases, it is worth briefly discussing the specific issue of mining and infrastructure. Although the literature on this is relatively sparse, it is worth noting that mining can, and often does, pose some challenges for those quick to carry assumptions through from

[6]'More importantly few scholars have actually acknowledged the important role of infrastructure in stimulating FDI and among the few proponents feature Wheeler and Mody (1992), Loree & Guisinger (1995), Richaud *et al*. (1999), Morisset (2000) Asiedu (2002), Sekkat *et al*. (2004).' (Khadarooa and Seetanah, 2007: 2)
[7]See http://www.enterprisesurveys.org/

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more generalised studies about FDI and infrastructure. Whereas it is true that mining activity would undoubtedly benefit from the existence of networks of infrastructure that are operated with some efficiency, it is also worth noting that many mining projects have the provision of mine-developed infrastructure included as a core element of the mining investment dynamic. As such, although there is literature that demonstrates the close relationship between mining and public infrastructure provision[8], there is also evidence of mining companies and their associated investors often carrying the burden of some significant elements of infrastructure.[9] Factors that influence this scenario include issues of remoteness and dispersal of activity that make taking advantage of existing infrastructure less likely. Furthermore, mines can often have specific needs in terms of the nature of services (level of power supplied or tonnage tolerance of rail or road) that make taking advantage of public provided infrastructure less straightforward. Even if mines can take advantage of some publicly provided infrastructure, they often provide and cover the costs for connection, and, even in such cases, there are invariably aspects that are still mine-provided. Different mining commodities and mining geological environments impose different challenges. These factors often contribute to the tortured negotiations between mining TNCs and recipient countries over taxation and royalties as mines seek to minimise their exposure using the lack of provision of appropriate public infrastructure as a rationale for more generous taxation allowances. Mines also have to often seek funding for infrastructure or have to work with investment partners that can deliver and operate infrastructure either on a mine-specific basis or as part of some joint initiative with other mining companies than might be able to tap into some measure of common infrastructure.

Mining companies have also been seen, in certain circumstances, to stimulate infrastructure investment in that either their use of the infrastructure makes public or private provision (or some combination of the two) feasible (UNCTAD, 2007). This infrastructure, if aligned with concentrations of the population, can have some wider societal and economic benefit. Governments have also seen mining as contributing to infrastructure indirectly through the contributions to the fiscus, which has been relatively significant in many countries with very low rates of revenue collection. Infrastructure can also be seen to impact on forward and backward linkages — for instance, where there is abundant cheap power, a mining company might chose to process or part-process a raw material in a country and in some cases governments use promises of subsidies for infrastructure as a draw-card for investors and their downstream activities (Hanson, 2001). In this context, it is also worth noting that proponents of the notion of the 'resource curse' would suggest that powerful mining interests might, in fact, capture infrastructure to their exclusive or dominant benefit and thus reduce prospects for economic diversification.

3 MINING AND INFRASTRUCTURE IN TANZANIA AND MOZAMBIQUE

As was suggested in earlier sections of the paper, Mozambique and Tanzania both present interesting cases around mining and infrastructure provision. Categorised as Least Developed Countries by the United Nations in terms of a range of indicators (including some of

[8]See for instance Fine and Rustomjee (1996) on South Africa's 'mineral–energy complex'.
[9]The case of Australia is cited by some where there is a relatively low public sector investment in infrastructure but relatively high private sector investment, including that related to the mining sector (Australian Treasury, 2007).

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Table 1. 2009 country data for Tanzania and Mozambique

Category	Tanzania	Mozambique
Population, total (millions)	43.7	22.9
Population growth (annual, %)	2.9	2.3
GDP (current $US, billions)	21.6	9.8
GDP per capita (current $US)	509	428
GDP growth (annual, %)	5.5	6.3
FDI [(2005; 2008) $US, millions]	498; 744	108; 587
Life expectancy at birth, total (years)	55.6	47.9
Mortality rate, infant (per 1000 live births)	68.4	95.9
Literacy rate, female youth (% of female youth, 15–24 years)	76.3	62.1
Prevalence of HIV, total (% of population, 15–49 years)	6.2	12.5

(Source: http://www.worldbank.org accessed on 20 November 2010; FDI data from UNCTAD, 2009a and own calculations)

those in (Table 1), they have generally low levels of infrastructure performance and coverage, and yet they have been both the targets of some considerable mining-related FDI in the past decade and a half in the context of rapidly accelerating FDI (see Table 1). In fact, in the 2005–2008 period presented in the table next, the overwhelming bulk of FDI was mining-related in both countries[10].

The discussion, which follows seeks to provide some insights into how these two countries, with their different circumstances have responded, in infrastructure terms, to FDI activity in the mining sector. The information presented suggests that the two countries have, to date, followed different strategies, and some attempt is made to understand the possible rationales that might have informed these choices.

3.1 The Case of Tanzania

In the case of Tanzania, Pedersen (2001a, 2001b) was cited in earlier sections of the paper as providing an overview of how much deterioration Tanzania's infrastructure suffered in the last decades of the 20th century. In more recent times, Ter-Minassian *et al*. (2008): 8 have argued that; 'Despite its geographic advantages as a potential entrepôt to its landlocked neighbours Burundi, Rwanda, Uganda and Zambia, as well as the D. R. Congo, there is clear evidence to suggest that Tanzania's lack of infrastructure is acting as a constraint on the expansion of trade and economic activity in both the country and the region.' The World Bank's Logistics Performance Index (Arvis *et al*., 2007) ranked Tanzania's transport infrastructure well below the average of other sub-Saharan African and low-income countries. In other fields such as power, writers have also reported performance lags (Eifert *et al*., 2005, 2008), which are also supported by business climate survey data (World Bank, 2006).

Taking these factors into account, it is not surprising that Tanzania was rated 137th in the 2007 World Bank Logistics Performance Index (Arvis *et al*., 2007). However, by the 2010 survey, Tanzania improved its ranking remarkably to 95th by demonstrating improvements, from an admittedly low base, in indicators related to customs controls, timeliness of deliveries and the like (Arvis *et al*., 2010). However, despite these performance upgrades in these dimensions, and some concerted investments in road

[10]Interviews with Tanzania Investment Centre and Centro de Promoção de Investimentos (Mozambique).

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infrastructure (again from a very low base), the functionality of road and rail infrastructure remains a major concern. Christ and Farrantino (2011) report anecdotal material outlining how in 2009 Burundian coffee exporters used the lengthier Mombasa route because Tanzania's infrastructure around the central corridor route was so poor.

According to the recent Africa Infrastructure Country Diagnostic (AICD) project country report for Tanzania, 'Annual infrastructure spending of $US2.9 billion is needed to catch up on infrastructure; [and] that cost, relative to GDP, is comparable to that incurred by China in recent years' (AICD, 2010a: 2). The reports note that, in the late 2000s, Tanzania's infrastructure spending was at around 9 per cent of GDP (AICD, 2010a, 2010b). Table 2 draws from the preceding reports in presenting the scale of the infrastructure challenges that Tanzania faces in terms of investment backlogs calculated against spending needs.

Table 2. Tanzania's annual infrastructure Operating and Maintenance (O&M) and capital spend compared with estimated need

Infrastructure	Spending ($US, millions)	Need ($US, millions)	Spending as % of need
O&M spend	544	897	60.6
Capital spend	217	1834	11.8

(Source: AICD, 2010a, 2010b)

These aggregate sums of spending against estimated need demonstrate that at least in aggregate terms some notable commitments — albeit from a low base — are being made. However, especially for capital spending, they remain some considerable way short of what the country needs to ensure functionality of the core infrastructure. A further investigation into the AICD material suggests that, compared with aggregate capital spending on infrastructure being over 11 per cent, transport capital spending is under 3 per cent of calculated need. This is of considerable significance when the combined importance of road and rail is noted in the Tanzanian context.

Mining activity in Tanzania has, to date, mostly comprised of gold mining concentrated in the north-west of the country. Interaction with mining companies operating in this area reveals that issues of infrastructure have been relevant in the decisions to invest as well as in the ongoing operation processes. However, all the companies interviewed made the point that they do have experience in operating mines in areas with even less infrastructure functionality than that in Tanzania. Key factors, which have made infrastructure issues manageable (although not without cost and complication), have been the incentive of a high gold price and also the fact that gold mines generally export little in terms of tonnages compared with bulk commodity mines and are therefore a bit less exposed to the costs of having export consignments delayed on rail, roads or at ports. Nevertheless, all the companies interviewed made the point that, as a result of management inefficiencies, excessive bureaucracy and infrastructure failures or inadequacies, their operating costs are increased as they face risks around the supply of inputs and capital equipment. Mining companies have also had to invest heavily in power generation and supply to ensure that their operations are not put at risk from inadequate energy cover.

However, beyond the case of the gold miners who felt that infrastructure issues were a challenge but manageable under certain circumstances, prospecting companies and their mining company partners looking to major bulk mining projects in southern and eastern Tanzania, as well as in Burundi and Rwanda, indicated that the absence of infrastructure or its dysfunctional state was generally a project stopper for them. Because of the very substantial distances to the coast from these mineral resource sites and because of the need for

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infrastructure networks to handle high tonnages of export product, so-called 'hard' infrastructure was very important to them. These companies pointed out that although they could contribute to this type of infrastructure, the scale of commitments needed would require many stakeholders to work together to make the financing viable and to build the use-thresholds to make investments worthwhile. Although the Tanzanian government participated in some regional planning processes towards this end, government officials indicated that they would not be supportive of state funding, driving these very high cost projects and would look to the prospective investors to resolve them. Interestingly, the officials also noted that they had heard that Chinese state or private investors had developed investment models to assist with infrastructure provision in countries such as Angola. In fact, they indicated that they would be actively courting Chinese participation in the Tanzanian economy towards this end.

Under these circumstances, it was no surprise that in late September 2011, China's Sichuan Hongda Co. Ltd. signed a $US3 billion investment agreement with Tanzania to mine coal and iron ore, in a joint venture with Tanzania's National Development Corporation (Reuters as cited on www.miningmx.com accessed on 22 September 2011). The project is associated with a range of agreements that Tanzania is expecting to secure with the Chinese government including financing of a natural gas pipeline and further power plant developments as well as road, rail and port upgrades. The details of the specific additional financing mechanisms were still to be confirmed.

3.2 The Case of Mozambique

The case of Mozambique is also one evidencing a highly stressed infrastructure context aggravated by a drawn-out civil war. It is however notable that from the period immediately following the peace accord with Renamo, the Frelimo government in Mozambique has focused considerable attention on infrastructure — although major setbacks were experienced with the 1997 floods. The country was ranked 110th in the 2007 World Bank Logistics Performance index (Arvis *et al.*, 2007), however, by the 2010 survey, Mozambique's performance had slipped relative to other countries to 136th (Arvis *et al.*, 2010). Much of this underperformance has had to do with shortcomings associated with the factors such as those related with border post management, customs clearance and delivery timeliness; however, the performance of physical infrastructure, although still weak, showed less of a decline in performance in comparison with these other fields (Arvis *et al.*, 2010). For instance, in the 2010 survey, Mozambique was rated at 145th for customs, 150th for timeliness whereas it was 124th for infrastructure (Arvis *et al.*, 2010). Being a relatively narrow country with a long coastline and a number of ports, there has been a lot of pressure for Mozambique to enhance its port performance for the benefit of improving its neighbours' logistics systems. However, despite some considerable movements in that regard (such as the Maputo Port concession) and upgrading of cranes at Beira Port, challenges such as prohibitively expensive dredging remain and reduce the performance of a critical component of infrastructure.

According to the recent Africa Infrastructure Country Diagnostic (AICD) project country report (2010a, 2010b), Mozambique's infrastructure spending is at around 12 per cent of GDP, which is relatively high in a regional context. Table 3 demonstrates that, although in terms of percentage of need, Mozambique spends more than Tanzania (see Table 2); this sum remains well short of the level of spending identified as needed. Of interest is the fact

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Table 3. Mozambique's annual infrastructure Operating and Maintenance (O&M) and capital spend compared with estimated need

Infrastructure	Spending ($US, millions)	Need ($US, millions)	Spending as % of need
O&M spend	225	392	57.4
Capital spend	434	1330	32.6

(Source: AICD, 2010a, 2010b)

that Mozambique is spending over 90 per cent of the capital need in terms of transport infrastructure, suggesting that other infrastructure fields, alongside other logistics factors, need attention to raise overall infrastructure performance.

Mozambique's mining experience is somewhat more recent than that of Tanzania's but with a strong emphasis in the export of bulk commodities — and in particular vast coal reserves in the north-west of the country. Companies such as Brazil's Vale have made substantial investment commitments to establish mining operations in the Tete Province and have been actively working with the Mozambican government to resolve infrastructure bottlenecks around road, rail and ports. Together with other companies such as Coal India, there have been steps taken to plan for a series of infrastructure projects, where some measure of joint contribution is expected to be made alongside some considerable investment from the Mozambican government. Vale officials indicated that their project was relatively sensitive to delays in the supply of inputs caused by both infrastructure blockages and factors such as customs processes. However, the most critical element for them was the need for vast improvements in functionality of road, rail and port. In this regard, they found the experience Mozambique had developed in the Maputo corridor project with South Africa as very valuable, in that a similar framework of shared commitments between public and private players could enable blockages to be dealt with. Furthermore, officials noted that there were a few other places in the world where such a scale of coal reserves could be located and as such the company would be prepared to display some patience in working to find solutions.

Mozambican government officials did indicate that they had interacted with both public and private interests from China but that these processes had not yielded major projects in mining terms. However, the participation of a Chinese company in the redevelopment of the main airport in Maputo and the provision of some supporting low interest loan finance around the project had been an experience that government officials in Maputo felt they could build on. One official went so far as to say, that he felt that the issues around infrastructure in Tete would ultimately require some commitment from Chinese role players as the global demand for coal was such that more rapid investment might be required than the spatial development initiative/corridor type approach could deliver. This same official indicated that it was notable how little the Chinese diplomatic officials complained to them about the bureaucratic barriers around transport infrastructure in comparison with their Western counterparts who spoke of little else.

4 FROM DIFFERENT APPROACHES TOWARDS A CONVERGING FUTURE?

In examining the infrastructure experience of both Tanzania and Mozambique, it is clear that both countries have major challenges to face around infrastructure development, improved transactional processes related to the infrastructure and ongoing maintenance.

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Although the countries have had quite different orientations in the last decade, with Mozambique investing more heavily in transport infrastructure compared with the relative commitments of Tanzania, both have sought ways to enhance their commitments in this regard. In the face of the overwhelming scale of need, Tanzania has tended to place emphasis on what officials expressed as lower cost items such as customs reform whereas Mozambique has, to some degree, neglected this in favour of physical projects because of the pressure related to investment projects associated with bulk commodity exports. One respondent working for a major donor-led development corridor project suggested that this difference could also reflect, in part, different points of donor emphasis in the two countries, which are both highly dependent on official development assistance budget-support.

For mining companies in the two countries, infrastructure is an important issue. When asked to rank issues affecting investment choices and the operational environment infrastructure, it was either first or second (alternating with the mining policy context). However, the experience in the two contexts is quite different for the already active companies. Drawing on interviews with mining companies involved in both exploration and mining operations in the two countries, it is notable that although both see dysfunctional infrastructure as a major barrier, for the gold mines in Tanzania, they have been able to operate despite infrastructure shortcomings, whereas for the coal mines of the Tete Province in Mozambique, they would not be able to export their product without major refurbishment and enhancement of infrastructure. Gold mines in Tanzania are logistics intensive in terms of inputs in their set-up phase and are generally able to overcome ongoing input logistics challenges. However, as they produce a final product, which is measured in ounces, they are not that exposed to logistics challenges in the export of their product. Coal mines on the other hand tend to operate at a much larger scale than gold mines — at least, this is the case of the very large mines being developed in the Moatize area of Tete Province — and as such need solid infrastructure for their operations and even more in the way of road-rail-port infrastructure combinations for the export of very high tonnages of coal.[11]

A number of factors have contributed to the two countries recent somewhat divergent experiences around the relationship between mining and infrastructure beyond the commodity specific factors. Mozambique has sought to embrace a policy approach in which private sector participation in infrastructure is significant based on the performance experience of the Maputo Port and Corridor project linking Mozambique with South Africa. In this regard, despite obstacles that remain, respondents from government and the mining companies outlined how the government has been actively working towards investment cost-sharing arrangements with the coal mining companies and prospective rail and port operators. In Tanzania, moves to explore different policy channels around infrastructure have been much more cautious with both mining companies and government officials expressing some reservations about the scope for effective collaboration. Although the country did seek to concession the main Dar es Salaam central corridor rail line, this proved to be a failure, aggravated in part by major damage caused to the line by floods in 2009, but also by a concessioning process that was widely seen to have been flawed.

Both countries have drawn on the New Partnership for Africa's Development inspired combination of Spatial Development Initiatives and Development Corridors to seek to

[11]Vale (CVRD) plans to export around 12 million tonnes from its Moatize mine once the necessary rail and port infrastructure is in place.

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align infrastructure enhancements with catalytic commodity extraction investment opportunities. In Tanzania, there has been considerable planning done along the Central Development Corridor, which was geared to link in with the gold mining cluster in the northwest of the country and also to enable effective infrastructure matches with major nickel and iron-ore deposits being explored along the border areas with Rwanda and Burundi. Despite the existence of an institutional infrastructure in the form of the Central Corridor Transit Transport Authority, which has sought to enhance road maintenance, regulation and improve trading through customs posts, little in the way of progress has been made towards major road and rail refurbishment, and the power grid remains limited. Mining companies with interests in exploiting bulk commodities have found it difficult to secure commitments from government around shared infrastructure planning and investment. Whereas this is certainly aggravated by the massive distances and other technical factors such as the number of rivers to cross and rail gauges involved, the processes appear to be a low priority for the Tanzanian government.

In Mozambique, the experience of the Maputo Corridor upgrades and those associated with the Port are widely seen in a very positive light. Although processes were slow in the initial stages, the government has sought to replicate the method of using cost sharing, concessions, management contracts and the like to enable it to accelerate reinvestment in infrastructure and its improved operations. Thus, the Transport Ministry has sought to create a Spatial Development Initiative team to facilitate the unblocking of infrastructure for coal mining along the Zambezi Valley. A high degree of political backing is provided, and there is active engagement to develop the necessary infrastructure partnerships with mining companies, Mozambican parastatals and potential operators. Mozambican government officials cite the importance of Mozambique raising its exports of coal to in turn enable the country to increase both social and economic investment in the country — and in particular in the less advantaged northern areas.

Mining presents many challenges as well as opportunities for infrastructure development in both Mozambique and Tanzania. Table 4, which follows, shows the main points of contrast between the two case studies. Mining activities tend to have divergent infrastructure needs dependent on their processes and the commodities they are extracting. This is well illustrated when comparing the experience of gold mining in Tanzania and the emergent coal mining in Mozambique. For revenue constrained governments, mining investment at some scale brings with it the potential of enhanced flows to the fiscus, which can in turn be directed at a diversity of infrastructure needs (World Gold Council, 2009). Both countries have evidenced growth in both capital and operating spending on infrastructure, albeit from a very low base. Government officials in both countries readily agreed that enhanced fiscal flows are important but also admitted that they are ultimately unlikely to accelerate much needed infrastructure spending, which is widely seen to be a limiter on economic growth and other developmental goals. In both contexts, the Spatial Development Initiative and Development Corridor approaches have been drawn on to enable functional links between mining FDI and infrastructure upgrades and extensions. Tanzania's Central Development Corridor experience has been that combinations of government ambivalence and the very real limits presented by the lower scale logistics intensity of gold mining (compared with bulk commodity extraction) have constrained meaningful connections. On the other hand, Mozambique's Zambezi Valley brings together the scale and threshold opportunities provided by bulk coal mining together with a government policy orientation sympathetic to PPP-type infrastructure upgrade and development strategies.

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Table 4. Summary of recent past comparison of contexts: Tanzania and Mozambique study areas

Context	Tanzania (CDC)	Mozambique (Zambezi/Tete SDI)
FDI [(2005; 2008) $US, millions*]	498; 744	108; 587
Mining commodity	Gold (possibly to be followed by coal and iron ore)	Coal
Mass measure of output	Ounces (but bulk projects starting to be promoted)	Tonnes
Logistics character of existing mining	Input import dominated	Output bulk export dominated
Infrastructure mix requirements of mining type	Road dominant because of lower export volumes with existing gold mining	Rail dominant because of volumes from coal mining
Existing available infrastructure connecting mining area to coastline	Weak with some road functionality (rail largely dysfunctional at present)	Weak with some limited rail and road functionality
Source of multi-national investment in mining	Europe and North America (and an investment commitment from China yet to be realised)	South Asia and Latin America (possibly South Africa to follow)
Character of public policy	Very cautious around mining: seen as competing for public sector attention to the detriment of agriculture	Oriented to incentivise large-scale FDI projects to help drive modernisation of the economy
Policy around investment in infrastructure (general)	Growing slowly from a low base, have experimented with PPP on rail but failed	A decade of exposure with PPP through Port of Maputo and Maputo Development Corridor
Policy around infrastructure to support mining	Tendency to require mining companies to make their own plans (recent agreement with Sichuan Hongda Co. Ltd. could change this)	Government agreement with CVRD/ Vale committed the government through CFM[a] to upgrade Sena Rail line via concession[b]
Corridor authority	Programme exists under the National Development Corporation, Corridor Authorities under Transport Ministry	Not yet established, but SDI Programme based in Ministry of Transport mimics the corridor programme (to be possibly formalised in the future as an authority based on Maputo Corridor Logistics Initiative experience)

(Source: Authors' own analysis)
[a]CFM is Portos e Caminhos de Ferro de Moçambique — the parastatal overseeing Mozambican Ports and Railways.
[b]Although the Sena Rail concession has experienced many problems, there has been a high degree of priority given to it by the Minister of Transport to resolve matters and progress the necessary investments.

Under these circumstances, both countries have looked with some envy at the Chinese model for linking commodity deals with infrastructure investments seen in countries such as Angola. However, for much of the period under consideration, despite government officials reporting a consistent and significant rise in the number of public infrastructure contracts being won by Chinese companies, the role of Chinese players remained independent of commodity investment projects.[12] However, the most recent experience suggests that

[12]'Chinese firms have begun to compete effectively in the rehabilitation of infrastructure, particularly roads, where Chinese firms are involved in the repair of more than 600 km of Mozambique's roads (two-thirds of the total being rehabilitated), and the rehabilitation of a large bridge between Mozambique and Tanzania. Chinese firms have also recently won tenders to repair water systems in Maputo ($30 m) and Beira and Quelimane ($15 m).' (Kaplinsky *et al*., 2007: 28)

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certainly for Tanzania, should the plans translate into a real project, and with a high degree of probability in Mozambique, the Chinese government as well as Chinese mining investors and infrastructure developers will feature in the immediate future of both countries.

Policy makers can look at the past experience of the two countries and consider the different emphases in their infrastructure approaches and in the impact of different mining commodity value chains. Certainly, it is clear that, should countries wish to seek gains from exploiting bulk commodity mining operations, they are likely to be faced with very high cost infrastructure development challenges. For developing countries, and in particular for Least Developed Countries, these commitments have often appeared insurmountable. Under such circumstances, it is not surprising that countries have therefore been advised to focus on procedural reforms which often come at lower fiscal risk. The importance of these reforms is not disputed and although not all respondents identified them as the major priority, they came up again and again as factors impeding investment and development effects. However, for respondents in this research, what was of the most significance was the main transport infrastructure and the degree to which it could cope with the scale of movement of mined product. Although the experience of gold mining in Tanzania suggested that a more integrated development plan involving both physical and procedural upgrades can be relevant, the larger scale bulk projects being proposed for the two countries need road, rail and port capability to make them viable.

The recent heralding of Chinese investment and development interests in these countries[13] introduces a new dynamic where development partners are likely to have access to networks of project finance that a number of the world's presently dominant mining companies would covet. However, these developments remain far too recent to gauge in any meaningful manner. Drawing on the insights of actors in the two countries over a bit more than a decade, it is clear that the stronger orientation of Mozambique's policy towards physical investments in transport infrastructure, alongside a track record of investment and partnership, was associated with considerably higher profile of FDI project realisation for major bulk commodity mining projects. The intervention of Chinese actors in both contexts will, in all likelihood, reinforce some of the patterns already seen in Mozambique and could provide some interesting shifts in Tanzania as bulk commodity mining becomes a greater feature of that country's FDI stock.

Although demand for bulk commodities is likely to see an ongoing shift in the balance of total resource commitments towards transport-related capital projects, both countries could see the wider societal gains from these processes being curtailed if a wider reform agenda is not progressed. Matters such as transport system governance, regulatory modernisation around trade and infrastructure, improved management and network enhancement beyond the bulk channels is imperative to ensure that the often single-purpose driven commitments, relevant to mining interests, contribute to an enhanced general mobility environment for people and freight. Significant infrastructure upgrades of export channel infrastructure can contribute to an important infrastructure fabric legacy but need to be actively engineered for wider benefit and to be matched by a more diversified transport and more general infrastructure policy reform agenda (UNCTAD, 2009b). This in turn would need to be supported by a sophistication of approaches to utilising resource rents and involve enhanced transparency and accountability in choices to ensure that narrow extractive industry development paths of the past are not repeated.

[13]Although it is interesting to note that Tanzania has had a relatively long association with China through, for example, the building of the TAZARA railway line.

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