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The state and innovation policy in Africa

Banji Oyelaran-Oyeyinka

UN-HABITAT, Nairobi. Kenya and UNU-MERIT, Maastricht, The Netherlands
Corrsponding author, email: Oyebanji.Oyeyinka@unhabitat.org

This paper examines the role of African states in the process of industrialisation. It sets out to examine the nexus of state capacity, innovation policy and the dynamics of development. The methodology is largely qualitative through which a historical narrative of governmental investments in large industries most of which failed is related. While we attribute much of industrial failure to a 'weak' state, we recognise the difficulty involved in of the process of technological learning to industrialise in an environment of underdevelopment. The paper recognises state capacity building as a complex multi-level undertaking that must put collaborative learning as a central plank of development. The country encountered a process of industrialisation that is complex because states need to provide coordination among very many disparate actors using a bureaucratic outfit that was short on the fundamentals of science technology and industrialisation processes. We recommend a regime of sustained state capacity building whereby the Nigerian state and by extension other countries, continuously learn from its past shortcomings while learning to coordinate all the critical actors to take advantage of the prospective growth surge across African countries.

Keywords: industrialisation, structural change

Introduction

The process of development is marked by pervasive and widespread market imperfections (Oyelaran-Oyeyinka 2012). To a large extent, government policies and institutions will therefore be required to correct these imperfections that constitute obstacles to development (Rodrik 2007).[1] By definition, economic structural change is measured by quantifiable *structural shift (GDP or employment share of the sector explained by the level of development)*.[2] This phenomenon involves observable economic transformation, accompanied by significant changes to the relative contribution of different sectors, in terms of production and factor use. Broadly, following Kuznets (1965),[3] economists characterise structural transformation (ST) with the following: (1) declining share of agriculture in gross domestic product (GDP), (2) declining share of agriculture in employment, (3) rural-urban migration, (4) growth of the service and manufacturing sectors and (5) a demographic transition with reduction in the population growth rates, and have noted that India's transformation is stalled. However, an economy reaches a turning point when the share of employment in agriculture declines at a faster rate than the share of agriculture in GDP. When this happens, differences in labour productivity between the agricultural and non-agricultural sectors cease to exist in these final stages of the transformation process. Prior to the convergence of labour productivities among sectors, a significant and prominent widening of the gap appears between labour productivities in the agricultural and non-agricultural sectors. The latter is responsible for the inter-sectoral income inequalities and concentration of poverty in the agricultural sector.[4]

States historically influence the growth of sectors in diverse ways including the provision of high quality infrastructure, as well as the establishment of regulatory, industrial and competition policies, which include subsidies and taxation. A number of African countries formulated 'development plans' after independence that mimicked current day discussion of industrial policy.[5] According to UNCTAD (2006)[6], an economic transformation process can take place only if an enabling policy is put in place that would bring about the process of capital accumulation, structural change and technological progress. To bring this about, conventional wisdom stresses the need for a strengthening of the capabilities of governments to enable them achieve structural change. According to Ohno and Ohno (2012, 242), the 'weak policy capability (faced by African countries) was common in today's successful East Asian countries; but they overcame the problem through focused hands-on endeavours to achieve concrete objectives, which we call dynamic capability development'. A large body of literature cites the East Asian experience as evidence to take equally seriously the role of 'institutions' and state capacity. These various sources emphasise the need to learn lessons from successful cases that led to capital formation and the promotion of technological capability accumulation.

However, structural change is driven by and thus demands the building up of new capabilities through learning, and it is primarily the hallmark of all latecomer

economies (Amsden 1989) and more importantly, it is fostered and implemented through state policies and actions. Amsden and others do not dispute the fact that 'government intervention is always vulnerable to corruption, abuse, and inefficiency [and] government failure may be as detrimental to development as market failure' (Amsden 2007, 94). On the contrary, the question is more about how the state should play a role, and what sorts of capacity will be needed for such roles to be effectively played.

The more industrialised countries of East Asia and Latin America have addressed market imperfections, using extensive, diverse but context-based industrial policies to support the development process through structural transformation (Oyelaran-Oyeyinka 2012). However the latecomer[7] faces the evident reality that 'backwardness has been relatively greater' that demands from it more intensive effort by the state and actions that translate to policy competence. Economic backwardness of the latecomer is coded in a variety of ways: the absence of strong and competent state institutions, weak entrepreneurial business firms, a relatively low level of skilled engineers and technical personnel and a lack of well-educated and abundant low-cost managers (Amsden 1989, Amsden and Chu 2003). For these reasons the weaker an economy, the greater the coordination role of public agencies is required, and as Amsden and Chu (2003, 13) observe, market forces are unkind to the weakly organised economies ('the more backward the country, the harsher the justice meted out by market forces') with its inherent and often contradictory requirements. Here I present the argument that state action is not easy to define but it is necessary to build the capacity of African states to deal with the complex requirements of structural transformation.

Structural change and sectoral dynamics in Africa

A number of studies provide narratives of a significant shift in the growth dynamics of African countries.[8] A study by McMillan and Rodrik (2011) show the extent to which structural change contributes to total productivity growth, namely through export composition, competitive versus undervalued exchange rates and labour market flexibility. Notably, sector dynamics tend to be important, whereas large shares of natural resource exports resulted in growth-reducing structural changes, and competitive exchange rate regimes and labour market flexibility contributed to growth-enhancing structural change (McMillan and Rodrik 2011). A follow-up to the one by McMillan and Rodrik, drawing on the Africa Sector Database to analyse the implications of structural transformation for productivity growth in 11 sub-Saharan countries over a period of 50 years, 1960–2010, reveal contrasting outcomes for the different regions (De Vries et al. 2012). Similar to the finding by McMillan and Rodrik, the study found that patterns of static productivity gains in Africa are similar to those of Latin America, but different from the Asian experience. While Asian countries transformed through low-wage manufacturing, dependent on resource endowments and labour skills amongst other factors, sub-Saharan African countries (as well as Latin America countries; see McMillan and Rodrik 2011) may experience transformation through low-wage manufacturing, services or the agricultural sector (IMF 2101). One of the recent and rare analyses of transformation of Nigeria's economy confirms notable structural changes in Nigeria over the period 1996 to 2009, with labour shifts from low productivity agriculture and low value-added trade activities into manufacturing, transportation and services, although manufacturing contribution to GDP remains very low (Adeyinka et al. 2013).

Other studies demonstrate widespread growth across African countries confirming much of the empirical results of the structural change studies (ACET 2014, McKinsey Global Foundation 2012).[9] Unlike previously observed growth, which was often concentrated around particular resources like oil and agriculture, this new growth in African countries, appears to be more widely spread among sectors. There are six sectors identified as experiencing major growth – agriculture, infrastructure/utilities investment, trade, resources, finance, and telecommunications – which had captured 83% of the total growth.[10] Of these six, the finance and telecommunications sectors have been the best performing sectors in sub-Saharan Africa (SSA) since 2000, and have also experienced the most consistent growth. However, we do not know fully why these sectors are growing as they are and how deep and sustained the growth will turn out to be in time.

From the above, growth tends to be driven by some specific sectors. A focus on sectoral dynamics has been a subject of empirical studies by scholars over time. This is evident in the cases of China's electronics and telecommunications equipment (Rodrik 2003); South Korea's semiconductor and automobile (Matthews 2000); Taiwan's computers and telecommunications (Amsden 1989); and Malaysia's electronics and oil palm products (Rasiah 2003). In all this time, Africa has remained connected to the global market mainly as a supplier of raw materials, particularly petroleum oil and minerals, which has quadrupled since the early 2000s. While the impact of this growth dynamics may be difficult to fully disentangle, its implications, drawing on the structural change study is that it might be growth-reducing, although country-specific studies should provide clearer perspectives. According to the ECA (2008), African manufacturing firms confront the risk of losing markets if they are to compete with imports from Asia. For this reason, the terms and volume of trade, as well as the destination of raw materials exports are shifting significantly, whereby Africa is now deriving much of its growth from exporting to Asia (OECD 2006). In the list of sectors identified as growing in Africa, we note that manufacturing sub-sectors often identified with

'increasing returns'[11] are *decidedly absent from the top six sectors driving growth in the continent*. However, while these manufacturing sub-sectors have disappeared from Africa's list of sectors spurring growth, local manufacturing capacity in Asia continues to grow, with China even now being aptly described as 'the factory of the world'.

In pursuing an understanding of Africa's prospects for an innovation-driven structural change, it is important to understand the institutional context within which industrialisation has in large part failed. After providing a framework of state-led innovation policy, I move on to discuss the fundamental reasons why industrial manufacturing has been slow and why in fact the little progress made was followed by a reversal-de-industrialisation. I suggest that apart from wrong policy choices particularly SAP, institutional embeddness of commodity-led/mineral-dependent economies tend to foreclose industrialisation. I will discuss this with a case study of Nigeria's failed industrialisation. This chapter advances on my earlier paper that the debate about Africa's weak states need to be re-visited in a way that lessons from more successful regions could be used to correct the region's failures going forward. In what follows we articulate the role of state policy and capacity for structural economic transformation (Oyelaran-Oyeyinka 2012).

The role of the state

This section reviews the roles as well as the broad and specific instruments available to states[12] in influencing structural change. The development agenda will of necessity be driven largely by a developmental state, described by Fukuyama as 'one that is limited in scope but strong in its ability to enforce the rule of law, competent and transparent in the formulation of policy, and legitimate enough to have the authority to make painful economic decisions' (Fukuyama 2002, 25). This notion of the developmental state, routinely associated with East Asia, is less of a phenomenon in Africa but it could evolve. A *developmental* state, is one that 'establishes as its principle of legitimacy its ability to promote sustained development; with development understood as the steady high rates of economic growth and structural change in the productive system, both domestically and in its relationship to the international economy' (Castells 1992, 55). The development agenda driven by structural change is thus intimately connected with, and dependent on, governance and the institutional context.

In the theoretical literature, the following stylised facts describe the approach taken by institutional as well as the comparative institutional analysis of the state (Chang (1994b, Chang and Rowthorn 1995, Amsden 1989). (1) The state is considered a social construct that is historically rooted and not simply a collection of self-interested individuals. Therefore decisions and policy-making processes are not made in a vacuum but shaped by an institutional context shaped over a long historical period of time. (2) Collaborative interaction between economic actors is critical to building a strong economic system and, as such, patterns of state-society relationships, particularly the relations between state and entrepreneurial groups, need to be understood and developed. According to Meisel (2008), what distinguishes developed and laggard countries is related in large part to the state's capacity to coordinate agents, foster confidence in the behaviour and actions of the state and to establish development as a priority national objective. (3) Both markets and the state are important institutions and therefore neither the notion of 'institutional primacy of the market' (Chang 1994b, 298) nor the fixation on the free markets as the fulcrum of economic systems and efficiency is helpful. (4) Finally a wider set of economic and non-economic actors and institutions drive the economic system, therefore the state has a strong coordination role to play in ensuring harmony and effectiveness of the system.

From the above, an enduring, important and continually relevant insight that emerged from the earlier development economists was that underdevelopment resulted from poor coordination failures that foreclose complementary investments (Ray 1998). It therefore called forth the function of the state as an entrepreneur in addition to its role in attenuating uncertainty and in conflict resolution. For this reason, the debate that focuses too much attention on how much and in fact whether the state should play any role at all is unhelpful; the more useful approach is to determine the specific roles the state and other actors should play in the process of structural change. In this chapter I will try to elaborate a framework of state-innovation policy intervention that we may want to focus on in a comparative analysis of different African experiences over time and in different contexts. This paper takes the position that states and markets are both socially constructed institutions; both their nature and roles should therefore be interpreted within the historical interrelationship within which both evolve.

Innovation and innovation policy

Innovation has been a key driver of the cumulative increases in productivity growth in industrial countries and is driven by technological change, investment in physical capital, and the growth of human skills.[13] However, these factors are shaped in very profound ways by institutions and policies. Deliberate investments in building up what is now broadly referred to as 'systems of innovation' involves purposive actions of governments in the creation of organisations and incentive mechanisms to foster the creation, transfer, adoption, adaptation, and diffusion of knowledge. This is where developing countries face considerable challenges given that the condition of underdevelopment in itself signifies in part poor capacity to bring about effective coordination of agents within this system.

An important tenet of the system view is that non-market avenues are just as necessary in fostering development (contrary to the pure market view) because as Lundvall (1988) and others suggest, the market alone is a poor filter for firm-level technical change, which is the locus of production and innovation. Although these non-market mechanisms are important, they are notably weak and suffer from poor systemic coordination in developing countries. Prominent among these are the structures of research and development (R&D), finance support, metrology, standards and quality centres, and, at the base of it all, the system of education, which is responsible for new knowledge from basic research and the training of scientists and engineers.[14]

Clearly there is a need for dynamic innovation policies in a global system that has become more complex, knowledge-based, and innovation-driven, and in addition the promotion and nurturing of critical institutions in which policy is embedded. An important role of innovation is that it attends to not just the activities of the firm, but the interaction between economic and non-economic actors. As (Edquist 2001) notes: *interactions should be facilitated by means of policy-if they are not spontaneously functioning smoothly* (emphasis added). This is a particularly significant function because developing countries lack organisations and institutions for the regulation and coordination of innovation activities. To effect structural change, governments of successful industrialising countries – as has happened in much of East Asia and in the transition countries of former Eastern Europe – deployed innovation policies to redesign and re-engineer institutions and organisations. (Lall 1994). In all these cases, state actions involved correcting markets, creating new ones when they were absent, and complementing existing ones when they were not functioning perfectly. This is because developing countries are characterised by a variety of underdeveloped markets,[15] such as the input markets for skilled and unskilled labour, capital, foreign exchange, and product markets for consumers and intermediate and capital goods. In the context of innovation promotion, markets fail to provide knowledge inputs such as extension services for standards setting, testing,[16] metrology, quality and information, intellectual property (IP), vocational, technical and skills training, and scientific and technological laboratories that could be private or public research organisations (Oyelaran-Oyeyinka 2012).

In the next section I draw on an earlier paper (Oyelaran-Oyeyinka 2012) to suggest an outline framework of what the roles and functions of states and innovation might be in promoting structural change.

States define an innovation and industrial vision

One of the most important steps towards engaging the key actors in an innovation system is to define a vision that guides the missions and subsequent actions. Doing this demands considerable investment in a priori knowledge and information gathering through the convening of various actors in society in order to reach a consensus among the different agents. The state role in this respect is important due to its convening power which makes it the only entity capable of such an entrepreneurial mission. We have examples from governments of both Western and late industrialising countries that have carried out similar entrepreneurial functions during the process of development. While the success of the East Asian countries has been the most widely cited in contemporary literature (Amsden 1989), the state has been equally active in older industrialised countries such as the United States, where the government historically played a very active entrepreneurial role during the process of industrialisation by supporting public research and protecting infant industry (Chang and Rowthorn 1995). One of the hallmarks of the innovation policy of East Asian countries is the attention paid to strategic long-term vision and equally the success of the planning process (Freeman 1987, Johnson 1982, Oyelaran-Oyeyinka 2012).

States formulate innovation policy for collaborative-coordination and efficiency of innovation systems[17]

The national SI is defined as 'the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies' (Freeman 1987, 1). Lundvall's concept of the national SI emphasises the diffusion of 'economically useful knowledge' (Lundvall 1992, 2). There is a wide variety of definitions (Nelson and Rosenberg 1993, Metcalfe 1994), but there is also a fairly good convergence of the key ideas at the heart of the SI framework. One such notion is that capabilities across regions and nations differ reflecting the skewed effect of innovation performance (Oyelaran-Oyeyinka 2006).

Within the states-innovation framework advanced in this chapter, the capacity for innovation policy-making should be taken as one of the foundational roles of the state, built to drive the vision of economic progress through structural transformation. While African countries broadly embraced the key elements of innovation policy, including investment in productive and design capacity, the key function of promoting horizontal collaboration of economic and non-economic actors has not been taken quite on board, while attention has mainly been on transfer of skills and equipment from industrialised countries. Clearly the role of institutions as a determinant of productive knowledge creation and exchange is now acknowledged as very important and therefore should be factored in future innovation vision (Oyelaran-Oyeyinka 2006).

States build missing institutions and strengthen weak institutional structures

Following from the above, the state must emphasise the building of a wide variety of formal and informal

institutions that support innovation policy. There are a number of steps: one is the design of missing ones, the re-building or reconfiguration of existing forms be they policy, economic or political that regulate innovative activities, and encourage communication between the state and society.[18] Another is to establish the innovation parameters for, and invest in knowledge bases to guide the different actors in the innovation system. These new institutions are important to support the process of structural transformation because of the dynamism of economic radical changes that accompany economic growth.

Industrial manufacturing source of economic growth and Africa's de-industrialisation

This section of the paper focuses on the critical role of manufacturing as the core driver of industrialisation-led structural change. Also, dynamic manufacturing performance is clearly very important to innovation-led development because this is precisely where most African countries tend to have made the least progress. For instance, while countries in Africa have recorded impressive economic growth rates whereby about 60% of African countries are now in the group of the fastest growing countries of the world,[19] concerns remain as to their competitiveness, economic diversification (from mono-production), long-term stability, and the ability to assure shared growth across societies. According to Rodrik (2013):

> Fewer than 10% of African workers find jobs in manufacturing, and among those only a tiny fraction – as low as one-tenth – are employed in modern, formal firms with adequate technology. Distressingly, there has been very little improvement in this regard, despite high growth rates. In fact, sub-Saharan Africa is *less* industrialised today than it was in the 1980s. Private investment in modern industries, especially non-resource tradables, has not increased, and remains too low to sustain structural transformation.[20]

For instance, even though in the last two decades, Africa has witnessed the expansion of services sectors, Nigeria, our country case study, an oil-producer and exporter, is one of the least diversified economies, with a very insignificant manufacturing sector contribution to the total output in the economy despite decades of industrial development efforts (The Economist 2014).

Figure 1 shows the contribution of the key sectors in Nigeria; employment share in agriculture declined from 74.18 in 1980 to 58.88 in 2010 while the contribution of the sector rose from 20.61 to 40.84 to GDP during the same period. Similarly in the services sector, the share of employment rose from 15.73 to 35.35 while its contribution to GDP rose from 15.05 to 18.10 during 1980 to 2010, while that of industry and by implication, manufacturing declined from 19% to 5%. The rise in services is not unexpected given the significant contribution of telecommunications in the over more than ten years, but the decline in industry consistent with the above analysis for the different regions does present a source of worry for a country desiring to industrialise.

The case for industrial manufacturing as 'the engine of growth', which in our view remains relevant, was made a long time ago through a seminal work trying to explain the slow rate of growth in the United Kingdom by Nicholas Kaldor (1966, 1967) and coded in *Kaldor's Laws*. They can be summarised as follows:[21]

(1) The faster the growth rate of manufacturing output, the faster the growth rate of GDP
(2) The faster the growth rate of manufacturing output, the faster the growth rate of manufacturing labour productivity (due to increasing returns)
(3) The faster the growth rate of manufacturing output, the faster the growth rate of non-manufacturing labour productivity (due to reallocation of labour).

Several studies following in the Kaldor tradition have established a clear empirical correlation between the degree of industrialisation and the level of per capita income in developing countries (Rodrik 2009). Not

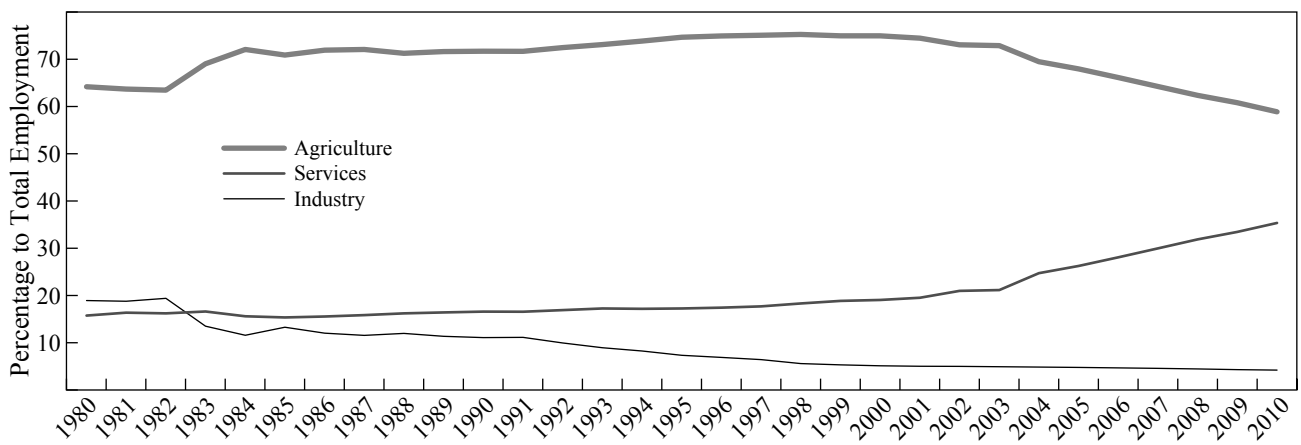

Figure 1: Structure of employment, Nigeria (1980–2010). Author: Calculated from National Bureau of Statistics Database

surprising, almost all developing countries that recorded higher per capital incomes concomitantly have a relatively high share of manufacturing in GDP and also a rise in levels of employment; for the more dynamic emerging countries, this is accompanied by dynamic growth of manufacturing output and manufactured exports. Poor countries, on the contrary, tend to record high levels of agricultural labour force and low manufacturing contribution to GDP. Second, developing countries that are industrialising are associated with a positive GDP per capita and shares of manufacturing correlation. This is because productivity is higher in the manufacturing sector than in the agricultural sector (Szirmai 2009). Structural change through an industrialisation pathway implies the shift of resources from agriculture to manufacturing, and this process continues so far as the share of manufacturing continues to rise in overall GDP (Rodrik 2009, Kathurai and Raj 2009).

Third, in contradistinction to agriculture, industrial manufacturing pathways are a faster road to capital accumulation; this is particularly so in spatially concentrated manufacturing (cluster agglomeration) compared with spatially dispersed agricultural activities. Capital intensity is equally high for sectors linked closely to manufacturing such as mining, utilities, construction and transport and much lower in agriculture and services. Capital accumulation is one of the aggregate sources of growth, therefore as the share of manufacturing rises, aggregate growth contribution increases. Fourth, industrial manufacturing pathways make possible large gains in economies of scale, which is often not realised in agriculture or services, (Cornwall 1977). As a large body of literature points out, technological change and innovation is largely concentrated in the manufacturing sector and diffuses from there to other economic sectors such as the service sector (Rosenberg 1982; Nelson and Winter, 1982).

Fifth, linkage and spillover effects are far more prominent and widespread in diverse industrial manufacturing compared with agriculture or mining. The notion of inter-linkages and their effects was made popular by Hirschman (1958) who analysed the direct backward and forward linkages in production and this has come to include other interactive relations between different sectors and subsectors in system of innovation literature (Lundvall 1992, von Hippel 1982). The cluster benefits include different kinds of linkage effects that create positive externalities to investments which include spillover effects (the disembodied knowledge flows between sectors).

The underlying reasons for Africa's de-industrialisation

The continent has experienced notable de-industrialisation due in large part to the structural adjustment programme adopted by African countries. In the period 1980 through 2010, the share of manufacturing output in total gross output on the content declined from 12% to about 11%. East Asian countries had contrasting experiences in this respect, maintaining a share of manufacturing output to gross output of about 31% over the same period. In addition, while much of growth in Africa is not employment generating some East Asian countries by encouraging the rise and development of labour-intensive industries generated employment, accompanied by rising incomes and sustained growth experiences and improved social welfare situation.

The table below shows how Africa has fared in comparison with East Asia on several counts. While Africa's industrial capacities declined, East Asia grew in per capital income and in share of global exports. In contrast to ineffective policies in most of Africa, the industrial policies drafted and effectively implemented in countries of East Asia backed by deep sense of political will and supporting institutions produced notable results. Incentives such as subsidies and trade protection to promote infant industries were put in place, the imprints of a colonial past are still on the African industrial trajectory today, as its industries are mere feeders of raw material into the economy of the colonial advanced countries as it was in the colonial times. The colonial structure, institutions and infrastructure left decades after countries gained independence were adverse for manufacturing-driven industrialisation, only supporting extractive industries which make most exports from the country primary goods intense, with little purpose for value addition.

The post-independence experiences of African countries saw the application of externally motivated policies in quick succession, which in turn had adverse effects on economic performance. These include import-substitution industrialisation (ISI) strategies, structural and adjustment programme (SAP), all of which failed to advance Africa's industrial progress. The failure of the different industrial policies resulted in increased unemployment rates across the region and mono-product economies and thus exports are concentrated in certain sectors of the economy. It is thus imperative that for lost ground to be gained Africa needs to rethink and correct past industrial policies in order to spread the effects of the recent high rates of growth to more sectors, and for it to be inclusive in nature, translating to social and economic development (not just growth).

The de-industrialisation of African economies reflects in part the impact of premature openness of these economies (through liberalisation, promotion of FDI and other measures). As Rodrik notes, 'Countries whose economies grow fast typically also become more open; but the converse progression – from greater openness to faster growth is much less apparent.' (Rodrik 1999, 13) However, these externally imposed policies could not work in the absence of the right capacities for policy and technological management. The other pieces of the

Table 1: As Africa de-industrialised, East Asia was fast industrialising

	1970	1980	1990	2000	2010
Africa					
Nominal GDP per capita (US$)	246	900	780	740	1,701
Share in world output (%)	2.75	3.65	2.22	1.85	2.73
Share in global exports (%)	4.99	5.99	3.02	2.31	3.33
East Asia					
Nominal GDP per capita (US$)	335	1 329	3 018	4 731	8 483
Share in world output (%)	9.83	12.94	18.14	21.53	20.69
Share in global exports (%)	2.25	3.74	8.06	12.02	17.8

Source: World Bank, World Development Indicators 2012

puzzle include infrastructure, human capital, financial investment, policy and institutional capacity. Investments in infrastructure, especially in the industrial sector, have significant growth-enhancing effects in countries with lower levels of development (Ocampo and Vos 2008). In the absence of this, just making investments in human capital without corresponding changes in the productive structure to create demand for the skills acquired, such investment carry the danger of knowledge flight through emigration (Ocampo, et al. 2007, 200, LDCR 2007).[22]

Commodity-dependence forecloses manufacturing

Another notable pattern of exchange that defines Africa's past and present is the dominance of commodity exports. Africa is endowed with physical, natural and human resources that can be employed to support industrialisation and structural changes driven by value-addition promoting policies at all sectoral levels of consideration. The share of Africa in world mineral reserves is 12%, 42% of world's gold, over 80% of the chromium and platinum group metals, 60% of arable land as well as wood resources.

With increased global demand for minerals and raw materials, Africa thus has a comparable advantage as a supplier of such materials. Her endowment of resources is a platform for new partnerships being sought for Sino-Africa relations, in exchange for the development of physical infrastructure, potential for sharing ideas, technical skills and production technology across borders and increased South–South relations. However exporting raw materials to industrialised countries and the emerging South accompanied with export of employment opportunities to those countries, is hardly supportive of domestic manufacturing capacity development. The overdependence on non-renewable commodity production does not guarantee the sustainability of the economic system and the lack of manufacturing value addition activities within national systems do nothing to move a country/continent on the value chain in ways to increase employment for the development of the economy. Natural resources can be at risk as it is for most of such goods, because the price is determined in the global market, which is subject to volatility over time and unpredictable fluctuation in the volume of trade.

The boom enjoyed due to rise in global price of commodities is notable but been over reliant on the dynamic global market for windfall gains via resource rents may fail to propel the economy into sustainable development path. This is because natural resources are subject to continuous depletion and can be exhausted and particularly with more countries discovering more of the same resources, there is the potential for a glut in the global market which cause global prices to plummet in response and a consequent bust cycle for the economy of African countries. Mastery of manufacturing in value adding processes for those commodities has enabled a move from being mono-product exporters to engagement with more diversified product markets. However, I argue that commodity dependence as a pathway for development is a risky agenda for several reasons. First, the current pattern of exchange of cheap manufactured good for commodities has weakened Africa's manufacturing capacity, leading to de-industrialisation. For example, Chinese firms tend to invest in extractive industries relying on imported Chinese labour. This strategy foster unemployment and reduce the dynamism of the different sectors to foster value addition. However, the more fundamental problem for commodity-dependent economies is that it promotes extractive institutions which are difficult or impossible to deal with in the context of weak institutions that characterise underdevelopment (Rodrik 2009). To start, there is a secular propensity of declining terms of trade for primary commodities. This is because of well-known price volatility as well as that income elasticity of demand for manufacturing good is relatively higher than that of primary products. In other words demand for manufactured goods rises faster; and for this reason, there is the clear prospect that revenue from commodity export will lag behind that of manufactured goods. While a commodity boom opens up a revenue window for Africa, the region needs to focus on the manufacturing pathway for sustainable development. In the next section I discuss in more detail the elements of *extractive institutions* that characterise mineral-dependent economies and commodity-led growth.

Mineral and commodity dependence leads to de-industrialisation

The region as noted in the previous section has developed its economy around minerals and petroleum exports since independence. In this section, I will argue that the focus and investment in developing the economy around non-manufacturing has contributed significantly to de-industrialisation because of the peculiar nature of mineral -dependent economies. I call attention to a typology of three economies namely: mineral-dependent economies, agriculture dependent economies and manufacturing dependent economies. For our purposes it is useful to distinguish between high level dependence, where either minerals, agriculture or manufacturing account for 40% or more of total exports, and medium-level dependence, where one sector accounts for a share of total exports between 20% and 39%. Low dependence would indicate a 10–19% share of the sector out in total exports.

A cursory examination shows that many of the sub-Saharan African countries exhibit high mineral dependence. In 2010, diamonds, not mounted or set, accounted for over 68% of Botswana's exports. In Ghana, data shows that exports are dominated by gold, which accounts for 45% of exported goods, and cocoa beans, which account for 25.6% of total exports. Thus Ghana exhibits a high dependence on minerals and a medium level of agricultural dependence. In 2009, 41.9% of Kenya's exports comprised food, live animals, beverages and tobacco, much of which was tea, cut flowers, vegetables and coffee, thus signifying a highly agricultural dependent economy. Nigeria exhibits the highest level of mineral-dependence in our sample, with 87.1% of exports in 2010 comprising mineral fuels, lubricants and other related petrochemical materials, according to the Standard International Trade Classification (SITC)**.** South Africa is also a mineral-dependent economy, though it exports a broader array of minerals, including platinum, coal, ferro-alloys, iron ores and concentrates, diamonds, petroleum minerals and manganese ores. Finally, export data from 2010 shows a high level of mineral dependence with very little to show for half a century of effort in non-mineral exports.

By contrast, Asian economies are heavily manufacture focused. Machinery and transport equipment accounted for 49.5% of Chinese exports in 2010, and miscellaneous manufactured articles followed as the second most prominent SITC section with 23.9% of total exports. Hong Kong's exports in 2009 were similarly dominated by various manufactured goods, including machinery and transport equipment (55.9%) and miscellaneous manufactured articles (23.7%). Indeed, machinery and transport equipment also accounted for the largest share of exports in the Republic of Korea in 2009 with 56.8%, in Singapore in 2009 with 51.9%, and in Thailand in 2010 with 42.2% of total exported goods (see Table 2).

Though there is a great deal of variety among mineral-dependent economies, and similarly within agriculture and manufacture-dependent economies, there are important trends within each typology that are worth further attention, particularly as they pertain to economic development and social welfare consequences. Some of these trends are clearly evident even in the small sample of countries we have highlighted in this paper. Nigeria is the most intensely mineral-dependent, has a relatively very high multi-dimensional poverty index (MPI), a low human development index (HDI), and high level of inequality (high GINI coefficient).

While there may not be sufficient evidence to support a robust deterministic relationship between mineral dependence and economic growth or reduced social welfare, there are clear pointers. The poor economic and social performance observed in economies with abundant mineral resources in the past four decades indicates that mineral dependence has on the whole been more damaging than beneficial to development. In what follows I discuss some of the key characteristics of Africa's mineral-dependant economies and analyse how they countervail manufacturing production.

Mineral dependence fosters weak sector diversification

A central function of innovation policy is to promote systemic interactions among economic and non-economic actors at both sector and national levels. Enclave institutions do little to promote actor collaboration. The Dutch disease effect explains how resource abundance that generates large quantities of foreign exchange can distort exchange rates and domestic wages, thereby damaging the growth of other sectors of the economy. To elaborate, the Dutch disease is an economic phenomenon by which revenues from natural resource exports damage a nation's productive economic sectors by causing an increase of the real exchange rate and wage increase. This makes tradable sectors, notably agriculture and manufacturing, less competitive in world markets. The increasing national revenue will often result in higher government spending (health, welfare, military) that increases the real exchange rate and raises wages. The weakening of in the sectors exposed to international competition and consequent greater dependence on natural resource revenue leaves the economy vulnerable to price changes in the natural resource. Also, since productivity generally increases faster in the manufacturing sector, the economy loses out on some of those productivity gains. Dutch disease first became apparent when the Dutch discovered a massive natural gas field in the North Sea in 1959. This phenomenon results in an economic structure concentrated on export of minerals that is termed an 'enclave economy'. Enclave economies are necessarily of a finite duration, dependent on the level of the mineral endowment. Lack of diversification in enclave economies tends to reduce the ability of governments to sustain

Table 2: Countries export typologies and key development statistics

Country	Total value exports (US millions)*	Value top 5 exports (US millions)*	% top five exports*	Economic typology	GDP per capita (current US$) 2010	Labour productivity 2008
Ghana	3 809.9	2 826.5	74.19	Mineral – High	1 287	3 647.10
Tanzania	4 050.5	2 030.9	50.13	Mineral – High	527	1 571.79
Kenya	4 463.4	1 870.0	41.90	Agriculture – High	769	2 453.11
Botswana	4 693.2	3 923.2	83.59	Mineral – High	7 513	–
South Africa	71 484.3	29 041.8	40.67	Mineral – High	7 280	11 984.32
Nigeria	86567.9	78 548.2	90.74	Mineral – High	1 224	4 670.76
Thailand	195 311.5	41 953.3	21.48	Manufacturing – High	4 679	15 547.95
Singapore	269 832.5	128 708.9	47.70	Manufacturing – High	43 324	45 786.45
Hong Kong	329 421.9	109 961.0	33.38	Manufacturing – High	31 877	58 605.00
Korea	363 531.1	136 282.8	37.49	Manufacturing – High	20 757	40 261.08
China	157 8200.0	337 900.0	21.41	Manufacturing – High	4 393	10 377.86

Source: UN Comtrade and International Labour Organisation, *Key Indicators of the Labour Market (KILM)* *Most recent year available.

a welfare state or social security network beyond the lifetime of the mineral resources.

Lack of sector diversification is due in part to poor linkages because the mineral sector is generally dominated by large-scale operations and transnational corporations that do not have substantial connections with other economic sectors. Oil production for example is an 'enclave sector' that therefore produces very few spillover benefits to other sectors in the economy, or even within the sector itself. The enclave phenomenon is the very antithesis of manufacturing because the latter has the propensity to generate wide backward and forward linkages.

Contrasting impacts of manufacturing and mineral sectors on employment

Another negative consequence of the enclave economy is limited employment opportunities as excessive capital and labour resources are directed towards primary production in the exhaustible mineral sector. The mineral industry especially employs a highly specialised group of professionals and is highly capital, technology-intensive, but precluding widespread employment. Oil dependence combined with the inability of a country to add value to these resources by refining its own crude mineral or producing other petroleum based products further diminishes employment opportunities for university graduates. Thus the inability to capitalise on mineral products beyond extraction results to missed opportunities for skilled workers such as engineers, scientists, researchers, environmentalists, accountants, and lawyers among others.

Large investments in the mineral sector by transnational corporations does in fact compete for the use of other resources such as land and water, a factor that further reduce agricultural development opportunities. Large-scale investments also impact employment in rural areas, particularly if they affect small-scale agriculture that otherwise would provide employment for a significant share of the labour force. In the Niger Delta region due to mineral spillage and pollution, fishing activities have been reduced, reducing access to gainful employment for some, destroying prospects of long term local economic development.

Whereas the mineral economy is dominated by large-scale investments and massive transnational corporations, manufacturing economies provide much greater opportunities and wider scope for small and medium enterprise production, which lead to more widespread employment than is found in mineral-dependent economies. Manufacturing is labour-absorbing and indeed has a higher potential for employment creation than the agricultural sector as well. Due to diminishing returns to scale in agriculture (and for that matter, mineral extraction) because of fixed factors including land and natural resources, the employment growth potential in these sectors is necessarily limited. As a country's population and economy grows, manufacturing must also expand to absorb the displaced labour from less productive sectors. Following Engel's law, the share of agriculture in total household expenditure falls as per capita income rises, while the share of manufactures increases. This implies that manufacture offers significant opportunities for export market expansion and therefore is a key driver of growth in merchandise trade. Notably, countries that have derived significant benefits from the rise in merchandise trade over the past three decades are those that have increased their exports of dynamic products, particularly manufactures, with high income elasticity of demand. Consequently, what a country produces and exports matters (Rodrik 2011).

Although there are many advantages of a manufacture-dependent economy, there is a close connection particularly in value addition, between agriculture and manufacturing; it is the reason why the neglect of agriculture is as tragic as Africa's de-industrialisation. There are many complementarities between agriculture and industry, including the prospects of forward and backward linkages already noted, and the fact that

agriculture can contribute to creating a competitive advantage for domestic manufacturing firms, while in the short-to-medium term, it could produce the foreign exchange needed to import intermediate inputs for use by domestic industries. Appendices 1 and 2 show the distinct differences between Nigeria and China, typical mineral dependent and typical manufacture dependent and clearly why China has become the second richest country in the world and Nigeria despite considerable mineral resources still has its citizens wallow in poverty.

Another employment limiting effect of mineral-dependence is that upstream activities in the petroleum and oil value chain, for example, mineral refineries or petrochemicals processing, tend to be located in developed countries. This limits the value that developing African countries can capture from their mineral resources and reinforces the lack of sector diversification by focusing economic activity entirely on extraction with little investment in manufacturing. An additional trend in mineral dependent countries is underinvestment in human capital (specifically education), which is a result of the lack of demand in the mineral sector for broader sets of educated, skilled labour. As noted by the United Nations Research Institute for Social Development (2010), conclusions drawn from comparing education investment in countries with varying degrees of resource wealth (based on the assumption that those without mineral wealth would have a greater demand for labour productivity and thereby human capital in non-mineral sectors) have however been contested on measurement grounds as well as use of indicator variables. Nonetheless, only very few countries, such as Botswana, have actually used mineral rents to increase investments in education.

The state and industrial progress in Nigeria as a case study

Development is in the long-run a complex, non-linear process that demands continuous learning and experimentation. The latecomer firm or country by definition could learn from other forerunners but in reality capability building processes are fraught with the possibilities of costly failures[23]. Several countries on a supposedly sound catch-up path often do not move as predicted or regress along this path mainly due to the inability of these countries to manage the coordination efforts required in setting up a sound basis to move to the next knowledge domain. In what follows we provide a narrative of learning and industrialisation failure in Nigeria. At the end we will interrogate our narrative of state capacity by probing if the Nigerian state played the five roles formulated in the framework of section two.

Context and consequences of Nigeria's failed industrial efforts

In order to give a background, we recall that Nigeria invested billions of dollars in building what constitutes the foundations of a modern economy, namely iron and steel plants, petrochemical (Eleme), fertiliser plants (Onne and Kaduna), refineries (Port Harcourt, Warri, Kaduna), among others, much of it run by highly-educated Nigerians, but currently the country has little to show for all these in terms of industrial outputs and structural transformation. Again, after more than four decades of industrialisation and development efforts, Nigeria's economy is still dominated by low-productivity agriculture and petty service activities compared with her Asian comparators (for example, Malaysia, Thailand) that have become centres for global production. Industrial activities and services have expanded but compose largely of mining, the exploitation of crude oil and, telecommunication made up mainly of the telephone segment. The share of manufacturing value-added in total GDP remains very low. Crude oil exports account for approximately 70% of total exports during the last four decades, a clear manifestation of lack of significant structural change, low sector dynamism and over-dependence on a single commodity.

There has been consistent economic growth in some key sectors over the last few years; however, the growth has not translated into appreciable change in the life of the average Nigerian. Oil and gas continues to dominate overall revenue generation in spite of the emergence of telecommunication and the resurgence of agriculture. The quantum of wealth from subsistence agriculture has not transformed the rural areas because it operates in large part with poor technologies with a low-skill base. Between 1980 and 1996, Nigeria's poverty level rose from 28 to 66%. GDP per person in 1982 was US$860; in 1996, it was US$280. At present (2010), it was reported to be US$290. Numerically, while 17.7 million people lived in poverty in 1980, the population living on less than US$1.40 a day rose to 67.1 million by 1996 and 100 million in 2012. Poverty and inequality have worsened and, while relatively less well-endowed countries are lifting large populations out of poverty, Nigeria's sink deeper into poverty.[24]

Symptomatic of the lack of industrial dynamism is the level and rates of unemployment. National unemployment rates rose to levels above one in five persons, the sudden acceleration in unemployment numbers from 2007 paradoxically coinciding with the liberalisation of the telecommunications sector. The unemployment rate is seven times the population growth rate, meaning that not only is there a dearth of opportunity for the newly-employable, but existing industries are shedding jobs. Large rates of unemployment in an emerging economy such as Nigeria might well signal the growth without development that characterises an economy that is almost fully-dependent on oil exploitation whose growth is disconnected from a large segment of the labour market.

The country's growth rate has been based on resources exploited by a few, despite being national by design.

Nigeria's paths of development are principally defined by choices made within a framework of state investment planning processes. This was common in many developing countries before the wave of privatisation swept through in the 1980s. While state investment in public utilities such as power and water remain common to industrialised and developing countries alike, intervention in directly productive sectors is more a feature of developing countries. Justification for this is wide and varied, ranging from economic and political to historical. To start, large-scale investment require heavy financial outlays but is characterised by low returns (at least in the short run) – a feature of capital-intensive manufacturing and service sectors. Once investment is made in these natural monopolies in the service sector and in oligopolies that produce tradable goods such as fertilisers, steel, petrochemicals and others, the tendency is to hold on and to control the enterprises. Other economic reasons relate to market failures, imperfection in factor market, lack of information, low level entrepreneurship and high-risk aversion of private capital to key and service sector investments.

In Nigeria, some of the above reasons were given for the widespread investment in public enterprises. Large-scale technology projects for several reasons were the choice undertakings. First was to generate domestic technological capacity (increase in physical capital); second was to develop endogenous technological capabilities (human knowledge and resources) in design, production and innovation; and third was to generate employment. The overall aim might have well been to deepen the industrialisation process and to hasten development. By the end of the 1990s, total Federal Government investments were worth over 36 billion Naira at their historical book values. Nigeria's Bureau of Public Enterprises (BPE) survey (1991) showed the magnitude of state intervention in Nigeria, in that there were more than 600 public enterprises at the Federal level alone and several smaller ones at the state level that accounted for between 10% and 40% of fixed capital and formal employment. However, over time the huge investment and continued state participation in industrial production came under intense questioning.[25]

Public ownership of industry in Nigeria achieved minimal success and many of the projects failed; failure in the context of this narrative being when a project encounters severe cost and time overruns, operates persistently below design or nominal capacity and due to the above factors, cannot build up technological capabilities, operates at a financial loss and in the end falls short of meeting social and economic objectives. This was in large part the fate of many of the projects, which failed despite huge investments by the government. For example, the Federal Superphosphate Fertiliser Company in Kaduna, completed in 1973, to produce superphosphate fertiliser and sulphuric acid for the Nigerian market, collapsed within ten years of commissioning. The fate of the Delta Steel Company in Warri was not much different. The company was operating at about 4% of capacity after fourteen years in operation. The same can be said of the Machine Tools Company in Oshogbo, which suffered several years of delay and cost overruns. The Iwopin Paper Mill was uncompleted, while Oku-Iboku paper mill closed down.[26] These were companies that were of strategic importance to the Nigerian economy. The fertiliser companies were expected to contribute to increased agricultural productivity and supply of food. The machine tools company was expected to service the informal sector as well as the large and small-scale industries whose contributions to the economy are enormous, while the paper mill was expected to facilitate literacy in the country. There are many more examples of large technological projects that failed in Nigeria. Clearly, the failure of these strategic projects contributed significantly to the poor contribution of the manufacturing sector, which is less than 10% of GDP. In the next section, I provide an outline of the underlying causes of the failed innovation policies and implementation.

Policy and technical challenges leading to public industrial pathway failure

The state enterprises which were largely import-substituting were grossly inefficient. They were generally plagued by excess capacity because of the inability to maintain plants locally, to substitute local for foreign materials, and to provide basic technical management skills. Most of the spare parts and components needed for repairs and maintenance in the plants had to be imported, mainly from Europe. They were therefore faced with perpetual shortages of these parts, which were commonplace items within the industrial system of advanced economies.

Again, large-scale projects are often very capital and technology intensive, requiring multiple technology mastery efforts in implementation, and the management requirements of such projects are usually far beyond what most developing countries like Nigeria possess. For the Nigerian government, though, domestic participation in technological acquisition was a key objective. This constituted a significant drag on the speedy completion of projects, although the general reasoning was that it was a worthwhile price to pay. Public servants, with the advice of young engineers relying on no more than theoretical knowledge of how industry works, assumed the enormous responsibilities of planning and managing large-scale process plants, roles for which they were ill-prepared. Furthermore, in order to encourage local participation in the project, civil and construction works were reserved for Nigerian contractors, which also caused a lot of problems in implementation. For many of the projects, the commissioning dates were never met. This caused a

lot of unnecessary delays and internal wrangling between foreign contractors and national bureaucrats.

Lack of institutional infrastructure leading to public industrial pathway failure

Nigeria's innovation system comprising institutional infrastructure was and remains to a large extent structurally weak. Technological infrastructure, including research and development institutions, quality assurance and testing, and technological information are all evidently ineffective. A vibrant system of innovation, which would guarantee a minimum interdependent relation among economic agents, is poorly functioning. While some technology institutions certainly exist in Nigeria, there appears to be limited interaction between them and the industrial sector. They thus operate in isolation from the productive sectors. In addition, many are not only poorly funded and given conflicting objectives, but also have inadequate equipment and unmotivated staff. Further, poor coordination among agencies competing for relevance, the limited skills of policy-makers, together with the paucity of scientific and technical personnel with the requisite understanding of the science and technology system, have jeopardised development objectives. Moreover, there seems to be a paucity of institutions that are critical to the industrial initiatives.

In addition, the ubiquitous lack of efficient physical infrastructure such as electricity for industrial purposes has been and continues to be a drag on to the economy. During the initial stages of operation of many of the plants, there were frequent interruptions of power supply by the now defunct National Electric Power Authority (NEPA). The issue of power supply, which should have been taken into consideration during the planning stages of the plants, had unfortunately been overlooked. When commercial production started in 1970s, the electrical power problem for most of the plants became more severe and was not rectified. By the mid-1980s, standby power generating sets were purchased to supplement the power supply from NEPA – this practice became widespread in practically all industrial installations.

Understanding failures of state intervention

Under this heading we call attention to six important issues for explaining the failure of earlier state action within the framework outlined above. To understand why despite plans and investments the state in Africa failed to benefit from policies that worked relatively well elsewhere in fostering structural transformation, we will return to the elements of the framework suggested earlier. The first duty of the state, we suggested, was about a definite vision; the question is: did the Nigerian government articulate a vision of what the future of the industrial landscape might look like? The most we can answer is that while there were several 'Development Plans' started in the 1970s, there was no guiding collective 'vision' by the leadership. Such awareness of the industrial imperative was not too common among the leadership, at the time emerging from a civil war (1969–1972) and preoccupied with uniting a fractious nation.

The first attempt at a Nigerian vision was undertaken almost forty years later, named Vision 2010, initiated by the military government of the time. As such, because there was no such overarching vision, the national plans fell victim to the traps of *involuntary entrapments of entrenched institutions* that shaped and subverted the entrepreneurial role of the state. Second, was there an attempt to create the sort of systems of innovation as we understand it today? In other words were there institutions that tried to integrate actor capabilities into a coherent productive system for say public-private collaboration? The answer is certainly not in the affirmative when we examine the overall capacity, knowledge base and disposition of governments and the different instruments applied over time, even if only in skeletal form.[27] An important but missing institution is the science and technology bureaucracy that the East Asian economies deliberately built up. There had been resistance to institutional changes, not surprising in late development conditions. The weak state capacity has institutional origins as well, as it is a result of low-level information regimes and low-level knowledge and skills for policy-making choices (Oyeyinka 2012). Third, we consider the custodial interventions of institution-building which relate to the creation and enforcement of rules and regulations. These rules are meant to prevent private factors from deviating from accepted norms of behaviour as well as induce them to act in ways to promote development. However, my conclusion is that the *rule-makers* of state polity as well as bureaucrats were in need of just the same types of rules to prevent them from subverting national vision and policies. While conventional wisdom focuses on the capability of the state to design and implement rules and regulations, the experience we share shows that regulations for private actors alone are not only inadequate but remarkably flawed in enforcement and too weak to sustain a long-term vision, to the point of jeopardising the most well laid out plans required for fostering industrial transformation.[28]

Fourth, was the state able to guarantee risks as insurance for innovation? The core elements of state intervention which aimed at 'midwifery' – the technique of inducing domestic entrepreneurs to make investments in targeted sectors – were equally not successful given that the fundamental capabilities of humans and infrastructure were absent and institutions were too weak to reduce the risk and uncertainty of such private investments. For example, a very important instrument is subsidies, complemented by protection (Amsden 1989, 1992). However in the absence of strong bureaucratic capacity to enforce performance standards in terms of output, exports, or other relevant variables, even this

instrument failed and become subject to destructive rent-seeking. Simply put, in the 1970s and early 1980s, when there was a profusion of National Plans and huge ambition, there were simply not enough capabilities to deal with the large-scale, capital and technology-intensive projects that were started all at once by Nigeria.

Conclusions

This paper sets out to examine the convergence of state capacity, innovation policy and the dynamics of development measured in part by structural transformation. The methodology is largely qualitative through a historical narrative of governmental investments in large industries, most of which largely failed. While we attribute much of industrial failure to a 'weak' state, we recognise the difficulty of the process of technological learning to industrialise in an environment of underdevelopment. Second, building state capacity is a complex, multi-level undertaking, making collaborative learning a central plank of development. It is complex because states need to provide coordination among very many disparate actors using a bureaucratic outfit that was short on the fundamentals of science technology and industrialisation processes. In other words, a lot of experimentation was going on all at the same time: in bureaucratic learning as well as in production processes at the level of the enterprises. Again, state capacity building requires coordinative capacity with the private sector and multinational companies engaged with the transfer of technology. This aspect of the learning and industrial management process was a new and challenging experience for Nigeria. It entails diverse ccollaborative interactions between economic actors that are critical to building a strong economic system for building state-society relationships and legitimacy – particularly the relations between state and national entrepreneurial groups. Third, a wide set of economic and physical infrastructure that was needed was at the most embryonic stage, a condition not uncommon with underdevelopment. As well, requisite economic and non-economic institutions necessary to drive the economic system were missing, as evident in our narrative; this hiatus did little to ensure the evolution, harmony and effectiveness of the industrial system. While the country had a relatively clear vision of its expected future industrial scenarios, it in the end had to contend with several sources of industrial bottlenecks that vitiated the expected capital formation and the promotion of technological capability accumulation.

We conclude that structural change is driven by and thus demands the building up of new capabilities and state capacity (bureaucratic and managerial) through sustained learning, and fostered and implemented through state policies and actions. Ultimately, the question posed by our findings would be not whether Africa needs capable states but it should be more about how the state should play a role, and what sorts of capacity will be needed for such roles to be effectively played.

In short, we make a case for a strong developmental state for African countries while we are aware that most have weak or no state capacity, which explains their backwardness in the first place. Therefore, an important issue to consider is what should be the right approach in the case of the countries that lack fundamentals of state capacity or have weak state capacity to foster such change. The above narrative points to the necessity for strong state capabilities as a necessary condition for long-run inclusive development, (Oyelaran-Oyeyinka and Gehl Sampath 2010, Oyelaran-Oyeyinka 2012. The question that arises for future research is what the significance is of the currently observed type and pattern of growth for African countries in the long term. Can this path of growth lead to sustained development and structural transformation? Is this dominant commodity-driven pathway the right path of development African countries should be embarking on? What are the possibilities to leverage a mineral-dependent or commodity-dependent pathway into more sustainable paths? In this paper, we conceptualise development in the broadest terms to mean a shift away from agriculture to engagement in high value manufacturing production and export, and such changes are driven largely by skilled manpower (technicians, engineers and scientists). This is why questions about the new growth impetus in Africa are relevant and we might perhaps pose the bigger question as to if and how this sort of growth, where manufacturing is conspicuously absent, might or might not lead to a 'structural transformation,' as described by Syrquin (1988). This chapter sought in large parts to interrogate state-led development in Africa's quest for structural transformation; we need to answer questions on the specific roles of the state and other non-state actors in this transformation i.e. is the state an entrepreneur, a producer or a regulator of these processes. How do we stimulate domestic firms for active engagement in value added activities in ways to achieve dynamic industrialisation? Since change lead to conflict, what capacities did the state have or still have to resolve conflicts, and attenuate among other functions, in the processes of these transformations? What are the institutions and institutional mechanisms that should be deployed to support this process? Furthermore, what capacity has been built and what more will be required to enforce these institutions? Innovation underpins development and growth particularly when it comes to investment decisions by enterprises, what role do institutions play to attenuate uncertainty through institutional building and enforcement? Lastly, what external factors have induced structural transformation in the current growing sectors and how sustainable are these likely to be? For example growth in much of Africa is being driven by

strong demands for resources by China and to a lesser extent, India. What is the contribution of this source to Africa's growth and what are the implications for long-run development?

Notes

1 Rodrik goes as far to declare that development economics is constructed around resolving the problems of market imperfection.
2 This is usually proxied by real capita GPD and total population.
3 Economists such as Chennery and Syrquin, Johnston, Mellor and Timmer have advanced on Kuznet's thesis.
4 http://rodrik.typepad.com/dani_rodriks_weblog/2014/05/todays-structural-transformation-is-a-more-mixed-story-than-in-the-past.html
5 Nigeria formulated successive five-year development plans after 1962, which were interrupted by the country's civil war (1969-1972). The first Nigerian National Development Plan was an ambitious economic plan launched in 1962 with a six-year target that envisaged the spending of about $1 900 000 000 on development and productivity enhancing projects. The plan was prepared by the Minister of Economic Development in concert with the United Nations and Ford Foundation experts, including the late economist Wolfgang Stolper. (See Adesioye BUN. 5-year plan a key to Nigeria future; development program aims at shift in economy oil increase is seen, New York Times, 9 January 1962 and (2) Nigeria Unveils Bold Six-Year Economic Plan, Chicago Daily Defender, Dec 26, 1962.
6 UNCTAD (2006) Least Developed Countries Report.
7 We define 'latecomer' as a country that is late to meeting up certain key capabilities compared with both the forerunners at the global frontier as well as competitors.
8 The 2007 World Bank African Development Indicators.
9 A recent IMF (2008) report projects a 6% growth rate for Africa.
10 Growth is measured by contribution to GDP.
11 Where increasing returns can be viewed as a situation whereby the proportion of outputs gotten out of the production process is greater than the proportion of inputs put into it.
12 The state is hereby conceptualised as a 'set of organizations invested with the authority to make binding decisions for people and organizations located in a particular territory and to implement these decisions, if necessary, by force (Evans and Rueschemeyer 1985. 46).
13 This section draws some insights from Oyelaran-Oyeyinka (2006)
14 The role of knowledge infrastructures and historical investments in universities and industrial and agricultural public research in Germany, Japan, the United States, and recently in Taiwan Province of China and Republic of Korea, have been well documented, see Mowery (2005).
15 A market failure occurs when three conditions are not met: 'the absence of externalities (external economies or diseconomies that affect the activity in question) and of public goods (commodities or services that, once provided, can be obtained without payment by others); second the presence of perfect competition; and third, a complete set of markets, including markets extending infinitely into the future and covering all risks' (Stiglitz 1996, 155).
16 15 European Union (EU) countries spend over Euro 83 billion yearly (approximately 1% of EU GDP), on measurement and standardisation (Wagner 2005).
17 I have used materials from Oyelaran-Oyeyinka (2006) here, largely definitional; also see Chang (1999, 1994) for details.
18 Various tasks should be included here: strengthening the judicial and legislative institutions, enforcing rules that consolidate an effective structure of political parties, creating informal channels of communication with relevant social groups, etc.
19 The Economist 2013.
20 http://www.project-syndicate.org/commentary/dani-rodrik-shows-why-sub-saharan-africa-s-impressive-economic-performance-is-not-sustainable#8r7VjpiX1FbVBRMF.99;
21 For more details, see Szirmai 2009; McCombie, 1983; Thirlwall, 1983; Lavopa and Szirmai 2012
22 As demonstrated by LDCR 2007, ch. 4.
23 Oyeyinka 2012.
24 Materials from this section are fully developed in B. Oyelaran-Oyeyinka (forthcoming 2014), *Rich country poor people.*
25 This led to the setting up of several study groups that reviewed the activities of public enterprises. In 1988, the government established the TCPC to carry out deep-going restructuring of the public ownership by privatising and commercialising the enterprises.
26 For a full account of the history of the projects cited and the broader industrialisation see Oyelaran-Oyeyinka et al. (1998): *Ailing public enterprises: Technological project failures and prospects for industrial renewal in Nigeria.*
27 Peter Evans (1995) distinguishes four different types of state interventions used to promote new industrial capacity.
28 This type of intervention is central for the minimalist neoclassical state. In fact the ability of the state to implement policies of liberalisation and deregulation ironically depends on its relative capacity as custodian.

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Appendix 1: Nigeria, top 10 export commodities 2008–2010

HS Code	4-digit heading of Harmonised System 2002	Value (million US$)		
		2008	2009	2010
	All commodities	81 820.5	49 937.5	86 567.9
2709	Petroleum minerals, crude	74 832.1	42 212	60 904.6
2710	Petroleum minerals, other than crude	7.9	15	9805
2711	Petroleum gases and other gaseous hydrocarbons	224.6	2 895.5	4 716.8
4113	Leather further prepared after tanning or crusting	468.3	315.1	2 073.8
1801	Cocoa beans, whole or broken, raw or roasted	510.3	1 250.9	1048
8905	Light-vessels, fire-floats, dredgers, floating cranes and other vessels	1 561.6	9.5	314.6
4106	Tanned or crust hides and skins of other animals, without wool or hair on	209.4	195	956.4
4001	Natural rubber, balata, gutta-percha, guayule, chicle	420.9	170.4	555.3
1207	Other mineral seeds and oleaginous fruits	153.5	194.7	641.5
3901	Polymers of ethylene, in primary forms	516	82.9	138.6

Appendix 2: China, top 10 export commodities 2008–2010

HS Code	4-digit heading of Harmonised System 2002	Value (billion US$)		
		2008	2009	2010
	All Commodities	1 430.7	1 201.6	1 578.2
8471	Automatic data processing machines and units thereof	105.7	101.6	139.1
8517	Electrical apparatus for line telephony or line telegraphy	89.9	86.5	106
8528	Reception apparatus for television	35.2	26.7	31.9
8473	Parts and accessories for use with machines of heading 84.69 to 84.72	32	26.2	31.3
8542	Electronic integrated circuits	24.7	23.6	29.6
8901	Cruise ships, excursion boats, ferry-boats, cargo ships, barges	17.2	23.9	35.2
9013	Liquid crystal devices	23.6	20.3	27.9
8541	Diodes, transistors and similar semiconductor devices	17	15.5	32
8443	Printing machinery used for printing by means of the printing type, blocks	19.9	17.1	23.6
8504	Electrical transformers, static converters	16.7	14.7	20.2

Source: UN Comtrade