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Industrial development for Africa: Trade, technology and the role of the state

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The discourse on the nature of the developmental state and industrial policy options for Africa has become central to debates on how to promote overall growth and prosperity in the continent. This article poses a fundamental question on the nature of the developmental state for Africa: should the developmental state be focused on applying policy learnings from other successful experiences of economic catch-up or should it be focused on identifying and addressing the challenges faced by African countries in particular in the current context? Arguing for the latter and cautioning against seeking to replicating successful experiences without a clear identification of local challenges to development, the article uses data from 1970–2012 to highlight the most pressing developmental concerns for sub-Saharan Africa. The paper then presents some thoughts on the nature, scope and form that the African developmental state can take.

Keywords: developmental state, trade, industrial policy, innovation capacity, sustainable development, technological learning

Introduction

Uneven industrial development has long been a core concern for economic theory. In their quest to articulate the fundamental constructs of a state that can promote industrial development, economists have argued and debated upon the notion of the 'developmental state'. Over time, the developmental state has emerged as a fundamental construct in current debates on what does and does not work for promoting sustainable and inclusive growth across countries. First widely explored in the context of Japan, the notion came to be widely recognised with the rise of the new industrialised economies of East Asia in the 1980s. One of the early authors on the subject, Johnson (1987) analysing the developmental state in the context of Japan defined it as a state whose role is to provide institutions that mimic the market mechanism by creating conditions that minimise uncertainty, socialise risk inherent to industrial activities, and encourage entrepreneurship and local technological advancement.[1] Over time, various studies have sought to expound upon the nature of the state that is fundamental to prevent developmental failures.

The interest in what may be the kind of state that is fundamental to prevent developmental failures has again been piqued by the rise of emerging economies such as Brazil, China and India as important economic powers; a process that has been accompanied by the simultaneous industrial and economic downturn of several other developing countries worldwide.[2] This dual phenomenon raises hope for a new future for the developing world, particularly in terms of what policies may work for development. Policy debates over the past few years have rightfully focused on how to define the nature of the developmental state, and what lessons can be extrapolated from the ongoing transformation of the emerging economies.[3]

At the same time, however, this 'sudden' rise of emerging economies in the developing world is confounding since it heralds a world with newer divides.[4] The new divides are multifaceted and more daunting in nature given that the global political context is now very different from the world in which the earlier tiers of new industrialised economies of East Asia and now the BRICS emerged to signal a new model of development based on learning through deliberate technological acquisition.[5]

All of these developments lend a new urgency to articulating the nature of a developmental state in general, and particularly for Africa, within the broader discourse on industrial policies and development. African countries, particularly in sub-Saharan Africa, often described by terms such as 'vulnerable'[6] and 'fragile',[7] are caught between the opportunities of global and South–South trade and the challenges of coping with promoting local industry while facing intense competition from other developed countries and the emerging economies. The challenges for policy making are numerous, starting from how to reduce reliance on resource-driven growth patterns, coping with impacts of the premature openness of economies, promoting sectoral diversification through learning and capabilities accumulation, fostering inclusive development and poverty reduction.

In an effort to propose a paradigm of growth for Africa, many recent studies have called attention to how African countries have witnessed strong growth in the 2000s (particularly up to the financial crisis of 2009) crediting their recovery post-2009 to 'sustained improvements in policies and institutions'.[8] Although the performance of SSA countries in the 1980s and the 1990s was rather dismal, these studies use the performance of most countries in the region in the 2000s to argue that a developmental strategy of minimising the state and maximising the role of the market is indeed beneficial. The fact that several African countries also showed progress on several important indicators of the World Bank and the IMF, such as political stability and good governance, is often also cited as milestone of success.

While proponents of market-led development approaches may rejoice in these observations, the impact of resource-led growth on industrialisation and structural change in sub-Saharan Africa (hereafter SSA) should not be underestimated. In fact, despite rising economic growth, there has been a slack in investment, low capital formation, low technological change, a movement of labour away from industry into agriculture and a negative net effect of international trade flows on demand expansion in most countries in sub-Saharan Africa between 2000 and 2009.

Weighing the emerging narrative against the general rhetoric on state-led versus market-led development strategies, some obvious questions emerge. Is the pattern of economic growth of the 2000s sufficient to make a definitive generalisation on the important role of market forces in developing Africa or does it call for a redefinition of the problem? Even if one were to assume that market forces have indeed ushered in much needed growth in SSA, does this invalidate a discourse on the role of the state?[9] And if not, what needs to be the cornerstones of such a discussion on the role of the African state?

Persuaded by the belief that the discourse on the nature of an African developmental state is long overdue, this paper seeks to analyse the key issues in this regard. The analysis is built around a simple yet fundamental notion derived from the earlier works of economic historians and political economists who explored the notion. The critical aspect of a successful developmental state has been that it has sought to tackle the existing challenges to development of that particular country at that particular point of time. Therefore, if the African developmental state is to succeed, then it is essential to move the discourse and academic discussion away from simply focusing on what lessons exist from already successful experiences for Africa, to exploring the current challenges that confront African countries and what could be the role of the state in resolving these.

The analysis in the paper therefore focuses on the challenges that confront African countries today, which may bear several similarities with what was faced by other countries before, but are more multifaceted and complex in nature. A key point of departure is the international context: the global political economy of trade and technology are different in several ways today when compared to earlier decades during which other developing countries employed the notion of the developmental state. Not only are countries bound to respect multilateral rules as part of their commitments to the World Trade Organization (hereafter WTO), there is a gradual but definite traction towards a global economic climate where international trade flows dictate the patterns of specialisation and development of countries. Statistical data helps to underscore this point better: excluding the examples of some economies such as China and India and some other South East Asian countries, growth trends in many developing countries and almost all least developed countries over the past decade have been accompanied by little changes in their productive structures (see for example, UNCTAD 2012). Furthermore, the policy space available to countries to respond to the challenges of integrating into global trade is also constantly on the decline. A large number of lessons on options available – for example, such as the limited use of intellectual property rights to allow infant industries to flourish from India or South Korea – are either inapplicable or very narrowly applicable in the current context.

This paper therefore begins with an assessment of whether there is indeed a choice between the state-led and market-led notions of development, suggesting a state that is conscious of the limitations of the market but is not shy to use it to achieve developmental outcomes. This is followed by an analysis using statistical data to show the negative impacts arising from the trade-technology nexus for structural change, and some thoughts on the nature, scope and form of the African development state. The analysis in this paper is based on field interviews carried out by the author in numerous African countries as part of her ongoing work, and on statistical data analysis of existing data on the topic. The term 'African countries' is used in this paper to denote countries of sub-Saharan Africa (excluding South Africa). While there may be some variations of the applicability of the findings (for instance, Nigeria or Kenya may not entirely face the same severity of constraints as some of the other countries). the analysis could not take on board these intra-regional variations.

Development: state-led or market-led?

The debate on whether development should be state-led or market-led that confronts African countries today is probably one of the oldest points of dispute in development studies. In theory, market-led or state-led developmental strategies are often suggested as two separate options for growth that one needs to choose from. However, in reality, it remains unclear as to whether a large number of developing countries have had any the freedom *yet* to

choose or exercise these options explicitly, barring a few which are the oft-touted examples in this regard.

Developing through the state or the market

A review of development literature shows that the market-led developmental paradigm, which draws quite simplistically from the tenets of neoclassical economics, argues for minimising the role of the state and allowing the market to allocate resources. The paradigm is rooted in the belief that the market is the best mechanism for resource allocation and has been reinforced time and again through a variety of international agencies, in particular the World Bank (see Stein, and numerous other authors). Market proponents believe that it is in fact the economic crises, primarily those of the 1970s, and their impact on widespread unemployment, inflation and trade deficits that allowed for market-led solutions to development, which relied on deregulation of markets and competitive industrial growth as longer term solutions to labour and finance (see Chang 2002, among others). Market proponents are keen to stress established shortcomings of the state, such as rent-seeking through state actors, the difficulties of engaging the private sector, creation of undue expectations regarding employment conditions (Olowu 2003), high transaction costs, undue coordination costs and information asymmetries. Several donor agencies, following the World Bank, have promoted a market-driven developmental approach in Africa, and advocate approaches that are 'hands off' and devoid of interventions from the state.

Despite this, the past decade has seen increasing emphasis on state intervention, particularly through industrial policy. A clear case for a state-led developmental paradigm has also been reinforced by macroeconomic growth patterns of boom and bust, characterised by unforeseen implications for economies in the developing world. This recurring phenomenon has undermined the relevance of the market as the sole force for stable development over time, increasing the call for a greater role of the state.

Such approaches build firmly on much of the rest of economic theory, which steers away clearly from an enunciation of market led strategies. Institutional economics, for instance, breaks away from the theoretical assumption of rational, welfare maximising individuals, operating in an unreal environment where all choices can be predetermined accurately, to a more realistic world where institutions are essential to reduce transaction costs (Coase 1937, 1960, 1988; Williamson 2005; 2010). The relevance of social norms and limitations of rationality (bounded rationality) as well as risk inherent in making decisions under uncertainty is part of the basic canvas of institutional economics (see North 1990). These insights have been further supported by other studies from political economy and economics, and economic sociology (Polanyi 1944, 1957), and building upon it to study the relevance of informal norms and embedded institutions (Evans 1995), innovation studies, the developmental state theorists (Amsden 1999, Amsden and Chu 2003, Johnson 1986 and 2000) and other recent works on industrial policy and economic catch-up (Cimoli et al 2009, Naude 2011, among others).

Within all these perspectives, the role of the state remains paramount as the means of resource mobilisation, particularly to ensure overall development, employment creation and equitable distribution of opportunities. There are differences in the way this role has been articulated. Whereas institutional economics sees the state as an actor requiring restraint, newer approaches see the state as a much more positive force of development. For instance, in the innovation studies literature, the state is the main force coordinating all economic and non-economic actors, and provides the direction for capabilities building through a purposive policy framework of coordination and learning.

State-led and market-led: a misleading dichotomy?

Current policy reality, however, in developing countries reveals a mixture of state-led and market-led approaches. At one end of the spectrum, success stories such as that of the East Asian economies, and now China and (to a much lesser extent) India are touted as examples of state-led developmentalism. These countries and their experiences conform to the view that social capital plays an important role in technological change (Gerschenkron 1962, and later Chang 2004, 2006a, 2006b). Technological change was pioneered through state-led actions, in which public sector enterprises played a critical role, not only in promoting a focus on product and process development, but also as hubs of creativity. As in the case of several East Asian economies and now China and India, state-led enterprises bred entrepreneurial spin-offs, led to the creation of skilled manpower, prompted closer industry-university alliances and also helped to create employment for a large number of people.

Based on the premise that the state's role needs to be strengthened, several scholars have called for a state that emphasises upon job growth, particularly to facilitate recovery from the recent economic and financial crisis (Moudud & Botchway 2009). It has also been suggested that such a job growth should be based on technological development, thereby generating high-quality, and sustainable jobs. How these jobs can be created, and what options exist is also a question that has been discussed at length, especially by extrapolating the state's role in promoting technological development in the East Asian economies and how it applies to Africa. In the African context, some studies have emphasised that the best way for African countries to generate job growth would be to focus on their relative comparative advantages. Fundamentally, this approach recommends that they engage in a development strategy that promotes the current expansion in labour and

resource intensive industries rather than move away to other sectors, which may call for more capital and skills (Lin 2012).

The problem with some of these arguments is that although they seem to favour the role of the state, they misleadingly label current patterns of development (particularly those related to resource-led commodities growth) as developmental strategies (see for example, Lin 2012). This ignores the fact that simply natural resources cannot be the backbone of a country's industrial efforts. It needs to be augmented through material growth (in the sense of machinery and industry) and intellectual capital (skills, learning and knowledge accumulation).[10] Another issue that is often obfuscated in the debate while propounding the role of the state in technologically-led job growth is that promoting high-skilled jobs often comes at a large expense of neglecting the creation of other forms of employment for the semi-skilled and the unskilled, primarily of the kind that rising manufacturing sector productivity has been traditionally associated with (see Jomo 2002, Jomo and Ocampo 2003). This is demonstrated currently by the Indian experience, for example, where the structural transformation of the economy has been different from that of China. Recent analyses are increasingly focusing on the fact that India's transition from agriculture to services with very little progress in manufacturing has been the chief cause for its overall lack of ability to generate job growth across the economy (Kotwal and Ramaswami 2011). The resulting availability of employment for the highly skilled has stunted any possibility of bringing large amounts of people out of poverty, in contrast to what China accomplished over the past three decades.

At the same time, a large number of other countries, particularly those in Africa, have opted for market led strategies, *not as a matter of choice*, but as a result of their complex relationship with the Bank and IMF. In particular the countries that implemented the structural adjustment programmes after the economic crisis of the 1970s in Africa began with the implementation of several measures that minimised investments in the public sector in accordance with prescriptions of these programmes. This has led to a major decline in the number of state owned enterprises across the world (Horowitz 2007).

It is therefore that the dichotomy market-led and state-led dichotomy is also often misleading, since many developing countries, particularly those in Africa, have not had a chance to systematically pursue the option of state-led development. It is also misleading in today's context where many countries are seeking to intervene but fail to do so because market failure results from states' lack of capacity, and state-led development may fail due to the position of a given country in global markets (Moudud 2011).

Articulating the nature and scope of the African developmental state

A systematic review of the underlying processes in countries that managed to promote partial or complete industrial transformation over the past four decades can be summarised in the form of five stylised observations on the nature of the developmental state. A first of these is that in almost all these cases, the state has invariably played an essential role by fundamentally providing a framework for regulating political and economic relationships so that the focus is firmly placed not only on long-term structural diversification, but also on the means through which such diversification can take place.

A second finding is that technological progress has a definite place in this process, and the developmental state sets the priorities as well as engages in institutional innovation and adaptations that will enable local entrepreneurs to capitalise on the new opportunities arising out of globalisation that they have discovered over time (see for example, Laznoik 2003, 2008). A third, somewhat related, finding is that there is no one single path/ set of defined routes to facilitate the engagement of the developmental state. Different countries have done it differently, and there is some level of disagreement amongst scholars analyzing these experiences from different standpoints on what have been the key triggers of such catch-up experiences.

Fourthly, the greater the level of underdevelopment of a country, the larger the role of state action, particularly in policy competence, in setting the economy on a constructive path of capabilities building. Several studies underscore this finding, with the pertinent observation that market forces are unkind to the weakly organised economies ('the more backward the country, the harsher the justice meted out by market forces'), with their inherent and often contradictory requirements (See Amsden and Chu 2003, p. 13).

A final finding is that several countries that could offer some lessons for state-led industrial transformation are still struggling with unemployment, poverty and inequality issues of varying degrees within their frontiers. In fact, one would be hard pressed to argue that the most pressing challenge for both developing and industrialised countries today still remains that of widespread unemployment and widening poverty and inequality.

Against this background, it would be moot to expect that the African developmental state would bear great resemblance to already existing versions. While policy learnings are critical to build upon and expound, the challenges confronting the state are largely created by a confluence of factors that were not present during the 1980s, 1990s or even the 2000s. The onus on the African state therefore, is to identify these challenges and to devise developmental responses.

Challenges for state action in the African context

The principle objective of state action is clearly to promote structural change to achieve overall socio-economic

development. Industrial policy narratives show how countries have managed to build sectors primarily on the basis of consistent investments into technological capabilities without large-scale transfer of technology. The development of local capabilities has been the focus of state efforts in order to promote the ability of actors to engage in enhancing productivity, and the creation of new technologies (and to adapt existing technologies to local conditions) is an essential adjunct to this process, often more important than policies that promote technology transfer and adaptation. New technologies appropriate to the African context, particularly the LDCs therein, are much more likely to be developed by people familiar with, and living in, low income contexts, and orienting their research specifically towards these conditions. The issue is thus not simply one of transferring or replicating existing technologies, but rather of developing industrial capacity options that promote the development of ***local capacity for the development of technologies suited to local conditions***, that would fundamentally address divides in knowledge infrastructure.

The African state therefore needs to focus on promoting industrial development based on three considerations. A first of these is the accumulation of technological know-how and learning capabilities, which is not an automatic process. Learning accompanies the acquisition of production and industrial equipment, but along with the efforts of learning how to use and adapt it to local conditions. It is important to differentiate between production capacity, which covers knowledge and organisational routines needed to run, repair, incrementally improve existing industrial equipment and products and technological capabilities which are capabilities that involve the skills, knowledge and organisational routines need to manage and generate technical change (see Bell and Pavitt 1993). The vestiges of the misplaced emphasis on science and technology institutions (that were predominantly supply-driven) that still remain call for change to promote tacit know-how and local knowledge for technology absorption and use.

A second consideration for the African state is to recognise the potential limitations of market as a growth strategy, not as a matter of choosing between the market and the state as developmental options but rather as accepting the market as a channel through which the state can facilitate growth. The African state cannot ignore the role of the market, but it would do well to acknowledge that the impact of openness of economies and the usefulness of the market as an engine for growth is contingent upon the maturity of the local companies and sectors, availability of local infrastructure, human capital, financial investment, and policy and institutional capacity.

Finally, a critical consideration that needs to shape the developmental state for Africa should be based on the recognition that challenges to promoting technology led growth are not just embedded in issues related to transfer of technology, national innovation systems or resource constraints, as it was before. Multilateralism, particularly global trading patterns, entails several complex causations of a debilitating nature for African countries. These were already triggered off through the process of globalisation, the expansion of economic activity worldwide, which has been enabled by new forms of industrial organisation that promote flexible production systems, with emphasis on minimising production costs and maximising innovation rents globally (Nayyar 2003). In the present multilateral context, firms rely on trade opportunities to reap rewards for their capital and innovation inputs, and investment in further sources of production that can decrease marginal costs is the main driver of global FDI in productive sectors. No doubt these trends have made many products cheaper, new technological outputs possible and affordable and benefited the global consumer as such, but countries' abilities to use the multilateral regime for development is dependent on their ability to generate value-added products and processes.

The linkages between trade and technology are not limited to just this simple equation. Trading patterns can determine technological exchanges, content of know-how and trading opportunities dictate sectoral specialisations of countries. A striking feature of Africa's growth has been that while the economies have seen upward movements from the 1990s onwards, the main driving force behind this has been rising GDP growth. Despite this positive trend, productive growth calls for a positive relationship between GDP growth, capital formation, sectoral rents and technological development, all of which are currently not observable in the African context to a large extent. If the African developmental state is to succeed, it needs to comprehend the nature and extent of these inter-linkages between trade and technology, and respond to them. The next section of this paper seeks to establish the numerous channels of interaction between trade, technological change and firm-level productivity.

Technological progress and structural change in Africa: Causes and consequences

In this section, we analyse the main facets of economic growth and structural change in Africa from 1970 to 2012 using statistical data. While African countries have had a steady GDP growth rate of 7% in recent years, the percentage of GDP in sub-Saharan Africa between 1970 and 2011 split across the three main categories of agriculture, industry and services is as depicted below (Table 1 and Figure 1). A first finding of relevance here is that despite the rising performance of countries such as Kenya and Nigeria, the regional aggregate is offset by the decline in several other economies. As a result, despite a steady GDP growth rate of almost 7% over the past few years, the data shows that the share of activities across the three main categories remains quite similar to what it was in

the mid-1980s (see for example, 1986 and 1989 when compared to 2011).

Structural transformation is achieved through the ability to upgrade production and export structures, industrialise and diversify economic activities. Technological change, although central to this process, relies on other factors that link learning to a virtuous cycle of demand and supply on the one hand, and favourable public investment climate on the other. The following sub-sections seek to highlight important factors in the nexus of trade, technology and structural transformation that have an unfavourable impact of Africa's development.

GDP growth and stagnating value addition in Africa

Recent evidence points to the fact that at low levels of per capita income, economies tend to diversify but as the income rises, the focus shifts to patterns of specialisation.[11] That is, countries change the basket of exports constantly in an effort to raise income levels based on relative specialisation in the early stages. The patterns of specialisation that countries embark on are idiosyncratic in nature; the export choices are not only determined by factor endowments (as classical theory dictates) but rather by external trading opportunities and global demand, and internal technological capabilities of firms to respond to such demand.[12]

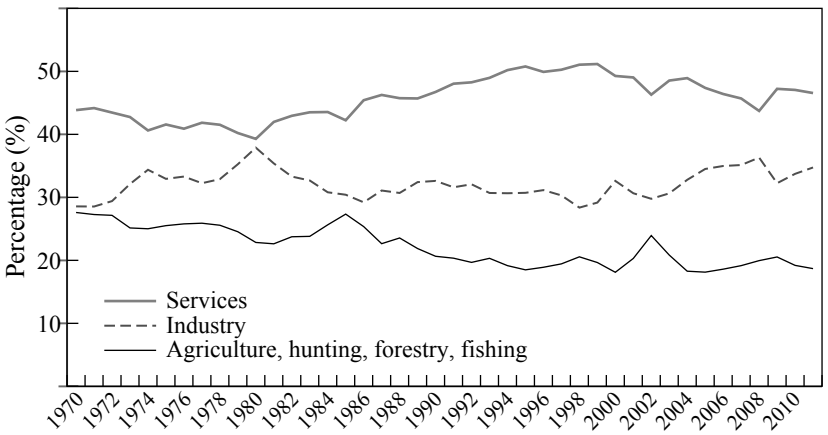

Figure 1: Percentage of gross domestic product across sectors, 1970–2011. Source: Author's calculations based on UNCTADstat.

Table 1: Percentage of gross domestic product across sectors, 1970–2011. Source: Author's calculations based on UNCTADstat.

Sector	Percentage of Gross Domestic Produc										
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Agriculture	27.6	27.3	27.1	25.1	25.0	25.5	25.8	25.9	25.6	24.5	22.8
Industry	28.6	28.6	29.4	32.1	34.4	32.9	33.3	32.3	32.9	35.3	37.9
Services	43.8	44.2	43.5	42.7	40.6	41.6	40.9	41.8	41.5	40.2	39.3
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	
Agriculture	22.6	23.8	23.8	25.7	27.3	25.4	22.7	23.5	21.9	20.6	
Industry	35.4	33.3	32.7	30.8	30.4	29.2	31.1	30.7	32.4	32.6	
Services	42.0	42.9	43.5	43.5	42.2	45.4	46.3	45.7	45.7	46.7	
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Agriculture	20.4	19.7	20.3	19.2	18.5	18.9	19.4	20.6	19.7	18.1	20.3
Industry	31.6	32.1	30.7	30.7	30.7	31.2	30.3	28.4	29.2	32.6	30.7
Services	48.1	48.3	49.0	50.2	50.8	49.9	50.3	51.1	51.2	49.3	49.0
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Agriculture	23.9	20.8	18.3	18.1	18.6	19.2	20.0	20.5	19.2	18.7	
Industry	29.8	30.6	32.8	34.5	35.0	35.1	36.3	32.2	33.7	34.8	
Services	46.3	48.5	48.9	47.4	46.4	45.7	43.7	47.2	47.0	46.	

An important insight of relevance to the debate is that some specialisation patterns are more conducive to technological upgrading than others; and when combined with the right forms of public investment and policy support can lead to productivity enhancing structural change.

Traditional theory tells us that the gradual movement of labour from agriculture to manufacturing to services is the main pathway for structural change. Figures 2, 3 and 4 depict the share of value-added (as a percentage of GDP) in agriculture, industry and services between 1995 and 2011. While there is a small increase in GDP value added in industry between 1995 and 2011 (rising from 29% in 1995 to 33% in 2011), agricultural value added remained stagnant, and services value added has declined drastically over time. Not only do we see a marginal rise in industrial productivity, there is a strong trend towards stagnating agricultural productivity and a decline in services value-added.

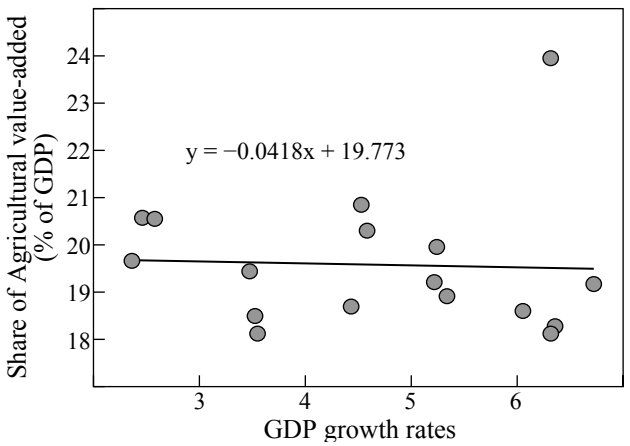

Figure 2: GDP growth rates and share of agricultural value-added (% of GDP) in sub-Saharan. Africa, 1995–2011. Source: Author calculations based on UNCTADstat.

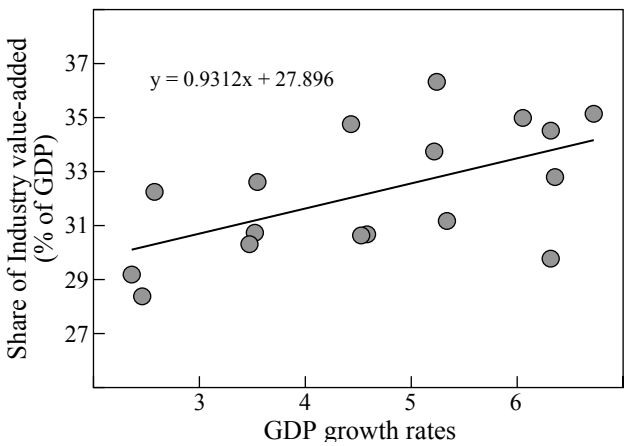

Figure 3: GDP growth rates and share of Industry value-added (% of GDP) in Sub-Saharan Africa, 1995–2011. Source: Author calculations based on UNCTADstat.

Two reasons account for the on-going declining share of value-added in agriculture and services, and the limited rise in industry value-added, in the African context. First and foremost, there is a constant 'push and pull' relationship between national and international factors in dictating innovation growth. If a country already has existing dynamic capabilities, these capabilities dictate countries' advantages in harnessing export opportunities and climbing the technology ladder (the supply push factor). However, the absence of capabilities implies that a country's ability to benefit from globalisation is almost entirely dictated by global demand for resources that the country can immediately benefit from to raise income levels (the demand pull factor). In the latter scenario, the trade opportunities for countries are constantly dictated by not what their national innovation policy framework provides for, but by export opportunities that currently exist in some sectors, particularly, resource-based and agricultural).

This is nowhere better demonstrated than in the African context, where over the past two decades if not more, African countries have faced an increasingly unfair globalisation process with growing knowledge component of industry and services. The gains to be had from the globalisation pie have been asymmetrical as documented extensively in the literature, with knowledge, and the ability to contribute through technological expertise, being the main drivers. At the onset of globalisation, already in the 1980s, over 26% of American exports contained intellectual property components when compared to 10% when the GATT was negotiated in the post-World War II period. Empirical studies that focus narrowly on the relationship between innovation and productivity high-income economies and manufacturing sector show that

> … as early as in the mid-1990s, innovation accounts for 80 percent of productivity growth in advanced countries;

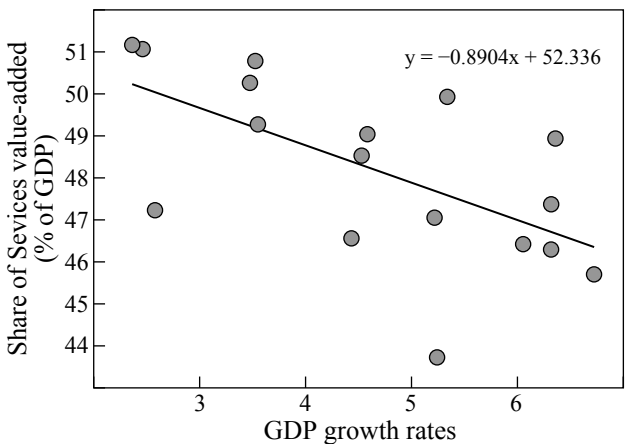

Figure 4: GDP growth rates and share of Services value-added (% of GDP) in Sub-Saharan Africa, 1995-2011. Source: Author calculations based on UNCTADstat.

whereas productivity growth, in turn, accounts for some 80 percent of gross domestic product (GDP) growth. More recent studies at the country-level demonstrate that innovation – as measured by an increase in R&D expenditures - has a significant effect on output and productivity (WIPO 2011).

At the same time, there has been an unprecedented rise in the demand for commodities from the developed countries and the now emerging economies. In fact, existing data shows that from 2004 onwards, emerging economies are the main drivers of the resource-boom in African countries, having surpassed the developed world in their demand for natural resources.

As a result of these two factors, there has been a gradual but significant shift of labour and productive resources away from agriculture and manufacturing to resource-based sectors (see for example, Tregenna 2009) that have very little or no technological component in the African context. Macmillan and Rodrik (2011) note that in the case of those countries that have experienced productivity-declining structural change, labour has been relocated from more productive to less productive activities in the economy, including into the informal sectors.

During the same period, a large number of African countries have enacted national regimes for science, technology and innovation with a focus on national industrial development. This has also been accompanied by rising investments into R&D, but little changes in productive structures. This lends credence to the harsh reality that national industrial or innovation policy frameworks cannot automatically cause a shift away from existing export markets that currently exist in some sectors, particularly, resource-based and agricultural.

This is particularly so because such patterns of specialisation are not conducive to long-run technological change, since the possibilities to technologically upgrade in an incremental way is highly restricted by the nature of the economic activity itself.[13] Promoting development through existing abundance of labour and natural resource endowments, therefore, is not an easy task, since it depends on rising productivity more than the endowments themselves (Otsuka 2012, IADB 2012). Escaping this calls for policy vision and strategic foresight.

Knowledge as a component of economic activity

To understand the factors that impede development, one is forced to recognise the links between trade and technology particularly the role of knowledge. Multilateral rules, currently under the auspices of the WTO, cement the advantages of globalisation further across sectors and industries, particularly focusing on the distribution of gains from the knowledge economy. These impacts have been extensively debated in the context of the Agreement on Trade Related Aspects of Intellectual Property Rights (the TRIPs Agreement), and have the result that technologies are difficult to access in many domains, adding to the already existing issue of low technological capabilities at the enterprise level. Some evidence on the existing knowledge divide is provided in Table 2, which analyses the share of ICT goods as a percentage of global trade. The table shows that as opposed to a share of almost 20% for all developing countries, African countries only had a total share of ICT goods of 0.4% within their overall trade volume in 2012.

The ICTs sector is just one example of the existing knowledge divide, which manifests in almost all high-technology sectors. The relevance of knowledge capabilities is increasingly becoming important even in a large number of medium technology sectors where ICTs are generally important to improve production and organisational efficiency, collaboration and linkages and overall management. The ICTs divide, therefore, prevents countries and sectors from making use of the general purpose technology across the board.

Generating demand for innovation

Whatever the rate of growth, it is ultimately the underlying structure of the economy that determines whether the growth is sustainable, and what kind of productivity

Table 2: Share of ICT goods as percentage of total trade, annual, 2000–2012

	Developing economies	Least developed countries	Emerging economies	Sub-Saharan Africa
2000	22.5	0.2	34.1	0.6
2001	21.4	0.2	31.6	0.7
2002	22.6	0.2	27.4	0.7
2003	22.6	0.1	20.6	0.7
2004	22.9	0.2	26.2	0.9
2005	21.6	0.1	18.5	1.0
2006	21.4	0.2	26.6	0.7
2007	19.7	0.7	23.5	0.6
2008	17.3	0.4	20.8	0.5
2009	20.1	0.4	22.7	0.6
2010	19.7	0.3	22.4	0.4
2011	17.3	0.4	19.2	0.3
2012	19.7	0.4	18.8	0.4

Source: Calculations based on UNCTADstat.

Note: Emerging economies as computed in this table include Argentina; Brazil; Chile; Mexico; Peru; China, Taiwan Province of; Korea, Republic of; Malaysia; Singapore and Thailand; India, Russia, South Africa, Indonesia, Philippines

increases can be expected from it. At a very basic level, firms' strategies to build innovation capacity are responsive to internal and external demand, and the more efficient the processes of learning and production, the greater the rate of productivity growth. Figure 5 shows the contribution of demand expenditure (by type) to overall GDP growth over the last forty years. The analysis is disaggregated by group of countries, namely Africa, least developed countries, developing countries, emerging economies and the developed countries.

The data shows that over the period of four decades, household expenditure has been the main source of expansion of aggregate demand with a steady 5% increase over the period of 1970 to 2011. Secondly, government consumption has been a very low contributor to demand generation, decreasing by over 0.3% over the past four decades. Gross fixed capital formation declined over the period from 22.8% in the period 1970–1979, to a low of 15.8 % from 1990–1999, and picking up to 17.1% between 2000 and 2011, which is really insufficient to

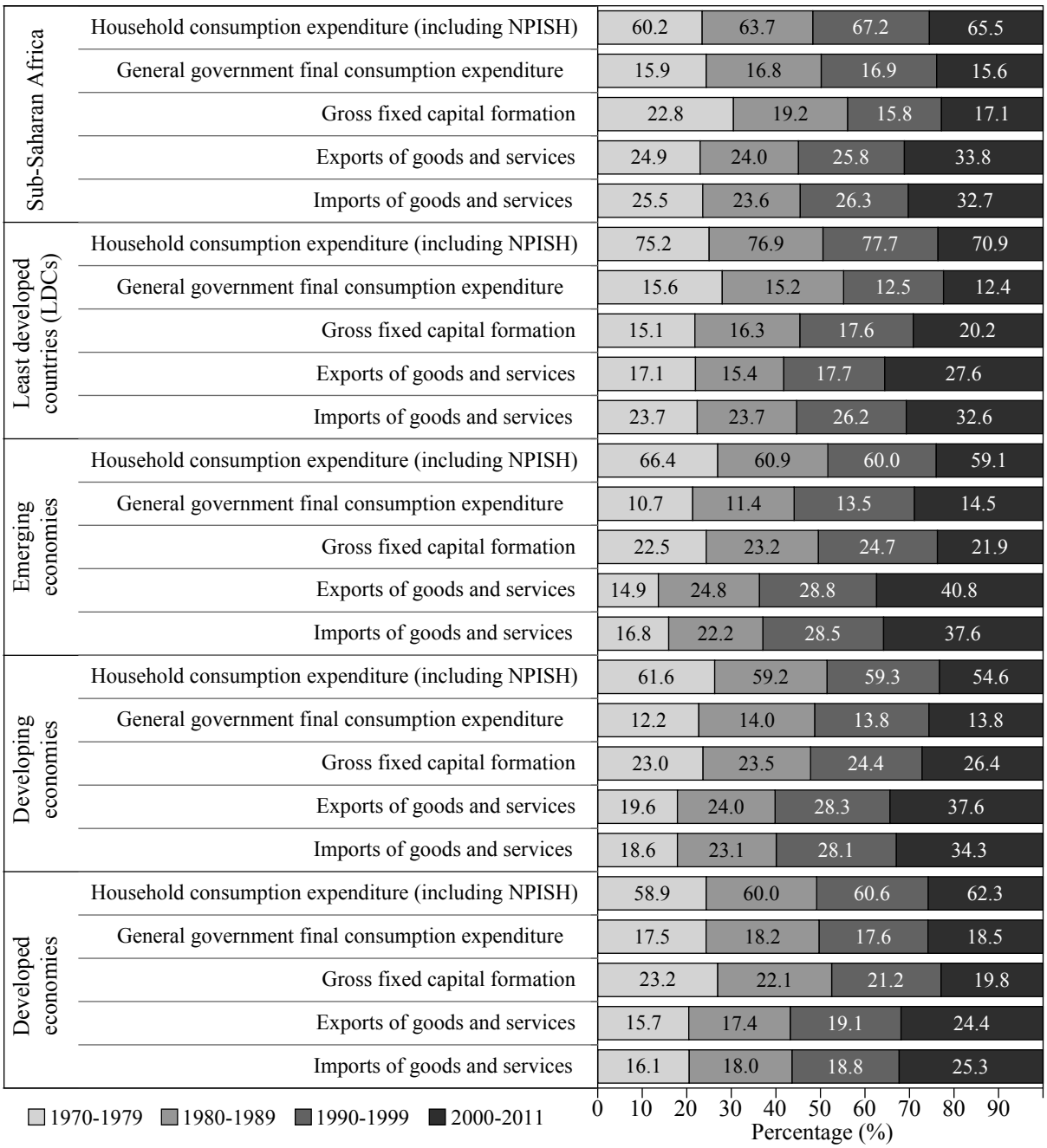

Figure 5: Trends in contribution to GDP growth by type of demand expenditure, 1970–2011. Source: author calculations based on UNCTADstat.

address the slow pace of capital accumulation in the region. Furthermore, although exports have increased over the period, and theoretically do provide an impulse to demand growth, Figure 6 that on the sectoral distribution of these exports, shows that the increase in exports has mainly been related to fuels and the primary commodities boom. Imports, at the same time, have increased, but data once again shows that a large part of these imports are not in the productive sectors, thereby eliminating their potential to act as sources of embedded technologies. Even where they are imported in productive sectors, the impact of embedded technologies is limited when the firms do not have the capabilities to exploit them (see IDB 2012).

These findings have a range of implications for understanding the nature of development in the region currently. First, innovation expenditure is dependent on the nature of demand, the availability of capital and export opportunities. Current trends in the African context, however, tend to undermine the ability of firms to generate domestic resources to grow, learn and expand. Second, in addition to adverse internal factors, the net effect of international trade flows on demand expansion has been negative for the overwhelming majority of countries in the region (see Davis and Valensisi 2011 for a similar conclusion). Third, the comparisons in the figure show the variable impact of globalisation and trade opportunities in the current international regime for different sets of countries. This is not to discount the differences between the well-performing and lagging countries within the African region (which clearly exist), but rather to underscore how the differences in technological capabilities translate into differential endowments in the trading regime.

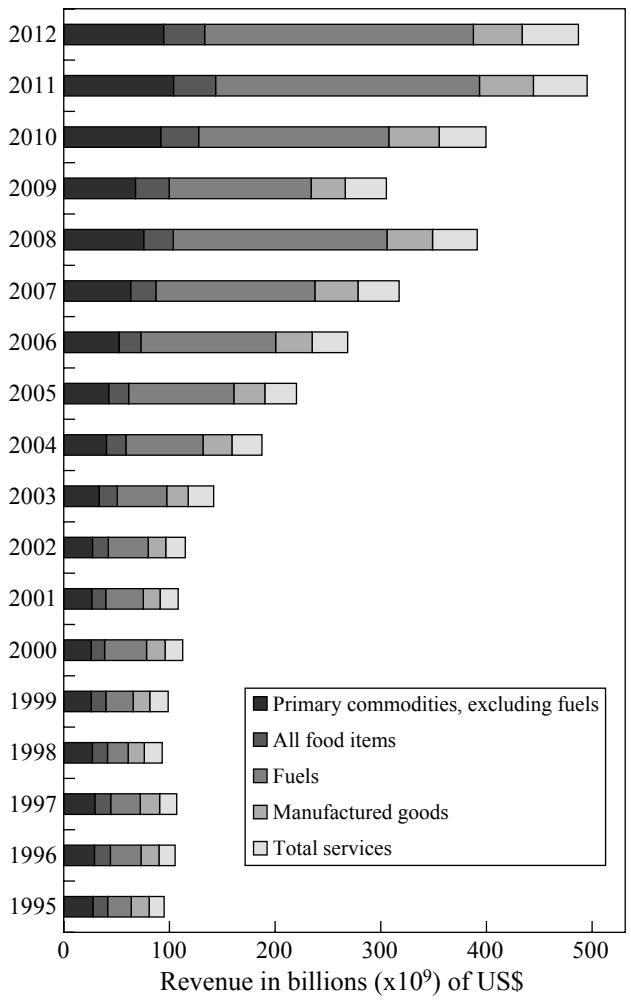

Figure 6: Sub-Saharan Africa's exports revenue by product, 1995–2012. Source: author calculations based on UNCTADstat.

Productivity, firms and the relationship to the general environment

The overall impacts of trade and globalisation, in terms of demand generation, capital formation and export and import ratios, also translate into day-to-day impediments at the firm level within countries and sectors. A large number of firms in African countries demonstrate very low levels of productivity and a few with medium productivity. This implies that the economy as a whole has low productivity since the overall productivity of the economy is an aggregate of the individual productivities of firms. Normally, the only reason why firms with low productivity survive is because the overall innovation environment is unable to allocate resources appropriately between firms that perform well and those that do not. That is, a natural process of selection and elimination of the kind that is fundamental to the creation of innovation firms is absent. Recent studies have attributed this phenomenon to different kinds of resource misallocation (see IDB 2011). A malfunctioning financial system, flawed taxation and enforcement regimes and loopholes in the social security system that can guarantee worker rights have been identified as some of the main reasons for resource misallocation in Latin American economies (IDB 2011).

In the African context, however, although these reasons are valid, there seem to be many other factors that work to hinder productive rents. A first reason is the capture of the regulatory and policy reform processes by firms that show medium productivity, which fundamentally alters the role of market incentives in sectors that could potentially be export-oriented. When the market is captured by medium-productive firms that generate sales as a result of their standing in the domestic market, local firms seem to be more interested in retaining their incumbent advantages by lobbying for static policies, rather than pushing concertedly for dynamic growth-oriented sectoral strategies.

A second factor is the lack of financial support, through banks, national credit institutions or venture capital. As a result, innovative companies never get the kind of support they need to move products from the laboratories to the market. A range of innovation-related

variables also impinges further on their abilities, as discussed extensively in several national and sectoral case studies in innovation literature. These include a lack of collaborative environment, missing university-industry linkages, lack of institutional support, policy vacuums, flailing investment into innovation and poor research and knowledge infrastructure.

A final reason is the policy framework itself. An interesting kind of policy failure is observable in a large number of developing countries when policies on innovation focus far too much on the lost opportunity of local production, often in an effort to urgently address the failings of the past, and unwittingly end up supporting inefficient allocation of resources amongst firms. A case in point is pharmaceutical production initiatives in several African countries. In Uganda, for instance, in an effort to promote local production of pharmaceutical products, the governmental policy has been to guarantee complete buy-back of products that are being produced by companies in the area of HIV/AIDS locally. The government granted several investment incentives to a foreign company in return for know-how as part of a joint venture, investing a 20% stake in the first company that began local production, which was set up in 2009 (see Gehl Sampath and Spennemann 2010). However, in the span of five years following the success of Quality Chemicals of Uganda, one is yet to see a second such initiative. What also often occurs in such policy frameworks is that governments tend to support local companies by limiting competition from foreign firms. This can take the form of making the local market off limits for foreign companies. Good examples of such policies are those in the pharmaceutical sector in India between the 1960s and 1980s, Bangladesh from the 1980s until now, and the energy sector in Thailand currently.[14] Such policy frameworks often fail to achieve the main target they were intended for because they do not create the right environment for distinguishing between the productive and non-productive companies. In order to successfully generate competitive firms, policies need to link innovation incentives to those enterprises that achieve higher productivity rents.

Firm performance, trade costs and policy failures

At the country level, when local companies are exposed to lowered trade costs and entry of foreign firms into the domestic economy, appropriate policy support systems are needed to enable their survival. The absence of such policy support is a type of policy failure that dramatically reduces the chances of survival of local companies in the light of international competition even in the domestic and regional market. *Prima facie*, economic theory predicts that such external competition would have a disciplining effect on the local firms, in the sense that the firms with lower efficiency and lower productivity will exit the market. A second facet of the same question that has recently been discussed in the context of Latin America is whether low trade costs allow local firms to export (See IDB 2012).

What one finds in the case of a large number of African and least developed countries is that a lower trade costs lead has allowed firms with low productivity to exit across all sectors. Given that the private sector in Africa is still weak, this often means that a large number of, or most, local firms are wiped out in the process. Numerous studies exist to show this to be the case across all sectors, regardless of their technological intensity, such as the readymade garments sector, pharmaceutical sector, electronics and food processing.[15]

Those local firms that have some level of productivity struggle to export despite lower trade costs for a number of reasons, including:

1. their inability to cater to the increasing demands of international consumers in terms of product range, packaging and sophistication
2. the demands on maintaining steady quality increase, at competitive prices
3. the difficulties of complying with product safety and other technical requirements.

Of course, these impacts have different consequences for firms according to the sectors in question, but technologies become steadily obsolete across a wide range of applications and the absence of a general environment that offers support to update/ upgrade their technological base is a huge disadvantage.[16] Tariffs and physical infrastructure issues also play a critical role in shaping the ability of local firms to supply in steady quality, and at competitive prices. This is particularly true in the case of companies that supply goods that are either time sensitive (such as in food processing) or call for advanced transport infrastructure (say, drugs, vaccines, etc.). In such sectors, freight costs and local transport plays a critical role in determining competitive production and supply and thereby affect the ability of firms to also participate in several global production networks to their advantage.[17] Other firm-level infrastructure inputs – such as energy and clean water – all play an essential part in reducing the marginal costs of production and maintaining quality – all of which also depend on policy support. Local companies also often compete with companies from emerging economies that have very high economies of scale and scope. In these cases, offering special tariff and export incentives to local firms has been found to be a very important policy support.[18]

But at the same time, one needs to be wary about the kind and extent of market support. Sectoral studies and surveys in several countries show that when medium or low productivity firms are protected through a policy framework that cushions them from foreign competition by restricting their entry, local firms tend to find solace in low productivity. In such cases, local firms gradually tend to cement their gains from the domestic market, and over time, the lack of foreign competition can lead to a

situation where firms do not have incentives either to make technological upgrades to improve competitiveness or to bring the prices closer to the marginal price. Several important sectors in developing countries that have been shielded from external competition demonstrate such effects. Policy change in these contexts is hard to impose since local firms seem to be more interested in retaining their incumbent advantages by lobbying for static policies.

In such a landscape, mistrust and lack of representation of consumer welfare are key features of interpersonal interactions and the policy landscape. Most of these factors inhibit even the role of competitive market pressures in fostering welfare-maximising collaborations, and can be summed up as 'negative' institutions, as some authors have identified them in the economic literature (Evans, 1995; North 1990). The informal and (the few) formal institutions for innovation in the local context end up creating ample scope for capture of the sector/local market by a few companies, to the detriment of the larger population. Sectoral survey in pharmaceutical and manufacturing sectors of several countries found numerous instances where firms work around well-intentioned policies to find informal mechanisms that help them to retain their profits, to the detriment of the economy and technological progress at large. As a result of this, in such contexts, competitive market pressures do not seem to work in the case of a large number of countries due to the institutional setting, where even well-intended policy and market incentives fail to enhance patterns of interaction and learning needed for innovation.

The imperative of sustainable development

The debate on sustainable development has intensified at the international, regional and national levels but the term can have different implications for countries at different levels of development. At the international level, the sustainable development discourse has an inclination to focus almost unilaterally on environmental issues. Particularly over the past decade, the international debate on finding sustainable development pathways has become focused on ways and means to promote climate change mitigation and adaptation and a movement to the green economy.[19] For much of the industrialised world, issues around climate change tend to be coded around the notion of the 'green economy'. Still very much an evolving concept, the green economy can be defined as economic development that is cognisant of environmental and equity considerations and promotes the earth's environment while contributing to poverty alleviation. The notion of the green economy is not entirely novel. In many ways, it builds further on the well-known notion of sustainable development, and has gained traction as a multilateral negotiation process within the Rio-Plus-20 framework. Fundamentally, it gives credence to the view that economic activities need to be environmentally sustainable, thereby making it imperative to factor in all environmental externalities of modern day processes. Most industrialised countries view this in terms of regulating economic activities (individual or firm-level) to account for carbon emission effects that may result from such activities.

Extremely critical developmental concerns, such as promoting universal energy access for all, or ensuring the capacity of the already nascent manufacturing sectors to cope with new standards of the green economy, are often considered only on the margins of the debate. This often creates a problem for prioritisation and problem framing at the regional and national levels, where the main challenge remains one of promoting state-led growth through job creation and poverty reduction (see Chang 2009). While environment and climate change are part of such a sustainable development process, a policy agenda that relegates overall industrial growth to a second place would not serve the interest of developing countries well, particularly those in Africa.

There is an urgent need to forge solutions that reflect both concerns simultaneously – for example, energy policies that also take on board renewable energy targets to ensure sustainable development, rather than considering developmental concerns through a lens of climate change. It would be important to work towards a definition of sustainable development that includes social and economic dimensions alongside the environmental dimension. After all, development without equality of income, livelihood and opportunities is hardly sustainable for global peace and prosperity.

The contours of a new developmental state construct for Africa: Some thoughts

The modern developmental state has more to account for than its predecessors. Not simply because of the fact that there is persistent under-development in many developing countries, but because, as the analysis in this paper shows, the state needs to move beyond addressing the symptoms to address the main causes, namely the interface between globalisation, trade, technology and development, as the previous section shows. The role of the African state in this context is tantamount to promoting an active, industrial policy, to engineer collective technological progress of the kind that is not only essential for industrial development in the sense of promoting a few competitive sectors but for a range of important *developmental outcomes*.

The state, in practice, should perform an ideological and functional role. At the ideological level, the state needs to begin by defining developmental outcomes that are befitting the nature of challenges highlighted in this paper. These developmental outcomes, in the current context, can be said to include, but may not be limited to:

1. Promote job growth

2. Create the right employment conditions and industrial relations through a balance of technology, skills and labour options
3. Minimise rents from corruption and informal institutions that impede industrial and economic performance
4. Promote the right kinds of policies for overall sustainable development (by creating a balance between environment, development and equity)
5. Reduce poverty and inequality.

State action on a functional level that seeks to implement this ideological construct will be fundamental to achieving these developmental outcomes. On a broad level, while defining state action through policy frameworks, the state will need to focus on balancing four different sets of uncertainties that are part of the process of technology-led development, namely: market failures, system failures, technological failures and environmental failures.

Market failures in technology-led development are numerous. Innovation across all sectors and industries calls for investments, the returns on which are uncertain. Innovation perceived as the development of commercially viable products/processes and social technologies relies to a large extent on demand. Returns on investment are particularly uncertain when products/processes are required in new technological domains that are important from a social point of view but carry a large risk for the innovator. Similarly, uncertainty and risk in innovating products for markets with low/no ability to pay causes market failures. Economic theory predicts that such market failures can be corrected through a range of market-based instruments including patents, tax incentives and subsidies. Governmental intervention in the form of industrial policy is called for to minimise information asymmetries between user-producer networks, mitigate inefficient resource use and also address public good issues.

In the case of most current technologies, in addition to these well-known market uncertainties, technical uncertainties exist that affect capabilities formation.[20] Markets in African countries for a variety of products and processes are just developing, and forecasts related to total market demand and market size in the future all vary depending on the assumptions made not only regarding the expansion of markets *per se* but also on alternate sources of competition and the ability of the local market to engage in manufacturing competitively. In such an environment, firms and organisations are faced with a choice of whether or not to invest in technological upgrading at all in many sectors , as opposed to other technological sectors where returns are more secure (from a current perspective). An added technological uncertainty is caused by the constant influx of newer technologies that not only affect products and innovation cycles, but also consumer behaviour, and re-allocate strategic advantages of firms on a constant basis. This accentuates the two-way relationship between firms and the underlying technological base of sectors. On the one hand, the changes in firms' organisational arrangements affect their technological opportunities and outcomes,[21] and on the other, technological sophistication of the production/delivery process often substantially impacts upon the firms' accepted and time-tested notions of organising innovative activity. Firms constantly need to compete and re-organise their internal strengths to re-align themselves with new technological opportunities presented by trade and globalisation as much as possible.

Other systemic failures exist that confound possibilities of expanding into new sectors and technologies in developing countries. Most importantly, countries and sectors are path-dependent and systemic risks imply that technologies may not be adapted, used or applied in other sectors of the economy. Firms in manufacturing and industry in developing countries are under considerable pressure in the multilateral environment to retain their competitiveness and export-orientation. Hence, policies that dictate paradigm shifts to integrate into global trading systems will involve sunk costs, as much as they may present opportunities. In the absence of political will followed by proactive governmental incentives and market-based incentives for firms to help offset such costs, such a shift will be difficult in developing countries.

Policy support in successfully internalising environmental failures is also very important if economic growth is to be sustainable. Firms and sectors need support to engage in sustainable modes of production, transition to a green economy and retain their industrial outputs in a competitive way. Access to energy, particularly through a mix of renewable and conventional energy sources, also calls for state-led championing in the right direction.

Conclusion

This paper has sought to articulate the notion of an African Developmental State. It has argued that articulating the role of the developmental state in the African context is as much a process of understanding the particular strengths and vulnerabilities arising from the African experience as it is one of assimilating and learning from the experiences of other developed countries and emerging economies. It makes the case that in today's context, the role of the state should be to promote technology-led growth, as many studies have called for, but that the state needs to be based on an identification of the particular challenges that this entails. It further shows that promoting technology-led growth in today's context is not the same as it used to be: technological change is intricately embedded in trade relations, and therefore state action through industrial policy needs to tackle the critical trade-technology linkages. The paper then demonstrates several of these linkages and their negative effect on the efforts of countries in Africa to promote structural change, by using statistical data between 1970 and 2012. The six trade-technology linkages identified in this paper are some of

the most important aspects of developmental failure that call for urgent, rectifying action.

Arguing thus, the paper suggests a definition and format for the African developmental state. More research and discourse into how these linkages may be translated into action are necessary to promote a constructive discourse on the African developmental state in the future.

Notes

1 As Johnson (1987, 41) states: 'One of the things a state committed to development must do is develop a market system and it does this to the extent that its policies reduce the uncertainties or risks faced by entrepreneurs, generate and disseminate information about investment and sales opportunities, and instill an expansionist psychology in the people. Once a market system has begun to function, the state must be prepared to be surprised by the opportunities that open up to it, ones that it never imagined but that entrepreneurs have discovered'.

2 Since 1975, the number of countries that qualify as least developed countries have doubled (going up from 25 in the early 1980s to 49 as of 2010).

3 In recent times, policy initiatives and scholarly works have focused on extracting and extrapolating lessons from East Asia and now the emerging economies for African countries. A large onus of this comparison exercise has been on the role of the state in promoting industrial development through technological learning. Studies have highlighted the ways in which this has been done in other countries and contexts. A variety of notions have emerged ranging from the most recent exposition of the entrepreneurial state (Mazzucato 2013). the interventionist state, etc.

4 It would be important to acknowledge that the rise of countries such as China, India and Brazil is the result of important economic decisions that were made between 1970s and the 1990s and therefore has not been as 'sudden', rather that it is the impact of the rise of these countries on the global economy that has been sudden.

5 The first and second-tier NIEs that followed Japan's industrialization comprised Hong Kong, the Republic of Korea, Taiwan Province of China and Singapore, and the second-tier comprised Indonesia, Malaysia and Thailand. As opposed to the rise of these NIEs, the past decade has seen a dramatic rise in the political and economic significance of some countries of the South, particularly Brazil, China, India and South Africa.

6 The term 'structural vulnerabilities' is often used in the context of expressing the impact of the macroeconomic boom-bust cycles on least developed countries, particularly, in Africa. See for example, UNCTAD (2010).

7 The term 'fragile states' in World Bank literature, is meant to denote countries that share two attributes: Firstly, these countries have weak state policies and institutions are weak in these countries, making them vulnerable in their capacity to deliver services to their citizens, to control corruption, or to provide for sufficient voice and accountability. Secondly, these countries face an increased risk of conflict and political instability.

8 IMF and World Bank (2010. 1).

9 Rodrik, for instance, calls for an 'augmented Washington consensus' approach where the strategy of relying on market forces for development is augmented with certain social aims, such as creating safety nets for the poor. See Rodrik (2006).

10 Economists as early as List (1857) identified the fact that natural resources alone cannot form the basis of a country's productive power. Levi-Frauer (1997) interprets List's notion of productive power to comprise of three elements - natural power, material power and intellectual power (See Shafaeddin 2005).

11 See for example, Felipe (2010). Imps and Wacziarg (2003).

12 See Hausmann, Hwang and Rodrik (2005) who establish a link between specialization patterns of economies and income levels.

13 A specialization pattern based on natural resources and low-value added manufacturing is in contrast with the traditional notion of learning through reverse engineering, to move upwards towards local adaptation, incremental innovation and R&D based opportunities, as innovation studies have outlined. A review of natural resources and low-value added manufacturing in the African context shows that the main sources of value-added, if any, are restricted to improved performance in global value chains. This is different from other sectors in the manufacturing domains, or services, where although the initial threshold of technological competence required is slightly higher, there are constant opportunities to incrementally promote learning and expand competitive production.

14 See Gehl Sampath (2014) that highlights the same in the context of the renewable energy policy framework of Thailand.

15 See Kaplinsky, McCormick and Morris (2007).

16 Field interviews.

17 Field interviews.

18 See Grace and Gehl Sampath, 2007.

19 See Birdsall and Subramaniam, 2009 who point to the lopsided focus on reducing greenhouse gas emissions in the global discourse.

20 Freeman, 1982.

21 e.g. Robertson and Langlois 1995; Brusoni and Principe, 2001; Ernst 2005.

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