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Industries without smokestacks

Firm characteristics and constraints to growth

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Abstract

Structural change is taking place in Africa, but—in contrast with East Asia—export-led manufacturing is playing a minor role. Falling transport costs and progress in information and communications technology have, at the same time, created tradable services and agri-businesses that share firm characteristics with manufacturing. This paper reviews firm characteristics in major IWOSS industries and proposes an approach to identify country-level constraints to their growth.

A review of current literature finds that four major industries without smokestacks—agro-industry and horticulture, tourism, ICT-based business services and transport and logistics—have many firm characteristics in common with manufacturing. There is evidence of the capacity for learning and productivity growth, and scale and agglomeration economies are important firm characteristics.

Four drivers of industrial location have largely shaped the global distribution of industry—with and without smokestacks. These are the “investment climate,” exports, agglomeration, and firm capabilities. Addressing these four drivers of industrial location can support a strategy for structural change that encompasses both manufacturing and IWOSS.

1. Introduction

Structural change is taking place in Africa, but at a pace and with a pattern distinct from the historical experience of industrialized countries and contemporary East Asia. Indeed, export-led manufacturing is playing a much smaller role in the structural transformation of Africa’s economies. In fact, on average, the share of manufacturing in Africa’s GDP has fallen since 1980. Services—some with quite low productivity—absorb the bulk of African workers leaving agriculture and moving to cities. These differences reflect the impact of technological progress, a changing global marketplace, and natural resource endowments on Africa’s industrialization prospects.

At the same time, reductions in transport costs and progress in information and communications technology have created services and agri-businesses that share firm characteristics with manufacturing.¹ Like manufacturing, they are tradable and have high value added per worker. They have the capacity for learning and productivity growth, and some exhibit scale and agglomeration economies (Ebling and Janz, 1999; Ghani and Kharas, 2010). Firm capabilities—the tacit knowledge and working practices embodied in the firm—play a central role in determining productivity and quality. We call these “industries without smokestacks” (IWOSS) to distinguish them from traditional, “smokestack” industry.

IWOSS activities are defined as those that are:

- Tradable;
- Have high value added per worker—relative to average economy-wide productivity;
- Exhibit the capacity for technological change and productivity growth; and
- Show some evidence of scale and/or agglomeration economies.
- Have the potential to employ large numbers of moderately skilled people

The four industries reviewed in Section 2—horticulture and high-value agri-business, tourism, business services, and other tradable services, such as transport and logistics—reflect this definition. Annex 1 lists additional examples of sectors exhibiting IWOSS characteristics.

Studies of 10 African countries undertaken by a previous Brookings-UNU-WIDER project show that many African economies are turning to these “industries without smokestacks” to lead structural change.² Our prior research left one important question unanswered, however—whether these new activities have the potential to offer a solution to Africa’s youth employment problem. Because the demand for labor is derived, the employment prospects of each IWOSS industry depend on its ability to create jobs—its employment intensity—and on the industry’s rate of growth. This framing paper reviews firm characteristics in major IWOSS industries and identifies country-level constraints to the growth of IWOSS sectors.³

Following this introduction, Section 2 presents a review of the literature on firm characteristics in four industries without smokestacks, agro-processing and horticulture, tourism, business services, and transport and logistics. Section 3 sets out the constraints-to-growth analysis, built around four drivers of industrial location that have largely shaped the global distribution of industry (UNIDO, 2009; Newman et al., 2016)—the “investment climate,” exports, agglomeration, and firm capabilities. The

¹ See Baumol (1985) and Bhagwat (1984).

² See Newfarmer, Page and Tarp (2018).

³ See Borat, Allen, Asmal and Steencamp (2019) for the companion framing paper on assessing the employment intensity of IWOSS.

constraints framework is intended to guide pilot studies of industries without smokestacks in Ghana and South Africa. Section 4 provides some guidance for implementing the constraints-to-growth analysis at the country level. Section 5 describes how value chain analysis will be used to complement the constraints analysis. Section 6 concludes.

2. Firm characteristics in “industries without smokestacks”

In Africa, four industries without smokestacks have become increasingly important: agro-industry and horticulture, tourism, business services, including information and communications technology (ICT)-based services, and transport and logistics (Newfarmer, Page, and Tarp, 2018). This section reviews the recent literature on firm characteristics in these industries.

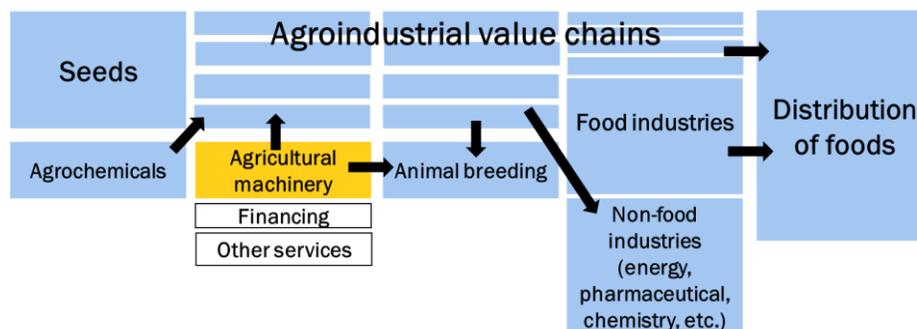
Agro-industry and horticulture

Lower transport and communication costs have created new opportunities for developing countries in the global market for processed agricultural products and horticulture (Fukase and Martin, 2018). In both agro-industry and horticulture, value chains increasingly dominate the global market

The agro-industrial value chain

Figure 1 maps the global agro-industrial value chain. As products move through the various stages, from inputs to the final customer, transactions take place between multiple actors. Only a few developing countries—notably Chile—have mastered food processing for export, largely due to agricultural supply problems. Volatility of input supplies reduces the efficiency of agro-processing and inconsistent input quality degrades final product quality (UNIDO, 2006). Firms in agro-industrial value chains require a range of capabilities in common with manufacturing, including the ability to: manage the volume, regularity, and continuity of production; improve product quality and safety; reduce the time needed to reach the customer; and assimilate technology and understand changing markets (UNIDO, 2009a).⁴

Figure 1: The Global Agro-industrial Value Chain



Source: Negrete (2017).

⁴ In fact, the International Standard Industrial Classification (ISIC) system classifies most agro-processing activities as manufacturing (UN, 2008).

Lead firms in the food business have taken on the characteristics associated with modern manufacturing. These characteristics include product differentiation and innovation, a shift towards quality assurance based on risk management and process controls, and just-in-time delivery (UNIDO, 2006). Adherence to standards depends on a high level of managerial capabilities—known as the hazard analysis critical control point (HACCP) concept, now widely used in agribusiness, which was first developed in the aerospace industry (Martin and Anderson, 2000). The need for firms to adopt standardized resource planning systems to supply major retailers poses another management challenge (UNIDO, 2006).

The global horticultural value chain

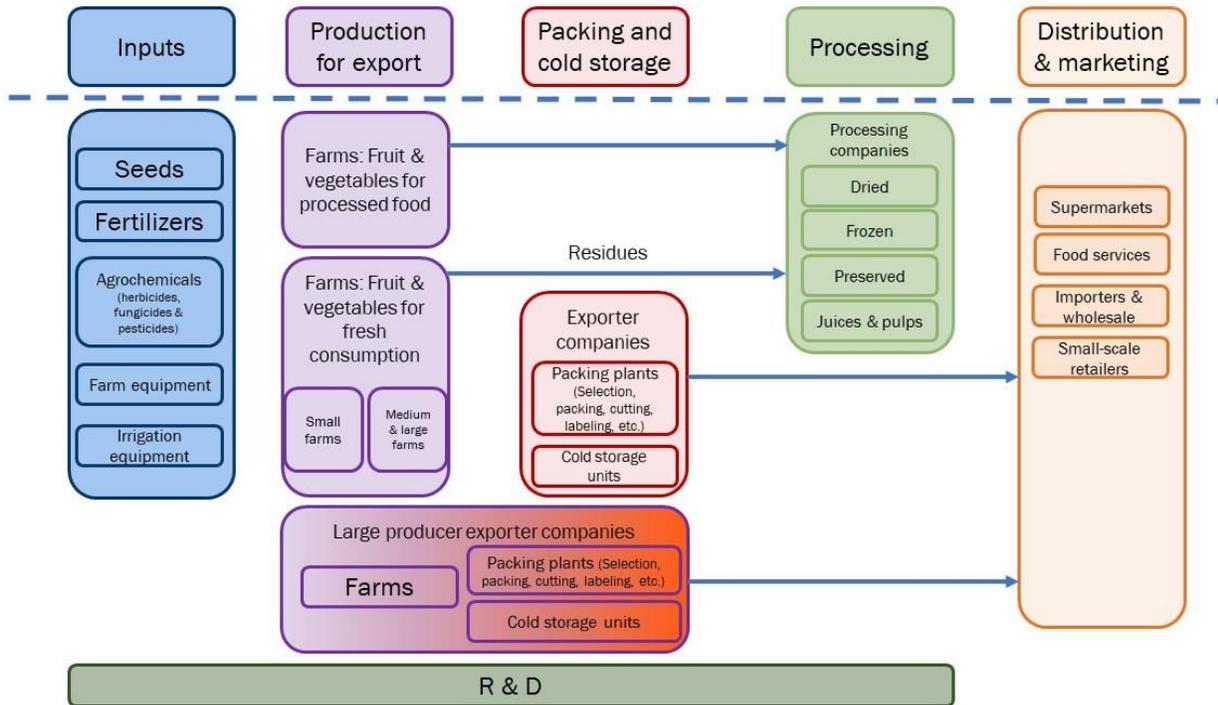
Since the 1980s, international trade of fruit, vegetables, and cut flowers has experienced tremendous growth. Once efficient logistics are in place, countries with suitable agro-ecological conditions can produce high-value products, such as cut flowers and fresh vegetables that were previously produced near their point of consumption (Fukase and Martin, 2018). In Africa, horticulture exports from Kenya—both cut flowers and packaged vegetables—amounted to more than \$1 billion in 2015. In 2014, Ethiopia earned some \$245 million from cut flower exports alone.

The horticulture export industry is an important source of employment. Cultivation of fruit and vegetables is substantially more labor-intensive than that of cereal crops and offers more post-harvest opportunities to add value (World Bank, 2005). Today, many developing countries perform horticulture-related activities that previously were carried out in developed economies. Packing and processing services—such as washing, chopping, and mixing as well as bagging, branding, and applying bar codes—now often take place at the source rather than at the end-market destination.

Figure 2 maps the global fruit and vegetable value chain, and Figure 3, the global value chain for cut flowers. Due to the fragile and perishable nature of the product, horticulture requires a high degree of coordination between the different actors along the value chain, and each stage offers opportunities for both productivity improvements and product upgrading (Stark, Bamber, and Gereffi, 2011). Process upgrading has allowed some exporting countries to cultivate and handle increasingly fragile and perishable product varieties, for example, berries in Chile and French beans in Kenya. An increasing number of countries produce “ready-to-eat” products (Jaffee and Masakure, 2005).

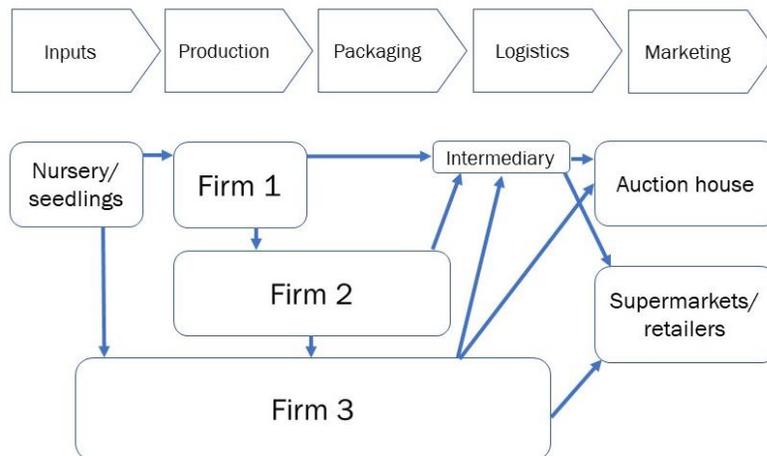
Process upgrading is essential for meeting the growing number of public and private standards in both the production and packing segments of the value chain. Given the significant level of buyer control, the requirements and practices of lead firms directly affect producers. Supermarket buyers such as Marks and Spencer, Sainsbury’s, and Tesco in the U.K., Carrefour in Europe, and Safeway and Giant in the U.S., supervise the entire value chain. These lead firms exercise vertical coordination and their requirements have spurred innovations, including productivity gains, better logistics and shipping technologies, and greater capacity to comply with standards. Firms’ investments in better production knowledge and market information have led to many of these innovations (Humphrey, 2005; Stark, Bamber, and Gereffi, 2011).

Figure 2: The global fruit and vegetable value chain



Source: Stark et al. (2011).

Figure 3: The Cut Flower Value Chain



Source: Malindretos (2015).

Tourism

Tourism is an important driver of economic growth around the world. In 2014, the industry provided an estimated 277 million jobs and accounted for about 9.8 percent of global GDP (Daly and Gereffi, 2018). From a base of just 6.7 million visitors in 1990, sub-Saharan Africa attracted 33.1 million

visitors in 2011 (UNWTO 2012). Tourism constitutes around 3 percent of South Africa’s GDP and has been growing at the same rate as the economy as a whole (Bhorat et al., 2018). In Tanzania, tourism generates over \$1 billion in annual foreign exchange revenues and contributes approximately 14 percent of GDP (Ellis, McMillan, and Silver, 2018). It is Rwanda’s largest single export activity, amounting to about 29 percent of total exports in 2015 (Gigombe and Newfarmer, 2018). In 2015, Ethiopia’s travel and tourism sector accounted for 11.3 percent of GDP and 9.8 percent of employment (Gebreeyesus, 2018).

Figure 4 maps the global value chain for tourism to Africa. The value chain map shows the difficulty of dealing with tourism as an “industry.” Tourism is a composite product that involves a variety of goods and services provided by different sectors—such as transport, accommodation, tour operators, travel agencies, visitor attractions, and retailing—and is transacted in multiple markets (Song, et al., 2012). Thus, while it is possible to track tourist arrivals, estimates of their direct and indirect impact on output and employment are imprecise.⁵

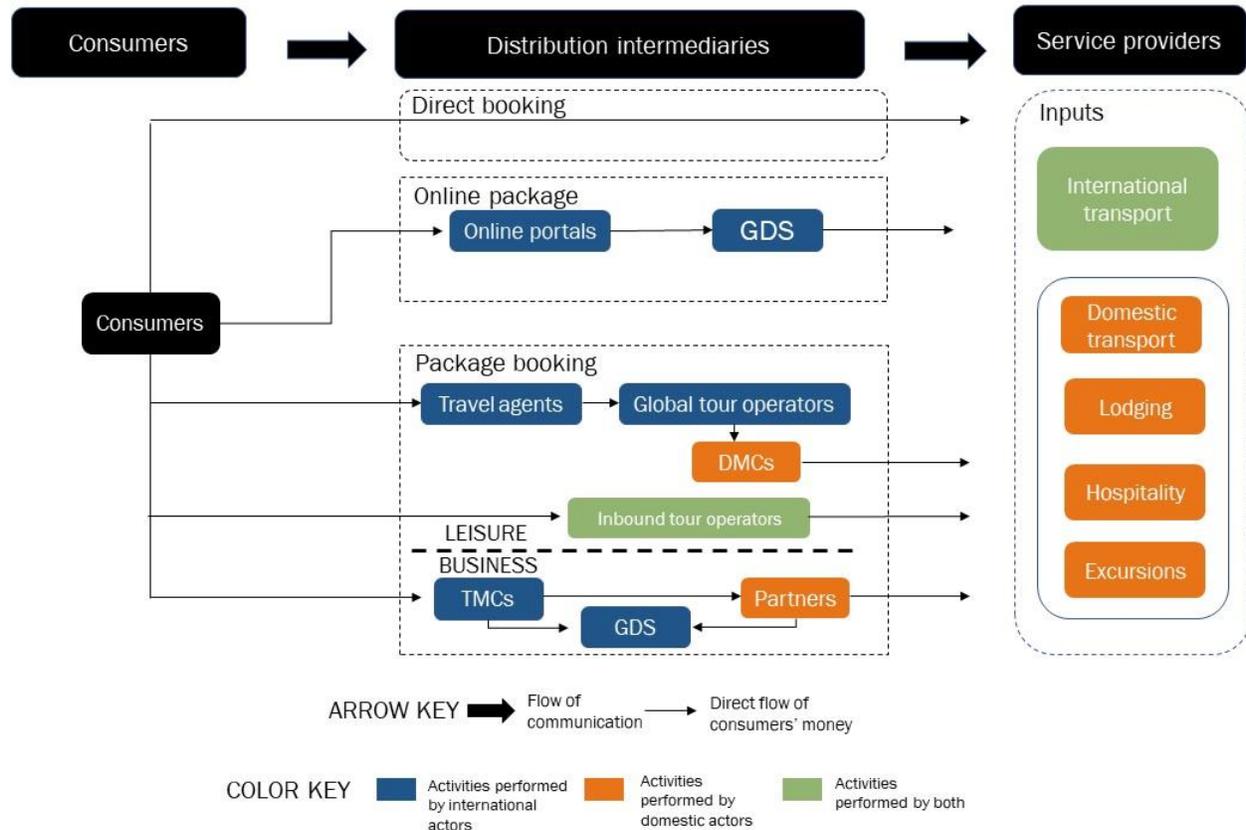
Clearly, the hunt for similarities between the bundle of tourism activities depicted in Figure 4 and manufacturing is more complex than that for agro-industry and horticulture. The approach taken here is to survey the literature on tourism service providers. Firm performance in service providers, measured in terms of productivity and efficiency, has been a long-standing topic in tourism supply studies (Song et al., 2012).

International transport

The high cost of air travel to sub-Saharan Africa reduces the competitiveness of its tourism destinations. Long-haul connections are dominated by a small number of carriers, such as Air France, British Airways, Brussels Airlines, Emirates, KLM, SWISS, and Virgin. The continent is served by only 4 percent of the world’s scheduled air service seats—about 100 million for both international and domestic travel. Brazil, by comparison, has about the same number of seats solely for its domestic market (Bofinger, 2018). Where an “open-skies” policy exists, as in Kenya, charters provide some relief from the high fares on scheduled airlines (World Bank, 2014).

Not surprisingly, aviation has a long history of innovation and technological progress, largely linked to improvements in aircraft performance and safety (IATA, 2018). But technological change is not limited to the hardware of air travel. Changes in information technology and artificial intelligence are spurring innovations that will fundamentally change the experience of flying. Online travel booking has led to millions of consumers interfacing daily with metasearch engines such as Expedia and Ctrip. More than half of U.S. airports expect to pilot biometric identity management over the next 10 years to eliminate manual identity checks. The Taiwanese airline EVA Air has introduced robotic customer service agents at international airports. More advanced artificial intelligence technologies will enable robots to scan and identify passengers based on online data (Cognizant, 2017).

⁵ This difficulty may explain why, despite the impressive growth in tourism flows to Africa over the last two decades, the volume of academic research on African tourism has grown only slowly (World Bank, 2014).

Figure 4: The tourism global value chain for Africa

Source: Daly and Gereffi (2018).

Notes: GDS-global distribution systems; DNCs-destination management companies; TMC-travel management company.

Domestic transport and excursions

Domestic transport runs the gamut from internal air travel, through busses and railways to individual taxi operators. Because of the range of modalities of the domestic transport system, it is difficult to summarize firm characteristics. However, studies of innovation and the role of firm capabilities in road transport offer some insights. Service attributes in transport affect perceived quality. For bus services, reliability, access time, and travel time are all highly significant determinants of perceived quality. Onboard safety, defined by smoothness of the ride, is also a statistically strong quality attribute (Prioni and Hensher, 2000). Among taxi passengers, waiting time is the most important factor for frequent users, and journey time is highly valued by all users, along with safety, accessibility and comfort (Alonso et al., 2018).

Excursion operators cater to a key activity, such as the safari—the primary tourism product for Eastern and Southern Africa. There is anecdotal evidence of learning and innovation in the excursion industry: Some tour operators are diversifying into owning and operating their own accommodations, such as safari camps, small lodges, and hotels. One luxury tour operator set up a charter air service in Kenya and Tanzania to overcome poor roads and long distances (World Bank, 2014). Excursion companies undertake product upgrading by offering multi-product tours or by creating convention or business packages. As excursion firms gain coordination and arrangement capabilities, they move up the value

chain to work directly as agents, ground operators, or destination management companies for global tour operators (Staritz and Reis, 2013).

Accommodation and lodging

There are about 390,000 hotel rooms in Africa. Unbranded guesthouses and lodges dominate; just 10 percent of rooms meet international standards. South Africa has about half the region's stock of international standard accommodation. Other destinations with established hotel markets are Kenya, Mauritius, and the Seychelles (World Bank, 2014). Twenty-three international hotel corporations operate in sub-Saharan Africa. Of these, Accor, Hilton, InterContinental, and Starwood are the largest. There are also nine regional brands (World Bank, 2014).

Studies of technological change, efficiency, and productivity in the hotel industry show a strong similarity with firm-level studies of manufacturing. Hotels, like plants, are learning enterprises in which capabilities play a central role. In the hotel business, technological change means investing in new methods, procedures, and techniques (Yu and Chen, 2016). Management is the most critical factor in the quality of a hotel and, therefore, in the price it can charge in the international market. Hotel management has become more complex, as ICT and social and environmental concerns have begun to play an increasingly prominent role (World Bank, 2012).

Both technical efficiency (improved capabilities) and technological change are key drivers of productivity change in the lodging sector. In a sample of Spanish hotels, Barros and Alves (2004) find that better investment planning, improved technical expertise, and superior management and organization led to significant productivity improvements. Investments in organizational factors, such as marketing, resource planning, and improvements in quality were largely responsible for these successes. Yu and Chen's (2016) analysis of the determinants of hotel productivity in Taiwan find that chain hotels are technology leaders—a hotel's membership in a group increases efficiency—while independent hotels tend to operate at less than best practice.

Recent research on the role of agglomeration economies in the hotel industry suggests that hotels, like manufacturing firms, benefit from spatial concentration. Tourism industry networks and clusters in the U.K., for example, support innovations by small and medium service providers (Novelli et al., 2006). Clustering and networking in the Italian meeting and convention industry increases firm-level efficiency (Bernini, 2009). In China's convention industry, a city's political or economic importance, the sophistication of its service industry, regional GDP per capita, and information accessibility all drive agglomeration (Zhang, Qu, and Guo, 2011).

Restaurants and hospitality

Restaurants are the quintessential non-tradable service. Dining in a restaurant requires that the client and the service provider be present in the same physical location. In Africa, the vast majority of restaurants are locally owned micro, small, and medium enterprises (MSMEs), and the sector plays a major role in job creation. Hospitality provides jobs across the skills spectrum—from highly skilled to low skilled, “breakthrough” jobs for those just entering or reentering the labor market. The sector provides many young people with their first employment experience.

The restaurant industry exhibits both innovation and productivity growth. Variable costs such as manpower and raw materials are significant cost drivers. As firms react to a changing business environment, innovations in equipment design and layout, packaging, and service techniques take place (Rodgers, 2007). These innovations include faster and better preparation methods, improved temperature control, less waste, better sanitation, and faster and more flexible service. Product and

service innovations occur even in small restaurants (Palmer and Griswold, 2011). Alberca and Parte (2018) find evidence of productivity growth at the firm level in restaurants in Spain over the period 2011-2014, and of a link between productivity growth and such financial outcomes as credit ratings, probability of default or bankruptcy, leverage, and cash flow. Productivity and operational efficiency are key factors in firm survival.

Business services

Second-generation information and communications technology will enable a far larger number of developing countries to enter service export markets, perhaps moving beyond the traditional business process outsourcing (BPO) model (Frishtak, 2018). BPO is the contracting of a specific business task to a third-party service provider. The most common examples are call centers and human resources, accounting, and payroll outsourcing. Almost half of business process outsourcing is in banking and financial services. Another 20 percent is in technology and telecommunications. Among developing countries, India, China, the Philippines, and South Africa are the leading BPO hosts (Kennedy et al., 2013).

Developing countries generally enter the global call center market by attracting FDI. Case studies of India, the Philippines, and Egypt indicate that multinational call centers often generate spillover effects by developing the capacity of local third-party service providers. Internet-enabled offshoring is an important source of jobs, especially for women. These jobs are often in call centers and bookkeeping, and may include tasks requiring higher skills and judgment, if the employees can be monitored remotely (Staritz and Reis, 2013). However, many of the characteristics that make jobs “offshorable” also make them vulnerable to automation. As technology improves and wages rise, some of the jobs typically offshored, such as call center jobs, could be automated (World Bank, 2016).

The poster child for ICT-based services in Africa is Kenya. Its most successful IT-based industry is mobile money—a financial product that allows users to make financial transactions via the mobile phone. Wide availability of mobile devices offers a distribution technology for mobile financial services to mobile network carriers and banks. Kenya was also an early entrant into BPO. Currently, there are 50 BPO firms in Kenya providing services such as data processing, digitization, transcription, and call centers. A growing number of firms are offering higher-end services such as software development, programming, research and development, and financial and accounting services (Nguai Muchai and Kimuyu, 2018). Senegal was one of the earliest entrants into outsourcing in sub-Saharan Africa. By 2016, however, Senegal still only had nine companies exporting IT-enabled services, and they were finding it increasingly difficult to compete outside Senegal. Regional exports of software have been more successful because the solutions developed for Senegal are often well-suited to other African contexts (English, 2018).

IT-enabled services closely resemble manufacturing in terms of innovation, productivity change and economies of scale. Total factor productivity growth has made a significant contribution to the growth of software services in India post-2000. Much of this growth is due to technological change, driven by exports (Banga and Kumar, 2011). The cost structure of many internet businesses gives rise to scale economies (Shapiro and Varian, 1999). For many internet-based businesses or services, once the online platform is in place, each additional customer, user, or transaction incurs very little extra cost, and for purely digital products, such as e-books, the marginal production cost is close to zero. Network effects, where the more users a system has, the more useful it becomes, often reinforce scale economies and allow firms to operate in “two-sided markets” (World Bank, 2016).

Transport and logistics

Transport and logistics is the network of services that support the physical movement of goods across and within borders. The industry comprises an array of activities beyond transportation, including warehousing and storage, terminal operations in ports and airports, express delivery, customs brokerage, and data and information management. This section focuses on firm characteristics in road transport (the largest segment of the industry) and contract logistics.

Road transport

Trucking companies in Africa range from modern, professionally organized fleets operating between 10 and several hundred trucks to informal contractors operating 1-3 vehicles. Variable costs predominate. The cost of fuel, lubricants, and tires represent at least 40 percent of total vehicle operating costs in African road transport. Fixed costs are generally low, due to low labor costs and the use of secondhand trucks (as old as 10-15 years). Cost structure and service quality vary with the organizational characteristics of the firm. Larger firms tend to have higher fixed costs, reflecting a newer fleet and better service quality (World Bank, 2009).

In his widely read survey of productivity in the U.S. transportation sector, Robert Gordon notes, “The production process in transportation is well described by the standard economic theory of production...” (Gordon, 1992). Road transport firms show evidence of both productivity growth and economies of scale. Since deregulation in 1980, productivity growth in the U.S. has been positive. The likely explanation is that carriers were better able to pursue operational efficiencies, and that competition spurred innovation (Ying, 1990; Parming, 2013). There are important benefits of scale in the trucking industry. While owner-operators can operate successfully at extremely small scale, they generally act in the role of sub-contractors to private firms doing their own trucking or to for-hire trucking firms with their own network of terminals and electronic data systems (Boyer, 1993). Accident rates, one measure of quality, decline with firm size (Moses and Savage, 1994).

The trucking industry is undergoing a period of rapid technological change. GPS technology and information services are being used by road transport companies to achieve leaner operations and improvements in network efficiency. Onboard computer-enabled improvements in communications and resource allocation have led to a major increase in capacity utilization in the U.S. trucking industry (Hubbard, 2003). In East Africa, a growing number of trucking companies use GPS technology to track shipments (Kunaka et al., 2018). To maximize fleet flexibility, road transport companies are introducing advanced tracing and routing technology. Companies are also applying digital technology to develop new business models, such as digital freight exchanges (BCG, 2016).

Contract logistics

As individuals and businesses expect to get goods faster, more flexibly, and, in the case of consumers, at low or no delivery cost and manufacturing becomes increasingly customized, logistics is growing more complex (PWC, 2016). In response, the industry is undergoing a period of rapid organizational, product, and process changes. Leading firms standardize processes as much as possible to reduce costs and seek to integrate their product offering into the full length of their customers’ supply chains (BCG, 2016). Large logistics providers benefit from economies of scale (Park and Lee, 2015). Market leaders grow by acquiring smaller players—achieving scale through consolidation (PWC, 2016).

Innovation allows logistics providers to develop new offerings that add value by using technology such as radio-frequency identification, robotics, and wireless remote-control systems. In warehouses, some companies are using augmented reality to facilitate navigation and repairs, as well as robots for

“picking and packing” (BCG, 2016). Lead firms in the industry innovate by acquiring entrepreneurial start-ups (PWC, 2016). Capabilities also play a central role. Four factors—customer focus, time management, integration and information—determine perceived quality (Mentzer et al., 2001). These attributes are closely tied to working practices, including employee ownership of the quality assurance process and training and education (Rahaman, 2006).

Summing up

This section surveyed the literature on firm characteristics in four industries without smokestacks—agro-industry and horticulture, tourism, ICT-based business services and transport and logistics. It supports the conclusions drawn from our earlier literature survey (Newfarmer, Page and Tarp, 2018). The four industries without smokestacks here have more in common with manufacturing than they have with agriculture and services as traditionally defined in economic statistics. There is considerable evidence of the capacity for learning and productivity growth. Scale and agglomeration economies are important firm characteristics, and firm capabilities play a central role in determining productivity and quality.

3. The constraints to growth

This section sets out the constraints-to-growth analysis proposed for the country studies. It is built around four drivers of industrial location that have largely shaped the global distribution of industry (UNIDO, 2009b; Newman et al., 2016)—the “investment climate,” exports, agglomeration, and firm capabilities. Because industries without smokestacks share firm characteristics with manufacturing, the same drivers of locational choice apply to them.

One insight from our previous research is that the drivers of locational choice are mutually reinforcing (Newman et al., 2016). Investments in infrastructure and skills raise the potential productivity of all firms, making some of them more likely to succeed in external markets. Industrial exports help build firm capabilities, which are transferred through agglomeration. Agglomerations raise firm-level productivity; however, in poorer countries, they generate competitive pressures that reduce incentives to cluster, unless the clusters are export-oriented. Because the determinants of locational choice are interdependent, structural change largely depends on the extent to which governments are able to pursue public actions to address multiple constraints simultaneously. The constraints analysis is designed to provide the empirical base to do so.

The investment climate

Although the “investment climate” has come to be broadly and somewhat vaguely defined, reliable electrical power, lower costs of transport, more capable workers, and competition are essential drivers of firm-level productivity (Spatafora et al., 2012).⁶ Here, we focus on three aspects of the investment climate that are particularly relevant to industries without smokestacks—infrastructure, skills, and the regulatory environment.

Infrastructure

The productivity penalty that African firms pay because of poor infrastructure has been extensively documented.⁷ By one estimate, the current infrastructure deficiencies in Africa contribute to a loss of

⁶ See Newman et al. (2016) for a discussion of the investment climate.

⁷ See for example Escribano, Guasch and Pena (2010)

about 2 percentage points per year in GDP growth.⁸ Reliable electrical power may be the greatest single constraint. The quality of electricity service is ranked as a major problem by more than half of the firms in more than half of the African countries in the World Bank's *Investment Climate Assessments*. Transport follows as a close second.

The impact of poorly performing infrastructure is not confined to manufacturing. High speed data transmission is critical to exporting a wide range of services and especially to IT-intensive exports (Frishtak, 2018). In call centers, information technology plays a key role in customer service and sales. Information technology also plays a significant role in the tourism industry. Developments such as computer reservation systems (CRS), global distribution systems (GDS) and the internet have transformed the ways in which tourists and tourism firms operate. In short, connectivity to the internet and communication infrastructure are important considerations for travelers to Africa (World Bank, 2014).

Adequate physical infrastructure is essential for tourism, especially in luxury segments of the market (Daly and Gereffi, 2018). In sub-Saharan Africa, many hotels have to provide their own infrastructure services, such as power, water filtration and treatment, solid waste removal, and sewage treatment and disposal, to compensate for unreliable public services. Such investments raise capital and operating costs, and adversely affect competitiveness (World Bank, 2014). The quality of road infrastructure constrains tourism in Kenya, Tanzania, and Uganda, where the highest cost in a safari package is inland transport (World Bank 2010b). In Rwanda, on the other hand, a drive from Kigali to see the mountain gorillas in the Volcanoes National Park takes less than three hours on well-maintained highways (Gigombe and Newfarmer, 2018).

Successful agribusiness exporting requires logistics infrastructure that facilitates rapid shipment of products and information and communication technology infrastructure that supports coordination between enterprises. Physical infrastructure is particularly important at points of export (airports and seaports). Horticultural exports are perishable and particularly vulnerable to delays in shipping (Bofinger, 2018).

Skills

Nearly 60 percent of African 15- to 24-year-olds have only completed primary school and only 19 percent have gone beyond lower secondary (Filmer and Fox, 2014). Educational quality is an issue at all levels. Learning assessments show that most primary students in Africa lack basic proficiency in reading at the end of second or third grade. Employer surveys report that African tertiary graduates are weak in problem solving, business understanding, computer use, and communication skills.⁹

Some industries without smokestacks rely heavily on post-primary level skills. For example, the IT-enabled services industry is potentially constrained by the lack of university graduates with relevant language skills. Lack of software development and project management skills has been identified as a constraint to ICT-enabled services in Kenya (Ngui Muchai and Kimuyu, 2018). Senegal's ranking among the top 50 potential suppliers of outsourcing services has fallen significantly in the last five years due to declines in the quality and quantity of human resources (English, 2016). The skills needed to interact with tourists and to provide the many "back office" services that are inputs into the

⁸ See NEPAD, AU and AfDB (2011).

⁹ See World Bank (2007) and Filmer and Fox (2014).

production of high-quality tourism are essential to further development of the tourism industry (Daly and Gereffi, 2018).

The regulatory environment

Because productivity in services has an important impact on productivity levels across the economy, competition is essential. Senegal’s decline in IT-enabled services provides an example of the costs of a monopoly controlling the price and quality of access to backbone infrastructure (English, 2018). Lack of competition in transport markets—often a product of regulation—is associated with higher trucking costs (Kunaka et al., 2018). By conferring substantial market power on lead firms, the “package booking” distribution channel reduces competition in Africa’s tourism industry (Daly and Gereffi, 2018). Import competition—including from within regional economic communities—can discipline local manufacturers and service providers. Removing barriers to foreign entry in services can increase competition, reduce costs and extend access to a broader range of differentiated services.

Exports

For most countries in Africa, regional and global export markets represent the best opportunity for rapid growth of manufacturing, agri-business, and tradable services. Exports permit firms to realize economies of scale, and, in low-income countries, the act of exporting raises firm productivity through learning (Harrison and Rodriguez-Clare, 2009). Because individual firms face high fixed costs of entering export markets, there is a risk that countries will export too little. To offset the costs to first movers, African governments need to develop a package of trade and exchange rate policies, public investments, regulatory reforms, and institutional changes aimed at increasing the share of non-traditional exports in GDP—put differently, an East Asian-style “export push.”

The trade and exchange rate regime has a direct impact on incentives to export. Tariffs on intermediates and capital goods can place exporters at a disadvantage relative to global competitors. One option to address anti-export bias is to create a “free trade regime for exporters” through various mechanisms to eliminate or rebate tariffs on intermediate and capital inputs used in export production. While duty drawback, tariff exemption, and VAT reimbursement schemes exist in many African countries, they are often complex and poorly administered. Export procedures—including certificates of origin, quality, and sanitary certification and permits—can be burdensome (Yoshino, 2008; Farole, 2011). Reforms to improve the institutional framework of trade logistics—including customs and standards—are essential to success in agribusiness.

Agglomerations

Like manufacturing, agro-processing, horticulture, tourism, and ICT-based services benefit from agglomeration, including thick labor markets, information and knowledge spillovers, and the ability to share overhead expenses and services. Agglomerations pose a collective action problem that governments can address by concentrating investments in high-quality institutions, social services, and infrastructure in a limited area, such as a special economic zone (SEZ) (UNIDO, 2009b; Farole, 2011).

Many of the SEZs established in the 1970s and 1980s in East Asia’s “tiger economies” were critical in facilitating their industrial development and upgrading processes. Similarly, the later adoption of the model by China—which launched SEZs on a scale not seen previously—provided a platform for attracting FDI that supported the development of China’s export-oriented manufacturing model and also served as a catalyst for sweeping economic reforms that later were extended throughout the country.

While most African SEZs have focused on manufacturing, SEZs are relevant to services and agro-based industries as well. For example., the Software Technology Parks of India Initiative (STPI) proved essential to the growth of the software industry. Indonesia and the Philippines—and recently Ethiopia—have established agro-industrial SEZs near growing areas to promote processed agricultural exports. A number of African countries—Ethiopia, Ghana, Nigeria, and Tanzania in particular—are attempting to promote SEZs, including agriculture-related zones. SEZs focused on high-end service sectors are less common (Newman and Page, 2017).

Firm capabilities

Empirical microeconomic studies repeatedly find that there are large productivity differences among enterprises in quite narrowly defined industries. In rich countries, the magnitudes involved are striking, but in developing countries, the differences in plant-level productivity within well-defined industries are even larger. There is a long “left-hand tail” of poorly performing firms. In China and India for example, average 90-10 total factor productivity ratios are more than 5 to 1.¹⁰ These productivity differences reflect differences in firm capabilities.

Firm capabilities are the knowledge and working practices used by firms in the course of production and in developing new products. Productivity is one dimension of capability. The other is quality. Productivity and quality depend, in turn, on the knowledge possessed by the individuals who make up the firm. Globally, firms are competing in capabilities, and those economies that succeed in attracting or developing higher capability firms are at a competitive advantage.

Capability building takes place in two phases. The first phase involves the introduction of a higher level of capability into an economy, either because of the entry of new, more capable firms or as a result of learning by existing firms. Foreign direct investment is one—and some would argue for countries at low levels industrial development the most important—way of introducing higher capability firms. The foreign investor brings the technology, managerial knowledge, and working practices it has developed elsewhere.¹¹ “Learning by exporting” is an example of how domestic firms build capabilities through learning. Demanding buyers and repeated relationships are characteristic of global markets, spanning the range of industries from traditional manufacturing to tradable services and agro-industry. These inter-firm relationships are the means by which suppliers and purchasers exchange knowledge.

Once higher capabilities have been introduced to an economy—say through a new foreign direct investment or through a newly successful export activity—their potential benefit will depend on the extent to which the technical knowledge and working practices held by the firm are transmitted to other firms. For this reason, the country studies should contain a limited “mapping” of firm capabilities in IWOSS sectors. The mapping will address the following three questions:

- What are the country’s current capabilities?
- Where did those capabilities come from?
- What areas show promise of improvements in capabilities?

The country-level research should also attempt to address the question of how capabilities are transferred between IWOSS sectors and between IWOSS sectors and other sectors. For example, do

¹⁰ Hsieh and Klenow (2009).

¹¹ A majority of researchers find that firms with foreign equity participation in developing countries typically have higher output per worker or higher levels of TFP than similar domestically owned firms. For a survey of the relevant literature, see Harrison and Rodriguez-Clare (2010).

other exporting activities benefit from improved logistic capabilities and knowledge in the horticultural sector?

4. Implementing the constraints analysis at the country level

The four drivers of industrial location discussed in Section 3 can contribute to the development of a broad-based strategy for structural change. However, country context matters. Thus, the country studies will need to focus on identifying binding constraints to the growth of the specific IWOSS industries that are the focus of the country study. In this section, we outline some practical steps to move from the drivers of industrial location set out in Section 3 to a country-level diagnosis of the major constraints to the growth of IWOSS industries.

The investment climate

Since 2006, the World Bank has conducted firm-level surveys using face-to-face interviews with managers and business owners following a standard global methodology.¹² These World Bank *Enterprise Surveys* are useful in providing information on aspects of the investment climate relevant to industries without smokestacks—notably, infrastructure, skills, and the regulatory environment. The enterprise surveys contain basic firm-level financial information that supports the measurement of outcomes such as productivity, employment, and growth, together with information on the business environment. The business environment topics include infrastructure, trade, finance, regulations, taxes and business licensing, corruption, crime and informality, access to finance, innovation, labor, and firms’ perceptions about obstacles to doing business. By looking at business environment measures in conjunction with performance measures, it is possible to identify aspects of the investment climate that may be impeding the growth of private sector firms.

Sector coverage is defined consistently across all economies and includes the entire manufacturing sector and most services sectors—retail, wholesale, automotive repair, hotels and restaurants, transportation, storage, communications, construction, and ICT. Public utilities, government services, health care, and financial services sectors are not included in the sample. The enterprise surveys are repeated approximately every four years. The results of these surveys are presented in a “Country Profile” and are frequently summarized in an “Investment Climate Report.”

Although the enterprise surveys are a useful source of data on the business environment, they suffer from limitations. Measurement error may be present in some sensitive questions, particularly those regarding corruption and firm’s accounting results. Some outcomes may be intentionally underreported due to the sensitive nature of the questions. The surveys are exclusively focused on formal, private sector firms. This constraint likely biases the reported results away from informal enterprises and “start-ups” that may be in the informal sector. This formal sector bias may make drawing inferences from the surveys more difficult, particularly in the business services and tourism sectors, where start-ups and informal firms may be overrepresented.

Attrition bias may arise when firms exit the sample because of mergers, acquisitions, consolidation, or bankruptcy, or when a firm is included in the sample only if it survives up to the point of interview. Without accounting for attrition, reliance on surviving firms will inevitably bias performance

¹² The survey data are available at www.enterprisesurveys.org.

measurements—usually upward. New entrants may differ significantly from surviving firms (Recanatini, Wallsten, and Xu 2002).

Notwithstanding the World Bank’s assertion that the surveys are “representative,” the enterprise surveys tend to give excessive weight to larger firms (Gelb, Meyer, and Ramachandran 2013). While there is some overlap in firms covered in the periodic four-year resampling, the surveys do not permit the construction of a panel of data. This fact limits the survey’s utility in addressing firm dynamics and endogeneity.

A small number of enterprise survey questions ask business owners or managers for their subjective opinion regarding the importance of various business environment elements—for example, access to finance, poor electrical service, corruption, and competition from informal firms. The responses to these questions should be interpreted with some care. In many economies, the perceptions of managers of large firms are very different from the perceptions of managers of medium and small firms. Thus, the size distribution of firms in IWOSS sectors may be relevant to identifying constraints. For the above reasons, country researchers using the enterprise surveys should describe the likely sources of bias in the reported results of the surveys.

Infrastructure

The enterprise surveys contain firm-level information on electricity, water supply, and telecommunications. Information on electricity shows the extent to which firms face electrical power outages or interruptions, and the effect of these power outages on sales, as measured by the losses they generate. Because service delays impose additional costs on firms and may act as barriers to entry and investment, the enterprise surveys also collect data on the number of days it takes to obtain an electricity connection. For many industries in the manufacturing sector—including agro-industry—water is an important input in the manufacturing process. For this reason, the enterprise surveys also provide data on the number of interruptions in water supply in a typical month.

In addition to summarizing the infrastructure data contained in the enterprise surveys, each country study should undertake an assessment of the state of IT infrastructure to determine whether it constrains the growth of the business services industry. In tourism, the enterprise surveys report results on the business environment for hotels, restaurants, and transportation. These data may need to be supplemented by discussions with industry representatives to identify other infrastructure constraints—for example, difficult road access to major tourism sites.

Skills

Each country study should include diagnostic analyses of skills constraints in each IWOSS sector.¹³ The enterprise surveys collect workforce information such as the number of permanent full-time employees, the number of temporary employees, employees by gender, whether formal training is offered, and managers’ experience working in the firm’s sector. In addition, for manufacturing firms, the surveys also collect the breakdown of the workforce between production and nonproduction workers and between skilled and unskilled production workers. These data can be supplemented by other labor force data and targeted interviews with industry group representatives to identify skills constraints to the growth of IWOSS activities.

¹³ There should be significant complementarity between the analysis of skills constraints and the analysis of employment potential. On the methodology for identifying skills constraints, see the companion framing paper by Bhorat et al. (2019).

The regulatory environment

It is unsurprising that a major focus of the enterprise surveys is on the regulatory environment. The surveys provide quantitative measures of regulations such as business licensing and taxation, including the percentage of time spent by senior management dealing with regulatory compliance and the number of required meetings with tax officials in a year. Other enterprise survey indicators measure the time required to obtain a construction permit and an operating license.

The country studies should undertake a systematic review of the regulatory environment affecting both international and domestic competition. In economies where IT-enabled services are an important IWOSS sector, the country study should describe the regulatory environment that governs IT service providers and assess whether it constitutes a barrier to entry. In the tourism sector, the country studies should analyze the regulatory regime, and the tax and fee structure governing tourism transactions. If transport and logistics are included in IWOSS sectors, efforts should be made to evaluate the regulatory regime affecting road transport providers.

Exports

Each country study should address how the trade and exchange rate regime influences the incentives for non-traditional exports and how well the institutional framework to offset anti-export bias functions. Data on the real effective exchange rate is frequently available in the country reporting of the IMF. Tariff data and information on regional trade agreements can be obtained from the WTO Tariff Analysis Online facility and the Regional Trade Agreements Database.¹⁴ Non-tariff barriers (NTBs), which disproportionately affect trade in services, are often more difficult to measure, but some effort can be made to identify major NTBs impacting services—for example, restrictions on the physical presence of service providers in the country—and convert the price impact of NTBs into a tariff equivalent.

The enterprise surveys provide some data on trade performance. For example, they quantify the trade activity of firms—including the percentage of firms’ exporting (either directly or indirectly) and the percentage of manufacturing firms using inputs or supplies of foreign origin. In countries where access to administrative data is possible—say, from customs and excise or the revenue authority—these data can be used to supplement the trade data from the enterprise surveys.

The enterprise surveys also collect information on the operational constraints faced by firms when exporting and importing—for example, the average number of days to clear customs for exports and imports. The country studies should also evaluate the effectiveness of the “free trade regime for exporters.” The evaluation should include an assessment of mechanisms to eliminate or rebate tariffs on intermediate and capital inputs used in export production—such as duty drawback, tariff exemption, and VAT reimbursement schemes— in terms of their complexity, administration, and timeliness.

Finally, country researchers should attempt to assess the extent to which the institutional and policy framework provides a coherent “export-push” policy regime. Among the questions that might be addressed are the following:

- Is there evidence of commitment to export promotion by the top political leadership?
- What is the institutional framework for promotion of non-traditional exports?
- Does a coordinating body exist to ensure “whole of government” coordination of policies and institutions?
- What is the level of coherence between macroeconomic and exchange rate policies?

¹⁴ See: <https://tao.wto.org/welcome.aspx?ReturnUrl=%2f%3fui%3d1&ui=1> and <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

- Are the FDI and SEZ strategies of the government well-coordinated?

Agglomerations

Each country study should contain a review of spatial industrial policy and an evaluation of the SEZ program. The extent to which the government has a policy of promoting SEZs in IWOSS sectors—say, for example agro-industrial or IT-enabled services zones—is of particular interest. The research should include two components in each country: (1) a case study, based on secondary research and interviews with investors, zone developers and operators, regulatory authorities, government, and other stakeholders; and (2) surveys of IWOSS investors operating in the zones. The case study and survey should seek to address the following issues:

- The extent of high-level, active, and consistent government commitment to SEZ programs.
- The extent to which the SEZs have succeeded in attracting global investors.
- Evidence that SEZs have played a significant role in employment creation.
- The extent to which zones are integrated with the domestic economy.
- The nature of the investment climate inside the zone—specifically for infrastructure and trade facilitation.
- An evaluation of the management quality of the zones.
- Whether the agency responsible for developing, promoting, and regulating SEZs have the resources and capacity to carry out its mandate.
- The extent to which the legal and regulatory framework codifies the program strategy and establishes the rules of the game for all stakeholders involved in the process.
- The extent to which SEZs are located within or adjacent to major ports, airports, or other key trade infrastructure.

Benchmarking the performance of national SEZs against relevant Africa-wide data may prove useful in identifying problems in SEZ performance.¹⁵

Firm capabilities

Firm capabilities are the knowledge and working practices used by firms in the course of production and in developing new products. Productivity is one dimension of capability. The other is quality. Productivity and quality depend, in turn, on the knowledge possessed by the individuals who make up the firm—both managers and workers.

Attempting to address the level of firm capabilities in an economy is a data- and survey-intensive exercise.¹⁶ These considerations notwithstanding, each country study should attempt to undertake a limited “mapping” of firm capabilities in relevant IWOSS sectors. The mapping should address the following three questions:

- What are the country’s current capabilities?
- Where did those capabilities come from?
- What areas show promise of improvements in capabilities?

In general, the literature on capability transfers emphasizes two transfer mechanisms: (i) *horizontal* linkages—whether the presence of foreign-owned firms within the same industry leads to knowledge or technology upgrading in local domestic firms, and (ii) *vertical* linkages—how foreign-owned firm

¹⁵ For relevant benchmarks see Farole (2011) and Newman and Page (2017).

¹⁶ John Sutton has undertaken an “Enterprise Mapping” exercise in a number of the countries in which we intend to carry out research—Ethiopia, Ghana, Tanzania and Zambia. These can provide useful background and benchmarking information. See: <http://personal.lse.ac.uk/sutton/>

affect the probability of knowledge transfers to local domestic input suppliers and/or customers of multinational enterprises. Thus, the capability mapping should consider both horizontal and vertical transmission of capabilities. Because capability transfers occur most frequently in value chain relationships, in most cases, the capability mapping exercise will be complementary to and should be undertaken as part of the value chain analysis described in Section 5.

The mapping exercise should attempt to address the following questions:

- To what extent are IWOSS industries linked—either horizontally or vertically—with other domestic firms?
- Do IWOSS industries produce wholly for the export market?
- To what extent do IWOSS industries have long-term relationships with domestic suppliers and/or customers?
- Is there evidence of spillovers from IWOSS activities—say, logistics in horticulture—to other non-IWOSS industries requiring similar capabilities?

5. Value chain analysis

Addressing the four drivers of industrial location discussed in Sections 3 and 4 supports a broad-based strategy for structural change—one that can apply to both manufacturing and industries without smokestacks—but the public actions needed to relieve constraints to growth are often quite specific to an industry (Rodrik, 2004). For that reason, as a complement to the constraints analysis, each country study should undertake value chain analysis of relevant IWOSS activities.

Value chain analysis is the process of breaking a value chain into its constituent parts in order to understand its structure. It consists of identifying key actors at each stage of the value chain and enumerating their functions and relationships. Understanding the governance of the chain—who the key players are, including the role of lead firms, and what rules govern cooperation or competition among the players—is also important (Gereffi, Humphrey, and Sturgeon (2005).

Value chain analysis typically consists of three stages (World Bank, 2010):

- Mapping the chain by disaggregating components such as cost, time, and value added along various segments;
- Establishing benchmark indicators comparing domestic performance against international best practice; and
- Conducting analysis of the critical issues that affect the performance of the value chain and identifying the binding constraints on competitiveness.

Mapping facilitates a clear understanding of the sequence of activities as well as the key actors and relationships involved in the value chain. Maps show all stages of the chain from the supply of inputs to marketing, the various actors in the chain, and their linkages. Some of the key questions the mapping exercise should address are (UNIDO, 2009c):

- What are the activities in the value chain needed to produce the final product?
- Who are the operators involved in these activities and what are their roles?
- What are the flows of products, information, and knowledge in the value chain?
- What are the production volumes, the number of actors, and the number of jobs?
- Where does the product (or service) originate and where does it go?
- How does value change through the value chain?

- What types of relationships and linkages exist among the various chain actors?
- What are the main strengths and weaknesses of the chain?

The next step is to benchmark the chain's economic performance and competitiveness. Benchmarking is important because it helps to identify where the value chain stands in relation to competitors or to global best practice. This task involves comparing a number of key parameters along the value chain—such as unit cost of production, labor productivity, and quality—against those of competitor countries or best practice.

Benchmarking facilitates identifying upgrading opportunities (Schmitz, 2005), which may include functional upgrading or “moving up the value chain” in which firms upgrade by moving within the value chain to a task that generates higher value added. Product upgrading can be achieved by producing higher-value products. Finally, process upgrading involves improving production methods through innovation or new technologies (Humphrey and Schmitz, 2004).

The value chain maps and the findings of the benchmarking exercise are tools to identify industry-specific constraints. Analyzing the flow of goods, information, and transactions through the various stages of the value chain makes it possible to detect problems in the business and policy environment, and identify interactions and synergies among and between actors (UNIDO, 2009a). The analysis should identify a set of priorities—some that are sector-specific and some that apply to the entire economy—needed to improve performance. Three types of issues typically arise: (i) economy-wide issues such as trade and competition policy, institutional constraints, property rights, and price distortions; (ii) issues affecting operating costs such as wages, finance, utilities, and land; (iii) factors limiting diversification such as lack of research and development, licensing, product standards, and limited supplier linkages (UNIDO, 2009c).

6. Conclusions

The objective of our research is to widen the options for structural change and job growth in Africa. Much of the effort to transform the region's economies and create jobs will need to come from African governments themselves. Identifying the constraints to the growth of manufacturing, tradable services, tourism, and agri-business is an essential first step in the design of an appropriate policy response. The literature suggests that the industries without smokestacks that are the subject of our research share many characteristics in common with manufacturing and are subject to similar constraints to growth. Thus, governments are not forced to choose between an “industrial policy” focused on manufacturing and policies to promote tradable services and high-value agriculture. Both can achieve structural change.

Annex 1: A user's guide to selected IWOSS sectors

Tourism: Some examples from the North American Industry Classification System (NAICS)

Sector 72. Accommodation and food services

Subsector 721. Accommodation

Subsector 722. Food services and drinking places

Sector 48-49. Transportation

Subsector 481. Air transportation

Subsector 482. Rail transportation

Subsector 483. Water transportation

Subsector 485. Transit and ground passenger transportation

Subsector 487. Scenic and sightseeing transportation

Sector 71. Arts, Entertainment, and Recreation

Subsector 711. Performing Arts, Spectator Sports, and Related Industries

Subsector 712. Museums, Historical Sites, and Similar Institutions

Subsector 713. Amusement, Gambling, and Recreation Industries

Agro-industry and horticulture: Some examples based on the SITC

01. Meat and meat preparations

011. Meat of bovine animals, fresh, chilled or frozen

012. Other meat and edible meat offal

016. Meat, edible meat offal, salted, dried; flours, meals

017. Meat, edible meat offal, prepared, preserved, n.e.s.

02. Dairy products and birds' eggs

022. Milk, cream, and milk products (excluding butter, cheese)

023. Butter and other fats and oils derived from milk

024. Cheese and curd

025. Birds' eggs and egg yolks; egg albumin

03. Fish, crustaceans, mollusks, and preparations thereof

034. Fish, fresh (live or dead), chilled or frozen

035. Fish, dried, salted or in brine; smoked fish

036. Crustaceans, mollusks and aquatic invertebrates

037. Fish, aqua. invertebrates, prepared, preserved, n.e.s.

05. Vegetables and fruits

054. Vegetables

056. Vegetables, roots, tubers, prepared, preserved, n.e.s.

057. Fruits and nuts (excluding oil nuts), fresh or dried

058. Fruit, preserved, and fruit preparations (no juice)

059. Fruit and vegetable juices, unfermented, no spirit

07. Coffee, tea, cocoa, spices, and manufactures thereof

071. Coffee and coffee substitutes

072. Cocoa

073. Chocolate, food preparations with cocoa, n.e.s.

074. Tea and mate

075. Spices

Commercial agriculture: Some examples based on the SITC

00. Agriculture and live animals (commercial firms only)

04. Cereals and cereal products (commercial firms only)

06. Sugar and honey products (commercial farms only)

08. Feed for animals (commercial farms only)

09. Edible products (commercial firms only)

Other IWOSS sectors: Some examples based on the IMF BPM6 classification (IMF 2017)

Construction (formal firms only)

Construction abroad

Construction in reporting economy

Financial services

Explicitly charged and other financial services

Financial intermediation services indirectly measured (FISIM)

Insurance and pension services

Auxiliary insurance services

Direct insurance

Pension and standardized guaranteed services

Reinsurance

Maintenance and repair services not included elsewhere (n.i.e)

Manufacturing services on physical inputs owned by others

Goods for processing abroad

Goods for processing in reporting economy

Other business services

Professional and management consulting services

Research and development services

Technical, trade-related, and other business services

Personal, cultural, and recreational services

Audiovisual and related services

Other personal, cultural, and recreational services

Telecommunications, computer, and information services

- Computer services
- Information services
- Telecommunications services

Transport

- Air transport
- Other mode of transport
- Postal and courier services
- Sea transport

Travel

- Business
- Personal

Wholesale and retail sales (formal firms only)

Transport and logistics: Some examples from the NAICS

- Sector 48-49. Transportation and warehousing
 - Subsector 481. Air transportation
 - Subsector 482. Rail transportation
 - Subsector 483. Water transportation
 - Subsector 484. Truck transportation
 - Subsector 488 Support activities for transportation
 - Subsector 492. Couriers and messengers
 - Subsector 493. Warehousing and storage

Business Services: Some examples from the NAICS

- Sector 51. Information
 - Subsector 517. Telecommunications
 - Subsector 518. Data processing, hosting, and related services
 - Subsector 519. Other information services

Manufacturing (SITC 01-99) (excluded)

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