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Knowledge, Technology, and Cluster-Based Growth in Africa: Findings from 11 Case Studies of Enterprise Clusters in Africa

DOUGLAS ZHIHUA ZENG

Although Africa is falling behind in today’s global economic race, it holds pockets of vital economic activity—many in the form of enterprise clusters scattered across the continent’s countries and industries. By clustering, enterprises are able to overcome constraints in capital, skills, technology, and markets. Enterprise clusters help their constituents grow and compete by encouraging more effective knowledge and technology diffusion and product specialization, leveraging local comparative advantage, fostering production value chains, and achieving collective efficiency. In so doing, they contribute significantly to Africa’s economic growth. They provide jobs for the continent’s growing population, thus enabling families not only to survive, but also to educate their children and perhaps move out of poverty. But in today’s increasingly knowledge-intensive and globalized economy, these clusters also face serious challenges in the areas of technology, natural resources, infrastructure, skill acquisition, and quality control.

How were these clusters formed and how did they evolve? What are the key elements contributing to their success? How can knowledge and technology be put to work to generate economic growth even in low-income countries? Are these clusters sustainable and replicable? To gain a better understanding of these questions, the World Bank Institute organized a study of enterprise clusters in five low-income and two middle-income countries in Africa. The cases presented in the book are the work of international and local consultants (the authors of the rest of the chapters in the book) who have been working on African clusters, with evidence gathered through desk study, field visits, and surveys. This volume reports the evidence gathered, with a focus on knowledge, technology, and policy.
The Selected Clusters

Clusters are defined by two key attributes: (1) their geographic and spatial distribution, and (2) their economic sector. Porter (1990) defines a cluster as a group of firms engaged in a similar or related economic activity within the national economy. In most cases these firms are geographically close, while in others they may be more dispersed. Schmitz (1992) defines a cluster as a geographic and sectoral agglomeration of enterprises. While both definitions are relevant, most of the clusters we study here fall into the latter definition, as it is based on geographic proximity as well as sectoral specialization. Nadvi’s (1999) collective efficiency model has four key variables that determine competitiveness in enterprise clusters—market access, labor-market pooling, intermediate input effects, and technological spillovers. The other variable in the model is what Nadvi calls joint action. This occurs when firms make deliberate efforts to cooperate and collaborate. The geographic proximity of clusters is assumed to facilitate joint activities initiated by the enterprises.

With regard to learning and information flows, Oyelaran-Oyeyinka (2004) has identified two types of knowledge: formal and nonformal (experiential learning). “Nonformal learning,” he writes, “which often takes the form of learning-by-doing, is an important component of human capital, particularly in economic contexts where traditional craftsmanship, often acquired through apprenticeship, predominates.” Oyelaran-Oyeyinka further notes that knowledge of production, which is tacit to a large extent, relies largely on workers’ skill (know-how), although skill itself draws on “know-why” to find reasons for particular procedures or routines.

Nadvi (1997), Schmitz (1999), and Meyer-Stamer (1998) recognize that clustering offers unique opportunities to engage in a wide array of domestic links between users and producers, and between the economy’s knowledge-producing sector (universities and R&D institutions) and its goods-and-services-producing sector. All of these linkages stimulate learning and innovation. Mytelka (2004) emphasizes the role of clusters in promoting the kind of interactivity that is an important stimulus of innovation, but cautions that the colocation of actors in geographic proximity does not automatically lead to interaction, learning, and innovation.

To demonstrate these points, we have chosen cases in low- and middle-income countries in East and West Africa. The sectors covered range from natural-resource-based activities, such as fishing, to high-tech industries, such as auto parts and computer manufacturing. Table 1.1 provides an overview of the case studies.
Table 1.1. Overview of 11 Enterprise Clusters in Africa

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Cluster</th>
<th>No. of firms</th>
<th>Firm size (average no. of employees)</th>
<th>Markets</th>
<th>Major challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The Suame Manufacturing Cluster in Ghana</td>
<td>&gt; 9,000</td>
<td>5–10</td>
<td>Domestic and limited export (West Africa)</td>
<td>Lack of effective dissemination of R&amp;D results to firms; inadequate physical infrastructure</td>
</tr>
<tr>
<td>3</td>
<td>The Kamukunji Metalwork Cluster in Kenya</td>
<td>&gt; 2,000</td>
<td>1–3</td>
<td>Domestic</td>
<td>Low barriers to entry and congestion of microenterprises; weak linkages with knowledge institutions; weak infrastructure support</td>
</tr>
<tr>
<td>4</td>
<td>The Lake Naivasha Cut Flower Cluster in Kenya</td>
<td>24 (large firms)</td>
<td>250–6,000</td>
<td>Domestic and export (mainly Europe)</td>
<td>Resource depletion and environmental pollution</td>
</tr>
<tr>
<td>5</td>
<td>The Nnewi Automotive Components Cluster in Nigeria</td>
<td>85</td>
<td>&lt; 12</td>
<td>Domestic and limited export</td>
<td>Asian competition and poor public goods</td>
</tr>
<tr>
<td>6</td>
<td>The Otigba Computer Village Cluster in Nigeria</td>
<td>&gt; 5,000</td>
<td>8</td>
<td>Domestic and export (mainly West Africa)</td>
<td>Lack of capital, especially long-term financing; weak infrastructure support; vulnerability to foreign exchange and import duties</td>
</tr>
<tr>
<td>7</td>
<td>The Mwenge Handicrafts Cluster in Tanzania</td>
<td>2,200</td>
<td>15–20</td>
<td>Domestic and limited export</td>
<td>Lack of financing; weak firm capacity; weak public institutions and infrastructure</td>
</tr>
<tr>
<td>7</td>
<td>The Keko Furniture Cluster in Tanzania</td>
<td>—</td>
<td>2–130</td>
<td>Domestic and limited export</td>
<td>Weak public institutions and infrastructure; lack of technological support and access to finance</td>
</tr>
<tr>
<td>8</td>
<td>The Lake Victoria Fishing Cluster in Uganda</td>
<td>17 (fishing plants)</td>
<td>35–200+</td>
<td>Domestic and export (mainly Europe)</td>
<td>Falling fish stock and EU quality standards</td>
</tr>
<tr>
<td>9</td>
<td>The Textile and Clothing Cluster in Mauritius</td>
<td>260</td>
<td>170</td>
<td>Domestic and international</td>
<td>Increasing labor costs; enhanced international competition; low productivity</td>
</tr>
<tr>
<td>10</td>
<td>The Wine Cluster in South Africa</td>
<td>&gt; 340</td>
<td>—</td>
<td>Domestic and international</td>
<td>Lack of effective marketing/branding strategy and expertise; financial constraints for small producers</td>
</tr>
<tr>
<td>11</td>
<td>The Western Cape Textile and Clothing Cluster in South Africa</td>
<td>327</td>
<td>103</td>
<td>Domestic and international</td>
<td>Increasing labor costs; enhanced international competition; lack of innovation both in product and process</td>
</tr>
</tbody>
</table>

Note: — Not available.
Source: Author's compilation.
Cluster Origins

Clusters come in many forms; each has a unique development trajectory and set of organizational principles; each faces specific challenges. Two broad categories can be defined, however. In the first are clusters that originate as spontaneous agglomerations of enterprises and other related actors. The second includes clusters induced by public policies, or “constructed”; these range from “technopoles” and industrial parks to incubators and export processing zones (EPZs).

Most of the clusters we studied belong in the first category. Exceptions include the Mauritian textile and clothing cluster, which started as an EPZ, and cases where governments did take some limited action—though such efforts were not normally part of a broad plan or systemic policy. Although the 11 clusters we studied were formed in different ways and at different times, it is possible to identify some basic elements that led, in varying degrees, to their formation:

- **Natural endowments.** These are especially important for the natural-resource-based clusters, such as cut flowers in Kenya, fishing in Uganda, and wine in South Africa. In the case of the Kenyan flower cluster, a favorable climate (a diverse range of temperatures and well-distributed rainfall), the availability of huge tracts of land, and fresh water resources from Lake Naivasha and underground constitute unique advantages. In the case of Uganda fishing, Lake Victoria, the biggest lake in Africa, provides very rich resources.

- **Proximity to major local markets (such as cities) and infrastructure (roads, highways, ports, airports).** This is an important factor for almost every cluster we studied. The Otigba computer village in Nigeria is located within Ikeja, the industrial capital of Lagos State and former capital of Nigeria. The Suame cluster in Ghana is located in Kumasi, the capital city of the Ashanti region and a very important and historical center for the region. In Kenya, the Kamukunji cluster is in the capital city, Nairobi, and the Lake Naivasha cluster is also near Nairobi and the Jomo Kenyatta International Airport. In Tanzania, the Mwenge cluster is located in the capital, Dar-es-Salaam, and the Keko cluster is near the Chag’ombe Road. In South Africa, the Western Cape cluster is located in the Cape Town metropolitan area.

- **Local entrepreneurs with tacit knowledge and basic skills in trading, design, or manufacturing.** In most clusters studied, the businesses were started by traders, traditional craftsman, artisans, carvers, flower farmers, and so on, who inherited their knowledge and skills through family and kinship ties or local apprenticeships. Most of them started with small and simple operations, then gradually expanded and upgraded. For example, in the cases of the Kamukunji metalwork cluster in Kenya
and the Nnewi auto parts and Otigba computer clusters in Nigeria, most businesses started by trading or repairing, and then gradually evolved into assembling and manufacturing activities. In the case of the Suame manufacturing and vehicle repair cluster in Ghana, business activities evolved from manufacturing simple tools to more sophisticated metal products.

- **Market push.** As noted earlier, almost all the clusters studied are located near major local markets. In all cases, the businesses that initially formed the basis of the cluster existed to meet market needs—mostly local, except in the fishing and cut flower clusters. For example, metal products were made to meet the needs of local households and farms, and computers were produced as a result of the emerging demands of local people for information and communication technology.

- **Limited government intervention.** Although most of the clusters were created spontaneously, different levels of government intervention also contributed to the formation of some, though these interventions were normally not part of a systemic plan or policy. For example, the formation of the Mwenge cluster in Tanzania and Suame cluster in Ghana were facilitated by government orders to move scattered or unorganized business activities into their current locations for the purpose of spatial planning or “keeping the city clean.” The establishment of the Mauritian textile and clothing cluster began with an EPZ in the 1970s, when the very first textile and clothing firms began to operate.

### How Do the Clusters Develop and Succeed?

Clusters survive and succeed mainly because they are able to upgrade the diversity and sophistication of their business activities to achieve greater productivity. They accomplish this by building up a supply-production-distribution value chain; acquiring, disseminating, and adapting knowledge and technology (both domestic and foreign); building a relatively educated labor force; achieving collective efficiency through joint actions and cooperation; and gaining support from national and local governments, institutes, and in some cases, international bodies (such as the European Union, World Bank, and United Nations). We will discuss these efforts in more detail later.

### Efficiency Gains through Cluster-Based Business Value Chains

When a cluster achieves a certain economy of scale and visibility, it begins to exert a strong pull on suppliers, marketers, distributors, users, and even financiers and providers of communication and business services. Along with them come more producers and manufacturers to take advantage of easy access to a mass clientele, as well as the cluster’s interfirm synergies, knowledge network, and an infrastructure that includes many shared
facilities and services (some of which, like warehouses, are provided by the government and donors). Such efficiency gains are demonstrated by the Otigba computer village, Lake Victoria fishing, Suame metalwork, and other clusters, although the components of the value chain are somewhat different in each. These value chains reduce transaction costs and greatly enhance the productivity and efficiency of all the business activities in the cluster.

**Knowledge and Technology Acquisition, Adaptation, and Dissemination**

In today’s economy, knowledge and technology have become the key drivers of economic growth and firm competitiveness. This is true even for less knowledge- and technology-intensive sectors. All the cases included in our study show that effective knowledge and technology acquisition, adaptation (including some innovation), and dissemination are among the critical factors of success. The major means of engaging in these activities are the following:

**Knowledge network and interfirm links**

A knowledge network is defined as a structure of interlinked actors that, in the process of innovation, facilitate further learning in firms and institutions. Interfirm links can be both horizontal and vertical. In broad terms, there are several forms of networks and interfirm links, including: subcontracting, market links with customers and suppliers, informal and formal collaborations (joint ventures, franchises), membership in professional and trade associations (to be discussed later), and the movement of skilled staff from one firm to another (Oyelaran-Oyeyinka 2001). All of these forms of networks or interfirm links exist in the cases we studied, though to different degrees.

In the case of the Suame cluster, subcontracting is prevalent, and the contracting firms often provide some technical assistance to help suppliers achieve higher-quality standards and technical specifications. In the case of the Kenyan flower cluster, subcontracting is necessary for small farms that fail to get accreditation or certification to sell directly to export markets (mainly in Europe). Such farms need to sell through larger farms. Other reasons for subcontracting include areas of high cost associated with the flower business, such as freight and marketing, and the failure of large farms to grow particular varieties in demand either because of unfavorable climatic conditions or because the demand is short-term and does not justify investment in extra operational costs. In all three clusters in Tanzania, interfirm links are manifest in subcontracting, collaboration, and mechanisms for information exchange and dissemination. Poaching of labor, labor mobility, and other forms of interfirm links can be found in Lake Naivasha, Mwenge, and all other clusters. In addition, customers and clients are important sources of innovation—as observed in the Mwenge and Kamukunji clusters. In Mwenge, clients are the most significant sources of innovation and new designs (table 1.2).
Networks and linkdages greatly enhance firms’ ability to improve production, process innovation, and overall competitiveness.

**Tapping into foreign knowledge and technology**

With the knowledge revolution, there is a vast stock of knowledge and technology available in the global market, especially in developed countries. Tapping into that global stock, adapting it, and using it for local economic growth are becoming increasingly important for developing countries.

Although in most clusters, firms acquire knowledge and technology domestically, there are a few cases where the technology and know-how are acquired from abroad, mainly through cooperative production agreements, franchising, licensing, reverse engineering, and imitation. Such cases include the Otigba computer village, Nnewi auto parts, Kamukunji metalwork, and Mauritian textile and clothing clusters. In Otigba, computer hardware is imported from China, Malaysia, and Dubai, and technical and production channels have been established with firms in these countries. Through reverse engineering, local technicians have acquired process technology needed for computer assembly. In Nnewi, practically all the firms obtained their technology from Taiwan (China). They also rely on Taiwan for machinery, equipment, and skills. In Kamukunji, local technology input is low and has to be imported from countries such as China, India, Republic of Korea, and Pakistan. Local entrepreneurs observe new products, study them, and design ways of producing similar products or others that can serve the same function. To facilitate product importation, the government waives the duty on basic engineering machines. In the Mauritian textile and clothing cluster, direct foreign investments from Taiwan in the 1980s and Hong Kong (China) in the 1990s played an important role in transferring technology and know-how. Foreign direct investment from Taiwan also contributed significantly to the South African textile and clothing cluster.

### Table 1.2. Sources of new ideas in the Mwenge handicrafts cluster

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage of firms citing link as primary source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification by clients</td>
<td>45</td>
</tr>
<tr>
<td>Catalogs and magazines</td>
<td>24</td>
</tr>
<tr>
<td>Visiting domestic trade fairs</td>
<td>15</td>
</tr>
<tr>
<td>Hired designers</td>
<td>10</td>
</tr>
<tr>
<td>Visiting trade fairs abroad</td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
</tr>
</tbody>
</table>

*Source: Chapter 7.*

**Learning and training**

Various modes of learning and training activities—formal, nonformal, and informal—are important means of acquiring and disseminating knowledge and technology in the clusters. In general, the following modes of learning and training can be identified: (a)
apprenticeship; (b) on-site training at suppliers’ factories; (c) on-the-job training; (d) expert contracting; (e) support mechanisms provided by public institutions; (f) learning through transaction with local and external agents; and (g) learning-by-doing in the areas of production and maintenance. In most clusters, apprenticeship, learning by doing, and learning through transactions are quite prevalent. On-the-job training, on-site training, and expert contracting are also available in most clusters, especially those that are related to manufacturing. This is because manufacturing clusters, such as Nnewi and Kamukunji, have higher technology intensity than clusters based on natural resources or assembly. In the case of Nnewi, foreign experts are hired to provide training, and Nigerian technicians are also sent to suppliers’ factories to be trained. In the two clusters in Tanzania, a survey shows that 80 percent of workers obtained skills from within their firms (on-the-job or in-house training); the remaining 20 percent obtained skills through previous employment, organized workshops, vocational training, or similar means. In the South African wine cluster, most of the established producers are actively engaged in exchanging production knowledge through viniculture forums, root stock associations, and Elsenburg—a training institute with vineyards and a cellar. Training organized or provided by public institutions is also available in most clusters.

**Universities and technology institutes**

Universities and technology institutes play a crucial role in the creation, dissemination, and application of knowledge and technology. But in the development of the African clusters we studied, such as the Otigba, Kamukunji, and Tanzanian clusters, the role of universities and technology institutes has been minimal, with few exceptions. In some cases, they provided qualified technical and engineering graduates, and, in a few cases, valuable technological and technical assistance. In the case of Suame, the Suame Intermediate Technology Transfer Unit, part of the Technology Consultancy Center at the Kwame Nkrumah University of Science and Technology, and the National Vocational Training Institute provided substantial technological assistance that was very important to the cluster’s upgrade and expansion. In the Kenyan flower cluster, the National Horticultural Research Center and several universities offered training programs in horticulture. In the Ugandan fishing cluster, universities also provided training in fisheries and aquaculture. In the South African wine cluster, the Wine Industry Network for Expertise and Technology played an important role in coordinating research, technology transfer, and training.

**Pooling of relatively educated entrepreneurs and workers**

An educated, skilled labor force is the core of firm innovation and competitiveness. Although, in general, Africa suffers from a shortage of skilled human capital, the clusters we studied benefit from a relatively educated labor force—though their education levels
are still low compared with their counterparts in more developed countries. In a few clusters, such as the Otigba cluster in Nigeria, there is a high concentration of well-educated workers. This is one of the important reasons why the clusters can perform better than the rest of the economy.

Although data on the entire labor force in the clusters are not available, some data (including surveys) are available about cluster entrepreneurs. Based on the data provided in the case studies, in some clusters, the majority of entrepreneurs have at least a primary school education; a significant number have completed junior secondary school (20–50 percent) and senior secondary school (17–25 percent) (table 1.3). In the Nnewi cluster, 40.8 percent of the surveyed entrepreneurs have a secondary school education, and 28.8 percent a technical education; 16.3 percent of the entrepreneurs hold university degrees. In Otigba, about 55–60 percent of the entrepreneurs are university graduates, and there is an uncommon presence of highly skilled and educated graduates in electronics, computer sciences, and related disciplines. This contrasts sharply with the Suame cluster in Ghana, where 75 percent of the entrepreneurs received no more than a primary education, and only 2 percent obtained higher education. Meanwhile, more college graduates with advanced degrees continue to join various clusters, becoming important catalysts of continued growth.

<table>
<thead>
<tr>
<th>Table 1.3. Education levels of entrepreneurs in selected clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percent</strong></td>
</tr>
<tr>
<td>Level of education</td>
</tr>
<tr>
<td>Primary or below</td>
</tr>
<tr>
<td>Junior secondary</td>
</tr>
<tr>
<td>Senior secondary</td>
</tr>
<tr>
<td>Tertiary</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: Chapters 2, 5, 7, and 11.

Note: The ways of assessing education level are different. In the Tanzanian clusters (first two columns), secondary education is from 8 to 13 years and tertiary is 14 years and above, while in Suame, secondary is 9–12 years, and tertiary is 13 years and above.

**Governmental and institutional support**

The role of governments and public institutions differ from cluster to cluster. In some clusters, governmental involvement is minimal (such as in Kamukunji, where the major governmental initiative was to provide sheds); in others, the government provided some facilitation or played a significant role. In general, government interventions are

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1 These data are drawn from a 2005 survey and represent a significant improvement in the educational attainment of owners. New owners of businesses with university degrees have begun to enter into the cluster, in contrast with a 1997 study, which reported only one person with a tertiary education degree. See Chapter 5.
manifested in the following areas: defining and enforcing sectoral policies, regulations, and standards; creating a special agency or organization to promote, coordinate, and facilitate cluster development; establishing various public institutions (such as councils, incubators, technology centers, and institutes) to provide technological and technical support, training (in technology, business, entrepreneurship, management), and capacity development; providing incentives such as tax holidays, special funds, duty-free provisions, and cheap land to promote technology imports and enterprise development; promoting alliances and partnerships among local firms and with foreign firms through joint ventures and strategic alliances (in the case of Otigba); and providing infrastructure such as roads, water, power, ports, warehouses, information technology (IT) facilities, and so on. These initiatives are present in varying degrees in different clusters; in some, most initiatives exist while, in others, only one or two are present.

In the Kenyan cut flower cluster, the government played a very positive and instrumental role. The government of Kenya recognized the importance of horticulture in the national economy as early as 1966 and committed to promoting its growth. In 1967, horticulture was declared a special crop and accorded priority in the government’s agenda. The government created the Horticultural Crops Development Authority (HCDA) to develop, promote, coordinate, and facilitate the horticultural industry in Kenya. Meanwhile, it enacted legislation to protect intellectual property rights and enforce quality standards, and set up promotion schemes such as manufacturing under bond, export compensation, and export promotion zones to support horticultural exports. Otherwise, the government’s direct involvement in the subsector has been minimal, limited mainly to issuing export licenses through HCDA. It has not interfered in the marketing or distribution of the crops, leaving these functions to the private sector. Such an enabling environment and the government’s subsequent hands-off approach have encouraged very strong and robust private-sector participation in the cut flower industry.

Some of these clusters benefited from the support of international organizations. For example, the World Bank has been involved in Kamukunji activities, especially in the areas of skill and technology development. The cluster also benefited from skill development programs sponsored by the United Nations Development Programme and United Nations Industrial Development Organization. In Suame, the World Bank organized short-term, hands-on training for auto mechanics and auto electricians.

Joint action and cooperation
Because of the small size of most cluster enterprises, it is very important for firms to establish joint organizations and cooperate to protect their common interests; exchange information and ideas; form synergies and interfirm links; provide technical, marketing, and policy services; increase collective bargaining powers; and survive in the face of
fierce competition. Such collective gains are normally obtained through various industrial and professional associations. In almost all the clusters, one finds various associations. These play different roles in each cluster. For example, in the Tanzanian clusters, associations help firms voice their concerns, provide valuable sources of information, and offer technological advice. In Suame, associations are mainly concerned with social welfare issues. In the case of the Kenyan cut flower cluster, associations’ objectives range from lobbying for policy support and environmental conservation to maintaining standards and facilitating corporate social responsibility. The Kenya Flower Council and the Fresh Produce Exporters Association are the key industrial associations, the objectives of which include maintaining standards, facilitating market access, and gathering market intelligence for members. In the South African wine cluster, Wines of South Africa plays an important role in marketing South African wines internationally.

**Are Africa’s Clusters Sustainable and Susceptible to Scaling Up?**

Clustering does contribute to the success and growth of a specific sector by offering various advantages not available outside the clusters. However, while African clusters have achieved some success, they also face serious challenges and constraints. Their growth and sustainability in the long run will, to a large extent, depend on how they can cope with these challenges. If they are successful, they could be expanded and scaled up—otherwise, their future may be uncertain.

**Challenges of the Knowledge Revolution and Increasing Global Competition**

With today’s global knowledge revolution, firms and industries are rapidly becoming more knowledge and technology intensive; accordingly, their means of production and operation are also becoming increasingly knowledge-based. This requires an increasingly intensive acquisition, adaptation, and use of knowledge and technology throughout the sector to enhance productivity and efficiency. While there are successful clusters (including those we studied), most confine their operations to Africa (the exceptions are cut flowers, fishing, wine, and textiles and clothing) or remain domestic enclaves. The firms in the clusters are small and, in general, lack access to capital, skills, and technologies; for the most part, they demonstrate limited innovation. Although the clusters in South Africa and Mauritius are relatively strong and compete internationally, they are losing ground owing to rising labor costs, falling productivity, and lack of innovation—and because of the phaseout of the EU’s Everything But Arms trade initiative and the U.S. African Growth and Opportunity Act (AGOA). As the market becomes more globalized, the firms in these clusters face more competition from Asian countries, such as China, India, and Vietnam. Surviving that competition will pose a big challenge.
**Lack of a critical mass of skills and talent**

Although the clusters we studied boast a relatively educated labor force, their overall educational level is still low compared with clusters elsewhere in the world. In a market that allows firms to produce and sell relatively unsophisticated products, higher skill levels may not be exploited in the short term. However, to sustain competitiveness, firms have to gradually move up the value chain and become more innovative. This requires having more talented technicians and engineers, who currently are not available in most clusters. For example, the Suame cluster already faces an oversupply of new entrants due to low entry barriers and a low technology level. To survive global competition, firms have to be more innovative.

**Weak links between businesses and educational institutions**

Based on our studies, institutions of higher education are providing some skilled personnel, but, in general, their contribution is limited owing to poor-quality education and a mismatch between skill supply and market demand. For example, in Kamukunji even new graduates from national institutes of technology, national polytechnics, and universities were not viewed as sources of knowledge in the cluster. Except in a few cases, universities and technology institutes are not deeply involved in firms’ technology and innovation activities. This may be traceable to weak demand from the private sector and the limited capacity of the universities and technology institutes. In Otigba, for example, it is thought that the collective IT capabilities in the cluster are much higher than those found in most IT-focused faculties in Nigerian universities and polytechnics.

**Weak governmental and institutional support**

As noted earlier, the level of governmental involvement varies across the clusters. In Kenya’s cut flower cluster and in the textile and wine clusters in South Africa and Mauritius, the government has played a very positive and conducive role. However, in most cases, the role of the government and support from public institutions are inadequate. Beyond providing some basic infrastructure and training, the government needs to build a conducive business environment. This is not just an issue of defining policies, but of implementing them. Based on a survey in the Nnewi cluster, most firms perceived governmental support as weak (table 1.4).
Table 1.4. Firms’ perception of government support in Nnewi cluster
Percentage of firms citing given level of support

<table>
<thead>
<tr>
<th>Strength of support</th>
<th>Innovation</th>
<th>Available skilled manpower</th>
<th>Public university support</th>
<th>R&amp;D</th>
<th>Intellectual property protection</th>
<th>IT support</th>
<th>Venture capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>89.8</td>
<td>77.1</td>
<td>89.4</td>
<td>93.8</td>
<td>87.5</td>
<td>91.1</td>
<td>95.7</td>
</tr>
<tr>
<td>Good</td>
<td>8.2</td>
<td>16.7</td>
<td>10.6</td>
<td>6.3</td>
<td>10.4</td>
<td>8.9</td>
<td>2.1</td>
</tr>
<tr>
<td>Strong</td>
<td>2.0</td>
<td>6.3</td>
<td>0.0</td>
<td>0.0</td>
<td>2.1</td>
<td>0.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Source: Chapter 5.*

Resource depletion and failure to meet international standards

These challenges mainly apply to the natural-resource-based clusters in our study, notably Kenya’s cut flower cluster and Uganda’s fishing cluster. In the case of Kenya’s cut flower industry, overdrawing water from Lake Naivasha for irrigation purposes threatens the lake’s existence. In some places, the water in the lake has retreated by more than 700 meters from its position before the advent of large-scale irrigation. In addition, an accumulation of agro-chemical effluents, especially nitrates, threatens aquatic life. Fish stocks have been reduced, and diseases and pests are on the rise. Meanwhile, the Ugandan fishing cluster has faced problems in meeting EU standards for safety and quality. Beginning in 1997, the European Union imposed and enforced a set of sanitary and phytosanitary standards on Uganda’s fish exports. Failure to meet the standards led to a conditional ban on one of Uganda’s most important exports and a crisis in the fish-processing and export industry. After both the public and private sectors made a joint rescue effort, focusing on process improvement, access to the EU market was restored. Uganda has not yet succeeded, however, in translating its successful response to the EU fish ban into a cohesive, proactive development process. In the medium- and long-term, a focus on technological capability and innovation could lead to systemic product upgrades, providing a basis for the sustained competitiveness of Uganda’s fish exports.

From the above analyses we can see that the challenges facing Africa’s clusters are still enormous, though varied across sectors. Clusters’ future sustainability and susceptibility to scaling up depends, to a great extent, on how successfully the clusters can overcome these challenges. For resource-based clusters, even those that are currently successful and function in international markets, a failure to solve the challenges of resource depletion and product upgrading will place long-term sustainability in doubt. The survival of technology-based clusters depends on how effectively the clusters can absorb and apply new technologies and adopt advanced knowledge-management practices to improve their overall competitiveness.
Clusters are important pockets of economic vitality. For them to become truly sustainable and scalable, the government has a vital and multifaceted role to play. In addition to providing leadership and coordination, the public sector needs to establish a favorable regulatory and incentive-based environment, facilitating innovation and the acquisition of knowledge and technology. It should also provide high-quality public goods from which the private sector can benefit.

**Some Policy Implications**

Several policy implications can be drawn from our studies, but these are by no means uniformly applicable to all clusters in Africa. Some clusters are of medium size, with a potential for considerable capability acquisition. Most firms in the clusters are owned by individuals who are resourceful and educated, with a complement of relatively skilled workers. Firm dynamism is usually limited by market type and size. To meet the needs of clusters’ diverse contexts and industries, policy design and implementation must be carefully considered and well planned. Government measures might include efforts to:

- *Encourage further knowledge acquisition, adaptation, and dissemination.* Based on clusters’ current knowledge networks and interfirm links, collaboration should be encouraged, especially with foreign companies. To tap into foreign technologies and apply them in a local context is crucial for improving clusters’ competitiveness. Nnewi’s close link with Taiwan is an example of such a collaboration. In addition to training and technical assistance collaborations, medium and large enterprises should also be encouraged to engage in R&D and innovation.

- *Strengthen educational institutions and technology institutes and their link with the business sector.* Technology institutes and universities (both public and private) should be encouraged to become more attuned to industry needs. They should reach out to firms with offers to provide technology support (such as R&D and technology brokering) and technical assistance. Policy incentives can be designed to encourage joint research, contracted services, and other types of collaboration. Universities must provide more skilled graduates to meet market demands. To accomplish this, some educational reforms, including in curricula and overall pedagogy, are necessary.

- *Establish and enforce a business-conducive institutional plan, including clear regulations, standards, and quality-assurance mechanisms.* These are important for building an enabling business environment, encouraging innovation, and delivering quality products. In defining and carrying out such a plan, a close public–private partnership is very important. Many tasks can be done in collaboration with trade and professional associations, which are present in almost every cluster. In some cases, the function of associations needs to be strengthened.
• **Strengthen and upgrade skill training.** In most clusters studied, skill levels are low, as are education levels, with a majority of the labor force having completed only primary school or junior secondary school. To enhance productivity and cope with increasing international competition, African firms need to upgrade the skill level of their labor force. This is also essential for product and process innovation, the key factors in promoting firms’ long-term survival. Improving skill levels must be done through close collaboration with universities, technology institutes, and training organizations. The focus should be not just on production technology, but on business management, marketing, branding, and packaging.

• **Provide sound infrastructure.** Although governments have been involved in providing basic infrastructure to some clusters, the effort is insufficient. Firms are constrained by poor public goods delivery—water, power supply, phone lines, and so on. For example, in the Nnewi cluster, 98 percent of firms claim that they have to spend a nontrivial percentage—in some cases up to 40 percent—of their total investment on private power generation and other utilities. This issue has to be addressed by the government.

• **In the long run, promote greater consumer purchasing power.** Firms grow when markets expand and, more importantly, when income levels are able to sustain high-quality consumer goods. Relevant policies should be seen in the light of enterprise promotion, leading to the evolution of higher levels of subcontracting and specialization.
References


