

**WBI Development Study**

Knowledge, Technology and Cluster-based  
Growth in Africa  
-- Findings from Eleven Case Studies of Enterprise Clusters in Africa

(Draft)

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## List of the Case Studies

Cluster	Country	Sector
Lake Naivasha	Kenya	Cut flower
Kamukunji	Kenya	Metalwork
Lake Victoria	Uganda	Fish production & processing
Mwenge	Tanzania	Handicrafts
Keko	Tanzania	Furniture
Nnewi	Nigeria	Auto parts
Otigba	Nigeria	Computer hardware
Suame Magazine	Ghana	Manuf. and Vehicle repair
Mauritian textile & clothing	Mauritius	Textile & clothing
South Africa Wine	South Africa	Wine
Western Cape	South Africa	Textile & clothing

To see these case studies, please check:

<http://www.worldbank.org/wbi/knowledgefordevelopment> (click “Upcoming event”  
- Knowledge for Africa’s Development, then “Resources”)

Please note that these studies are still in draft format and don’t cite until published.

## **Knowledge, Technology and Cluster-based Growth in Africa - Findings from Eleven Case Studies of Enterprise Clusters in Africa**

Although, in general, Africa is falling behind in today's global economic race, there are a number of pockets of vitalities, especially demonstrated in the form of enterprise clusters, scattered in various countries and industries. These clusters enable enterprises to overcome many "binding constraints" in the areas of capital, skills, technology, market, etc, to grow and compete through more effective knowledge/technology diffusion, product specialization, leveraging local comparative advantage, fostering production value chains, and achieving collective efficiency. They make significant contributions to the economic growth and provide jobs for the growing number of men and women, enabling families to survive, educate their children, and in some cases, move out of poverty. On the other hand, in today's increasingly knowledge intensive and globalized economy, these clusters also face serious technological, natural resource, environment, skills and quality challenges as well as global competitions.

How were these clusters formed and how did they evolve? What are the key elements contributing their success? How can knowledge and technology be put to work even in low-income countries to generate economic growth? Are these clusters sustainable and replicable? To have a better understanding of these questions, we conducted a study of eleven cases of enterprise clusters in five low-income and two middle-income countries in Africa. This paper is based on the evidence presented in the studies, with a focus on the knowledge and technology aspects.

### **A. An Analytical Framework and Overview of the Selected Clusters**

Clusters are defined by two key attributes namely geographical/spatial distribution and sectoral dimension. Porter (1990) defines clusters as a group of firms engaged in a similar or related economic activity in national economy. In most cases these firms are geographical close while in others, they may be more dispersed. Schmitz (1992) defines clusters as a geographic and sectoral agglomeration of enterprises. While both definitions are relevant, all the clusters we study here fall into the later definition, more based on the geographical proximity as well as sectoral specialization. The collective efficiency model (Nadvi, 1999) has identified at least four variables that determine competitiveness in enterprise clusters. These include: market access, labor market pooling, intermediate input effects and technological spillovers. McCommick (2004) referred to them as "external economic factors" and has defined external economy as the unintended or incidental by-product of an economic action. The other variable in the collective efficiency model is what Nadvi (1999) has called joint action. This occurs when firms take deliberate efforts to cooperate and collaborate. The geographical proximity afforded to them by clustering is assumed to facilitate any joint activities initiated by the enterprises. In terms of learning and information flows, Oyeyinka (2004) has identified two types of knowledge, namely formal and non-formal (experiential learning) and states, "non-formal learning 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.” Oyeyinka (2004) has further noted that knowledge of production, which is largely tacit, relies largely on the skills (know-how) of workers although skill itself draws on know-why to find reasons for particular procedures or routines. Nadvi, Schmitz, and Meyer-Stamer (Nadvi:1997, Nadvi & Schmitz:1999, Meyer-Stamer:1998) recognize that clustering offer unique opportunities to engage in the wide array of domestic linkages between users and producers and between the knowledge producing sector (universities and R&D institutions) and the goods and services producing sectors of an economy that stimulates learning and innovation. Mytelka (2004) has also emphasized the role of clusters in promoting the kind of interactivity that is an important stimulus for innovation to occur, but cautions that co-location of actors in a geographically proximate space, does not automatically lead to interaction, learning and innovation.

To demonstrate these points, we have chosen eleven cases spread in seven low and middle income countries both in the Eastern and Western African regions, with a wide coverage ranging from natural resource-based to manufacturing and high-tech sectors, such as auto parts and computer. Table 1 is an overview of the case studies.

**Table 1. Overview of Eleven Enterprise Clusters in Africa**

Cluster	Country	No. of firms	Firm size (no. of employees)	Products	Markets	Major Challenges
Lake Naivasha	Kenya	24 (large firm)	250-6000	Cut flower	Domestic & exports (mainly Europe)	Resource depletion and environmental pollution
Kamukunji	Kenya	+2000	1-2	Metalwork	Domestic	Low barriers to entry and over-congestion of micro enterprises; weak linkages with knowledge institution; and weak infra. support
Lake Victoria	Uganda	17 (fishing plants)		Fish production & processing	Domestic & exports (mainly Europe)	Falling fish stock and EU quality crisis
Mwenge	Tanzania	2,200	15-20 (average)	Handicrafts	Domestic & limited exports	Lack of financing; weak firm capacity; and weak public institutions and infrastructure
Keko	Tanzania		2-130	Furniture	Domestic & limited exports	Weak public institutions and infrastructure; lack of technological support & access to finance
Nnewi	Nigeria	85	< 12 (average)	Auto parts	Domestic & limited exports	Asian competition and poor public goods
Otigba	Nigeria	+5000	8 (average)	Computer hardware	Domestic & exports (mainly West Africa)	Lack of capital, especially long-term financing; weak infrastructure support; and vulnerability to foreign exchange and import duties
Suame Magazine	Ghana	+9000	5-10	Manuf. and Vehicle repair	Domestic & limited exports (West Africa)	Lack of effective dissemination of R&D results to firms; and inadequate

						physical infrastructure
Mauritian textile & clothing	Mauritius	260	170 (average)	Textile & clothing	Domestic & international	Increasing labor costs; enhanced international competition; low productivity
South Africa Wine	South Africa	+340 (wine farms)		Wine	Domestic & international	Lack of effective marketing/branding strategy and expertise; financial constraints for small producers
Western Cape	South Africa	327	103 (average)	Textile & clothing	Domestic & international	Increasing labor costs; enhanced international competition; lack of innovation both in product and process

Source: Author's compilation.

## B. The Origins of the Clusters

Clusters come in many forms, each of which has a unique development trajectory, principles of organization, and specific problems. Two broad distinctions, however, can be made. The first type is the clusters that originate as spontaneous agglomerations of enterprises and other related actors, and the other includes those induced by public policies, or “constructed” clusters. The latter ranges from technopoles and industrial parks, to incubators and export processing zones (EPZs).<sup>1</sup>

Most of the clusters we studied here belong to the first category except a few such as the Mauritian textile and clothing cluster which started as an export processing zone, and in some cases, government did take some limited actions, but they were normally not part of a broad plan or a systemic policy. Although the eleven clusters are formed in different ways and different times, some basic elements can be identified that led to the formation of the clusters, though they played roles at varying degrees.

- Natural endowments. This is especially important for those natural resource based clusters, such as the Kenya cut flower, Uganda fishing and South Africa Wine. In the case of Kenya cut flower, a favorable climate (a diverse range of temperatures and well distributed rainfall), the availability of huge tracts of land, and the fresh water resources from the Lake Naivasha as well as underground waters give it a unique advantage. In the case of Uganda fishing, the Lake Victoria, which is the biggest lake in Africa, provides very rich resources.
- Proximity to major local market (such as cities) and infrastructure (roads, highways, ports, or airports, etc.). This is almost the case for every cluster we studied. The Otigba computer village in Nigeria is located within Ikeja, the industrial capital of Lagos State, the 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 centre for Ghana. In Kenya, the Kamukunji cluster is in the capital city Nairobi, and the Lake Naivasha cluster is also near Nairobi and the Jomo Kenyata International Airport. In Tanzania, the Mwenge cluster is located

<sup>1</sup> Mytelka, Lynn, and F. Farinelli, “Local Clusters, Innovation Systems and Sustained Competitiveness”, discussion paper, United Nations University, October 2005.

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.<sup>2</sup>

- Local entrepreneurs with tacit knowledge and basic skills in trading, design or manufacturing. In most clusters, the businesses were started by traders, traditional craftsman, artisans, carvers, flower farmers, etc. who have inherited their knowledge and skills through family and kinship ties or local apprenticeships. Most of them start with small and simple operations, and then gradually expand and upgrade. For example, in the cases of Kamukunji metalwork cluster in Kenya, Nnewi auto parts and Otigba computer clusters in Nigeria, the businesses mostly started with trading or repairing, and then gradually evolved into assembling and manufacturing activities. In the cases of Suame manufacturing and vehicle repair cluster in Ghana, the business activities evolved from manufacturing simple tools to more sophisticated metal products.
- Market push. As we mentioned above, almost all the clusters are located near major local market. In all the cases we studied, the existence of the initial businesses which formed the basis of a cluster later, was a result of meeting the market needs, mostly the local needs, except the fishing and cut flower cases. For example, the metal products were initially made to mostly meet the needs of local household consumption and agriculture, and the computers were produced as a result of the emerging ICT demand from local people.
- Limited Government intervention. Although most of the clusters were created spontaneously, different levels of government interventions also contributed to the formation of some of the clusters, though these interventions were normally not part of a systemic plan or policy. For example, the formation of Mwenge cluster in Tanzania and Suame cluster in Ghana were facilitated by government orders to move scattered or unorganized business activities into the current locations for the purpose of spatial planning<sup>3</sup> or “keeping the city clean”<sup>4</sup>. The establishment of the Mauritian textile and clothing cluster started as an Export Processing Zone in the 70's, when the very first textile and clothing firms began to operate.<sup>5</sup>

### C. How Do the Clusters Develop and Succeed?

These clusters are able to survive and succeed, mainly because they are able to upgrade their business activities towards more diversity and sophistication and reach a certain scale, through building up a supply-production-distribution value chain, acquiring knowledge and technology (both domestic and foreign) and disseminating and adapting them, building a relatively educated labor force, achieving collective efficiency through joint actions and cooperation, gaining government and institutional support as well as

<sup>2</sup> Boladale, “The South African Clothing and Textile Clusters”, a background study for the World Bank, 2006.

<sup>3</sup> Adeya, “Suame Cluster in Ghana”, a background study for the World Bank, 2006.

<sup>4</sup> Adeya, “Micro and Small Enterprise Clusters in Tanzania”, a background study for the World Bank, 2006.

<sup>5</sup> Boladale, “Textiles and Clothing Clusters in Mauritius”, a background study for the World Bank, 2006.

international support (such as EU, World Bank and UN) in some cases. We will discuss these in more details below.

### 1) Efficiency gains through a cluster-based business value chain

In most of the cases we studied, when a cluster achieves certain economy of scale and visibility, many suppliers, marketers, distributors, users and even financiers and communication and business service providers will throng into the cluster, along with more producers/manufacturers to take advantage of the easy access to the mass clientele, inter-firm synergies, knowledge network and many shared facilities/services (some of these are provided by the government and donors, such as warehouse) as well as infrastructure. This is demonstrated in the cases of Otigba computer village<sup>6</sup>, Lake Victoria fishing<sup>7</sup>, Suame metalwork<sup>8</sup> and many other clusters, although the components of the value chain in each cluster are somewhat different. Such a value chain reduces the transaction costs and greatly enhances the productivity and efficiency of all the business activities in the cluster.

### 2) Knowledge/Technology acquisition, adaptation and dissemination

In today's economy, knowledge and technology have become the key drivers for economic growth and firm competitiveness. This is true even for less knowledge/technology intensive sectors. All the cases included in our study show that effective knowledge/technology acquisition, adaptation (including certain innovation) and dissemination is one of the critical factors for their success. The major means for them to achieve this include the following:

#### a. Knowledge network and inter-firm linkages

A knowledge network is defined as a structure of interlinked actors that facilitate the process of learning in firms and institutions in the process of innovation. Inter-firm linkages can be both horizontal and vertical. In broad terms, there are several forms of networks and inter-firm linkages among which are: subcontracting, market linkages with customers and suppliers, information and formal collaboration (joint ventures, franchise), membership of professional and trade associations (this will be discussed later), and movement of skilled staff from

**Table 2. Sources of New Ideas**

Source	Percentage
Specification by clients	45
Catalogues and magazines	24
Visiting trade fairs	15
Hired designer	10
Visiting trade fairs abroad	4
Others	2

Source: Survey data from Adeya, "Micro and Small Enterprise Clusters in Tanzania", a background study for the World Bank, 2006.

<sup>6</sup> Boladale, "The Otigba Computer Hardware Cluster in Nigeria", a background study for the World Bank, 2006.

<sup>7</sup> Adeya, "The Case of the Fish Processing and Exporting Clusters in Uganda", a background study for the World Bank, 2006.

<sup>8</sup> Adeya, "Suame Cluster in Ghana", a background study for the World Bank, 2006.

one firm to another, etc.<sup>9</sup> In the cases we studied, all these forms of networking or inter-firm linkages exist, though at different degrees. In the case of Suame cluster, subcontracting is prevalent, and often the contracting firms provide some technical assistance to help its suppliers to achieve high quality standards and technical specifications. In the case of Kenya cut flower, subcontracting is necessary for small firms which fail to get accreditation/certification to sell directly to export market (mainly Europe) need to sell through the large farms. Other reasons for subcontracting include high costs associated with the flower business mainly for freight and marketing, and large farms' failure to grow certain varieties in demand either due to unfavorable climatic conditions in their locations or because the demand is short-term and does not justify investment in extra operation costs.<sup>10</sup> In all three clusters in Tanzania, inter-firm linkages manifest as sub-contracting, collaboration, and mechanisms for information exchange and dissemination.<sup>11</sup> Poaching and labor mobility and other forms of inter-linkages could be found in Lake Naivasha, Mwenge and all other clusters. In addition, customers and clients are also important source of innovation, which can be observed in Mwenge and Kamukunji clusters. In Mwenge, clients are the most significant source of innovation and new designs<sup>12</sup> (table 2). These are the important means of knowledge/technology acquisition and dissemination, which greatly enhances firms' ability for production and process innovation and overall competitiveness.

#### b. Tapping into foreign knowledge and technology

With the knowledge revolution, there are a vast stock of knowledge and technology available on the global market, especially in the developed countries. To tap into the global knowledge stock, adapt them and use them for local economy growth is 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 actually acquired from abroad, mainly through production cooperation, franchising, licensing, reverse engineering and imitation. Such cases include Otigba computer village, Nnewi auto parts, Kamukunji metalwork clusters, and Mauritian textile and clothing. In Otigba, computer hardware is imported from China, Malaysia and Dubai, and technical and production channels are established with firms in these countries. Through reverse engineering, the local technicians acquired the computer assembling process technology.<sup>13</sup> In Nnewi, practically all the firms obtained their technology from Taiwan, and also rely on Taiwan

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<sup>9</sup> Oyeyinka, Banki O., "Networks and Linkages in African Manufacturing Cluster: A Nigerian Case Study", discussion paper, United Nations University, September 2001.

<sup>10</sup> Bolo, Maurice, "The Lake Naivasha Cut Flower Cluster in Kenya", a background study for the World Bank, December 2005.

<sup>11</sup> Adeya, "Micro and Small Enterprise Clusters in Tanzania", a background study for the World Bank, 2006.

<sup>12</sup> Kinyanjui, Njeri, "The Case of Kamukunji *Jua Kali* Metalwork Cluster in Nairobi, Kenya", a background study for the World Bank, 2006.

<sup>13</sup> Boladale, "The Otigba Computer Hardware Cluster in Nigeria", a background study for the World Bank, 2006.

for machinery, equipment and skills.<sup>14</sup> In Kamukunji, local technology input is low and it has to be imported from countries such as South Korea, China, India and Pakistan. Local entrepreneurs observe new products, study them and design ways of producing similar products or others that can serve the same role. To facilitate the importation, the government waives the duty for basic engineering machines.<sup>15</sup> In the Mauritian textile and clothing case, the foreign direct investments from Taiwan in the 80s and Hong Kong in the 90s played important roles in transferring technology and know-how.<sup>16</sup> FDIs from Taiwan also significantly contributed to the South African textile and clothing cluster.

#### c. Various learning and training

Various modes of learning and training activities, formal, non-formal or informal, are also very important means of knowledge/technology acquisition and dissemination in the clusters. In general, the following modes of learning and training can be identified in the clusters: (a) apprenticeship; (b) on-site training at suppliers factory; (c) on-the-job training; (d) expert contracting; (e) support mechanism provided by public institutions; (f) learning through transaction with local and external agents; and (g) learning-by-doing for production and maintenance. In most clusters, apprenticeship, learning-by-doing, learning through transactions are quite prevalent. On-the-job training, on-site training and expert contracting are also available in most clusters, especially those manufacturing-related, which have higher technology intensity, such as Nnewi, Kamukunji and other clusters. In the case of Nnewi, even foreign experts, for example, those from Taiwan are hired to provide training and also Nigerian technicians are sent to supplier factories in Taiwan to be trained. Trainings organized or provided by public institutions are also available in most clusters. In the three clusters in Tanzania, a survey shows that 80% of firms obtained skills from within the firm (on-the-job training) and in-house training and learning, and the remaining 20% obtained skills through previous employment, organized workshops and vocational training, etc.<sup>17</sup> In the South African wine cluster, most of the established producers are actively engaged in exchanging production knowledge through viniculture forums, root stock association, and Elsenburg – a training institute with vineyards and cellar.<sup>18</sup>

#### d. Universities and technology institutes

As one of the key knowledge and technology actors, the role of universities and technology institutes is crucial for knowledge/technology creation, dissemination and application. In the development of the African clusters we studied, the role of universities and technology institutes is generally low, except a few exceptions, however, in some cases, they provided qualified technical and engineering graduates, and in a few cases,

<sup>14</sup> Boladale, “Nnewi Automotive Components Cluster in Nigeria”, a background study for the World Bank, 2006.

<sup>15</sup> Kinyanjui, Njeri, “The Case of Kamukunji *Jua Kali* Metalwork Cluster in Nairobi, Kenya”, a background study for the World Bank, 2006.

<sup>16</sup> Boladale, “Textiles and Clothing Clusters in Mauritius”, a background study for the World Bank, 2006.

<sup>17</sup> Adeya, “Micro and Small Enterprise Clusters in Tanzania”, a background study for the World Bank, 2006.

<sup>18</sup> Adeya, “The South African Wine Cluster”, a background study for the World Bank, 2006.

they provided valuable technologies and technical assistance. In most cases such as Otigba, Kamukunji, and Tanzanian clusters, the influence of universities and technology institutes is minimal. However, in the case of Suame, the Suame Intermediate Technology Transfer Unit (ITTU) of the Technology Consultancy Center, Kwame Nkrumah University of Science & Technology (KNUST), and the National Vocational Training Institute (NVTI) provided substantial technology assistance, which was very important for the cluster's upgrading and expansion.<sup>19</sup> In the Kenya cut flower case, the National Horticultural Research Center (NHRC) and several universities offered training programs in horticulture.<sup>20</sup> In the Uganda fishing cluster, universities also provided trainings in fisheries and aquaculture.<sup>21</sup> In South African wine cluster, the Wine Industry Network for Expertise and Technology (Winetech) plays important role in coordinating research, technology transfer and providing trainings.<sup>22</sup>

### 3) Pooling of relatively educated entrepreneurs and labor force

An educated and skillful labor force is the core of innovation and firm competitiveness. Although in general, Africa suffers from skills and human capital shortage, the clusters we studied, benefits from a relatively educated labor force, though their education level is still low compared to their counterparts in more advanced countries. In a few clusters, there is a high concentration of well-educated people (such as the Otigba). This is one of the important reasons why the clusters can do better than the rest of the economy.

Although figures for the whole labor forces are not available for the clusters, there are some data (including surveys) available for the entrepreneurs. Based on the data provided in the case studies, in some clusters, majority of the entrepreneurs have at least primary education, with a significant portion of them with junior secondary education (20-50%) and senior secondary (17-25%) (table 3). In the Nnewi cluster, 40.8% of the surveyed entrepreneurs have secondary education, followed by those with technical education (28.8%), and 16.3% of the entrepreneurs have university degrees.<sup>23</sup> In Otigba, about 55-60% of the entrepreneurs are university graduates, and there is an uncommon presence of highly skilled and educated graduates in electronics and computer sciences as well as related disciplines.<sup>24</sup> This is sharply contrasting to the Suame cluster in Ghana, where 75% of the entrepreneurs got primary education or below, and only 2% got higher education. Meanwhile, more college graduates with advanced degrees continue to join various clusters, becoming a very important force for continued growth.

<sup>19</sup> Adeya, "Suame Cluster in Ghana", a background study for the World Bank, 2006.

<sup>20</sup> Bolo, Maurice, "The Lake Naivasha Cut Flower Cluster in Kenya", a background study for the World Bank, December 2005.

<sup>21</sup> Adeya, "The Case of the Fish Processing and Exporting Clusters in Uganda", a background study for the World Bank, 2006.

<sup>22</sup> Adeya, "The South African Wine Cluster", a background study for the World Bank, 2006.

<sup>23</sup> This data is based on the 2005 survey and represents a significant improvement in the educational attainment of owners. New owners of businesses with university degrees have begun to enter into the cluster, a contrast with the 1997 study where there was hardly any (except one) with tertiary education degree. See Boladale, "Nnewi Automotive Components Cluster in Nigeria", a background study for the World Bank, 2006.

<sup>24</sup> Boladale, "The Otigba Computer Hardware Cluster in Nigeria", a background study for the World Bank, 2006.

**Table 3. Education Levels of Entrepreneurs in Selected Clusters (%)**

Level of Education	Mwenge	Keko	Suame	Nnewi	Western Cape
Primary or below	38.9	25	75	42.9	82.5 (semi & unskilled)
Junior secondary	22.2	50	23	40.8	13.1 (skilled)
Senior secondary	16.7	25			
Tertiary	22.2	0	2	16.3	4.4 (highly skilled)
Total	100	100	100	100	100

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

Source: author's compilation based on case studies by Adeya (2006) and Boladale (2006).

#### 4) Government and Institutional Support

The role of government and public institutions are different from cluster to cluster. In some clusters, government involvement is minimal (such as in Kamukunji, where the major government support was only shed provision), while in others, government provided some facilitation or played a significant role. In general, government interventions are manifested in the following areas: defining sectoral policies, regulations and standards and enforcing them; creating a special agency or organization to promote, coordinate and facilitate development of a cluster; establishing various public institutions (such as councils, incubator, technology centers and institutes) to provide technological and technical support, various trainings (such as technical, business, entrepreneurship, management, etc.) and capacity development; providing incentives such as tax holidays, special funds, duty free, cheap lands, etc. to promote the development of MSEs and technology imports; promoting alliances and partnerships among local firms and with foreign firms through joint ventures and strategic alliances (Otigba); providing infrastructure, such as roads, water, power, ports, warehouse, IT facilities, etc. These elements are present at various degrees in different clusters – in some, most of them exist, but in others, maybe only one or two are present. The case of Kenya presents a good example of the role of government (**box 1**).

#### **Box 1. Creating an Enabling Environment for the Horticulture Industry – the Case of Kenya**

In the Kenya 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 itself to promoting its growth. In 1967, horticulture was declared as a special crop thereby accorded priority in the government's agenda. It created Horticultural Crops Development Authority (HCDA) to develop, promote, coordinate and facilitate the horticultural industry in Kenya. Meanwhile, it enacted various legislations to protect intellectual property rights and to enforce quality standards; and set up various promotion schemes such as manufacturing under bond, export compensation schemes, and export promotion zones to support the horticulture exports. Other than these, the government's direct involvement in the sub-sector has been minimal, limited mainly to issuing export licenses through HCDA and interfering neither in the marketing nor distribution of the crops, leaving these functions to the private

sector. Such an enabling environment and the government's hands-off approach have encouraged a very strong and robust private sector participation in the cut flower industry.

Source: Bolo, Maurice, "The Lake Naivasha Cut Flower Cluster in Kenya", a background study for the World Bank, December 2005.

In addition, some of these clusters also benefited from support of international organizations. For example, the World Bank had been involved in Kamukunji activities especially in the area of skill and technology development. The cluster also benefited from UNDP and UNIDO skill development programs.<sup>25</sup> In Suame, the World Bank organized short-term hands-on training for auto-mechanics and auto-electricians.<sup>26</sup>

#### 5) Joint action and cooperation

Due to the small size nature of most of the enterprises in the clusters, it's very important for these firms to establish joint organizations and cooperation to protect their common interests; exchange information and ideas; form synergies and inter-firm linkages; provide technical, marketing and policy services; increase collective bargaining powers; and survive the fierce competitions. Such collective gains are normally obtained through various industrial and professional associations. Almost in all the clusters, there are various numbers of associations, which play different roles in each cluster. For example, in Tanzanian clusters, associations help firms voice their concerns, provide valuable source of information, and offer technological advices. In Suame, associations are mainly concerned with social welfare issues. In the case of Kenya cut flower, the objectives of associations range from lobbying for policy support, environmental conservation, maintaining standards to facilitating corporate social responsibilities. The Kenya Flower Council (KFC) and the Fresh Produce Exporters Association (FPEAK) are the key industrial associations whose objectives include maintaining standards, facilitating market access as well as gathering market intelligence for their members.<sup>27</sup> In South African wine cluster, the Wines of South Africa (WOSA) plays an important role in marketing South African wines internationally.<sup>28</sup>

All these factors, though working at quite varying degrees in different clusters, have contributed the development of these clusters in Africa.

#### **D. Are These Clusters Sustainable and Up-scalable?**

So far, we can see that clustering does contribute to the success and growth of a specific sector due to various advantages that are not available outside the cluster. However, while these African clusters have achieved some success, they also face serious challenges and constraints. In the long run, their future growth and sustainability will, to

<sup>25</sup> Kinyanjui, Njeri, "The Case of Kamukunji *Jua Kali* Metalwork Cluster in Nairobi, Kenya", a background study for the World Bank, 2006.

<sup>26</sup> Adeya, "Suame Cluster in Ghana", a background study for the World Bank, 2006.

<sup>27</sup> Bolo, Maurice, "The Lake Naivasha Cut Flower Cluster in Kenya", a background study for the World Bank, December 2005.

<sup>28</sup> Adeya, "The South African Wine Cluster", a background study for the World Bank, 2006.

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 might face some gloomy uncertainty.

### 1) Challenges of knowledge revolution and enhanced global competitions

With today's global knowledge revolution, firms and industries are rapidly moving towards more knowledge and technology-intensive ones, and, accordingly, the means of productions and operations are also becoming more and more knowledge-based. This means more intensive acquisition, adaptation and use of knowledge and technology throughout the sector to enhance productivity and efficiency. While there are quite a few clusters (including these we studied) which are successful, they are mostly operating in the context of Africa (except the cut flower, fishing, wine and textile & clothing clusters), and remain as "enclaves". The firms in the clusters are mostly small and micro, and in general, lack access to capital, skills and technologies, and with limited innovation. Although the clusters in South Africa and Mauritius are relatively stronger and competing internationally, they are losing competitiveness due to the rising labor costs, falling productivity, and lack of innovation, as well as the phase-out of EU Trade Bill and the USA Growth and Opportunities Act (AGOA). When the market is being increasingly globalized, these firms in the clusters face enhanced competitions from Asia, such as China, India, Vietnam, etc. How to survive these competitions will be a big challenge.

### 2) Lack of critical mass of skills and talents

Although the clusters we studied boost a relatively educated labor force, their education level is still low compared to the world level. Due to the type of market that alls firms to produce and sell relatively unsophisticated products, it seems that higher skill levels may not be exploited in the short term. However, to sustain the competitiveness, firms have to gradually move up the value chain and be more innovative. This requires more talented technicians and engineers, which are currently not available in most clusters. For example, the Suame cluster already faces the problem of oversupply of new entrants, due to low entry barriers and low technology level. To survive such a competition, firms have to be more innovative.

### 3) Weak knowledge and technology institutions and their linkages with the business sector

Based on the studies, the higher education institutes are playing some roles in providing skillful personnel, but in general, their roles are limited due to poor quality and mismatch between the skill supply and the market demand. For example, in Kamukunji, even new graduates from national institute of technology, national polytechnics or universities were not viewed as sources of knowledge in the cluster.<sup>29</sup> Except a few cases, mostly the universities and technology institutes are not deeply involved in firms' technology and innovation activities. This could be due to both the weak demand from the private sector

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<sup>29</sup> Kinyanjui, Njeri, "The Case of Kamukunji *Jua Kali* Metalwork Cluster in Nairobi, Kenya", a background study for the World Bank, 2006.

and limited capacities of the universities and technology institutes. In Otigba, for example, it is even perceived that the collective IT capabilities in the cluster could be at a much higher level than those to be found in most IT-based faculties in Nigerian universities and polytechnics.<sup>30</sup>

#### 4) Weak government and institutional support

As we mentioned before, the level of the government involvement is quite different across the clusters, there are a few exceptions, such as the Kenya cut flower (Lake Naivasha) and textile and wine clusters in South Africa and Mauritius where the government has played a very positive or conducive role, but in most cases, the government's role and public institutions' support are inadequate. Except for providing some basic infrastructure and training, government needs to build up a conducive business environment, and it is not just an issue of defining policies, but also an issue of how to implement them. Based on a survey in the Nnewi cluster, most firms perceived that the support from government was weak (table 4).

**Table 4. Firms' Perception of Government Support in Nnewi Cluster**

	Innovation	Available skilled manpower	Pub. university support	R&D	Intellectual property protection	IT support	Venture Capital
Weak support	89.8	77.1	89.4	93.8	87.5	91.1	95.7
Good support	8.2	16.7	10.6	6.3	10.4	8.9	2.1
Strong support	2.0	6.3			2.1		2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Boladale, "Nnewi Automotive Components Cluster in Nigeria", a background study for the World Bank, 2006.

#### 5) Resource depletion and failure to meet the international standards

These challenges mainly apply to the natural resource-based clusters, notably the Kenya cut flower (Lake Naivasha) and Uganda fishing (Lake Victoria) clusters in our study. In the case of Kenya cut flower, overdrawing of the lake's water for irrigation threatens the lakes existence. It was reported that the rapid extraction of water from Lake Naivasha for horticulture is likely to kill the lake whose volume is believed to have decreased by up to 800 yards. Moreover, the use of agro-chemicals leads to pollution, such as the accumulation of chemical effluents, especially nitrates, threatening aquatic life. Meanwhile, it faces the problems of reducing fish stocks and increasing spread of disease and pests.<sup>31</sup> In the Uganda fishing case, it ever experienced a crisis for failing to meet the European Union (EU) standards. From 1997, the EU imposed and enforced a set of

<sup>30</sup> Boladale, "The Otigba Computer Hardware Cluster in Nigeria", a background study for the World Bank, 2006.

<sup>31</sup> Bolo, Maurice, "The Lake Naivasha Cut Flower Cluster in Kenya", a background study for the World Bank, December 2005.

Sanitary and Phyto-Sanitary (SPS) standards on Uganda's fish exports. This led to a conditional ban of one of Uganda's most important exports and a subsequent crisis within the fish processing and export industry when the country's fish processing and export clusters were unable to meet the new exporting requirements. After some joint rescue efforts by both the public and private sectors, mainly focusing on the process improvements, the access to the EU market was restored. Uganda has, however, not yet succeeded in translating its successful albeit reactive response to the EU fish ban(s) into a more cohesive and proactive medium and long-term process of technological capability development and innovation that could lead to a systemic product upgrading, which could provide a basis for sustained competitiveness of Uganda's fish exports.<sup>32</sup>

From the above analyses, we can see that, in the long run, the challenges for the African clusters are still enormous, though at different levels. Their sustainability and up-scalability in the future to a most extent will depend on how successfully they can overcome these challenges. For those resource-based clusters, although they are currently quite successful and have won some international markets, if the challenges of resource depletion and product upgrading are not solved, their long-term sustainability will be put into question. For those medium-tech or even high-tech (such as computer) based clusters, their sustainability will depend on how effectively they can absorb and apply new technologies, and adopt advanced knowledge management practices to enhance their overall competitiveness.

To deal with these challenges and make these pockets of vitality to be really sustainable and scalable, the government has a vital and multifaceted role to play. In addition to overall leadership and coordination, the public sector needs to establish a favorable regulatory and incentive environment, facilitating knowledge and technology learning and innovation, and provide high-quality public goods that the private sector can benefit.

### **E. Some Policy Implications**

Based on the studies, some general and specific policy implications could be drawn, but they are by no means uniformly applicable to all clusters in Africa. Some clusters are medium-sized, with potential for considerable capabilities acquisitions. Most firms in the clusters are owned by individuals who are resourceful and educated, with a compliment of relatively skilled workers. Firm dynamism tends to be limited by market type and size. To fit into the specific contexts and industries, the policy design and implementation have to be well thought-through. Some general measures could include:

- Encourage further knowledge acquisition, adaptation and dissemination. Based on the current knowledge networks and inter-firm linkages, further collaborations, including training and technical assistance, should be encouraged, especially those with foreign companies. To tap into the foreign technologies and to apply them into the local context is crucial for the clusters' upgrading. In this regard, Nnewi's close linkage with Taiwan can be

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<sup>32</sup> Adeya, "The Case of the Fish Processing and Exporting Clusters in Uganda", a background study for the World Bank, 2006.

example. In addition, medium and large enterprises should also be encouraged to engage in R&D and innovations.

- Strengthen the knowledge and technology institutes and their linkages with the business sector. The technology institutes and universities (both public and private) should be encouraged to be tuned more towards the industrial needs, providing 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 collaborations. Universities should be encouraged to provide more skilled people that market demands. In order to do this, some educational reforms, including curriculum and pedagogies reforms, are necessary.
- Establish and enforce a conducive institutional regime, 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 regime, a close public-private partnership is very important. Many of the tasks can be done in collaboration with trade and professional associations, present in almost every cluster. In some cases, the functions of associations need to be strengthened.
- Strengthen skills upgrading and training. In most clusters we studied here, the skills levels are generally low with the majority of the labor force getting primary and junior secondary education. To cope with the increasing international competition, African firms need to upgrade the skills level of their labor force to enhance productivity and competitiveness. This is also essential for promoting product and process innovation, which is the ultimate solution for their long-term survival. These have to be done through close collaboration with universities, technology institutes, and training organizations. The focus should not be just on technology, but also business management, marketing, branding, packaging, etc.
- Provide sound basic infrastructure. Although in some clusters, governments have been involved in providing various infrastructures, however, they seem not sufficient. Firms are constrained by poor public goods delivery – water, power supply, telephone, and so on. For example, in the Nnewi cluster, 98% of firms claim that they have to spend certain amount (in some cases, 40%) of total investment on private power generation and other utilities.<sup>33</sup> This issue has to be addressed by the government.
- In the long run, promote greater purchasing power of consumers. Firms grow when markets expand and, more importantly, when income levels are able to sustain high-quality consumer goods. Policies in this regard should be seen in the light of enterprise promotion, leading to the evolution of higher levels of subcontracting and specialization.

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<sup>33</sup> Boladale, “Nnewi Automotive Components Cluster in Nigeria”, a background study for the World Bank, 2006.

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