



Industrial Clusters and Innovation Systems in Africa

Institutions, Markets, and Policy

Edited by Banji Oyelaran-Oyeyinka
and Dorothy McCormick

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Dorothy McCormick



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1

Introduction: Clusters and innovation systems in Africa

Dorothy McCormick and Banji Oyelaran-Oyeyinka

Every locality has incidents of its own that affect in various ways the methods of arrangement of every class of business that is carried on in it: and even in the same place and the same trade no two persons pursuing the same ends will adopt exactly the same routes. The tendency to variation is a chief cause of progress; and the abler are the undertakers in any trade the greater will this tendency be.¹

Regional agglomerations of industrial activity have long been recognized as potential sources of innovation as well as of general economic growth. At the turn of the twentieth century, proximity was absolutely necessary for rapid communication and cooperation among firms. Thus it is not surprising that Marshall (1890, 1919) took great pains to explain the localization of particular industries and the benefits of industrial districts. Revolutions in transport and communication may seem to have reduced the need for firms to operate near one another, yet scholars continue to argue “locality matters” (Schmitz, 2004).

Locality matters to industrial development in several different ways. Some observers have focused on the regional context in which industry operates, emphasizing the importance of local governance and in particular meso-level policy (Messner, 2004; Scott, 2002; Scott and Storper, 2003; Storper, 1995). The rich literature on industrial clusters, more about which will be said in chapter 2, highlights the availability of external economies and opportunities for joint action arising from proximity (Beccatini, 1990; Pyke and Sengenberger, 1992; Schmitz, 1995, 2004; World Development, 1999). Porter’s (1990, 1998) slightly different use of the

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term “cluster” underscores the importance of local synergy and rivalry as sources of industrial development. Attempts to examine the difference between developed and developing country clusters are yet another way of looking at the importance of locality. Schmitz and Nadvi (1999) pointed out that the former are frequently global leaders that play a decisive role in innovation and product design; furthermore, they are standards makers, whereas firms in developing country clusters are standards takers and tend to work to specifications set elsewhere. While this dichotomy surely oversimplifies a wide range of cluster capabilities in both developed and developing countries, it serves to highlight the very important issues of industry leadership, product and process quality and linkages between global standards and local realities. Nevertheless, locality does also seem to matter for innovation. Studies of innovation systems also point to the impact of local institutions in shaping patterns of innovation and technical change (Edquist, 1997; Lundvall, 1992; Smale and Ruttan, 1997; and Mytelka in this volume).

Locality can be understood to mean anything from the whole of the developed or developing world to a very small local neighbourhood. We choose in this volume to focus on industrial clusters. These vary in size, but are most often sub-national in extent.

The notion of clusters fits into the innovation systems framework given its systemic, networking features as well as reliance on institutions as sources of dynamism. However, clusters are not necessarily innovation systems (Mytelka and Oyelaran-Oyeyinka, 2000; and Mytelka in this volume) and transforming clusters into innovation systems requires sustained policy support. The process of policy learning is itself heuristic, while strengthening local actors takes time and requires explicit investment in learning. An important lesson for developing countries is the fact that traditional sectors in advanced industrial countries have made the transition from low technology sectors into successful innovative clusters.

Despite the usefulness of the cluster approach, however, it has, like all abstractions from reality, its fundamental weaknesses. One such weakness is the assumption of homogenized relationships between the different-sized firms in the cluster. In other words, the cluster theory assumes that all firms are equal in the status and power they wield in the cluster. This underplays the inevitable confrontation, friction or domination by powerful actors of other firms. This assumption builds into the framework a naive hypothesis on the reality of collective learning that takes as given that all actors in the cluster benefit from interactions. This presupposes that actors will be unified in interest and behaviour, putting the collective above the individual. It is for this reason that “joint action” is unintentionally selective, because, evidently, its applicability to cluster actors will be differentiated and uneven (Kennedy, 1999). The case study

of Domiat furniture in this book shows that there are differentiated relationships between firms and this is reflected in confrontations over power, knowledge and income. The types of links between actors in the cluster are a reflection of their differences in power relations. More importantly, not all interactions, even in cooperative relationships or in the creation of new knowledge, are beneficial to all actors. The case study shows that where there is a negative asymmetric power relationship, interaction could lead to deskilling where dominant actors force an unprofitable learning trajectory.

The second theoretical approach in this book, the systems of innovation framework, has received widespread attention in the last two decades (Freeman, 1987; Lundvall, 1992; Nelson, 1987). A national system of innovation is the “elements and relationships which interact in the production, diffusion, and the use of new, and economically useful, knowledge . . . and are either located within or rooted inside the borders of a nation state” (Lundvall, 1992: 12).

A system of innovation framework is essentially undergirded by the theory of institutions and this book appropriately places a strong premium on institutions and institutional change. In studies of technological change, institutions may be conceptualized narrowly or broadly,² but in both cases they take on a wide range of functions. These include managing uncertainty, providing information, managing conflicts and promoting trust among groups (Edquist, 1997; North, 1989).³ Institutions in these areas are necessary for innovation for two reasons. First, the innovation process is characterized by considerable uncertainty. For example, institutions provide stability by regulating the actions of individuals and enforcing contractual obligations. Second, the creation, validation and distribution of learning and knowledge, which are prerequisites of economic change, are mediated by institutions. These institutions operate in such areas as research and development (R&D), finance and investment, intellectual property rights, patent laws and so on.

As with clusters, innovation systems have spatial and geographic dimension. An innovation system could be national, regional, local or sectoral. In other words, the persistent and uneven distribution of the capabilities of firms to innovate could be identified across sectors, countries and regions. This skewed effect of innovation performance is a function of specific national or sectoral factors and as such the competitive advantage of sectors and nations depends greatly on how advanced the system of innovation (SI) is and how well it has generated coherence and interactions. From the above, this approach places emphasis on knowledge flows, interactive learning and the role of institutions.

To sum up, an industrial cluster is a dense sectoral and geographical concentration of enterprises comprising manufacturers, suppliers, users

Box 1.1 Definitions and stylized facts on clusters and innovation systems

- An innovation system is defined as the network of institutions in the public and private sectors whose activities and interactions “initiate, import, modify and diffuse new technologies” (Freeman, 1987);
- A cluster is defined as a sectoral and geographical concentration of enterprises (Schmitz, 1995);
- A cluster is characterized as a geographically and sectorally bounded entity akin to a (local) innovation system but differing in that the latter emphasizes the networking of individuals, firms and organizations whose interaction fosters the innovative performance of firms. The roles of individual firms (intra-firm capability) and organizations therefore matter, in contrast to the cluster approach, which emphasizes inter-firm and collective learning approaches;
- Geographic proximity is necessary to reap the benefits of geographic agglomeration but it is not sufficient. Cognitive, social and cultural proximity are equally necessary for collective learning;
- Firms possess differentiated knowledge bases that cannot logically be diffused to all firms in a cluster; there is considerable asymmetric power and information relationship within clusters;
- Firms do more than produce goods and services, they are repositories of idiosyncratic knowledge, skills and experiences; they are organizations with path-dependent and specific routines and bounded by uncertainty in the pursuit of innovation and production activities (Nelson and Winter, 1982). For this reason, firm-level behaviour is an important factor in understanding the growth of clusters;
- Clustering policy emphasizes collective efficiency through “joint action” by firms and associations to realize productive efficiency while innovation policy emphasizes learning through incremental technical change through capabilities built up within firms and organizations.

and traders. On the other hand, an innovative cluster is more than a geographic phenomenon; it is defined by strong inter-firm interaction and a distinct sectoral specialization (Nadvi, 1994). For the purpose of this book, we identify four factors that distinguish an innovative cluster, or what we suggest is similar to a local system of innovation (LSI). First, this cluster will exhibit high rates of learning and knowledge accumulation within its component firms and institutions, which lead to continual changes to the knowledge base of the cluster. Second, it will be characterized by high levels of collaboration and interaction between key agents and institutions (suppliers, producers and so on). Third, this cluster will begin or has built up a dense network of formal and informal institutions

to support production and innovation. On this and the first two issues, the cluster and innovation systems literature tend to share a common notion, although with different emphasis (Becattini, 1990; Saxenian, 1991; Schmitz, 1995). Fourth, successful LSIs will possess a certain optimal skills and knowledge structure in engineering, mathematics and sciences that support industrial development. It is not enough for a country to produce manpower per se, but also the right kinds for its level of development. While general knowledge acquired from formal educational institution forms an important component of a nation's human capital, firm-level training, R&D and production are necessary for the idiosyncratic knowledge bases of firms (Freeman, 2002; Lall, 1992, 2001). Box 1.1 enumerates the stylized facts on clusters and innovation systems.

We now turn our attention to the particular approach to clusters and clustering used in the chapters that follow.

Our approach to clusters

This book adopts the notion of clusters as defined by geography and product specialization. To this end, a cluster is defined as a sectoral and geographical concentration of enterprises (Schmitz, 1995). The starting point of the debate on clusters and clustering is that firms do not innovate and grow in isolation, but rely extensively on external knowledge sources. Firms in dense geographic proximity tend to enjoy certain advantages of agglomeration relative to isolated enterprises. This happens in at least two different ways. First, demand for their goods and services are enhanced as potential customers become aware of the cluster. This is especially true for micro and small enterprises, whose markets tend to be local and dependent on direct sales to traders and individual consumers (McCormick, 1999). Second, a cluster's ability to innovate and supply high quality products also benefits from agglomeration. For these reasons, the main advantage of agglomeration derives from the properties of knowledge, which is that it is largely tacit, uncodified and informal. Therefore, the fundamental system benefit of clustering is knowledge externality. Firms are embedded in a network of users, suppliers, consumers and knowledge producers (Kline and Rosenberg, 1986). These actors are repositories of market, scientific and technical knowledge that potentially provide inputs into a firm's innovation efforts and reduce technical and commercial uncertainty within a spatially bounded environment. Regional clusters are, thus, common and provide a range of advantages to firms locating within them (Ehrnberg and Jacobsson, 1997).

Geographic agglomeration promotes innovative activities and here we take a broader approach to innovation than the conventional view, which

is largely focused on R&D. We define innovation as the “process by which firms master and implement the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors, their countries or the world” (Mytelka, 2000: 18). In this framework, innovation has its sources in a wide variety of places and in activities such as R&D, design, production on the shop floor, quality control and marketing. Actors engaged in innovation are embedded within a wide network of agents in a system, or a “system of innovation”. A system of innovation is a network of firms and other economic agents that act in concert and govern by formal and informal institutions to foster the generation, absorption and diffusion of new processes and products. The SI framework thus takes policies generated through the formal institutions of government and structures provided by other, less formal institutions as critical in promoting interaction and learning of different actors in the economic system. Studies of systems of innovation have consistently underlined that specialized suppliers and skilled labour are the main sources of continuous innovation. The notion of knowledge externalities and spillovers underlies much of this debate with the conclusion that firms located in clusters and strong in their own industry tend to grow faster and be more innovative than isolated firms.

Clustering supports a diverse range of specialized local input suppliers and intermediate input and service providers at lower cost. The existence of a pool of specialized skills and knowledge – knowledge externalities – promotes different forms of learning: through dissemination of ideas, by continuous dialogue in social networks (learning-by-interaction) and learning-by-doing. Social networking aids knowledge exchange in informal settings (Saxenian, 1994) and promotes the conditions for the emergence of stable relationships over time. In other words, geographic proximity fosters the diffusion of innovation in clusters. Implicit in this statement is another important characteristic of learning: the acquisition of technical skills is an evolutionary process with path-dependent characteristics. This means that an enterprise located in a cluster with a long history of knowledge creation is likely to derive greater benefits from co-location than one in a technologically arid environment.

However, mere co-location is insufficient for achieving high rates of innovative activity, and learning is not an automatic outcome of geographic proximity. In addition, clusters differ widely in their structural characteristics, which have been shaped, as it were, by history and the institutions that govern their actions and interactions. From the foregoing, two weaknesses of the existing framework for analysing clusters emerge. First, much of the current thinking on clusters is implicit on or makes assumptions on the time dimension and analyses clusters through a static framework. As the empirical cases in this book illustrate, clusters are dynamic

entities while learning and innovation processes evolve unevenly (Nelson, 2001). For these reasons, innovative activity is more likely to thrive in an environment with a history of continuous invention where there is a fully evolved market to demand and accommodate new technologies and technological change. Insertion into global value chains can be especially important for upgrading (Humphrey and Schmitz, 2002; Schmitz, 2004).

Second, much of the current debate implies a certain degree of homogeneity among clusters but reality speaks to different facts. Clusters differ in structural characteristics such as size and type of product specialization, as well as by the institutions that bind them together and structure them. For example, the presence of supportive formal and informal institutions attenuates communication and market failures. The institutional component of different forms of agglomeration including clusters requires a systemic perspective on innovative activity within clusters. Through this, one can establish the presence of continuous learning, the dynamic combination of technical and organizational innovation, “high quality” interaction among the different actors, including knowledge flows, and continuous investment in competence-building and the social capital of the cluster.

This book draws on evolutionary economics (Nelson and Winter, 1982) and the concept of collective efficiency (Schmitz and Nadvi, 1999) to make two modest contributions. First, we bring together a number of previously unpublished studies of clusters in Africa. Second, we illustrate through a variety of case studies the fruitful use of the cluster concepts, the evolutionary innovation framework and the collective efficiency strand of the literature (see, in particular, the McCormick and Mytelka contributions to this volume). Insights from evolutionary economics call attention to the importance of incremental technical change (minor innovation) rather than the so-called “radical” innovations and, as well, interactive learning, path dependence and the role of formal and informal institutions. Much of the growth and improvements in productivity in dynamic late-comer countries have been due in large part to these kinds of technical change processes that take place on the shop floor rather than in organized formal laboratories (Dahlman and Nelson, 1995), as illustrated in box 1.2.

The studies reported in this book broadly investigate whether firms in clusters collaborate and, if so, why. In so doing, the studies highlight the collective role of formal and informal institutions that foster and hinder cluster growth and innovation. Attention is also paid to the role of external pressures on clusters such as competition and market deregulation. Our working definition of institutions is based on North’s (1990) “rules of the game” while the empirical case studies also illustrate the importance of “how the game is played” (Nelson and Sampat, 2001) in studies

Box 1.2 Definition and nature of innovation

There are many definitions of innovation depending either on disciplinary focus (for example, sociological or managerial economics) or perspective (for example, user, producer or seller).¹ In an evolutionary economics perspective, which this book adopts, we take our definition of innovation from Schumpeter (1934: 66). He defines innovation as the “carrying out of new combinations” which he resolves into five different types, namely:

- The introduction of a new good (product);
- The introduction of a new method of production (process);
- The opening of a new market;
- The opening of a new source of supply; and
- The carrying out of a new organization of any industry, like the creation or breach of a monopoly position.

Innovation has several characteristics, prominent among which are uncertainty, interactive learning and a degree of innovativeness, which leads to characterizations such as “minor – major” and “radical – incremental” among others.² One might characterize them as follows:

- Radical changes of global significance (radical innovation);
- Small improvements in product design and quality, in production processes or in the way in which production is organized; changes to maintenance routines that collectively modify products and processes, to bring costs down, increase efficiency, enhance welfare and ensure environmental sustainability (incremental innovation); and
- Changes to management and marketing brought about by new technologies (institutional and organizational innovation).

1. In the managerial literature, Tushman and Moore (1982: 132) define innovation “as the synthesis of a market need with the means to achieve and produce a product that meets that need”.

2. The Schumpeterian definition tends to address some of the shortcomings of other types of definitions.

of clusters. At the policy level, we examine whether clustering is an appropriate instrument for industrial policymaking in Africa. The readings of the individual chapters clearly show the convergence of the ideas implicit in clusters, collective efficiency and systems of innovation frameworks. If we succeed in advancing the debate on the role of clusters as an important form of industrial organization necessary for fostering industrialization in typically low-technology latecomer environments, then the efforts of the authors will have been richly rewarded. Table 1.1 puts

Table 1.1 Levels of analysis of clusters and system of innovation

Level of analysis	Cluster concept and innovation systems	Focus of analysis: Clusters	Focus of analysis: System of innovation
National level (macro)	Industry group linkages in the economic structure	Specialization patterns of a national/regional economy Need for innovation and upgrading products and processes in mega-clusters	National level actors (organizations and individuals) Knowledge bases and institutions Linkages between actors
Branch or industry level (meso)	Inter- and intra-industry linkages in the different stages of the production chain of similar end product(s)	Benchmark analysis of industries Exploring innovation needs	Sectoral analysis of actors, knowledge bases, linkages and institutions
Firm level (micro)	Specialized suppliers around one or a few core enterprises (inter-firm linkages)	Strategic business development Chain analysis and chain management Development of collaborative innovation projects	Firm level core capabilities for production and innovation Collaboration capabilities

Adapted from Roelandt and Den Hertog (1999)

in perspective the analytical building blocks of systems of innovation and industrial clusters frameworks.

Structure of the book

Dorothy McCormick, in chapter 2, provides three distinguishing features for clusters: geography, sector and/or firm inter-linkages in an increasingly globalized context. These perspectives are based on analyses of institutions, value chains and the collective efficiency of a given cluster. A specific set of formal and informal institutions, or “the institutional environment” according to McCormick, defines the rules by which the cluster and the enterprises within it must and do interact or “play”. The institutions most closely associated with a cluster include product markets, firm linkages (including business networks and associations), laws and contracts, state support systems, education system, technology and innovation systems. Value chain analysis determines if clustering results in

upward movement by the clustered firms as indicated by increased productivity and revenues, and increased use of sophisticated and complex technologies. Finally, studies of clusters from a collective efficiency perspective examine whether or not clustering helps enterprises, especially the smallest ones, to overcome international and domestic market constraints to expand and grow, thereby improving economic performance. Such constraints include macro institutional lock-in, poor access to technology, inadequate organizational forms and inadequate or insufficient access to market information. Collective efficiency encompasses the two dimensions of local external economies and joint action. The former is passive and may occur simply because of co-location. Joint action, however, requires the active engagement of the clustered enterprises.

In addition to McCormick's three perspectives for cluster studies, the contributors to this book employ the notion of "innovation systems" in their case studies. Lynn Mytelka provides the second theoretical chapter, in which she lays out the elements of a dynamic innovation system. Long used in studies of industrial organization and enterprise agglomeration at different geographical scales in developed economies, an innovation system perspective offers a holistic frame of analysis with a wide breadth. This comes, however, at the expense of in-depth analyses of the various important features of a cluster, or more generally a "system", including the formal and informal institutions as systemic structuring phenomena and policy as an instrument of change. Mytelka applies the innovation system to traditional industries, arguing that although these were previously thought not to require the kind of learning that characterizes high-tech sectors, innovation in industries such as textiles and wine-making can be critical to their success. She further suggests that spontaneous clusters may be more likely to foster new habits and practices of learning, linkage formation and continuous innovation than constructed clusters such as export processing zones or industrial parks.

McCormick and Mary Njeri Kinyanjui report that despite the problems facing clusters in developing countries, they have existed for many years in Africa and, as the other contributors to this volume illustrate, continue to exist and emerge in numerous countries. The authors use the notion of "productive capacity" to draw attention to infrastructure, skill levels, intermediate inputs, technology, joint action and benchmarking as the necessary features for examination in cluster studies. In their study of Kenyan micro and small enterprise clusters, McCormick and Kinyanjui find that many of these features are at best sub-optimal and require intervention through government policy to increase cluster performance through increasing domestic and export market shares based on improved quality and upward movement on the value chain. The authors argue that micro and small enterprise clusters in Kenya lack the productive capacity to

take full advantage of the improved market access brought about by liberalization.

Most Kenyan clusters remain locked in low-quality, low-income markets. Weak productive capacity, according to McCormick and Kinyanjui, is at the heart of this problem. Combining insights from the collective efficiency model with those of value chain analysis, the authors examine 17 micro and small enterprise clusters in three sub-sectors. The analysis revolves around the six variables of infrastructure, skills, intermediate inputs, technology, joint action and benchmarking. The chapter concludes that adding issues of governance, benchmarking and upgrading to the original collective efficiency framework greatly enhances the understanding of the potential of these clusters. A key practical conclusion is that encouraging clusters to produce for demanding customers such as supermarkets, hospitals, schools and governments can enhance productive capacity. To achieve this, the clustered enterprises will need the support of government, their own associations, non-government organizations, research institutions and larger private sector actors.

Clusters are not always planned by the participating firms or governments and are sometimes secondary products of exogenous factors. Flora Mndeme Musonda's study of three Tanzanian clusters shows that while two of the clusters somewhat benefited from government assistance, the third cluster emerged and developed independently as a secondary outcome of a government policy to make the main roads in Dar es Salaam aesthetically more pleasant by moving street traders and artisans to a predefined location. However, once this location was populated by the evicted roadside entrepreneurs it acted as a magnet for other traders to move in. This secondary self-organizing feature of agglomeration and clustering by firms is also underlined in Banji Oyelaran-Oyeyinka's chapter on the Otigba information and communication technology cluster in Lagos, Nigeria.

Musonda's chapter tests whether the enterprises in each of the three clusters cooperate, what forms of formal or informal institutions exist to structure and stabilize the clusters, and how these institutions have emerged. The chapter reports on the relationships between cluster performance and the three key variables of the education levels of the entrepreneurs, forms of learning, such as apprenticeship, and competition in the product market. The analysis of the data reveals that entrepreneurs benefit from clustering and are acutely aware of the importance of the external economy. However, contrary to official government pronouncements, this case study finds very little evidence of support from the government and other formal institutions. Support is lacking mostly in finance and technology. Nevertheless, the enterprises feel that they are better off in clusters than those operating alone and especially benefit in having

access to tool sharing, tacit knowledge and collective security against damage to or theft of property.

Oyelaran-Oyeyinka's examination of the Otigba computer cluster, dubbed Nigeria's Silicon Valley and located in the heart of Lagos in the "Ikeja Computer Village", shows that it evolved into a sub-regional hub for computer assembly, components sales, repairs and even limited computer-parts manufacturing. From small beginnings in the late 1990s, the Village grew to more than 4,000 computer shops in five years. The mostly young entrepreneurs – graduates of universities and polytechnics – are trained in servicing, repair and assembly of personal computer clones. The chapter weighs the experience of this somewhat unusual agglomeration against the notion of an innovative cluster, how individuals and firms within the cluster learn what they need to know to continue operating in a dynamic sector and how the cluster as a whole maintains stability. A defining feature of the Otigba cluster is the considerable reservoir of tacit knowledge shared by the clustered firms. Despite fierce competition among the clustered firms there are endogenous (to the cluster) and exogenous formal and informal institutions that bring stability to the cluster and promote its long-term interests. The chapter also examines the role of private institutions in fostering innovation and looks at the cluster's potential for process, product and functional upgrading.

Samah El-Shahat's analysis of the Domiat furniture-making cluster in Egypt begins with a general criticism of the mainstream approaches used in studies of clusters. El-Shahat contends that none of the approaches used by the contributors to this book or by others elsewhere can adequately account for the role of conflict in socio-economic development, including in the development of clusters. The lack of attention to the role of conflict and competing agendas in economic activity implicitly assumes "institutional neutrality" and overlooks the question of power and asymmetries in control and access to knowledge and other resources. Egypt's institutions, like many in the developing world, are not conducive to trust among and virtuous behaviour by the actors in their quest for economic well-being. El-Shahat describes many of Domiat's institutions as heavily politicized and socially corrupt. What are small firms and micro enterprises, clustered or otherwise, to do insofar as innovation and moving up the value chain are concerned, given this institutional context? El-Shahat's analysis seems to suggest that without direct government action serving as a major structuring factor, complete with a host of incentives and disincentives, firms have few choices within or outside clusters.

The chapters by Rose Kiggundu and Jochen Lorentzen et al. highlight two important issues in the discourse on clusters. They analyse how clusters respond to crises such as changing international trade rules and trade

liberalization and underline the importance of joint action through learning in dealing with the crises. Kiggundu presents a detailed empirical study of cluster upgrading by the Ugandan fish-processors. Kiggundu finds that the process and organizational innovation is externally stimulated. The analysis shows a common learning trajectory in developing countries where firms first upgrade their processes before embarking on product upgrading. After the mastery of simple assembly operations, firms then move to “functional upgrading” and value-adding activities. This involves a shift from low-return to high-return activities, consistent with moving upward on the value chain. Eventually, the firms shift to more skill-intensive, technologically complex and profitable business activities.

The evolution of the fish-processing clusters in Uganda demonstrates clearly distinguishable learning characteristics and patterns of joint action to upgrading in processes followed by upgrading in products. The transition from preparation of Nile perch exports to introduction of value-adding technologies had been difficult and required a new form of organizing. While buyers played a minimal role in supporting process-related upgrading following a European Union ban, they have been more important in the second round of upgrading involving the introduction of value-adding technologies. The chapter underlines the clusters’ ability to upgrade rapidly in processes to meet new requirements by export markets and the difficulties in introducing product-related change. It also highlights the minimal role of buyers in process upgrading and their more significant role in product upgrading.

Lorentzen, Glen Robbins and Justin Barnes begin from the premise that whether or in what form a cluster exists or defines itself is of less relevance than how it gains competitive advantage and through what means and processes. In their study of the Durban Automotive Cluster the authors focus on the gains to the clustered firms through joint action in the areas of supplier development, human resource development, logistics and benchmarking. They contrast their findings with benefits accrued to firms through increased international competition and technical assistance by foreign partners. As with all other cases reported in this book, the backdrop for the Durban Automotive Cluster case study is the aggressive trade liberalization of the 1990s and its impact on the competitiveness of the domestic automotive sector in South Africa. The foundations of the sector were laid in the post-World War II period by the government of South Africa. Like a number of governments in other developing countries, such as Taiwan and South Korea, the South African government adopted an industrial development policy framework based on import substitution after the war. This policy was bolstered in the last quarter of the twentieth century as the apartheid regime began to suffer

the effects of international isolation and sanctions and reacted with greater efforts to become self-sufficient in strategic market areas.

Due to political regime changes and drastically changed external market conditions, the obsession with self-sufficiency gave way to an accelerated programme of liberalization. In its wisdom, the post-apartheid South African government intervened to ensure that the domestic automobile sector could compete under the new market conditions. Benchmarking was used in commissioned studies of the sector, supported by the provincial government and international donor agencies, to examine the gaps between the performance standards of domestic firms and the new performance standards required for meeting the expectations of multinationals. Significant features of the Durban Automotive Cluster include the ability to learn from past experiences, an equitable mode of governance that ensures key actors such as Toyota do not wield excessive procedural control, consistent funding with limited conditions from all levels of government and full engagement of researchers from the academic community. The cluster that has emerged is characterized by a high degree of trust among its member firms. However, Lorentzen et al. caution that the emergence of new formal and informal institutions within the cluster were neither spontaneous nor initiated by concerned firms and that the government played a quite instrumental role in creating the necessary conditions for collaborative initiatives among firms.

McCormick and Winnie Mitullah analyse the institutions charged with managing a fish cluster on the Kenyan side of Lake Victoria. They rightly point out that fisheries management is as much about people as it is about fish and ecosystems. This realization has brought about changes in the institutional framework that are gradually creating a system of co-management. Co-management in this context is a system in which government, the community of fishers, external agents and other stakeholders share the responsibility and authority for making decisions about fishery management. They assert the new direction is positive, but many problems remain. The stickiest of these may be the inequalities of power and economic resources among the different parties who are supposed to cooperate.

Morris and Robbins pay particular attention to the role of government in fostering cluster formation. A synthesis of the evolution of South Africa's post-apartheid industrial policy serves as the basis for highlighting the positive and negative experiences of two successful automotive clusters. The analysis emphasizes the role played by the government at multiple scales and over time in shaping the current state of these clusters. Like other industrial sectors in South Africa, the automotive clusters were protected under the apartheid regime through a policy of import substitution. The post-apartheid era was marked by a less protective gov-

ernment and an industrial policy aimed at a more open domestic market and increased exports. The institutional measures taken by the South African government included the creation of a new Department of Trade and Industry (DTI) with a mandate to open up the economy to competition and to increase exports to global markets. Part of this mandate was to support the growth of micro, small and medium-sized enterprises. Measures taken by DTI in this regard included access to credit and market information, the provision of training and labour market reforms. More broadly, DTI's industrial policies and programmes were based on five pillars: investment support, trade liberalization, a technology policy, human resources development through education and facilitation of collaborative arrangements for information and expertise exchange among firms. Together these measures played a central role in defining the development trajectory of the automotive sector.

Focusing on learning and the spread of information and communication technologies within clusters as a means to increase competencies and collective efficiency, the chapter by Oyelaran-Oyeyinka, Kaushalesh Lal and Catherine Nyaki Adeya examines the uptake of information and communication technologies (ICTs) by the Suame cluster in northern Ghana and the Kamukunji and Kariobangi clusters in Kenya. The authors report that there have been no known policies to introduce ICTs in clusters and collective learning by clustered micro and small enterprises seems to have occurred in response to collective needs. To understand the dynamics of this learning process the authors focus on the role of formal and informal institutions and test a series of hypotheses on the relationships between learning and the sources of information. Two sets of pre-existing conditions are identified for adopting new technologies. The firm-specific conditions are the academic qualification and knowledge of the person in charge of the enterprise, the level of motivation by the leading person to provide the workforce with training on the use of new technologies, skill intensity of the workforce, sales turnover and profit margin. The cluster-specific conditions are the presence of training and collective technological support entities within the cluster and the expectation of the clustered firms to benefit from inter-firm sharing of facilities.

As far as policy measures to induce a higher level of innovation, the authors suggest encouragement through policy for greater private sector participation in setting up training and information service centres within clusters. The authors also suggest that the personnel from leading firms need orientation programmes to build awareness of the potential and actual benefits of adopting new technologies. To support and/or steer moves toward new technology adoption, governments can provide a host of economic incentives including subsidies and financing schemes.

It is clear from the above chapter summaries that to varying degrees the authors in this volume attribute considerable weight to the role of government in industrial development. That governments should play a key role is hardly at the centre of the debates on industrialization. Nevertheless, there continue to be disagreements about the level of government involvement in industrial development, the manner in which government intervenes against it or interacts with it and the dynamics of the global market in relation to the domestic industrial base. From a development policy perspective, Mytelka (in this volume) points out that the emergence of clusters may be nurtured through policy intervention but not manufactured. As she puts it, promotion of clusters with the narrow objective of building up a manufacturing sector rather misses the point about the value of clusters by seeing them as magic bullets for development. The emphasis should be placed on how to create an environment conducive to “continuous learning, capacity building and innovation as needs, opportunities and conditions change”. Under these conditions clusters can emerge organically as an integrated part of the economic production system.

Industrial policy aimed at nurturing the growth and sustenance of domestic firms is by no means a straightforward task. There is often a large discrepancy between outcomes and objectives in the industrial policy-making arena, particularly in developing countries. The factors to give rise to this discrepancy are simultaneously endogenous and exogenous and often independent as variables. Some governments have been more successful than others in meeting their industrial policy objectives as the two chapters on South Africa clearly illustrate. But is South Africa’s relative success due primarily to government action or are there pre-existing conditions that facilitate and complement government intervention? We invite the readers of this book to consider this two-part question while reading the various chapters. We will attempt to provide our own answers to this important question in the concluding chapter.

Notes

1. Marshall (1890), book V, chapter 4, paragraph 3.
2. In a narrow sense, institutions are seen merely as organizations, such as universities and technological service groups, whereas more broadly the concept includes the political and social context and the rules regulating innovation.
3. Coriat and Dosi (1998) refer to the broad meaning of institutions as having three components: (1) formal organizations (ranging from firms to technical societies, trade unions, universities and state agencies); (2) patterns of behaviour that are collectively shared (from routines to social conventions to ethical codes); and (3) negative norms and constraints (from moral proscriptions to formal laws).

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Tel: +81-3-3499-2811 Fax: +81-3-3406-7345
E-mail: sales@hq.unu.edu general enquiries: press@hq.unu.edu
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E-mail: unuona@ony.unu.edu

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Edited by **Banji Oyelaran-Oyeyinka** and **Dorothy McCormick**

Contributors:

Banji Oyelaran-Oyeyinka
Dorothy McCormick
Lynn K. Mytelka
Mary Njeri Kinyanjui
Flora Mndeme Musonda
Samah El-Shahat
Rose Kiggundu
Jochen Lorentzen
Glen Robbins
Justin Barnes
Winnie V. Mitullah
Mike Morris
Kaushalesh Lal
Catherine Nyaki Adeya

Industrial clusters are an increasingly important form of industrial organization in Africa and this book is the first to analyse their role and impact in various sectors and levels of economic development in Africa. The book improves our understanding of how industrial clusters in Africa can be transformed into local systems of innovation and how these clusters can be better connected to global actors. The authors draw out implications for policy and practice and provide guidance to governments, private sector associations and non-governmental organizations.

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Banji Oyelaran-Oyeyinka is Professor of Technology, Innovation and Development and Senior Researcher at UNU-MERIT in Maastricht, The Netherlands. **Dorothy McCormick** is Associate Research Professor and Director of the Institute for Development Studies, University of Nairobi, Kenya.

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