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**Skills development for industrial  
clusters: A preliminary review**

Marco Marchese and Akiko Sakamoto

Skills and  
Employability  
Department

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## Preface

The primary goal of the ILO is to achieve full and productive employment and decent work for all, including women and young people, a goal which has now been widely adopted by the international community. Working towards this goal is the fundamental aim of the ILO.

In order to support member States and the social partners to reach the goal, the ILO pursues a Decent Work Agenda which comprises four interrelated areas: Respect for fundamental worker's rights and international labour standards, employment promotion, social protection and social dialogue. Explanations of this integrated approach and related challenges are contained in a number of key documents: in those explaining and elaborating the concept of decent work,<sup>1</sup> in the Employment Policy Convention, 1964 (No. 122),<sup>2</sup> and in the Global Employment Agenda.

The Global Employment Agenda was developed by the ILO through tripartite consensus of its Governing Body's Economic and Social Policy Committee. Since its adoption in 2003 it has been further articulated and made more operational and today it constitutes the basic framework through which the ILO pursues the objective of placing employment at the centre of economic and social policies.<sup>3</sup>

The Employment Sector is fully engaged in the implementation of the Global Employment Agenda, and is doing so through a large range of technical support and capacity building activities, advisory services and policy research. As part of its research and publications programme, the Employment Sector promotes knowledge-generation around key policy issues and topics conforming to the core elements of the Global Employment Agenda. The Sector's publications consist of books, monographs, working papers, employment reports and policy briefs.<sup>4</sup>

The *Employment Working Papers* series is designed to disseminate the main findings of research initiatives undertaken by the various departments and programmes of the Sector. The working papers are intended to encourage exchange of ideas and to stimulate debate. The views expressed are those of the author(s) and do not necessarily represent those of the ILO.

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Executive Director  
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<sup>1</sup> See the successive Reports of the Director-General to the International Labour Conference: *Decent work* (1999); *Reducing the decent work deficit: A global challenge* (2001); *Working out of poverty* (2003).

<sup>2</sup> In 1964, ILO Members adopted Convention No. 122 on employment policy which states that "With a view to stimulating economic growth and development, raising levels of living, meeting manpower requirements and overcoming unemployment and underemployment, each Member shall declare and pursue, as a major goal, an active policy designed to promote full, productive and freely chosen employment". To date, 97 member States have ratified this Convention.

<sup>3</sup> See <http://www.ilo.org/gea>. And in particular: *Implementing the Global Employment Agenda: Employment strategies in support of decent work*, "Vision" Document, ILO, 2006.

<sup>4</sup> See <http://www.ilo.org/employment>.



## Foreword

The current paper was originally prepared as a background document for the ILO's internal workshop on 'Skills development for industrial clusters', held in November 2005. A cluster-based approach to development has received considerable attention, first among developed countries, and then among developing countries since the mid- 1990s. While the importance of skills is mentioned in many studies of clusters, there are few studies that focus specifically on skills. The current paper provides a basic conceptual framework for understanding the role of skills in cluster development. The framework was developed by analyzing the skills aspect of a limited number of well-researched cluster case studies (i.e. knitwear in India, surgical instruments in Pakistan, shoes in Brazil and Fishing in Kenya and garment in South Africa).

The selection of cases was made in a large part on the basis of whether they presented a significant role of skills in cluster development. It should be mentioned, however, that cluster development is dynamic and that there are continuously new developments. Latest developments are not reflected in these case studies. They are nevertheless enlightening on the specific question of the skills aspects of cluster development and sustainability. It should be noted that discussion of surgical instruments in Sialkot, Pakistan does not draw parallels with the other well-known cluster there in the production of footballs, whose later development has taken a different path than that of the surgical instruments cluster.

The paper also provides some preliminary thoughts on how to design cluster-focused skills development interventions and how to integrate them with ILO's overall cluster development strategy. The cluster approach has been recognized as an effective means for the promotion of enterprise expansion and local economic development, which can contribute to employment creation, poverty reduction and the promotion of decent work. The ILO has pursuing cluster development as part of its work led by the Job Creation and Enterprise Development Department.

This paper highlights the significant role of skills in cluster development, both as a precondition for cluster emergence and as a catalyst for developing a skilled workforce and generating knowledge spillovers. A variety of approaches to skills upgrading are presented and the paper argues that different types of clusters benefit from different skills interventions. Appropriate interventions can range from strengthening the public training system in supplying technical skills, consolidating local apprenticeship, establishing cluster-specific training centres based on public-private partnerships, providing basic and strategic management skills, promoting research and links with academia, and, encouraging specific training to promote compliance with international standards (e.g. health and safety, child labour, environment). The nature of these activities will depend in large part on the initiative of the cluster, the level of intra-firm cooperation and the possibilities for collective efficiency in cluster upgrading. In most cases, the role of the state will not be limited to the provision of basic skills and services through the formal training centres. It is important that a national skills development strategy or a cluster development strategy recognize the importance of the skills aspect of clusters and provide appropriate measures in meeting the skills challenges that they present.

The findings of this paper also indicate that the enhancement of technical training needs to be combined with the broader technological improvement of local enterprises, particularly in underperforming clusters. In this regard, the paper stresses that skills development interventions must be implemented hand-in-hand with efforts for product and process upgrading, thus increasing the demand for higher skills (e.g. by promoting linkages with quality markets). The paper argues that cluster development can support economic and social development and that skills development is a key ingredient in achieving those twin objectives.

The findings of the paper have contributed to our understanding of the role of skills in enhancing productivity while also promoting employment growth. These connections have been analyzed in the background report prepared for general discussion at the 97th Session of the International Labour Conference on Skills for Improved Productivity, Employment Growth and Development (June 2008).

I would like to thank the authors for the analysis and case studies in this report. Marco Marchese carried out this work as an ILO consultant. He currently works at OECD as a Policy Analyst in the Local Economic and Employment Development Programme. Akiko Sakamoto is a Skills and Training Policy Specialist in the ILO, currently working in the ILO Sub-regional Office for South Asia (New Delhi). The paper benefited from valuable comments from various ILO colleagues, in particular Mpenga Kabundi, Anne Posthuma, Gopal Joshi and David Lamotte, as well as from Frank Pyke (ILO consultant), Ms Jane Auvre provided vital editing support which is greatly appreciated.

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## Abbreviations

EU	European Union
FDA	Food and drug administration
GMP	Good Manufacturing Practice
ICT	Information and communication technology
IIS	Indian Institute of Science
MIDC	Metal Industries Development Centre
MNE	Multinational Enterprise
R & D	Research and development
SIMA	Surgical Instrument Manufacturers Association
SME	Small and medium-sized enterprise
SV	Sinos Valley
WTO	World Trade Organization



## Introduction

A cluster-based approach to development has attracted much interest in both developed and developing countries as a way to improving productivity, competitiveness and export performance. Comprised mainly of micro and small enterprises, clusters share and make efficient use of local resources, infrastructure and markets. They create employment and offer a positive response to the challenge of globalization.<sup>5</sup>

While clusters in the developed world have received considerable attention since the 1970s, those in developing countries have attracted the interest of researchers and policy makers only more recently, mainly since the early 1990s.<sup>6</sup> Moreover, the literature on these clusters has focused chiefly on how some of them have become leading exporters, succeeding in outperforming rival clusters in developed countries. Less emphasis has, however, been placed on the specific role of skills – especially workforce skills – in cluster development and even less attention has been given to the social dimension of clusters. The literature that does deal with skills focuses on developed countries, in particular the United States, or on theoretical aspects. There are few skills-focused studies related to developing countries, although practically all studies of clusters in these countries do mention the importance of skills.

In this context, many key questions regarding skills and cluster development have remained unanswered. These questions include: how can skills contribute to the emergence and further development of clusters? What is the role of workforce skills in that process? And, is it possible to envisage specific skills interventions for cluster development?

Moreover, it is important to explore cluster development not merely as a means of enterprise development and employment generation, but also as a catalyst for equitable and pro-poor growth in local areas. We need to know whether clusters have any effect on social issues such as poverty reduction and informal economy upgrading and whether cluster upgrading in itself can be regarded as a social development process. Cluster development is a highly dynamic process which is likely to leave on the ground winners and losers.

This paper aims to investigate these questions through the lens of skills development. It analyzes the social effects of cluster development, an issue which is of particular interest to the ILO. It also examines the role of skills in cluster development and how skills development can facilitate cluster development, in particular in developing countries. Due to the lack of focused studies on skills and clusters in developing countries, the analysis draws heavily on five well-known cases of clusters. We have ‘teased out’ the skills aspects of these experiences and examined their implications. These cases are: the Sialkot surgical instruments cluster in Pakistan (Nadvi, 1999); Ludhiana’s knitwear cluster (Tewari, 1999) and Bangalore’s Information and Communication Technology (ICT)

<sup>5</sup> In its recent *World Employment Report 2004-2005: Employment, Productivity and Poverty reduction*, the ILO (2005) has urged governments to examine seriously how the cluster concept could enhance productivity and contribute to poverty reduction. *A Fair Globalisation: Creating Opportunities for All* (ILO, 2004), a report prepared by the World Commission on the Social Dimension of Globalization set up by the ILO, also stated that the threats of globalization have to be met locally by better organizing and improving local economic activities. See also Joshi (2005).

<sup>6</sup> See, for instance, the special issue of *World Development* devoted to this topic in Knorringa, 1999 (vol. 27, no. 9).

cluster (Nadvi, 1995; Holmström, 1994) in India; the Sinos Valley (SV) footwear cluster in Brazil (Schmitz, 1995; 1999) and the African manufacturing clusters investigated by McCormick (1998; 1999), which are presented as case studies in Part II of the paper. The analysis lies at the crossroads and thus draws upon two different, yet sometimes converging, literatures: “clusters of small and medium-sized enterprises” (SMEs) and “skills and technology”.

The paper is structured into two parts. Part I first gives preliminary definitions of ‘clusters’ and ‘skills’. Second, it provides a brief historical account of the theories on clusters and technology. Third, it investigates the role of workforce skills in cluster development, giving theoretical and practical insights. Fourth it addresses variation within clusters and explores differences in skill development approaches. Part II presents general approaches to skills upgrading in the five case studies of well-known clusters.

## **PART I - Clusters and skills development**

### **1. Definitions**

The term ‘clusters’ refers to a geographical agglomeration of firms usually operating in one industry. The majority of cluster firms are SMEs, but some clusters also include one or more large companies. Cluster structure may, therefore, vary across industries and locations. Industry specialization, moreover, does not necessarily imply product specialism: clusters in the same industry often produce different goods. In fact, besides attracting firms and workers specialized in the cluster’s core business, clusters also include ancillary industries (e.g. transportation; input producers) and services (e.g. financial). Furthermore, clusters are embedded in the local governance and institutional structure which includes business associations and local government (e.g. municipalities, provinces, etc.) and which can support cluster development.<sup>7</sup>

The term ‘skills’ is used here to designate the final outcome of any learning process occurring at the cluster level. This includes not only technical skills acquired through formal education and training, but other kinds of skills and learning that the *workforce and organizations* (i.e. enterprises and cluster associations) acquire through formal and informal channels. This includes new abilities concerning the management level such as how to better organize and implement new production systems: and how to effectively interact with other firms. Both technical and generic transferable skills (e.g. problem-solving and team-work) are also important skills for clusters. Skills acquisition takes place at multiple levels within a cluster: workers, enterprises and the cluster as a whole. For the purpose of the paper, however, the term skills is used to refer to workers’ skills unless specifically explained otherwise.

<sup>7</sup> A good example of a mature cluster is the one devoted to leather products in Tuscany, Italy. This cluster mainly consists of shoemakers, but also includes handbag makers and tanners. Regional banks provide subsidized credit to local firms, which are represented by active business associations that supply business development services that can be administrative (e.g. payroll, fiscal counselling, etc.) and/or production-oriented (e.g. participation in trade fairs, organization of workshops, support to business consortia, etc.).

## 2. Theoretical background on clusters and skills

The economic advantages of clusters were first theorized by Alfred Marshall in his landmark work *Principles of Economics* (1920). He introduced the concept of external economies (now known as *externalities*) to refer to those benefits which accrued to single enterprises by the mere fact of being geographically close to each other and working in the same industry. In particular, Marshall pointed out three external economies: a market of intermediate inputs; a skilled labour force; and technological spillovers. The first two lowered transaction costs (Williamson, 1973), while the third contributed to creating what Marshall himself called “industrial atmosphere.”

Over fifty years elapsed before Marshall’s remarks on external economies were taken up to describe modern clusters. In the intervening period, the Fordist system of production dominated the industrial scene. In that system vertical integration within single, large firms was considered the most efficient way to produce goods while small firms were regarded as inefficient. Over time, however, the potential role of small firms in economic development was reappraised and this was principally due to mainly Italian economists and sociologists in the mid-1970s who investigated the industrial development of the so-called ‘Third Italy’ (Bagnasco, 1977). This centre-north region of the country distinguished itself from the industrialized north and the relatively underdeveloped south with a production system based on what Italian scholars called *distretti industriali* (i.e. industrial districts).

Italy’s industrial districts were characterised by fairly mature markets and relatively developed infrastructures which facilitated the emergence and continued operation of SMEs (Viesti, 2000). The cultural origins of these firms were rooted in the workforce skills and entrepreneurial spirit of ancient traditions in both agricultural and artisan independent work (Triglia, 1986). At the same time, the absence of large factories and the paucity of public employment reduced workers’ wage expectations so that cost of labour, which was higher in neighbouring regions (i.e. Milan, Turin, and Genoa) could be more easily restrained. Labour and inter-firm relations, then, followed informal patterns based on flexible arrangements whereby each enterprise specialized in one specific stage of production. This system of production would later be defined as “flexible specialization” (Piore and Sabel, 1984; Capecchi, 1989) and successful local companies played the main role in cluster emergence by generating spin-offs and acting as role models for future entrepreneurs. Finally, local institutions (e.g. municipalities, social partners, etc.) sharing a common subculture supported these clusters by adopting an approach to problem-solving characterized by negotiation and compromise (Locke, 1995).

This highly stylized account, which merges some of the main scholarly findings on the topic, can serve as a useful paragon when analyzing clusters in developing countries. This is not so much because every cluster is supposed to go through the stages outlined above. Instead, the Italian situation highlights the critical factors (e.g. decent infrastructures, wide workforce skills basis, intra-cluster cooperation, effective local public governance, etc.) which prompt clusters to emerge and expand.

In the early 1990s cluster development became a major subject of analysis in the United States, where Michael Porter (1990) first highlighted the interesting paradox that in an increasingly globalized race for competitiveness, local factors such as a skilled labour force and virtuous local institutions were still the main determinants for economic success. This point was epitomized by the fact that the global economy, including the centres of economic strengths in the United States, Europe and East Asia, continue to be dominated by geographically delimited clusters.

Development theorists took up the cluster approach in the 1990s and formulated the notion of *collective efficiency*, which combined the idea of externalities with that of joint action (Nadvi and Schmitz, 1999). The latter denotes the benefits that cluster firms receive from cooperation, which is undertaken with the aim to offset resource advantages deriving from their small size (Visser, 1999). It is joint action that is the basis for cluster upgrading.

There are at least three different types of upgrading: product, process, and functional. The first refers to quality improvements in the goods being manufactured; the second involves streamlining the manufacturing process; the third implies moving up to greater value-added stages of production (e.g. from manufacturing to design and marketing as well). The case studies (Part II) demonstrate that the last kind of upgrading is the most difficult to achieve, especially when clusters have very close relationships with large and influential buyers that have an interest in promoting the upgrading of suppliers' product, but have no interest in letting them compete in the same final product markets (e.g. the SV footwear cluster).

By contrast, functional upgrading becomes relatively easier when enterprises serve a final product market, especially if the latter is particularly concerned with quality so as to provide producers with feedback on "functional" issues like marketing and design (e.g. the Ludhiana knitwear cluster). Conversely, product and process upgrading are harder to achieve in this circumstance compared to working closely for a buyer, who can offer direct tutelage that markets do not normally supply.

In any case, however, upgrading requires considerable effort on the part of firms, which have to invest in product development, workforce skills, new competences, etc. In other words, upgrading is a learning process, which, far from being automatic and effortless as proposed by neoclassic economics, calls for an amount of effort proportional to the "tacitness" and "circumstantial sensitiveness" of the technology required to upgrade.

'Tacitness' means that technology cannot be easily transferred through a blueprint because "much of the knowledge about how to perform elementary processes and about how to combine them in efficient systems is tacit, not feasibly embodied and neither codifiable nor readily transferable" (Evenson and Westphal, 1995, p. 2213). 'Circumstantial sensitiveness' is the idea that new technology needs to be adjusted to local circumstances, which gives rise to different techniques (i.e. the particular way of doing something) every time the same technology is implemented in a new situation.

These two features of technology reinforce the vital role of skills in cluster development. On the one hand, cooperation, informal socialization, and the tendency to form associations, all elements typically present in clusters, supports the tacit aspect of technology use. On the other hand, geographical clusters make circumstantial sensitiveness an issue which can be jointly faced. To sum up, clusters reduce the costs associated with learning, thereby potentially boosting local economic growth and helping developing regions to catch up with developed ones. The catch up concept is far from being automatic, as depicted by the economic literature on convergence (Romer, 1990). Quite the opposite, it calls for continuous efforts and investments in innovation (i.e. workforce skills, product development, etc.), which make clusters and their ability "to make risks more riskable" (Schmitz, 1995) particularly helpful, especially in developing countries where the business environment is highly uncertain.

### 3. The role of skills in cluster development

The experience of the Italian districts described above gives a glimpse of the role of skills in cluster development. This section explores further the skills contribution to the emergence and further development of clusters. We draw from the experience of five well-known cases of cluster development (Part II) and divide the analysis between first advantage and second advantage factors suggested by Burgess and Venables (2004).

*First advantage* factors are necessary but not sufficient preconditions for cluster development. Among these factors are traditional development variables such as a sound capital market, good infrastructure and appropriate level of education.<sup>8</sup> These factors are critical to enabling local firms to tap new emerging opportunities or to face eventual external threats, but by themselves fail to explain why a cluster rises and grows somewhere. In contrast, *second advantage* factors shape business decisions made both internally and externally to the cluster, thus originating a cumulative decision-making process. These decisions result in market thickening effects, knowledge spillovers, the development of networks and the strengthening of technological capabilities. The second advantage factors are essential for causing cluster materialization and success.

#### a. *Preconditions for cluster emergence: First advantage*

In all the cases examined, workforce skills are indeed preconditions for cluster emergence. Sometimes, the skills basis of a cluster dates back several decades, even centuries, before the time when the cluster effectively blossoms. In Sialkot, Pakistan, a surgical instrument cluster developed in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries based on pre-existing skills developed by local blacksmiths to make forging edge tools (knives, swords, etc.). In other clusters, the time that elapsed between the development of the skills foundation and the rise of the relevant cluster has been much shorter. This has been true especially when skills formation is not a spontaneous process, but rather is induced by external actors. This process is epitomized by the Bangalore ICT cluster where the presence of the Indian aeronautics programme and the renowned Indian Institute of Science (IIS) encouraged the origin of an ICT cluster that after a few decades was already attracting large foreign companies and playing a leading role in the sector.

The existing evidence casts doubt on the possibility of creating clusters from scratch without a solid skills basis. Rather than being specifically created, instead clusters 'emerge' on the basis of existing workforce skills. If the latter are not in place, there are only two ways to bring them on: the first is to relocate skilled workers, while the second is directly to train workers. However, the first option is probably unrealistic and definitely expensive because skilled labour may not be willing to move from one place to another,

<sup>8</sup> This should not lead us to assume, however, that skilled labour force and educated population do play the same role in cluster development. It is common wisdom that one can be highly skilled at, say, repairing cars and, at the same time, be semi-illiterate, while, conversely, one can hold a diploma of secondary education but still be unready to enter the labour market. Similarly, one country may boast a relatively high literacy rate but lag behind another which has a smaller share of literate population, but a larger proportion of highly and specifically trained workers. To give an example of countries represented in our case studies, India's literacy rate is far lower than Kenya's (61 per cent vs. 73.6 per cent) but, nevertheless, outperforms with regard to industrial development, in general, and cluster development in particular. All of this has critical policy implications, beginning with the likely overemphasis on literacy as an engine of growth, which is slightly at odds with the simultaneous overlooking of the role of secondary and vocational education in economic growth via industrial development.

even with the promise of better wages (Florida, 2002). Training workers, on the contrary, implies that the state will choose the sector to be developed but such a “picking the winner” approach has sprouted protectionist policies and failed attempts at industrialisation in the past in many developing countries.<sup>9</sup>

#### *b. Marketing thickening and knowledge spillover effects: Second advantage*

In addition to providing an important precondition for cluster emergence, skills also give rise to self-reinforcing effects leading to second advantage factors of market thickening and knowledge spillovers.

##### *Catalyst for Foreign Direct Investment (FDI)*

A competent labour force attracts investments from outside the cluster. Bangalore provides us with an example whereby workforce skills attracted foreign direct investment and the latter, in turn, further fed the local development of skills. Prior to India joining the World Trade Organization (WTO), large US companies commonly came to this southern Indian city to pick up the best talents and bring them to successful US ICT clusters such as California’s Silicon Valley and *Route 128* in Massachusetts. As a result, the Bangalore cluster was deprived of its best human capital. This trend was inverted when, as a consequence of trade liberalization, large US companies such as Dell and IBM put up plants in Bangalore and were able to draw locally on a highly skilled labour force that was much cheaper than the one available in the US. For Bangalore this change led to significant economic growth, which was sparked in part by the same computer scientists who had originally gone to the US and who now came back to India to start up firms allied with the same US companies for which they had previously worked in the US. In other words, the stoppage of the previous brain drain and, indeed, the return home of the best talents contributed enormously to Bangalore’s economic takeoff.

##### *Catalyst for developing a skilled workforce*

In addition to attracting investment, the presence of skilled manpower also acts as a catalyst for additional workers with the same skills. More often than not, it is not just a question of job opportunities, but involves lifestyles too. Saxenian (1996), for example, gives a charming description of the Silicon Valley as a place where ICT workers share a common sense of belonging to the cluster and have similar lifestyles. In her description, computer-related issues lie at the core of discussions not only at work, but also during social gatherings. It does not come as a surprise that US computer devotees deem Santa Clara as *the* county to live in.<sup>10</sup>

The ability of existing skilled labour to attract both new investments and human resources comes within the broader category of market-thickening effects. That is, the presence of skills *in situ* makes capital and labour markets thicker, thereby contributing to cluster development.

<sup>9</sup> This is far from embracing a laissez-faire view whereby the state should keep its hands off from the market, including clusters. Quite the opposite, in our view the state should lead or, at least, be part of the cluster governance, mainly carrying out a supporting and mediating role among different local stakeholders.

<sup>10</sup> Santa Clara is the county that hosts the ICT cluster commonly known as the Silicon Valley.



### *Levers for knowledge spillovers*

Besides triggering market-thickening effects, labour skills also increase the extent of knowledge spillovers, which is another second advantage factor. This occurs in at least two ways. At the external level, the skills basis of a cluster influences its “absorptive capacity”, which is *the* ability of the cluster to codify and implement external knowledge and often lies at the origin of cluster upgrading via major technological discontinuities (Giuliani, 2005).<sup>11</sup> Two variables affect a cluster’s absorptive capacity: i) the presence of technological leaders – “gatekeepers” in the words of Giuliani – capable of codifying the external information; and, ii) the level of homogeneity among cluster firms’ technological capabilities, so that the bulk of the cluster can easily acquire and use the information first processed by the technological gatekeepers.

The second variable directly introduces us to the internal dimension of technological spillovers, which is influenced by the technological gap among the cluster’s firms.<sup>12</sup> This gap affects both the ability of the followers to communicate with the leaders and the willingness of the latter to transfer their knowledge to the former. As for the last point, transferring technologies to incompetent partners increases the time needed to complete the skills transaction and reduces the likelihood of receiving adequate gains from the collaboration. To sum up, the wider the intra-cluster technological gap, the greater the transaction costs, the lower the technological spillovers and the lower the level of cluster development.

While skills generally have a positive effect on cluster development, this is not always the case. Such an occurrence can take place when the labour market is not ready to receive and pay an adequate wage for newly trained labour. Skills upgrading of the workforce may lead to self-employment and to overcrowding within the cluster, which can severely reduce the profit margins of all cluster operators. Known as “disabling labour market pooling” effect, this phenomenon is not uncommon in many African clusters (McCormick, 1999).

## **4. Different approaches to skills upgrading in clusters**

The previous section analyzed the importance of workforce skills in cluster emergence and development. Here we focus on how different clusters have upgraded skills in the context of their specific economic milieu. The evidence, largely drawn from the case studies in Part II, highlights four main approaches to skills upgrading:

- a. Providing demand-driven training;
- b. Promoting linkages with multinational enterprises (MNEs);
- c. Learning from other external sources (e.g. international consultants and buyers);
- d. Promoting intra-cluster cooperation.

<sup>11</sup> In this regard, the case of Sialkot is emblematic (Nadvi, 1999).

<sup>12</sup> It may be good to remember that in this context technology has always a strong skills content, bearing the meaning of “knowledge about how to do things.”

The section also analyses the role of the state in skills upgrading for clusters and briefly presents the policy dilemma on labour specialization versus skills diversification.

*a. Provision of demand-driven training*

The mode in which state-provided training should be delivered falls within the current debate on supply-driven assistance (SDA) vs. demand-driven assistance (DDA) to SMEs (Tendler and Amorim, 1996). The demand-driven perspective suggests that the design of any large training programme should always be preceded by a small survey designed to determine the real needs of the local firms, especially smaller ones which are rarely represented by local associations and yet are more in need of skills upgrading. However important, social dialogue with local business or trade associations cannot be considered synonymous with a demand-driven intervention, which is instead a broader concept comprising, in our case, the entire cluster. As a result, one clear step toward the provision of demand-driven training would be through as extensive as possible decentralization. This can occur through support to what Rosenfeld (2002) has called “cluster skill centres.” They would not necessarily be traditional institutions, complete with physical premises. Their activities can range from surveying the cluster’s skill needs – and accordingly devising training courses – to facilitating collective projects with skill contents. The latter might involve focus groups considering particular bottlenecks affecting the cluster or one of its industries. The centres might also benchmark good practices in other places and other clusters.<sup>13</sup>

*b. Promoting linkages with multinational enterprises (MNEs)*

Creating ties between MNEs and local suppliers in the cluster can also facilitate the transfers of skills and technology, thus contributing to skills upgrading. An array of government programmes currently pursue this objective (Pyke, 1999).<sup>14</sup> In Singapore, the Local Industry Upgrading Programme “brings MNEs together with local suppliers of parts and services in mutually beneficial collaborations.”<sup>15</sup> Two of the programme’s three stages are the “transfer of new products or processes to the local enterprises” and “joint product and process R&D.” The strength of such a programme is that MNEs are really engaged in the skills upgrading of local suppliers, providing them with training in quality control and various engineering practices. A weakness is that there is no reference, direct or indirect, to functional upgrading and that the programme rests on a strong and unchangeable division of labour between MNEs and suppliers. Similar programmes can also be found in Argentina and Mexico, both of which focus on the automotive industry (Pyke, 1999).

<sup>13</sup> Rosenfeld mainly mentions examples of UK centres of vocational excellence such as the “Fashion and clothing” programme of the London Institute, the “High-tech engineering” programme of the Plymouth college, etc. (Rosenfeld, 2002, p. 26).

<sup>14</sup> An interesting historical example of this type of intervention is provided by the Singaporean authorities, which in the 1960s convinced *Singer*, the main worldwide producer of sewing machines, to outsource 80 per cent of its production in their city-state. As a result of this agreement, *Singer* enhanced local skills by providing suppliers with both consulting (e.g. accounting, product management, etc.) and formal training, thus creating a skills basis that would have subsequently persuaded other industry leaders to relocate there (Pyke, 1999; Hobday, 1995).

<sup>15</sup> Website of the Singaporean government.

*c. Learning from other external sources (e.g. international consultants and buyers)*

At the theoretical level, we have already referred to the concept of “cluster absorptive capacity” (Giuliani, 2005) as an important element for cluster upgrading. Empirical evidence also suggests that the clusters often needed an injection of skills that originate externally. Apart from MNEs as mentioned above, sources of these external skills can be international consultants or buyers. The role of international consultants was evident in the case in Sialkot, where both “hard” (i.e. technical) and “soft” (managerial) skills had to be imported from abroad at different times, or in the Lake Victoria fish cluster where external consultants had to be hired to acquaint Kenyan processors with the EU standards on fish handling. As for the benefits of using international consultants, bringing in a consultant appears to be the easiest and most efficient way of meeting immediate objectives in terms of new skills acquisition. However, in a business environment that is in continuous evolution, skills can become obsolete very quickly, making the sporadic use of consultants less effective.

Facilitating the emergence of close relationships with external buyers is another alternative and can be a more far-sighted and sustainable alternative. In this respect, the mainstream view is that large and foreign buyers furnish the best learning opportunities for clusters. However, whether to encourage linkages with foreign or domestic and large or medium buyers depends on the specific circumstances and sectors.

In traditional manufacturing industries (e.g. footwear, knitwear, etc.), learning from buyers does not seem to be so much a question of nationality, as of size. And surprisingly, medium-sized buyers with greater willingness to provide close tutelage seem to matter more than the alleged greater skills endowments of large firms. The decisive element is the greater interest of medium-sized buyers in securing quality output as compared to large buyers. A practical example of these dynamics is given by the Ludhiana knitwear cluster in India, where both quality-oriented markets and medium-sized buyers contributed to local skills development more than did extensive low-end markets or large buyers (Tewari, 1999).

The situation can be quite the opposite in the ICT sector, however. Here, nationality and the (large) size of buyers do matter. This has to do with the fact that market leaders vaunting cutting-edge knowledge in this industry still come from a very limited number of countries, chiefly the US, so that the gap between front-runners and followers with regard to what they can offer to suppliers in terms of learning is still too wide. With regard to the buyer’s size, the fact that the costs of reproduction in the software industry are practically zero means that large buyers are more attractive than small ones, not so much for skills upgrading, but for income prospects.

*d. Promoting intra-cluster cooperation*

In an earlier section, we noted that a key advantage accruing to firms in cluster is their greater ability to cooperate and undertake joint action. Far from having implications only on business-related issues, cooperation has the potential to enhance the capabilities of the cluster as a whole.

Cooperation helps overcome the two main obstacles intrinsically associated with knowledge acquisition: tacitness and circumstantial sensitiveness. By cooperating, firms join forces and thereby increase their chances of codifying technological elements that firms working individually are unlikely to absorb. Moreover, if technology is sensitive to local circumstances, intra-cluster cooperation can help devise a limited set of specific techniques (i.e. on how to use technologies) that fit the needs of most cluster operators.

There is, therefore, definitely room in clusters for public action aimed at encouraging intra-cluster cooperation as a means for skills development, especially in developing countries where formal vocational training may be more difficult to organize. In practical terms, this means encouraging cooperation first through non-binding activities (e.g. joint projects), followed by cooperation involving more formalized instruments such as business associations, research consortia and business internationalization consortia.

Business associations can play a crucial role in upgrading the skills base of clusters. In many clusters, including those analyzed in Part II, local business associations are engaged in training provision, either as direct suppliers or as mediators in bringing external skills to the cluster (e.g. through consultants). Training programmes devised by an association should mirror the skill needs of all members and not only those of the most influential. This is a representativeness problem which is evident from the case studies (e.g. Sialkot, SV, etc.). An attempt to broaden the very idea of “demand-driven” training should be made, trying not to limit the concept of “demand” to formalized associations, but striving to include the needs of those micro and small enterprises that may not be represented by the cluster association despite constituting the bulk of the cluster’s members.

Research consortia do not only play an important role in high-tech industries such as ICT or biotech. On the contrary, any industry can be knowledge-intensive (Porter, 1998), including those based on natural resources or traditional manufacturing. Depending on the sector, then, the activity of a research consortium will be different and range from design and marketing in manufacturing (e.g. footwear, knitwear, etc.), to product development in high-tech or natural-resource-based sectors (ICT, fruits, etc.).

Business internationalization consortia facilitate cluster access to external knowledge, which, as seen, plays an especially important role in sparking functional upgrading related to major technological discontinuities. In this respect, linking these consortia to first-class markets, rather than promoting exports indiscriminately, will better serve the purpose of cluster skills enhancement. In fact, only by serving quality markets, will consortium members receive feedback on issues such as marketing and design which lie at the core of functional upgrading, which implies a qualitative improvement in skills.

Intra-cluster cooperation for skills upgrading does not take place automatically, despite reduced transaction costs (e.g. exchange costs, monitoring costs, etc.) inherent in being associated with a cluster.<sup>16</sup> In effect, local business associations may be in conflict with each other due to diverging interests. Consequently, they may end up embracing a conflict-oriented approach aimed at maximizing the benefits for their constituencies to the detriment of the cluster’s overall interests. Furthermore, business associations may fail to represent the very interests of the profession, let alone of the entire cluster, because the largest local companies exert overwhelming influence in their political direction. Once they have attained large size, in fact, cluster enterprises often become more interested in striking deals with big foreign buyers than with small local units, although the two strategies are not mutually exclusive (e.g. the SV footwear cluster). In other cases, business associations may fail to recognize what action to undertake, especially when this implies greater costs than another easier option.<sup>17</sup>

<sup>16</sup> Monitoring costs are lower in a cluster because speculative behaviours get disclosed more easily than elsewhere thanks to the smaller geographical dimension and the different forms of informal socialization (e.g. meetings, conversations among personal acquaintances, etc.) typical of a cluster.

<sup>17</sup> This was the case, for instance, in Sialkot, where the local business association, in order to raise quality standards, originally sought to lobby the relevant authority and only later invested in the skills upgrading of its members by organizing collective training sessions (Nadvi, 1999)

In addition, cooperation may succeed within the industry but fail among capital, labour, and the state. This is not a less problematic issue and may have negative repercussions on investments in workers' skills, as well as in other as critical economic spheres. As for the first point, a lack of social dialogue may result in an underinvestment in workforce skills by all sides (i.e. state, labour, and capital) and in the fragmentation of the skills supply and its mismatch with demand. Concerning the second point, abortive cooperation between the industry and the state may lead to patterns of urban development which penalize the cluster.<sup>18</sup> In the worst scenario, cooperation may be thwarted by ethnic and racial divisions which foster mutual distrust, as has been the case in some African clusters (McCormick, 1999).

The different outcomes for skills development from cooperative vs. non-cooperative behaviour is then well exemplified by the diverging evolution of the Sialkot and SV clusters. In the former, joint action led to process upgrading, whereas in the latter the lack of cooperation stifled functional upgrading.<sup>19</sup>

### ***Role of the state in skills upgrading for clusters***

We have previously suggested that the state should not strive to create clusters from scratch. Arguing in this direction, however, does not imply championing a laissez-faire approach either. In a cluster framework, we believe that the role of the state is finer than the one suggested by this dichotomy.

In addition to fostering cooperation, the state has also a more proactive role to play in supporting cluster development.<sup>20</sup> In many successful clusters, the state has contributed to developing a skilled workforce that has subsequently triggered the self-reinforcing process leading to cluster development. This was evident in Bangalore with the IIS and in the more traditional Sialkot cluster with the Apprenticeship Training Institute. The role of the state in basic skills provision is as important in traditional sectors as it is in high-tech ones.

Ideally, the state might want to limit itself to the provision of basic skills and services such as those usually carried out by the formal training centres mentioned above. However, the real world is far from the stylized one where generic and specific training can be neatly demarcated (Becker, 1993). In reality, government bodies are engaged everywhere, directly or not, in the provision of different forms of vocational training, if only because latter is considered a "merit good" (Lepenies, 2004). This greater involvement can be especially crucial in those clusters that perform poorly in terms of cooperation, thereby missing the learning opportunities associated with collaborative behaviours. In this respect, Giuliani *et al.* (2005) have analyzed cross-sectoral correlation between collective efficiency and different forms of upgrading, reaching the conclusion that there are

<sup>18</sup> The collapse of Bangalore's public-private taskforce, originally established with the aim of solving several local infrastructural bottlenecks, provides a good example in this respect (The Economist, 2005).

<sup>19</sup> An in-depth analysis of both cases is given in Part II of this paper.

<sup>20</sup> Supporting an existing cluster is different from creating a new one, but even this effort can entail the same problems of trying to a "pick a winner". Government patronage of particular firms is always a potential danger. Policies aimed at supporting a cluster would then require objective indicators of economic performance and economic potential. The measure of a cluster's economic performance is quite straightforward and good proxies include export level, percentage contribution to national GDP, etc. The assessment of a cluster's economic potential can be more complicated, although, as a minimum a cluster worthy of support should include more than a dozen firms, have an active local association and be able to demonstrate a record of attempts at joint action. Unsuccessful joint action would indicate at least a willingness to cooperate.

industries such as automobiles or those based on natural resources where collective efficiency is poor due to the lower level of inter-firm cooperation. From a policy perspective, this means that in some industries such as the aforementioned ones the role of the state in training provision will need to be stronger.

As mentioned, the state facilitates linkages between MNEs or foreign buyers with firms in the cluster. Provision of demand-driven training to meet the cluster's needs also requires the state's assistance, for instance by allowing formal training institutes to provide tailor-made training for clusters, or setting up new institutions or programmes to assist cluster development. The state-run research and testing centres are particularly critical in helping a cluster's firms to comply with the increasing number of standards which rule today's industrial world and are often real barriers to more profitable domestic and export markets.<sup>21</sup>

The state can also support clusters through public procurement. An outdated version of this concept sees the government purchasing from small firms or modifying the rules so that small firms can bid. Both cases, however, lead to inefficiencies on each side of the contract. In the first case, the state would consider any monitoring activity as useless in that it could not affect the decision whether to continue or not the commercial relationship with small firms. The enterprises, on the other hand, protected by a softened non-market environment, would not feel sufficiently motivated to deliver. In the second case, which has been more common but nonetheless problematic, public procurement fragmentation would unavoidably cause cost inefficiencies on the part of the state. Moreover, in both scenarios, the underlying idea is that small firms, even when clustered, are unable to compete with large firms. That has been proven untrue by the successful stories of industrial clusters both in the developed and developing world.

An interesting new concept of public procurement has, on the contrary, been advanced by Tendler and Amorim (1996), who have argued in favour of the state dealing with business associations rather than single small firms, as this would enable the state to maintain cost efficiency and to shift part of the monitoring costs to the SMEs via their business association (i.e. payments would be made conditional upon all small firms involved in the deal delivering their own part of work to quality and other standards). This view has the merit of being particularly suited to cluster settings, where business associations are fairly common, and to foster small firms to join their forces, with the ensuing multiplier learning effect. Furthermore, the frequent stability characterizing commercial relationships with the state would provide SMEs in clusters with a steady, though normally not much quality-concerned, source of learning.

### ***Labour specialization or skills diversification?***

This short section investigates whether it is better for cluster development to opt for labour specialization or workforce skills diversification. That is, should clusters (or the state) encourage workers' skill development in a few specialized areas, or in more diversified areas in the clusters? If one looks at neoclassical economic theory, there should be few doubts in opting for the first alternative. Since Adam Smith's account of pin manufacturing, there has been a broad consensus that labour specialization lies at the core of economic growth and development. Here we do agree with the gist of the argument, but also note that in traditional manufacturing clusters with a low level of technology, job rotation may still represent a valid alternative in order to provide workers with a wider

<sup>21</sup> Suffice to think of Sialkot's *Metal Industry Development Centre* (MIDC), which has been carrying out the key function of testing the quality of the metal used in the production of stainless surgical tools (Nadvi, 1999).

range of skills and thus a greater chance to avoid unemployment. From a theoretical perspective, supplying a more diversified set of skills means moving the skills issue from the enterprise to the labour market, empowering local workers with greater employability. As pointed out by Mitra (2002, p. 7), “non-specialisation is the most commendable strategy for those who exist on the broad underside of the labour hierarchy.”

At the cluster level, then, especially in situations of high labour turnover, labour rotation helps diversify workforce skills and enable firms to cope with the problems related to high quit-rates (e.g. Ludhiana knitwear cluster).

From a policy perspective, this means that under normal circumstances training programmes should continue to be fairly specific, while in elementary clusters, such as rural ones (Weijland, 1999) and those characterized by high job instability, skills diversification may be a valid alternative option.

## 5. Addressing cluster diversity in skills development

So far, we have dealt with skills development in clusters quite indistinctly, irrespective of the cluster size, sector, structure, etc. In this section, we sketch an analysis of these specificities to identify skills development approaches according to two cluster dimensions: macro-industry (manufacturing vs. high-tech) and internal structure (diversified vs. subcontractor).<sup>22</sup>

Some specifications need to be made initially to guide the analysis. First, the latter dimension of our taxonomy (i.e. internal structure) is adopted from Padersen (1997). He defines “diversified”, those industrial clusters that are characterized by a highly stressed vertical specialization and which, accordingly, derive their competitive advantage from strong intra-cluster collaboration. On the other hand, “subcontractor clusters” involve local SMEs holding close relationships with large-scale, often external, enterprises. Rather than being mutually exclusive, these two categories should be seen as poles of a continuum.

Second, the arguments made in the following section are general in nature, as skill needs may change a great deal even within clusters in the same industry and with a similar organizational structure. For instance, other variables that matter when designing skills development policies, but which have not been taken into account here are the stage of cluster development and localization (urban vs. rural). The following table summarizes our taxonomy and provides examples.

**Table 1: Taxonomy of industrial clusters**

	<b>Diversified clusters</b>	<b>Subcontractor clusters</b>
Traditional manufacturing	Ludhiana Most African clusters	Sinos Valley Sialkot
High-tech	Bangalore	

<sup>22</sup> Quick reviews of cluster taxonomies are also offered by Nadvi and Barrientos (2004, pp. 9-10) and by Albu (1997).

### ***Traditional manufacturing: Diversified clusters***

This first group includes highly heterogeneous clusters, from the quite successful Ludhiana knitwear cluster in India to the problem-ridden clusters of Lake Victoria (i.e. fish processing) and Kamakunji (e.g. wheelbarrow manufacturing) in East Africa. Nevertheless, some common features can be outlined:

- a) Firms serve markets more than buyers and thus upgrading is chiefly market-driven.
- b) No upgrading is *a priori* inhibited, as is often the case with functional upgrading in buyer-supplier relationships; on the other hand, product and process upgrading may take more time in this situation than in hierarchical partnerships.
- c) Two main variables determine the presence, type, and speed of upgrading: i) the degree of collective efficiency; and, ii) the type of market served.
- d) Intra-cluster cooperation and relationships with quality-oriented markets are critical determinants for upgrading more than anywhere else; in fact, a lack of cooperation prevents upgrading in many African clusters (e.g. Kamakunji and Zinawi), while quality-driven markets have helped Ludhiana to grow.

The following policies can spur skills development for clusters of this group:

- i) Given the importance of collective efficiency for upgrading, promoting cooperation will probably be a suitable strategy. At the beginning, one may sponsor non-binding forms of cooperation such as participation in trade fairs and visits to other clusters with a better record of cooperation. Subsequently, collective projects limited in time can be proposed, to finally pass to the more formalized patterns of cooperation previously presented (e.g. research consortia, business internalization consortia, etc.). In other words, the process toward cooperation should be gradual so as to be able to screen out those enterprises that behave speculatively and to consolidate trust among the others.
- ii) Promoting linkages with quality-oriented markets will also serve the purpose of enhancing skills in the cluster. At the same time, however, the feasibility of this policy option will strongly depend upon the cluster's stage of development. Clusters which do not comply with minimum qualitative standards, with regard to final products as well as to the system of production (e.g. labour, environmental, hygiene), will clearly find it difficult to penetrate first-class markets.
- iii) When cooperation is low, the role of public action in supplying training will become especially critical to avoid underinvestment in workforce skills. The kind of training to be delivered will depend again on the stage of cluster development.
- iv) In underperforming clusters, technical training will play a prominent role to help local firms undertake product and process upgrading in an effort to diversify their final markets beyond local ones. In these circumstances, however, workforce training may not be enough to ensure cluster upgrading and may actually lead to "disabling labour market pooling" effects (see above) if they are not coupled with an overall technical improvement of the local SMEs. It highlights the importance of a two-pronged approach: enhancing workforce skills on the one hand while supporting the technological advancement of the cluster's SMEs on the other. Only in doing so will SMEs be able to receive and integrate the newly trained labour force. Failing this, there is a risk of exacerbating the already serious enterprise overcrowding of many developing clusters.
- v) At a macro-policy level, improvements in secondary and vocational education are a precondition for the development of many underperforming clusters. These clusters



often lack the workforce skills basis that is a precondition for cluster development (Burgess and Venables, 2004).

- vi) In more advanced and diversified clusters, the development of management-related skills will also be helpful. These skills include not only basic management skills but also strategic management skills which enable the cluster to link itself to a broader market or to global production systems as a means to cluster upgrading.
- vii) Finally, regardless of the stage of cluster development, training that targets international standards compliance (health, safety, environment, labour, etc.) will always be important for clusters (even when they are not under the supervision of large buyers demanding the compliance to such standards). These standards often represent outright thresholds toward process upgrading and more profitable markets.

### ***Traditional manufacturing: Subcontractor clusters***

Clusters classified within this category present the following main distinctive traits:

- a) Product and process upgrading is usually easier in this category than in the former, thanks to large buyers' guidance; conversely, functional upgrading is often inhibited because it would mean entering the core competencies of the large customer.
- b) Cooperation is mainly vertical and induced by the large buyer; autonomous forms of collaboration promoted by very local firms are, on the contrary, rare, at the vertical (e.g. SV), let alone at the horizontal level, where producers of the same component struggle against each other to win the contracts issued by the large buyer.
- c) As a result, cooperation is difficult to achieve and, indeed, conflicts of interest frequently arise (e.g. the SV footwear industry).
- d) The size of the buyer will influence the upgrading process; unlike commonly thought, however, medium-sized buyers may be better sources of learning than large buyers (e.g. the Ludhiana knitwear industry).

The following approaches would then be suitable to develop skills in this context.

- i) Given that functional upgrading is inhibited by large buyers, supporting the linkage of these clusters to less hierarchical value chains will certainly make sense (Pietrobelli and Rabellotti, 2004). It should be noted, however, that this task will never be easy in traditional manufacturing industries.
- ii) The mediating role of local governments (e.g. provincial councils, municipalities, etc.) will be crucial in managing conflicts of interest and fostering the cluster's functional upgrading. In this respect, the case of SV provides us with a useful example in which this absence undermined an important opportunity for the cluster to upgrade functionally.
- iii) In the event that large buyers, often external, have not become autonomously involved in the skills development of their suppliers, their greater involvement in the cluster upgrading, not least of product and process type, should be promoted. It can draw on a large enterprise's Corporate Social Responsibility (CSR) policy, if it has one.
- iv) Considering that product and process upgrading in these clusters are easier to achieve because of the vertical linkage to large buyers, clusters can encourage training centres to be established, possibly jointly funded and managed by the buyers, the enterprises in the cluster and local/central governments. Alternatively, the provision of tailor-made training for the cluster may be arranged with existing local training institutions. The training curriculum can

include functional upgrading for instance in branding, marketing and design. For this second option, in particular, the active support of the state would be vital.

### ***High-tech sectors: Diversified clusters***

We now turn to analyse high-tech clusters. It should be noted however that the analysis draws heavily on one high-tech cluster, namely Bangalore and thus the general application of the arguments below should be treated with caution. In addition, although Bangalore represents this category it does not exhibit exclusively “diversified” features because large companies, both foreign and national, outsource and have their own branch offices within the cluster. Clusters such as Bangalore present the following main features:

- a) Cooperation among local firms is quite common but often goal-oriented; this means that long-lasting partnerships are rare and that in the long run intra-cluster relationships are, in fact, mainly market-driven.
- b) Hence, functional upgrading is more common here than elsewhere.<sup>23</sup>
- c) Knowledge-disseminating and knowledge-creating institutions such as universities and research centres carry out a prominent function in high-tech clusters; so does the state by issuing research contracts (Kenney, 1986; Saxenian, 1996).

The following approaches can then be envisaged:

- i) Strengthening the scientific basis. This action may take heterogeneous shapes, from supporting basic academic research, to starting new research centres and funding scholarships in ICT-related vocational training institutions or university departments (e.g. engineering, computer science, etc.).
- ii) Enhancing technical and vocational education and training in generating technicians and engineers. Otherwise, another option may be to set up or consolidate the local apprenticeship system.
- iii) Reinforcing the links between the cluster and the university system. This may occur through state-university-industry partnerships for collective projects in which both the state and the industry have an interest and decide to outsource the relevant part of research to local universities.
- iv) Supporting training centres where expertise management is primarily left to the industry. This approach has been quite successful in industries like electronics and has the merit of leaving the decisions on the training curriculum to the firms which will mainly pay for the courses.<sup>24</sup>

<sup>23</sup> Even anecdotally, the ICT sector is replete with success stories of small enterprises that have become industrial giants in a few decades.

<sup>24</sup> An example is Malaysia’s Penang Skills Development Centre (PSDC), which, although founded by the state with the help of academia, today is supported by the direct involvement of industry in both administration and management expertise (Website of the PSDC, Nov. 2005: <http://www.psdcc.com.my>).

## 6. Social dimension of cluster development

Throughout this paper we have only incidentally dealt with the social dimension of clusters, including poverty reduction and/or the upgrading of the informal economy. An attempt to address these issues prompts more questions. Is a certain type of cluster development more effective than the others in addressing these issues? What would be the features of such a type of cluster development? Can we promote such cluster development and if so, how? What are the roles of skills development in that process? So far, these questions are only beginning to be answered.

One of the few works which explicitly broaches this thorny subject is by Nadvi and Barrientos (2004). In this work, developed for UNIDO, the two scholars correctly argue that from a static viewpoint rural and urban informal economy clusters are those which can potentially have the greatest impact on poverty reduction. Being based on unskilled labour and a low level of technology, these clusters – which are also defined “incipient” (Nadvi and Schmitz, 1999) or “survival” (Altenburg and Meyer-Stamer, 1999) – provide many poor people with a source of income.

From an ILO perspective, however, survival clusters frequently fail to meet the standards of ‘decent work’ defined as “productive work in which rights are protected, which generates an adequate income, with adequate social protection” (ILO, 1999, p. 13). Moreover, the levels of safety at work and working environment salubrity are often dismal in these clusters, while the practice of workforce skills upgrading is practically absent.

Hence, it appears that – following Humphrey’s suggestion (1995) to move towards the analysis of cluster trajectories – there is a need to look at the poverty reduction impact of cluster development carefully. All the more so because in an increasingly globalized world, very few remote clusters can be considered sheltered by competitive threats from abroad. Survival clusters are always on the brink of perishing.

The real issue is thus how to make cluster development a socially inclusive process, since it is clear that cluster development, in and of itself, is not the panacea for problems affecting a particular local or regional economy. As with other dynamic processes, cluster development generates “winners” and “losers” (Nadvi and Barrientos, 2004), where the former can tap the new opportunities sparked by the upgrading process (e.g. new markets, relationships with large buyers, etc.), while the latter are those who only benefit from the incipient stage of the cluster’s development (e.g. unskilled workers who lose their job or whose skills are not updated as a result of the upgrading process).

Such a dynamic is well epitomized by the recent evolution of the Mexican blue jeans cluster in Torreon (Bair and Gereffi, 2001). The cluster’s expansion has benefited only a small elite of enterprises who hold close relationships with US large buyers. Moreover, female workers, who have been the traditional labour power in this industry, have seen the new, more skilled jobs being assigned to men because employers considering women’s presence at work transitory.

Similarly, in the SV footwear cluster (Schmitz, 1995; 1999) a few large companies have seized preferential commercial partnerships with influential buyers. These large companies tend to divide cluster subcontractors into two tiers: one with which to cooperate closely and another with which to resort only sporadically when the business cycle is at a peak and additional productive capacity is needed to fill orders. Naturally, the latter suffer a great deal from the unsteadiness of contracts and proceeds. In the same cluster, moreover, the presence of child labour is still prevalent, notwithstanding the growing fame of SV worldwide (Schmitz, 1999).

As a result, the effects of cluster development on labour are not straightforward either. On the one hand, we have seen that workforce skills foster cluster upgrading, which in turn generates new opportunities for skilled workers, thereby alluring more workers with similar skills. On the other hand, cluster development can be accompanied by the continuation of child labour (e.g. SV) or by a loss of jobs, as occurred in the Indian Agra footwear cluster (Knorringa, 1999). The latter has experienced a simultaneous process of growth and loss of jobs, as producers accustomed to serving the easy Soviet market abandoned the industry as soon as that market collapsed and government export subsidies ceased as New Delhi began espousing trade liberalization.

Finally, welfare spillovers from urban clusters to the surrounding rural areas are problematic too. In the Bangalore ICT cluster, for instance, income per capita is 25 per cent above the national average but does not seem to radiate out its effects to the surrounding rural areas (Benjamin and Bhuvaneshwari, 2001). However, this may be due to the peculiarities of an industry like ICT, which presents high entry barriers in terms of human capital.

To sum up, there is definitely room for public action to design measures to make cluster development not only an economic, but also a social success. So far, research on these policy-making aspects has been meagre and general in content. Nadvi and Barrientos (2004) have, *inter alia*, proposed that initiatives focus on clusters where poverty is more marked and to undertake a “poverty strategic support” in which the needs of the “worse off” and “better off” are distinguished.

The first proposal, however, would mean turning cluster development from an industrial to a social policy, whereas clusters of SMEs are still prominently an economic phenomenon. To say the least, such a shift would imply a completely different logical framework with respect to the policy evaluation and impact assessment of cluster development initiatives.

The second proposal, on the contrary, better fits the idea of cluster development as an economic and social process at the same time. In this context, training policies can clearly do a lot. Specific training programmes could be, for instance, devised for those workers who are expected to lose out on the upgrading process. As the Torreon blue jeans cluster demonstrates, women are often part of this group in developing countries, so that designing specific training programmes targeting unskilled female workers could be an option to help them keep up with the rise in skills triggered by cluster upgrading. Skilled labour has significant multiplier effects on the entire local economy and a higher level of women’s employment, together with better wages, normally translates into more rational spending and social protection choices within the household (Sen, 1996).

Given the nature of this work, these can be only generic suggestions with which to conclude the first, more conceptual, part of this work. Part II will present five well-known case studies of clusters in developing countries as provided by the existing literature on the topic.

## PART II - Case studies

The five case studies analyzed in this second part are the following: the surgical instruments cluster of Sialkot, Pakistan (Nadvi, 1999); India's Ludhiana woollen knitwear cluster (Tewari, 1999); the Brazilian SV footwear cluster (Schmitz, 1995; 1999); the ICT cluster of Bangalore, India (Holmström, 1994; Nadvi, 1995; Caniëls and Romijn, 2003); and a mix of African clusters mostly in traditional manufacturing industries (McCormick, 1998; 1999).

### *The Sialkot surgical instruments cluster*<sup>25</sup>

The city of Sialkot, in the Pakistani region of Punjab, hosts important clusters in three main industries: sports goods, leather garments, and surgical instruments. Here we focus on the latter, with special emphasis on the consequences and implications for skills development.

As with most clusters, the surgical instrument industry intensively developed in Sialkot for historically fascinating reasons. The region of Punjab represented in the past a strategic crossroads and was, therefore, subject to frequent invasions from the surrounding areas. An expertise in forging metal weapons such as swords and knives therefore emerged, which, much later (i.e. late nineteenth century), was to prove convenient when foreign mission hospitals required surgical instruments produced locally. As early as the beginning of the twentieth century, Sialkot was exporting as far as Egypt. Later on, the Allied Forces selected this cluster as the main supplier of surgical tools during World War II.

In terms of workforce skills development, large local companies originally played a key role training their workers both internally (i.e. fitters, turners, etc.) and externally, and sending newly graduated engineers to specialize abroad. The recruitment of foreign engineers (e.g. Germans) for training purposes was also fairly common at the very beginning.

Interestingly enough, this pattern of training led to the emergence of skilled workers who were subsequently able to start up their own business by imitating their former employers. In other words, the process of imitation, which is frequently crucial to the emergence and growth of any cluster or district,<sup>26</sup> was triggered by the high level of formal and on-the-job training originally supplied by large companies.

Starting from the early 1960s, the government also began to play a more active role by setting up different institutes (e.g. the Apprenticeship Training Institute) that supplied cluster-tailored training programmes (e.g. metal working, export-related subjects, etc.).

Today, Sialkot hosts some 3,000 enterprises operating in the surgical instruments industry, only 10 per cent of which both manufacture and export their own products. Critical institutions are the *Metal Industries Development Centre* (MIDC), which is mainly a provider of technical services, the trade association *Surgical Instrument Manufacturer's Association* (SIMA), and the *Dry Port Trust* (SDPT), which deals with customs, handling, and storage facilities.

<sup>25</sup> The historical account of this cluster heavily hinges on Nadvi (1999).

<sup>26</sup> See, for instance, the very broad literature on Italian industrial districts.

A recent turning point for this cluster was the 1994 US Food and Drug Administration (FDA) ban on imports of Sialkot-made surgical instruments. This legal action stemmed from the incompliance of Sialkot-based enterprises with the “Good Manufacturing Practices” (GMP) rule, which in turn was due to serious hygiene deficiencies in the production system.

For a market that mainly thrived on US-led export, this meant an acute downturn and could have entailed the collapse of the overall industry. All the more so because the FDA sanction did not hit any specific enterprise, whether it be large or small, but rather the entire cluster, with a ban “ostracizing” Sialkot-made instruments as a whole. It was, thus, a clear example of collective failure, which called for collective action as a response.

And collective action was not late in coming. First, Sialkot’s largest companies unsuccessfully sought to lobby the FDA. Then the SIMA decided to bargain a loan with the Pakistani government with the aim of hiring a foreign consultancy company which was to train Sialkot’s producers – regardless of their size – on the new system of quality management.

For this to happen, however, a sweeping change in the SIMA management was needed. Up to 1994, the SIMA had been considered, especially by SMEs, quite ineffective because of its tendency to represent only large producers. However, after the mismanagement of the first stage of the crisis culminated in the failed lobbying attempt, some large producers realized that a change in the association management was also in their own interest and accordingly clinched an alliance with small subcontractors.

The main consequence of this change was the above mentioned government loan, which enabled over one hundred local firms to be GMP-certified by 1997. Most staggeringly, two local enterprises voluntarily decided to go for, and obtain, ISO 9002 certification. In doing so, they set the example for other local enterprises.

As a consequence of this successful action, exports rose again. As early as 1996, they were above the pre-crisis level by 16 million US dollars (125 million vs. 109 million).

This overall upgrading led to important consequences in the pattern of cluster learning as well. Prior to the “FDA crisis,” large foreign buyers were highly involved in monitoring main local enterprises, which in turn bore the responsibility of supervising subcontractors’ work.

To a certain extent, however, the GMP certification has implied that a direct and steady quality control is no longer needed. This, on the one hand, has caused a decrease in the knowledge flow from foreign buyers to large local firms. On the other hand, it has prompted large local companies to rely on fewer trustworthy small-sized enterprises to be subcontracted on a closer basis.<sup>27</sup> Such a change has meant a more intense, and yet less widespread knowledge sharing than the one characterizing the cluster before the crisis occurred.

<sup>27</sup> Sometimes, this even implied the internalization of subcontractors in the premises of the large enterprise.

## *Lessons learned*

What can we learn from Sialkot's surgical instruments cluster from the point of view of skills development?

First, the initial pattern of skills development chiefly rested upon local large companies, which, by providing their workers with extensive training, smoothed the way for the process of industrial imitation, key to further cluster development. Such a pattern of skills development, where costs were exclusively borne by the employers, could however be sustainable only at a very early stage of the cluster lifecycle, when the gain prospects associated with a new contract more easily outweighed the training costs thanks to the relatively small number of competitors. As time passed, however, this system of training proved to be highly inefficient for the single enterprises and, indeed, brought along the seeds of its fall and disuse. In fact, not only did it provide free training for the employee at a high cost to the employer,<sup>28</sup> but as seen above, it also unwittingly favoured the emergence of several new competitors. While this process was to reveal beneficial for the cluster growth, it reduced the income prospects for many large companies, which soon found this system no longer rational and convenient. Unsurprisingly, thus, today's training system sees in Sialkot the active involvement of a much larger number of stakeholders, including the government and local business associations. On the contrary, probably due to the predominance of small-sized enterprises, unions do not seem to be playing a leading role, an absence which might have downward repercussions on the optimal level of investment in workforce skills.

Second, critical demand for new skills often comes as a result of what can apparently look like an external threat. Without going too far to the role of Punjab blacksmiths for the skills basis of the Sialkot cluster, if the GMP regulation had not more recently been implemented in the US, Sialkot would have probably never endogenously received the needed input to undertake the upgrading process. As we will see, Sialkot shares this dynamic with other clusters too.

Third, once the learning process has begun, this can go beyond the minimum level required. This is epitomized by the fact that after many Sialkot-based enterprises were GMP-certified, some of them moved on to obtain the more demanding ISO 9002 certification. This meant that some of the local producers, definitely the most far-sighted, understood the crucial role of quality assurance in such a demanding and conscious market as health care in the US and Europe. Moreover, this move also implied an understanding of the economies of scale associated with learning. That is to say, some enterprises recognized that once they had undertaken the necessary steps to abide by one rule, complying with the following called for lesser effort and cost.

Fourth, skills development and cooperation dynamics may intertwine mutually and beneficially. On the one hand, joint action through the Sialkot trade association led to the learning process which would enable the overall cluster to upgrade. On the other hand, cooperation was strengthened by the learning process begun by the compliance with the GMP regulation. However, while the cooperation enhancement entailed a higher degree of intensity in knowledge sharing, it also meant a lesser degree of inclusiveness. Indeed, subcontracting enterprises which were not internalized within larger companies suffered a progressive business marginalization and ended up carrying out a very minor role in the cluster.

<sup>28</sup> Comparable to the costs associated with sending graduates to specialize abroad or requesting foreign consultants to come to Pakistan to supply training.

The last fact gives one practical example why cluster upgrading, however important, cannot be referred to as the panacea of any problem affecting regional economies. Like any dynamic process, cluster development brings along winners and losers and the latter may well be a larger group than the former. As a result, any socially concerned action of cluster development will have to strive to include those actors who are more likely to lose out on the cluster development process. Among these unskilled and low-skilled workers are often the majority, which is the reason why well-targeted training policies can contribute to ensuring a socially inclusive cluster development.

In the case of Sialkot, for instance, the losers were the small firms unable to guarantee a homogenous and steady production of the stainless steel used in the manufacturing of surgical tools. Moreover, the new more exclusive patterns of skills transfer and knowledge sharing exacerbates the risks run by these enterprises to be excluded from the bulk of the cluster business. The role of public training policies in helping these firms to remain in business can, therefore, be crucial because the market (i.e. the larger companies) no longer seems willing to take on this role and responsibility.<sup>29</sup>

Fifth, “soft,” “value-adding” technologies such as labour, hygiene, and environmental rule compliance can be more difficult to learn than “hard” technologies such as techniques and modes of production. As far as the main question in Sialkot had been “how to produce the surgical instruments”, imitating and sometimes even “reverse engineering” had been enough to keep in business and even thrive. When the main issue became not so much of a productive nature, as of a management nature (i.e. management of the quality assurance system), the cluster was on the brink of collapse and an external input of skills locally unavailable was necessary for the cluster to recover.

However, at the very early stage of the cluster lifecycle, especially in developing countries, “hard technologies” may have to be imported from outside in order to speed up cluster development. In Sialkot, for instance, the resort to foreign engineers as trainers of the local labour force was a common practice in the 1960s and definitely quickened the growth of the cluster.

Sixth, and finally, effective technical institutions at the local level are important for cluster skills development, not only directly (i.e. when they provide some training), but also indirectly when they use their leverage to ensure as inclusive as possible a diffusion of knowledge across local firms. The role and good management of producer associations became prominent in clusters due to one of their main peculiarities: i.e. the predominance of SMEs which, alone, would not be able to gain access to services (i.e. training, business development consulting, trade facilities, etc.) that efficient associations can, on the contrary, directly or indirectly supply. In this case, only after an important change in the SIMA administration took place, were SMEs trained at low costs, definitely lower than those faced by the few large companies that had originally neglected the collective action option and had individually hired consultants to bypass the FDA ban. A choice that only some months later would have revealed to be economically inefficient and proves that collective failure normally calls for collective action.

<sup>29</sup> Indeed, public institutes such as the MIDC and the *Small and Medium Enterprise Development Authority* (SMEDA) have assumed a leading role in the provision of formal training at the local level with courses covering technical issues like “material selection and heat treatment,” as well as more trade-oriented subjects such as “export marketing” and “WTO effects on the surgical industry.”



## *The Ludhiana knitwear cluster*<sup>30</sup>

The city of Ludhiana is locally renowned as the Manchester of India, a nickname earned on the field by having long been the Indian main hosiery and woollen knitwear producer for both the internal and external markets.

The historical origins of this cluster date back to the late nineteenth century, with the first hosiery factory being established in 1894. The full development of the cluster came, however, in the 1940s through two important historical occurrences: the migration from Pakistan of thousands of skilled Kashmiri artisans and the granting of massive contracts by the Indian Ministry of Defence during both World Wars. Thanks to these events, the cluster developed intensively throughout the second half of the twentieth century, mainly serving the former Soviet market.<sup>31</sup> This has allowed the cluster to grow to its present size consisting of over 10,000 productive units (e.g. garment, knitting, and dyeing units, spinning mills, etc.) and 40,000 workers.

As with Sialkot, Ludhiana has more recently been faced with a threat, which has actually been twofold: i) the collapse of the soviet system which abruptly eliminated its main export market; and ii) the sudden drop of national trade tariffs as a result of India joining the WTO.

Needless to say that the sudden disappearance of Ludhiana's main export market was expected to have disruptive consequences for the local cluster. By contrast, Ludhiana coped with the new scenario extremely well thanks to some capabilities that it had developed throughout the second-half of the twentieth century.

First of all, most local large enterprises did not limit themselves in the 1970s and 1980s to serving the Soviet market, but maintained a strong presence in the middle-end domestic market, which worked as a backup when the orders from the main export market plummeted. Most importantly, running operations in two very different markets helped local enterprises to nurture different types of skills. The Soviet market mainly taught Ludhiana producers how to manage large volumes at very low rates and still make a profit (i.e. cost-cutting skills). The domestic market, on the contrary, by becoming increasingly more demanding over time, instructed cluster firms to consider concerns that the Soviet market would have never conveyed: e.g. shifts in demand, quality-related issues, new trends in design, etc. This sensibility was to reveal crucial later in the 1990s when most local enterprises had to shift their exports towards the more challenging western markets as a result of the collapse of the Soviet Union. Last but not least, operating simultaneously in different markets made local producers skilled at multi-task management as well.

Second, those firms which were excluded from the originally highly profitable Soviet market started to explore Western European markets quite early on, succeeding in obtaining short-term and small-scale orders from European medium-sized buyers. These kind of contracts performed an important learning function because they provided inexperienced exporters with a steady feedback and tutelage that large purchasers would have probably been unable to guarantee. The learning curve for these small-sized exporters was therefore steeper than it would have been if they had served large buyers from the beginning. In other words, by signing short-term small-scale contracts, they were able to learn by doing, and through mistakes, whereas a mistake with a large buyer would have

<sup>30</sup> The historical account of this cluster heavily hinges on Tewari (1999).

<sup>31</sup> The Soviet market took on such a predominant role for the Ludhiana cluster that, at one point, it represented nearly 100 per cent of exports.

probably meant the termination of the commercial relationship due to the likely significant losses.

Third, Ludhiana enjoyed a highly multi-skilled workforce apparently as a consequence of another “accident of history.” During the 1980s Punjab used to be a conflict-ridden region due to separatist claims. From an economic perspective, those political disorders caused a high labour turnover, which in turn induced knitwear employers to provide workers with a large range of skills. In doing so, employers insured themselves against the losses associated with incomplete tasks due to workers leaving their jobs without prior notice. In short, this historical situation unwittingly enhanced local workers’ skills.

Fourth, going back in time, the input of labour skills in Ludhiana was at the very beginning also favoured by government programmes subsidizing the hiring of foreign designers who would teach local producers the most recent trends. As the cluster grew, however, the government progressively retreated and local manufacturers started to pay themselves for the foreign designers, evident proof that they still considered this transfer of skills profitable.

Finally, Ludhiana has traditionally been endowed with a host of institutions which directly or indirectly deal with training. Those historically present in the cluster have been the government Advanced Training Institute (ATI) and Small Industries Service Institute (SISI), as well as the entrepreneurs association Knitwear Club, all of which provide formal vocational training.

More recently, UNIDO has also played an important role, contributing to the establishment of the Apparel Exporters Association (APPEAL), which has eventually promoted the creation of three-month training courses for unskilled women within the Government Polytechnic for Women (GPW). UNIDO has also strongly sustained the cluster computerization (e.g. internet, e-commerce, etc.), in collaboration with Knitwear Development Group (KNIDGRO), and bolstered the creation of an umbrella organization called Federation of Knitwear and Allied Industries Association (FEKTAA). The latter has forged a USD 10 million worth private-public partnership for the construction of the Ludhiana Apparel Park.<sup>32</sup>

### *Lessons learned*

The recovery of Ludhiana in the 1990s is staggering not only in taking just one-and-a-half years, but also because Ludhiana coped with two simultaneous potential crises: i) the dissolution of the main export market; and ii) the end of the regime of protection enjoyed in the domestic market. Important lessons can, therefore, be expected from this cluster.

As commonly known, one of the unwritten rules in the financial market is “never put all one’s eggs in one basket,” which well conveys the concept of business diversification. That is, investing in different markets and, if possible, different industries is key to being equipped with a “life-jacket” to stay afloat in the event of a sudden fall in profits. However, this motto seems to have some interesting implications for skills development as well. Operating in different and, most importantly, not homogenous markets helped Ludhiana producers to diversify their skills, paving the way for a prompt shift in the export market when the Soviet one vanished. Moreover, it enhanced multi-task skills, which in an increasingly globalized world are becoming as crucial as technical skills in achieving positions of market leader.

<sup>32</sup> Information from the UNIDO website [www.unido.org](http://www.unido.org).

The history of the Ludhiana cluster also tells us that the distinction between domestic and foreign markets has probably been exaggerated in economic literature. According to the mainstream view, foreign markets are a more powerful source of information than domestic markets due to the presence of a greater and more diversified number of competitors. Ludhiana's story, however, highlights that business-related learning may not be so much a question of geography, as of quality. Irrespective of the geographical provenience, quality-concerned markets represent a greater source of learning than quantity-driven markets, especially with regard to the functional upgrading of skills.

From a policy viewpoint this means that value-adding strategies aimed at improving the cluster position in the relevant global value chain may not be enough for cluster upgrading. Indeed, the very value chain where the cluster is included matters. If the upper end of the supply chain is more concerned with quantity than it is with quality, then cluster enterprises may end up having poor learning opportunities and being compelled to pursue a continuous and socially dangerous cost-cutting strategy. Such a strategy would be clearly unable to reach any social goal, as it would first heavily hinge on labour cost cutbacks.

In other words, bringing a cluster into the "global market" may not be enough to guarantee its upgrading, let alone to achieve poverty reduction goals. Policies seeking to link up the cluster with more quality-oriented markets will probably have more chance of reaching social development goals, especially if coupled with proper training policies on the supply side aimed at raising the skills of the local workforce. In doing so, a two-pronged policy would be implemented. On the supply side, workforce skills would be enhanced through well-targeted training policies. On the demand side, the cluster would be linked with quality-concerned markets or buyers. The latter particularly, through feedback and guidance, can further boost the skills upgrading of the cluster labour force.

In this respect, as the Ludhiana case shows us, it is not necessary to be a large buyer. Indeed, small and medium-sized buyers can better serve the learning purpose thanks to their greater willingness to provide suppliers with tutelage. The reasons for this willingness are clearly not philanthropic, but rather trace back to the very nature of the commercial relationship, which, being based on the delivery of quality output, takes more time to attain a level of mutual satisfaction. Changing partners would consequently represent a loss for the buyer due to the monetary and non-monetary (i.e. time) costs involved in training any eventual new partner.

The early stage of the cluster saw an import of external skills which were locally unavailable particularly designers. What distinguishes Ludhiana from Sialkot is, however, a more pervasive and not crisis-driven role of training. Indeed, it is just the presence of latent skills formally and informally cultivated throughout the previous decades that enabled Ludhiana producers to promptly react in the 1990s to the abrupt change in the export market.

This special sensibility toward skills development is also reflected in the awareness of Ludhiana manufacturers toward work organization, which has, in fact, been a more significant source of cluster upgrading than any change in machinery. An important component of work organization has been job-rotation, which in clusters characterized by high labour turnover rates can represent a valid alternative to labour specialization. Skills diversification may work, in fact, as an informal unemployment insurance and thereby become a poverty reduction tool.

## *The Sinos Valley footwear cluster*<sup>33</sup>

The SV, in the Brazilian state of Rio Grande do Sul, hosts one of the most researched clusters in developing countries. Specializing in shoe-making, Novo Hamburgo, the SV's main city, hosted over 450 shoe-making enterprises by 1968.

The very early stage of development of this cluster (i.e. 1960s) was furthered, on the one hand, by the import-substitution policy of the Brazilian government and, on the other hand, by the high level of cooperation among SV footwear enterprises. The presence of a one-only association representing the entire cluster well-embodied the existence of a shared view about the destiny of the cluster at that time.

This situation was bound to change in the late 1960s, when the loosening of the import-substitution policy by Brazil opened up export opportunities which the SV most far-sighted enterprises promptly seized. In the 1970s, therefore, the cluster diversified internally between large companies mainly producing for the foreign markets (i.e. chiefly the US) and small enterprises continuing to serve the domestic market. This diversification did not imply, however, a distinction between a high and low road to production. Indeed, the domestic market followed a trend similar to that of the foreign market and firms serving the former had similar chances to flourish than those prevalently working on the latter. While this ramification was, to a certain degree, normal, it also brought about the emergence of conflicts of interest in the cluster – e.g. between exporters and local suppliers – which resulted in the dissolution of the previous one-only association and the establishment of different institutions representing sectoral and, thus, more narrowed interests.<sup>34</sup>

While the late 1960s can be considered as the positive turning point for the SV cluster, the negative turning point came in the 1980s when China entered the global market, which abruptly provoked the end of Brazil's labour cost comparative advantage. This decade was also characterized by the introduction of a new system of production based on shorter delivery times, which, together with the previous point, called for some reaction by the SV enterprises if they were not to lose market shares.

The response formulated by the SV cluster mainly took the shape of new cooperative arrangements, which have however only partially met the requirements given by the new market conditions.

At the vertical level, cooperation between manufacturers and subcontractors has doubtless risen. At the same time, we witness, as in Sialkot, a distinction between a core group of subcontractors working more closely with the main producers and a marginal group which maintains an on-and-off relationship with them. Reasonably, the learning opportunities for the former are more significant than for the latter in that a greater tutelage is guaranteed to them and training has often been part of the deal.

While some progress has, therefore, been reported at the vertical level of cooperation, it is at the horizontal level that failures have outnumbered successes, which has so far inhibited the SV cluster from entering greater value-added stages of production. The most serious recent attempt to animate horizontal cooperation was *Programa Calçado*, which aimed at functionally upgrading the SV cluster by internally and jointly undertaking the stages of marketing and design. However, this project failed due to two main factors: i) the

<sup>33</sup> The historical account of this cluster heavily hinges on Schmitz (1995; 1999).

<sup>34</sup> Namely, *Abicalçados* (shoe producers), *Aicsul* (tanners), *Assintecal* (component producers), *Abrameq* (machinery suppliers), *Abaex* (export agents).

unwillingness of the main local enterprises to really believe and invest in this collective action; and ii) the absence of the state when its mediating role was indeed much needed.

The behaviour of the larger companies was due to the presence of vested interests which were openly in conflict with the ambitions of *Programa Calçado*. The agreement with a large US buyer, in fact, specifically stressed a labour division based on production being done by the Brazilians and value-added stages by the US partner. When it came to giving up certainty for uncertainty, the SV large companies first shuffled and then sabotaged the plan.

Nevertheless, the plan might still have had some chances of success had the state believed in its mediating role. Public energies had, in fact, been mobilized and the presence of the state to shun the obstructionism of the five largest enterprises might have resulted in some form of agreement benefiting the entire cluster. Conversely, an excess of *laissez-faire* has hitherto relegated the cluster to manufacturing-based stages of production.

This has some important consequences on workers. While the level of employment in the industry has impressively grown in the last decades, the wage level has decreased and only owing to child labour family income is reported to be higher than the Brazilian average. This provides us with an example of how cluster economic growth does not necessarily imply local social development, and that as long as clusters of developing countries are confined only to the stages of manufacturing, social upgrading will be slower than if greater value-added stages could be undertaken as well.

### *Lessons learned*

Much of the history of the SV cluster can be analyzed through the “collective efficiency” concept (Schmitz and Nadvi, 1999). At the very beginning, as seen above, was the presence of common views about what was in the interest of the cluster enterprises that let the cluster grow. Import-substitution policies clearly helped, but alone fail to explain why a cluster emerged in the SV and not elsewhere in Brazil.

As with successes, the concept of collective efficiency – or rather its opposite, i.e. collective inefficiency – also explains the most recent failures in the SV. If the SV seems to be unable to undertake functional upgrading today, this is mainly the result of a joint action which failed due to the interests of some leading companies clashing with those of the majority.

The last point is also crucial in that it tells us that business associations frequently mirror the interests of the most prominent members. This fact should be taken into consideration when planning an intervention. While the involvement of business associations will be essential, the needs of those firms (usually of small and micro size) scarcely or not at all represented by them should be weighed as well. Only in doing so, will the policy intervention be unbiased against small enterprises, which, it should be noted, are not only the bulk of the cluster, but also its very engine. In short, the question of “who represents what” should always be borne in mind.

All the more so because especially in clusters where we have large companies, in addition to the representativeness problem, we also face a principal-agent problem. Large successful enterprises are, in fact, more likely than any others in the cluster to have shifted their centre of action elsewhere (e.g. foreign markets or buyers), which makes them still less apt to represent the interests of the overall cluster or, more simply, of their profession. A principal-agent problem arises insofar as large enterprises pursue their own interests while representing the interests of all members of their association.

The role of the state can also be important for cluster upgrading, both at the beginning and at later stages of development. At early stages, we have observed elsewhere that state orders can boost the cluster development (i.e. Ludhiana and its huge defence contracts).<sup>35</sup> Later, when the cluster grows and conflicts of interest unavoidably arise, the state may be called on to play a mediating role. A negligence of the state towards this role may, indeed, have negative consequences on the further cluster enhancement, whereas its presence can help overcome disagreements and find a win-win solution in which the interests of the overall cluster, rather than of single stakeholders, prevail.

If possible, this function is even more important than that of direct provider of vocational training<sup>36</sup> because it has usually no, or very low, monetary costs<sup>37</sup> and, on the contrary, fills a space which is a typical domain of the state, i.e. market failures. On the one hand, stakeholders and their associations are, logically speaking, expected to voice the interests of their constituencies.<sup>38</sup> On the other hand, in doing so, they may overlook the interest of the overall cluster, thereby ending up penalizing themselves. That provides us with quite an evident example of market failure where the intervention of the state would be recommended.

The consequences of state non-intervention appear to have led to missed opportunities in terms of functional upgrading for the SV. This seems to have had repercussion at the social level, for instance, with child labour remaining quite widespread in the cluster.

This contrasts with other cases where the state – here intended in the broadest sense of any level of government (i.e. federal, regional, local, etc.) – has furthered the regional/cluster development by accepting the mediating role which Brazilian institutions have rejected in the SV. This was the case in the so-called Third Italy of the 1970s and 1980s, where local institutions and social partners adopted an approach to problem-solving based on negotiation and agreement. This pattern of public policy management has set the scene for the implementation of more recent and “radical” programmes where local governments (i.e. municipalities, provincial councils, etc.), far from declining their role of mediation, lead a full process of local governance. Two important examples are Italy’s early 1990s *Territorial Pacts* and today’s EU-funded *Integrated Territorial Plans*.<sup>39</sup>

Turning back to our case study, the SV footwear cluster provides us with some comforting confirmations about conclusions we had reached in the previous pages. For instance, the inability of the SV cluster to upgrade to greater value-added stages of production corroborates the point that the relationship with large and powerful buyers, while useful at the beginning for the cluster to grow and economic welfare to spread, somehow prevents functional upgrading. The SV also substantiates the present trends which see the cluster “stars” dividing subcontractors into two different groups: a restricted core group with whom to hold increasingly closer relationships and a marginal group

<sup>35</sup> Something similar has occurred in the Bangalore software cluster.

<sup>36</sup> In the SV, this role is carried out by SENAI, the national vocational institute, which offers formal vocational courses ranging from design to leather treatment.

<sup>37</sup> Sometimes, as a mediator, the government may be asked to facilitate the process by shouldering some of the costs involved in the agreement. For instance, if a new technical institute is to be built up, the state may have to provide the physical premises where the new institute will be hosted or, more simply, to transfer the public property where they will be constructed.

<sup>38</sup> That, as seen in the case of the principal-agent problem, does not always occur.

<sup>39</sup> They are both examples of local governance where municipalities and provincial councils, alongside business associations, trade unions and other local stakeholders, plan together public projects concerning local economic development.

which is left in the hands of fate struggling with uneven orders, extremely short delivery times, and scattered information about technical issues inherent to the manufacturing process. Of course, the learning opportunities for the former group are much bigger than for the latter.

Finally, the boom of the SV, with the emergence of local stars and of conflicts of interest, further demonstrate that any cluster upgrading brings along deep changes in the local economic framework. Making this new framework socially equitable will call for a public local governance which, as seen above, definitely includes training policies addressing the needs of those actors who are more likely to lose out on the cluster economic growth. Among these are women, who, in developing countries, are often the bulk of the unskilled and low-skilled workforce.

### *The Bangalore software cluster*<sup>40</sup>

The Indian city of Bangalore, capital of the southern state of Karnataka, has become popular in the last decades as India's Silicon Valley. While places locally nicknamed Silicon Valleys for hosting a few ICT companies can be found everywhere (e.g. Brazil, Italy, etc.), hardly any of them approach Bangalore's level of ICT density, which is entrenched in its very history.

Once a medium-sized city renowned for its mild climate and relaxed lifestyle, Bangalore has passed from a population of 800,000 to over 5,000,000 in less than five decades and does not show any sign of slowing its growth pace. The Bangalore cluster is also very different from the others so far examined, not only because its core business consists of high-tech industries (e.g. software, advanced machine tools, etc.) as against traditional manufacturing sectors elsewhere, but also because Bangalore represents a rare case of cluster, the emergence of which has been intentionally fostered and supported by the state.<sup>41</sup> Indeed, the two things are not completely unrelated and, indeed, the fact that we are dealing with high-tech industries probably explains why such a governmental intentional action could be successful. We will dwell more on this point in the "lessons learned" section.

The vision that the Indian government had since the very beginning for Bangalore is well epitomized by the words of the first Prime Minister Jawaharlal Nehru, who defined it with far-sightedness the "City of the Future." He kept faith to this promise by making Bangalore the seat of large state enterprises in the telephone (i.e. Indian Telephone Industries) and electronics (i.e. Bharat Electronics) industries, which were at that time being sheltered by protectionist policies within the "infant industry" framework. New Delhi's choice of Bangalore was not casual though, neither was it merely related to its initial remoteness. Karnataka's capital already hosted in the 1940s the Indian aeronautics programme and the prestigious IIS. The twofold presence of synergies with the space

<sup>40</sup> The historical account of this cluster heavily hinges on Nadvi (1995) and Caniëls and Romijn (2003). In turn, the first work is based on Holmström's (1994) findings.

<sup>41</sup> Not that the state was aware of bolstering the emergence of a cluster, but definitely envisioned Bangalore as a sort of quiet scientific resort where scientists and engineers could devote their efforts to the nation's scientific advancement. Implicitly, they were thus assuming the importance of both economies of agglomeration leading to transaction cost reduction and of active joint action. Of course, they could not expect Bangalore to become, in such a short time, a metropolis of five million people, which generates here the same serious development problems affecting other main Indian cities: i.e. traffic congestion, high levels of pollution, bewildering income disparities, etc. All of these issues would call for an effective local governance that, as we will see, at the moment does not seem to be in place.

industry and of high-skilled labour force was thus critical to the government's choice of making Bangalore India's scientific hub. Workforce skills were then being further nurtured by the foundation of many other technical, industrial training, and applied-science institutions that, in addition to churning out updated skilled workers, often carried out also the role of partners for applied-research projects.<sup>42</sup>

All of this, however, did not yet make Bangalore a cluster in the 1950s, as the scene was still dominated by large state-run companies in nearly monopolistic industries. It was only in the 1960s and, more pronouncedly in the 1970s, that private leading companies and SMEs started to set foot in the city, finally giving rise to a cluster configuration. Interestingly enough, many SMEs were started up by employees of large state companies, who were being encouraged by their own former employers to set up a business. The role of large companies as incubators of skills was a key to cluster growth but it was supported by their public counterparts in an attempt at downsizing, reducing costs, and recovering minimum competitiveness.

As a result of their origins, these SMEs kept very close, nearly patron-client relationships with their progenitors. Something which was to change only in the following decades of the 1980s and 1990s, when India's espousal of free trade allowed foreign leading companies (e.g. *Dell*, *IBM*, etc.) to enter the Indian market and thus increase the level of competition in both the product and labour market. Together with greater stress on flexibility and quality, this changed the relationships between large companies and SMEs, which have become, since then, more market-driven.

As in other cases previously observed, SMEs can be divided into two main subsets also in Bangalore. The first group resembles the subcontractors working closely with a larger partner (as in the SV). The enterprises belonging to this group also have a steady commercial relationship with a larger partner – be it public or private, Indian or foreign – and receive from it regular training. As in Sialkot or in the SV, however, these firms do not develop their own products and do not have a say in the product development of the large enterprise for which they work, which reduces the level of skills being transferred and makes them more dependent upon the performances of their larger partner.

The second group is, on the contrary, very different from the “marginalized” group in traditional manufacturing clusters. The members also have less stable relationships with larger private or public companies, but this is often the result of their witting choice to undertake product development. This grouping could be tagged the “maverick” one, as it comprises enterprises which are in business not only for profit reasons, but for which innovation is equally important. To summarize effectively this concept, one can say that this group consists of computer scientists more than pure entrepreneurs. While some of them have definitely performed well<sup>43</sup>, the majority has however tended to fail, overwhelmed by debts and unsteady proceeds. Their approach to business starkly differed from those enterprises that, while competing with each other, have also decided to cooperate more intensively by establishing, for instance, research consortia.

Our account has hitherto concentrated mainly on the history of the Bangalore cluster. But what is its present condition? Far from being perfect, Bangalore might indeed already be choking on its own success as a consequence of poor local public governance. The city has grown impressively but infrastructures (e.g. road, electricity, water supply, etc.) have

<sup>42</sup> Today, the city hosts 3 universities, 14 engineering colleges, 47 polytechnic schools and a very large number of industrial training institutes (Stremlau 1996).

<sup>43</sup> The history of the ICT industry is replete with small-scale businesses which started in garages and became world starts in a matter of years (Saxenian, 1994).



roughly remained the same as twenty years ago; income disparities between the city and the surrounding rural areas have also soared, boosting the emergence of usury and the number of suicides;<sup>44</sup> the main attempt at governing the staggering growth pace – i.e. The Bangalore Agenda Task Force, which put together private and public actors – has failed due to diverging ideas between the industry and the state about Bangalore’s priorities. All these factors are a serious threat to the economic and social welfare of the region, even though in the short-term Bangalore’s conspicuous stock of know-how seems to prevent any possible capital flow. For now, the gains deriving from the relatively cheap high-skilled workforce still overshadow the losses due to infrastructural shortcomings. The fact that this occurs in the ICT industry is not accidental, because only in this sector can limitations in physical infrastructures be bypassed by the long networks of the web which enables products to be delivered at a click. That is one more charming element of the Bangalore cluster.

### *Lessons learned*

The Bangalore case study leaves us with specific considerations regarding the ICT industry in particular, as well as clusters in general.

First of all, at the beginning of this section, we mentioned that Bangalore was one of the rare cases where the state succeeded in promoting a cluster nearly from scratch. This should not, however, prompt us to think that clusters can be easily promoted in an industry, even providing that the state is willing to do so. Far from being the result of an automatic process, cluster promotion and development usually calls for a broad basis of skills already available at the local level and independent from the action of the state, as other case studies demonstrate (e.g. Sialkot and Ludhiana). If Bangalore is an exception to the rule, this is mainly due to the fact of ICT being its core-business, an industry where the original role of the state and of outstanding universities has always been prominent. Suffice to think of *Route 128*, the first US high-tech cluster that grew around the renowned Massachusetts Institute of Technology (MIT) thanks to massive defence contracts which still today continue feeding the cluster. A history quite similar to that of Bangalore, where the presence of the Indian space programme and of the IIS were key determinants in the decision of the first Indian independent government to establish in the region electronics and telephone state companies, as well as a host of scientific and training institutions.

While defence contracts, and thus indirectly the state, perform a key function for the emergence of workforce skills in a high-tech cluster, their further upgrading often occurs through the private sector. This is again well epitomized by US ICT clusters. According to Saxenian (1994), *Route 128* today lags behind Silicon Valley because the former has relied too extensively on defence contracts and its entrepreneurs have spent too much time lobbying in Washington rather than innovating their products, whereas the paucity of political contacts of Silicon Valley’s entrepreneurs has helped them to exclusively focus on mutual partnerships leading to innovation.

All these factors – large public and private companies, defence-related research, and outstanding polytechnics – mattered for Bangalore’s cluster development. In this respect, still today, the latter guarantee the fundamental basis of basic-research skills, whereas foreign leading companies such as General Electrics, IBM, and Texas Instruments are critical to assuring that the local workforce receives the most updated applied skills. Hardly does a Beckerian scenario take place in the real world with such neat contours as in

<sup>44</sup> According to a recent special report on Bangalore of *The Economist* (23/04/2005, p. 82), 700 people took their own lives last year in the region.

Bangalore, where state universities mainly supply generic skills<sup>45</sup> and the private sector shoulders the costs of specific training (Becker, 1993).

Is there any policy implication from what we have been saying so far? Can we conclude that it is possible to foster the rise of a high-tech cluster? Because of the traditional role of the state in this industry, ICT is probably one of the few sectors where this is indeed possible, but, it should be noted, not easy. The fact that the only ICT cluster in a developing country is in India is far from being a coincidence. India's literacy rates and, most importantly, R&D indicators are far higher than those of neighbouring countries such as Pakistan and Bangladesh.<sup>46</sup> In clusters whose naissance and development is intrinsically associated with a wide basis of high-skilled labour force, boasting a relatively educated population and a solid scientific basis become an essential prerequisite. Its current lack in many developing countries will, therefore, more likely inhibit them from undertaking this route.<sup>47</sup>

Turning to the patterns of cooperation between large companies and SMEs, we observed that those in place in Bangalore are characterized by a high level of frequency and closeness. However, not even in a high-tech cluster cooperation can be referred to as a perfect proxy for learning. More often than not, product development is excluded from these cooperative agreements, which reduces the amount of skills being transferred through the relationship. It ensues that these partnerships are more frequently driven by commercial rather than scientific or technical reasons, which is often the case in high-tech clusters. In Boston's biotechnology-devoted cluster, for instance, even when the reasons lying at the origins of the partnership had been scientific, most enterprises admitted that they had ended up benefiting from the relationship mainly from a commercial point of view (Marchese, 2003).

A second characteristic of cooperation in Bangalore is that it has sometimes become formalized. In this cluster, forging formal alliances has meant for some enterprises to cut transaction costs and enhance joint action in order to meet a demand for qualitative or quantitative upgrading coming from large companies. In addition, formalization has also answered a need of protection from free-riding behaviours in a place where the high level of skills would make reverse-engineering fairly simple. Again, formalization of cooperation is not just peculiar of Bangalore, but rather of many high-tech clusters. From a policy viewpoint, therefore, promoting such legal institutes as cooperatives and consortia in industries like ICT can be a rewarding strategy to facilitate the transfer and growth of skills.

Finally, we also observed that acting as a "maverick" in a cluster rarely pays off. Of course, exploits are always possible, especially in fields where boasting a brilliant mind

<sup>45</sup> Although, of course, there are also private schools.

<sup>46</sup> India's literacy rate is 61 per cent, while Pakistan's 48.7 per cent and Bangladesh's 41.1 per cent. As for number of researchers per million people and investments in R&D, India sensibly outnumbers Pakistan as well – respectively 120 vs. 88 with regard to the first indicator and 0.8 per cent vs. 0.3 per cent as for the second. Data are not available for Bangladesh (<http://www.uis.unesco.org>).

<sup>47</sup> The only other developing country which may see in the close future high-tech clusters emerge from nil is probably China, which indeed is going through a process of simultaneous massive investment in technology and openness to free trade that resembles for many aspects that of India in the 1980s. In the Chinese software industry we are still at a stage where large state companies take the lion's share, but for the near future there are all the conditions (e.g. substantial investments in defence, improving polytechnics, large percentage share of graduates in science, etc.) for which something akin to what has occurred in Bangalore might come about also somewhere in China.

can still generate a significant source of income. At the same time, however, working by themselves while in a cluster implicitly means exploiting the underlying passive externalities but forsaking the advantages deriving from active joint action, among which there is that of making investments less risky (Schmitz, 1995). Unsurprisingly, then, many “mavericks” have failed, overwhelmed by the debts contracted to invest in new equipment. That reminds us also of the importance that changes in work organization can have for competitiveness upgrading when investing in technological machinery becomes too costly.

The last point we touch here is the relationship between the economic development of a high-tech cluster like Bangalore’s and the social development of its region. That is, has the dizzy growth of Bangalore reverberated its effects on the general improvement of local social indicators? At first glance, it does not seem so. For instance, average per capita annual income in Bangalore is roughly USD 400, 25 per cent higher than the national average (Stremlau, 1996). Yet, if we consider that a large share of the population, i.e. the high-skilled labour force working in the software industry, earns considerably more than the local average, we can deduce that the economic growth of the cluster has not radiated its benefits out to the surrounding rural areas. This may have to do with the very nature of the cluster, which being in the ICT industry presents high-entry skill barriers and a fast growth rate exacerbating welfare disparities.

To say the least, these problems would call for an effective local public governance, which has yet been far from materializing. On the contrary, the relations between the domains of politics and business, if anything, are becoming more conflict-oriented in Karnataka, an approach that definitely does not contribute to the further upgrading of the cluster, if not from an economic point of view,<sup>48</sup> at least from a social one.

### *The African manufacturing clusters*<sup>49</sup>

So far, we have mainly dealt with what some would call “super clusters” (Schmitz, 1995), that is, clusters which have become world-famous by turning themselves into leading exporters. But what about second-tier clusters, those clusters which are not international leaders, which daily struggle to survive, where joint action rarely happens and, if so, often results in speculative behaviours that further discourages the already scant cooperation?

If we have skipped these clusters, which are abundant and probably the majority of clusters worldwide, it is because they convey far fewer lessons than the mature clusters we have presented as yet. This is especially so with regard to workforce skills development. In traditional clusters where the level of technology is low and the presence of institutions weak, one cannot expect to find a high level of learning, which will occur nearly exclusively through informal channels and will hardly convey innovative elements.

Nevertheless, devoting some attention also to these clusters will serve a double purpose: it will help us better appreciate the progress made by the successful clusters previously analyzed; and it will usher us into a very different typology of clusters which call for a different range of policies.

While second-tier clusters are present everywhere, including countries renowned for a longstanding cluster tradition (e.g. Italy), here we will only focus on Africa for two main

<sup>48</sup> From an economic viewpoint, as seen above, the presence of relatively inexpensive high-skilled labour force still outweighs any possible drawback (e.g. poor infrastructures and local governance) associated with being located in Bangalore.

<sup>49</sup> The historical account of these clusters heavily hinges upon McCormick (1998; 1999).

reason: first, in doing so, we get a roughly common socioeconomic background which will enable us to infer more meaningful generalizations; second, we can draw on the academic work of Dorothy McCormick (1998; 1999), who is one of the few scholars to have extensively investigated African clusters. However, rather than proceeding by focusing on a specific cluster, we will deal here with the category of African clusters in general, which is, with the significant exception of South Africa, relatively homogenous.

The first reason of this homogeneity is similar socioeconomic frameworks. Although country rates vary significantly,<sup>50</sup> the common African socioeconomic landscape is one where literacy rates and industrial training are low; credit rationing extremely high; financial systems rigid; and public utilities such as water and energy supply erratic.

Most clusters in this continent comprise only small and micro firms, with some exceptions such as the Kenyan Lake Victoria fishing cluster and the South African Western Cape garment cluster, which also de large enterprises. Even for these clusters, however, infrastructural shortages heavily penalize business. For instance, the paucity of electricity in Lake Victoria means that local fishermen and fish processors cannot preserve fish for a long time, thereby ending up having to accept a price lower than they would do if they could freeze it.

The more glaring infrastructural shortage, i.e. dearth of roads, moreover prevents many African cluster firms from serving other than local markets. The only few exceptions are, again, the aforementioned South African garment and Kenyan fishing clusters, which have more recently sought to export with different fortunes. The former has done so thanks to extensive horizontal and vertical cooperation, which has sometimes been formalized in business associations and consortia. The latter, on the contrary, has partially failed due to quality problems. In the early 1990s, in fact, two Spaniards died of salmonella poisoning after eating Nile perch imported from Uganda. An EU ban on any fish imported from the whole Eastern Africa followed. As learned from the Sialkot case, such a type of sanction denotes a collective failure which normally calls for collective action as the appropriate response. And, indeed, collective action took place through cooperation between fish traders and processors, which finally succeeded in having the EU ban lifted. However, two drawbacks characterized this joint action: first, improved fish handling techniques were not universally adopted in the cluster, which denotes the absence of a cluster-wide skills development. And this although the entire cluster catch of fish came from the same beach, so that technological spillovers, moreover very simple, could have easily occurred. Second, joint action and the ensuing learning was merely ad hoc. That is, after the EU ban was revoked, fish processors came back to their original individualism, as demonstrated by the fact that they were unable to solve the problem of falling fish supply due to the massive fishing of young perch.

Thus, individualism causes poor skills development, which is consistent with the conclusion we had reached above that a great deal of cluster learning occurs through cooperation. What is interesting and more peculiar of African clusters is that individualism is further exacerbated by the low skills basis needed to operate in African clusters, so that a vicious cycle takes place. This is the case with fishing and fish processing in Lake Victoria, but also with wheelbarrow manufacturing in another Kenyan cluster, Kamakunji. Low skill entry barriers – together with poor wages, employers' speculative behaviours, and small scale of business – prompt most people to enter the cluster as self-employed rather than employees, thereby overcrowding the cluster, triggering a price-based competition, and finally reducing the income prospects cluster-wide. All these factors can

<sup>50</sup> For instance, adult literacy rate ranges in Africa from Benin's 33.6 per cent, to Ghana's 48.1 per cent, to Kenya's 73.6 per cent.

be summarized under the concept of “disabling labour market pooling” effects (McCormick, 1999), which are very usual in many African clusters.

### *Lessons learned*

In the early 1970s American economist and historian D. North introduced the concept of institutions in the economic theory. Puzzled by the lack of evidence about the development convergence predicted by the neoclassic theory of growth (i.e. R. Solow), North came to the conclusion that divergence in economic performances worldwide could be explained by the different types of institutions present at the national and sub-national level. Citing North (p. 4-6, 1990):

Institutions define and limit the set of choices of individuals...(and)...affect the performance of the economy by their effect on the costs of exchange (i.e. transaction costs) and production (i.e. manufacturing costs)...The major role of institutions in a society is to reduce uncertainty by establishing a stable structure to human interaction.

Also, institutions can be both formal (e.g. a constitutions, property rights, credit rules, etc.) and informal (e.g. religious or community norms of conduct).

This theoretical framework helps us understand better than anything else why clusters have not grown or have done so poorly in Africa. Indirectly, this also explains why we have dwelled more extensively on successful South Asian and Latin American clusters. The analysis of African clusters’ failures call for explanations that are more typical of the domain of macroeconomics than that of development studies, a difference which requires a shift in the logical framework from a micro to a macro dimension.

Our application of the institutional argument to African clusters can be merely sketched here, especially considering the cultural richness of the institutional approach. Here, it will however suffice to mention that many of the downsides hampering African clusters upgrading can indeed be explained through the concept of institutions as previously defined.

Uncertain property rights and transaction rules, as well as inefficient credit markets, reduce the amount of investments and number of commercial exchanges, thereby bolstering weak cooperation. The latter is in turn boosted by unwritten social norms, which can result in distrusting people just on the grounds of a different ethnic or religious group. Frequently, social cleavages are more powerful than profit prospects in driving business in Africa.

Beyond institutions, other more classical macroeconomic variables account for the weakness of African clusters. The dearth of roads and erratic energy supply limit the market outreach of many African clusters. Education matters too, but unlike commonly thought, the African cases and the comparison with the Indian ones demonstrate that secondary education might count more than primary for the ends of industrial development. That is in contrast with the great emphasis being placed in the current development debate on literacy and primary education as engines of growth. In fact, while India’s literacy rate (61 per cent) is lower than that of Kenya (73.6 per cent),<sup>51</sup> India outperforms Kenya in terms of education enrolment, in particular, at the secondary and

<sup>51</sup> Source: <http://www.uis.unesco.org>.

tertiary level.<sup>52</sup> Nonetheless, the former presents a degree of industrial development and a number of successful clusters higher than the latter, whose clusters are conversely still at an incipient stage (e.g. Lake Victoria, Zewani, and Kamukunji).

An example will better clarify the point. Let's consider a young worker who performs a low-skilled job, say, car repairer or whitewasher. Turning this worker from illiterate to literate will definitely help him in everyday life, including in the work domain (e.g. being able to consciously sign a contract). However, this change will hardly increase his productivity and thus his wage. For this to occur, he will need enhanced analytical skills that only come with secondary education (e.g. mathematical ones) or practical skills more typically transferred by vocational programmes.

From the policy viewpoint, this means that while massive literacy campaigns should always be welcome, they should not come about to the detriment of investments in secondary and vocational education, as the latter are the final educational determinants for more advanced stages of industrial development.

From a policy perspective, therefore, investing in professional and industrial skills development can have important reverberating effects not only at the economic, but also at the social level. As already learned, however, this policy should be coupled with the technical upgrading of local enterprises (i.e. two-pronged policy), so that the latter can properly receive the newly trained workforce. Otherwise, the risk will be that of aggravating the already grave labour surplus, which, by lowering wage rates and enabling employers to draw on a large mass of unemployed, works as a disincentive for workforce training and as an incentive for self-employment. That, by discouraging cooperation, completes the vicious cycle of non-learning.

<sup>52</sup> In 2002, the net primary school enrolment ratio by gender was 90 per cent for male and 85 per cent for female in India, compared to Kenya's 66 per cent for both sexes. However, when it comes to secondary and tertiary enrolment, measured as gross enrolment rate (GER), the gap widens. So, India's secondary enrolment was 58 per cent (male) and 47 per cent (female) as compared to Kenya's 25 per cent and 24 per cent, respectively. Finally, GER was 14 per cent (male) and 10 per cent (female) in India while 4 per cent and 2 per cent respectively in Kenya (<http://www.uis.unesco.org>).

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