



Clustering and Industrialization: Introduction

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1. INTRODUCTION

Compared with a decade ago, there is now more optimism concerning the growth and export prospects of small manufacturers in developing countries. Recent research on industrial clusters has made a major contribution to this shift in the debate. There is increasing agreement that clustering helps small enterprises to overcome growth constraints and compete in distant markets but there is also recognition that this is not an automatic outcome.

One of the main objectives of this Special Issue is to specify the circumstances in which clustering boosts industrial growth and competitiveness. This Introduction stresses that such an undertaking needs to distinguish between incipient and more advanced stages of industrialization. It argues that clustering is particularly relevant for the early stage by helping small enterprises to grow in riskable steps. Some articles in this Special Issue show both the importance and limitations of this argument. Other contributions focus more on mature clusters that include medium and large enterprises. These contributions examine the ability of such clusters to cope with global competitive pressures and they help to specify the circumstances that make the difference between success and failure.

The aim of this introductory article is fourfold. First, it traces briefly the trajectory of the debate on industrial clusters in developing countries. Second, it identifies what we—as editors—consider the key issues in this debate. Third, it highlights how the contributors to this Special Issue advance our knowledge on these questions. Fourth, it brings out the limitations of the work accomplished so far and the implications for future research.

2. TRAJECTORY OF THE CLUSTER DEBATE—BRIEF OVERVIEW

Contributors to this Special Issue use a simple definition of clusters as sectoral and spatial concentrations of firms. Such clusters have received increasing attention in research on advanced countries, especially in some lines of New Mainstream Economics (Krugman, 1991), Business Economics (Porter, 1990)¹, Regional Science (Scott, 1996) and Innovation Studies (Braczyk, Cooke and Heidenreich, 1998). They share a view of enterprises as connected entities and an emphasis on local factors for competing in global markets. Research on clusters in developing countries also shares this view but it has a different trajectory: it grew out of the small-scale industry debate. The latter was a tired line of research in the late 1980s, kept alive more by the shortcomings of large firms in creating employment than new theoretical or policy approaches.

Those studying small-scale industry in developing countries eagerly received accounts of small-firm industrial districts in Europe, especially Italy, conquering international markets. These success stories, while referring to experiences in the 1970s and 1980s, did not (with the exception of Piore and Sabel, 1984) become widely known in the international community until the late 1980s and early 1990s (Garofoli, 1992; Goodman and

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Bamford, 1989; Pyke, Becattini and Sengenberger, 1990; Pyke and Sengenberger, 1992). They were, however, soon translated into an agenda for research on developing countries (Schmitz, 1989) which had two main questions: first, are there similar industrial clusters in developing countries; second, what are the conditions which either produce, modify or prevent their growth? Initial attempts at answering these questions, using the flexible specialization framework set out by Piore and Sabel (1984), largely re-examined data that had been collected for other purposes (for example, Pedersen, Sverisson and van Dijk, 1994; Rasmussen, Schmitz and van Dijk, 1992). New empirical research explicitly undertaken to assess the relevance of clustering in developing countries came later, gradually leading to a substantial body of original case material and substantive theoretical discussion (for example Das, 1998; Holmström, 1998; Meyer-Stamer *et al.*, 1996; van Dijk and Rabellotti, 1997; Visser, 1996). The main lessons can be summed up as follows:

—*Industrial clustering in developing countries is significant.* The growing amount of case material shows that clusters are common in a wide range of countries and sectors (Nadvi and Schmitz, 1994). Their statistical significance in industrial production is hard to determine, however, because economic regions do not respect administrative boundaries and industrial classifications often fail to capture the existing specialization. Krugman (1991) pointed this out for the case of advanced countries. The same applies to developing countries.

—*The growth experiences of these clusters vary widely.* At one end of the spectrum are artisanal clusters which show little dynamism and seem unable to expand or innovate (e.g., McCormick, 1998). At the other end are clusters which have been able to deepen the inter-firm division of labor, raise their competitiveness and break into international markets (Cawthorne, 1995; Nadvi, 1999b; Schmitz, 1995). Along the spectrum there are many intermediate cases (Knorringa, 1996; Rabellotti, 1997; Sandee, 1995; Visser, 1996). Even the successful clusters differ in several respects from the Italian model.

—*Internal heterogeneity is pronounced* (Knorringa, 1996; Rabellotti and Schmitz, 1997). Except in the rudimentary clusters, medium and large firms have emerged and

play an important role in the governance of these clusters. In this respect the developing country experiences are substantially different from the Italian model (based on the 1970s and 1980s experience) but not different from the Italian reality of the 1990s (Brusco *et al.*, 1996; Rabellotti, 1997).

—Contrasting the developing country clusters with the Italian model was in a number of studies a useful initial framework but the consensus now is to move “*from models to trajectories*” (Humphrey, 1995). This shift to a dynamic approach, which seeks to understand the processes that lead to success or failure, is the core theme of this Special Issue on industrial clusters in developing countries.

3. TOWARD A THEORETICAL FRAMEWORK

In spite of the diversity of experiences recorded so far, the focus on clusters has proved to be analytically useful. The most fundamental analytical insight did not, however, come from these recent studies but from old theory. In his *Principles of Economics*, Marshall (1920) showed why clustering could help enterprises (especially small ones) to compete. He noted that the agglomeration of firms engaged in similar or related activities generated a range of localized external economies that lowered costs for clustered producers. Such advantages included a pool of specialized workers, easy access to suppliers of specialized inputs and services and the quick dissemination of new knowledge. Such external economies help explain the growth of contemporary industrial clusters and Marshall's century-old work is a standard reference in this new literature.

It is also agreed, however, that Marshallian external economies are not sufficient to explain cluster development. In addition to incidental external economies, there is often a deliberate force at work, namely the conscious pursuit of joint action. This is what emerges from research on industrial clusters in advanced and in developing countries (Brusco, 1990; Cooke and Morgan, 1998; Humphrey and Schmitz, 1998; Rabellotti, 1997; Tandler and Amorim, 1996). In our own work we brought together the incidental and deliberate effects into the concept of *collective efficiency* defined as the *competitive advantage derived from external economies and joint action*. By calling the former *passive* and the latter *active* collective efficiency, one can

express neatly that clustering brings two advantages: those that fall into the producer's lap and those that require joint efforts (Nadvi, 1996; Schmitz, 1995).

We have also suggested that pairing the passive and active components helps to theorize and explain differences in performance. How does one explain that some clusters do well and others stagnate; that within clusters there are segments which grow and others which just survive; that clusters which were thriving in the 1980s are struggling in the 1990s? These are the kind of findings which come out of the recent case material and we need a theory (or theories) to explain the differences between clusters, within clusters and over time. Several papers in this Special Issue use the collective efficiency framework for this purpose, hypothesizing that joint action is necessary for clustered producers to cope with new competitive pressures. The common conclusion is that this conceptual framework is useful—for example, cooperating firms are found to be performing better—but insufficient. There are two main areas of deficiency. First, the collective efficiency framework does not adequately capture external linkages; for example, the nature of linkages with foreign buyers can be crucial to the cluster's development. Second, a strategic response to external challenges may require more than joint action of local enterprises thus raising wider issues of local governance. We return to these deficiencies later.

4. THE SIGNIFICANCE OF INDUSTRIAL CLUSTERS FOR INCIPIENT INDUSTRIALIZATION

We have suggested that research on industrial clusters has begun to transform thinking on the growth and export prospects of small enterprises in developing countries. We have also mentioned that this line of research was triggered by the success of small firm industrial districts in Italy. Their record, however, has not gone unchallenged. Harrison (1994), for example, suggests that the success of small enterprise clusters has been over-rated and the strength of the large corporation under-rated. In his view, the dominant form of industrial organization is the large company controlling networks of (often small) suppliers.

Clearly research that compares clusters with other forms of industrial organizations is

important, but it is equally important not to construct false dichotomies. Successful clusters are unlikely to remain populated only by small firms. For example, in exporting clusters in Pakistan (Nadvi, 1999b) and Brazil (Schmitz, 1995), a number of large firms have grown from within, occupying powerful positions *vis-à-vis* local suppliers. Some are even seeking new roles outside their cluster.

This is not an argument against comparing clusters with other forms of industrial organization. On the contrary, such research is an important part of the assessment of clusters. But, comparisons of current performance would probably miss the significance of clustering in the industrialization *process*. Understanding this significance requires a process approach and distinguishing between incipient and advanced stages of industrialization.

For poor regions seeking to industrialize from below two things need to occur: the mobilization of unused local resources (financial and human), and the effective use of these resources. In the early stage, both the mobilization and use of resources occur in small amounts at a time. This is where clustering becomes significant because it facilitates specialization and effective investment in small steps. Producers do not have to acquire equipment for the entire production process; they can concentrate on particular stages leaving other stages to other entrepreneurs. Specialized workshops that can repair and upgrade existing machinery further help to reduce technological discontinuities. It follows that investment capital is needed in small, rather than big, lumps. Moreover, working capital requirements are affected by clustering. Where specialized suppliers of raw materials and components are close by, there is less need to store inputs. Similarly, small amounts of human capital can be made to count. One producer's investment in a specialized skill renders returns because others have invested in complementary expertise. Specialization does not mean isolation, however, because without interaction no one can sell their products or services.

To complete the argument, the mobilization and use of entrepreneurial talent needs to be considered. Truly visionary entrepreneurs with large amounts of capital and/or willingness to take large risks are rare. Clustering draws out the less exceptional and more common "ordinary" entrepreneurs. This occurs because

clustering makes it possible to advance by taking small and calculable—rather than large and wild—risks. The steps are small and riskable due to the division of labor (with a focus on a particular aspect of manufacturing capability) and the enabling local external economies stressed earlier on. Joint action also helps reduce the size of the leap for the individual entrepreneur.²

This emphasis on *riskable steps* (Schmitz, 1997) is supported by observations on the industrial structure in developing countries, a frequent feature being the “missing middle”: some large enterprises at the top and many small enterprises at the bottom unable to graduate into the medium-sized category. They cannot grow because of “informational and other market failures associated with the provision of financial, technical and market support to SMEs” (Levy, 1994). One of the most striking aspects of much of the recent case material on clusters is that it shows enterprises of all sizes, including a strong middle segment (for example, Brautigam, 1997; Knorringa, 1996; Nadvi, 1996; Rabellotti, 1997; Tewari, 1996). It seems that the growth constraints faced by individual small-scale manufacturers are less severe in clusters.

In summary, the argument is that clustering facilitates the mobilization of financial and human resources, that it breaks down investment into small riskable steps, that the enterprise of one creates a foothold for the other, that ladders are constructed which enable small enterprise to climb up and grow. It is a process in which enterprises create for each other—often unwillingly, sometimes intentionally—possibilities for accumulating capital and skill. Probably the best example is the Taiwanese computer industry that gave rise to global players but started as a cluster of small firms pursuing what Levy and Kuo (1991) call the “bootstrap strategy”.

While clustering facilitates this strategy, such evolutionary growth does not necessarily follow. McCormick's (1998) review of African clusters shows that the accumulation of capital and skills remains low. In her contribution to this Special Issue she uses some of this material to show that the collective efficiency approach provides certain insights but is ultimately insufficient. Contrasting her contribution with Weijland's article on incipient Indonesian clusters brings out particularly clearly that collective efficiency only emerges under the following conditions:

—*The existence of trade networks.* Clusters that are limited to local markets are likely to experience involutionary rather than evolutionary growth. Clustering tends to attract traders but we cannot simply assume that effective trade links to larger (usually distant) markets exist. For example, Weijland's contribution shows that trade networks in Indonesia are highly developed but not ubiquitous. In an important earlier paper she shows that rural clusters which are well connected to distant markets by traders have higher incomes than those which are not (Weijland, 1994). In a similar vein, Pedersen (1997) has stressed that the poor distribution networks in East and Southern Africa are a major factor in accounting for the inferior growth performance of small producers. These external linkages need more attention in future research.

—*The existence of effective sanctions and trust.* Sanctions and trust are important both within clusters and their trading connections (Humphrey and Schmitz, 1998; Knorringa, 1996; Mead, 1984; Nadvi, 1999a). Where sanctions and trust are missing, a production system requiring deepening specialization and interdependence of formally independent firms is unlikely to develop. In her contribution to this Special Issue, McCormick stresses that contract enforcement and economic cooperation are often hampered by institutional failures and that this explains in part the dearth of successful clusters in East Africa. One of the rare African success stories—Nnewi in Eastern Nigeria—supports this emphasis on institutional factors. According to Brautigam (1997), the socio-cultural networks of Nnewi's entrepreneurs reduced transaction costs, enhanced trust and were, thus, critical to the cluster's success. Similarly, Weijland's article in this Special Issue suggests that socio-cultural networks furthered the growth of rural Indonesian clusters. Lack of trust also brings discontinuities in the learning process. Knorringa (1996) has shown most clearly how distrust between producers and traders, due to existing socio-cultural barriers, can hamper the process of local learning and retard a cluster's technological development. Similarly, socio-cultural divides between Asian and African business communities seem to explain the lack of upgrading in the Kenyan fish cluster studied by (Mitullah, 1999). This ex-

perience appears to have wider significance, explaining—to some extent—why many East African clusters remain rudimentary and, more generally, why there is a missing middle in much of African industry (Ferrand, 1997).

In conclusion, if one takes seriously the task of understanding *trajectories*, that is the *processes* that lead to success or failure, it is important to distinguish between incipient and more advanced stages of industrialization. We argue that clustering is particularly significant at the incipient stage because it facilitates evolutionary growth in *riskable steps*. Small amounts of capital, skills and entrepreneurial talent can be made to count. But, clusters only experience industrial growth where effective trade networks connect them to sizable distant markets and where trust sustains interfirm relations.

5. MATURE CLUSTERS AND THE CHALLENGE OF GLOBALIZATION

Trying to understand trajectories of clusters does not mean reconstructing their entire history. Focusing on key turning points can help identify the forces that determine a cluster's growth path. Five papers in this Special Issue concentrate on a common recent turning point: the twin challenge of liberalization and globalization faced by clusters in India (Knorrington and Tewari), in Pakistan (Nadvi), in Mexico (Rabellotti) and in Brazil (Schmitz). While the specificity of the challenge differs, there is a broad similarity: local firms are increasingly forced to perform to global standards not just in matters of costs but also quality, speed of response, and flexibility. Enterprises in these relatively mature clusters benefit from strong positive external economies, but is this sufficient?

The central hypothesis that runs through four out of these five case studies is that the upgrading necessary to respond to the new pressures requires greater joint action by local firms. This involves increased cooperation in vertical ties as well as horizontal cooperation both bilaterally and multilaterally, for example, through local trade bodies. These four studies, by Knorrington, Nadvi, Rabellotti and Schmitz, use the collective efficiency framework and share similar methodologies for their empirical analysis.

Rabellotti's paper on the Guadalajara shoe cluster provides the clearest analytical connection between changes in trade regimes and its impact on inter-firm co-operation. As a consequence of Mexico's trade liberalization in the early 1990s, the cluster's traditional domestic market witnessed extensive penetration, leading to the closure of many firms. Among the surviving firms, however, it prompted greater horizontal and vertical cooperation. The ensuing increase in dynamic efficiency was aided by the devaluation of the local currency which provided a breathing space for both individual and joint initiatives.

India's trade and industrial liberalization program, which gained pace in the early 1990s, provides the turning point for the clusters of Agra and Ludhiana studied by Knorrington and Tewari respectively. Both, however, show that the scenario was not as simple as implied in much of the economic liberalization or globalization literature: local producers accustomed to an easy domestic market suddenly facing more exacting global markets. Instead, the early 1990s were characterized by the disappearance of India's traditional low quality export market in the Soviet Union alongside the growing demand for high quality products in a domestic market segment. Nevertheless, liberalization and globalization accentuated the need for local firms to upgrade their capabilities. In doing so, Tewari points to the importance of organizational learning that came from competing in dynamic segments of foreign and domestic markets. Knorrington pursues a similar argument, showing that enterprises targeting these market segments increased horizontal and vertical cooperation more than those operating in "lower" market channels.

Nadvi's study on the Pakistani cluster throws light on an emerging aspect of globalization, the importance of conforming to international quality assurance standards. His paper shows that—following a major crisis in quality assurance—Sialkot's surgical instrument producers were able to expand export sales by upgrading manufacturing practices. Such upgrading involved greater co-operation both in vertical and horizontal ties, but collective failure in other areas remained.

The Brazilian study by Schmitz shows that enterprises in the export-oriented Sinos Valley have stepped up their *vertical* co-operation in response to intensified global competition in leather footwear. While this enabled the cluster to upgrade substantially in the sphere of

production this was not sufficient to further expand exports. There were also, as in the other cases, major differences within the cluster.

While the responses to the new global competitive pressures differ within and between these clusters, there is a common finding across these studies: *firms that increase co-operation show greater improvement in performance*. This is a result emerging from quantitative research (correlation and/or regression analysis of survey data) backed up and qualified by qualitative investigation. Taken together, these papers advance the debate in two ways:

—While interfirm cooperation has often been highlighted as a central feature of the more successful contemporary industrial clusters, it has rarely been investigated systematically, let alone quantified.

—The positive and statistically significant relationship between increases in co-operation and improvements in performance supports the collective efficiency argument that responding to major challenges requires greater local co-operation.

The papers also stress the need to decompose this result: some forms of co-operation increased more than others and co-operation tended to be selective rather than cluster-wide. A systematic comparison of these studies remains to be carried out but some general findings are already clear.

—*Vertical cooperation was high and/or increasing*. Improvements in the supplier–manufacturer relations were a significant outcome of the new pressures in the Pakistani, Mexican and Brazilian clusters and also in the upper segments of the Indian clusters. Co-operation with key suppliers and subcontractors increased on issues of quality and delivery and there was more flow of information up and down the chain.

—In contrast, *bilateral horizontal co-operation was low and/or increasing little*. However, a common aspect of the turning point was the increase in exchange of information and experiences.

—*Multilateral horizontal co-operation varied between the clusters*. Nadvi argues that in the Pakistani cluster, the local trade association played a critical role in channeling external know-how on quality assurance to local firms. This effort helped both large and small firms to upgrade to international

standards. In Mexico, Rabellotti also observed an increasingly active trade association, engaged, for example, in new marketing initiatives geared to both the domestic and international market. In the Indian clusters, multilateral co-operation seems to have played little (Agra) or no role (Ludhiana). In the Brazilian cluster, a strategic multilateral upgrading initiative was launched but failed in the end due to the lack of support from a few large and influential manufacturers.

—*The responses were highly differentiated within the clusters*. The common findings that co-operating firms perform better implies heterogeneity within clusters. What else emerges on the profile of successful and less successful adjusters? In the Mexican and Pakistani clusters large and medium-sized firms improved their performance more than small ones. In the Indian cases, the critical distinction was not so much size as market channel. In fact, Knorringa proposes the market channel approach as a conceptual framework to study cluster differentiation. In “his” cluster of Agra, producers in the more demanding channels have raised co-operation and performance most. This is also borne out by the articles of Rabellotti and Tewari. In the Mexican cluster, co-operation with suppliers was markedly closer in the export channel. Similarly, Tewari stresses differences between market channels of the Ludhiana cluster. Particularly interesting is her finding that competence for responding to the demands of overseas customers was acquired, not in previous export activity, but in producing for up-market channels of the internal market.

While the five papers discussed above focus on turning points associated with the challenges of liberalization and globalization, a similar set of findings emerges from Kennedy’s analysis of a different but equally dramatic turning point. Her paper reviews the response of tanneries in India’s Palar Valley to exogenous regulatory pressures to mitigate environmental costs associated with tannery pollution. Kennedy’s study not only brings out the potential diseconomies of clustering, but also provides a link to the growing concerns with the environmental impact of local industrialization. In showing how local tanneries responded, Kennedy underlines the importance of local joint action that resulted in common effluent treatment plants. Again,

such co-operation, while uneven, had a positive impact on performance and resulted in a process of upgrading.

In conclusion, while Kennedy's article points to the potential danger of external diseconomies, the other articles stress that external economies have helped the clustered producers to respond to the new quality and speed requirements. They also show that these passive advantages of clustering were not sufficient and that joint action was essential to meet the challenge. Five common findings emerge. First, while external economies tend to be cluster-wide, joint action tends to be selective. Second, greater co-operation is positively correlated with improved performance. Third, co-operation in backward ties with local suppliers and subcontractors is either high or increasing. Fourth, horizontal co-operation is comparatively low. Fifth, the new challenges have led to increasing differentiation. One implication of this last finding is, as some of the papers suggest, that a strategic response cannot just rely on private joint action but requires public agencies as catalysts or mediators. We return to this issue in the next section.

6. POLICY ISSUES

In recent years industrial clusters have attracted a great deal of attention in policy-making circles.³ As with the earlier enthusiasm for promoting small industry, a key motivation has been the potential for employment generation. To this has been added the excitement generated by the cluster success stories which show small and medium enterprises (SMEs) competing in global markets. Eliciting the critical success factors has been the core concern for both researchers and policy makers. Such enthusiasm has also led to a misguided view of clusters as a panacea, an elixir for small enterprise development. This calls for caution; successful clusters cannot be created from scratch. There needs to exist a critical mass of enterprises and skills (however rudimentary) that outside assistance can "hook into".

The main lessons that can be learned from experiences of fostering clusters and networks have been drawn together in a previous article in this Journal (Humphrey and Schmitz, 1996). It argues that to be effective interventions need to be (a) *customer-oriented*: enabling firms to learn about, and from, the needs of their cus-

tomers helps them to tackle their key problems of competitiveness; (b) *collective*: directing support at groups of enterprises not only has lower transaction costs than assistance to individual firms, but it also encourages co-operation and mutual learning; (c) *cumulative*: generating the capacity to continuously upgrade and improve makes further public support unnecessary.

The contributions to the Special Issue tend to support this "Triple-C Approach," but add important qualifications. The most important is that the above principles need to be applied differently to different categories of clusters. This is the main message of the article by Altenburg and Meyer-Stamer. Reviewing policy experiences from Latin America, they identify measures for three types of clusters: first, survival clusters of micro-and small-scale enterprises; second, more advanced clusters of differentiated mass producers; third, clusters of transnational corporations and their near-by suppliers. The third category is an important addition to the cluster agenda, bringing home that the advantages of clustering are not limited to local firms and that transnational firms can be an effective entry point for fostering the upgrading of local suppliers.

Survivalist clusters merit policy attention, according to Altenburg and Meyer-Stamer, because of the employment they provide in Latin America. Weijland, in her article on Indonesia, puts more stress on the seedbed such clusters provide for industrial growth and entrepreneurship. Both articles stress the need to foster networking. Identifying common problems and the means for common resolution of such difficulties can provide a basis for local co-operation and for networks to emerge. Altenburg and Meyer-Stamer refer to Latin American experiences in using network brokers to facilitate local cooperation. Weijland shows that in Indonesia, assistance to network formation has had varying success and underlines the need to differentiate among survivalist clusters. Their potential seems to vary with the market channel in which they operate.

In more advanced clusters, policy measures have to be geared to promoting upgrading, in particular in areas of technical learning and innovation. As Altenburg and Meyer-Stamer point out, the first stage in this is the need to build awareness of the necessity to upgrade. This can be achieved through benchmarking local practices against those of global market

leaders. Helping firms to meet international best practice itself requires promoting local joint action, often through strategic intervention in areas such as technological development or environmental upgrading.

The emphasis on private self-help—in the mature clusters studied by Rabelotti, Knorr-Ing, Nadvi and Schmitz—does not mean that public intervention was superfluous. On the contrary, in Mexico a temporary re-imposition of protective trade barriers (coupled with a devaluation of the peso) was essential in giving local producers the breathing space to upgrade. In India (Agra), the intervention of a government agent was critical in mobilizing a public-private partnership aimed at reducing export barriers. In Pakistan, strategic support by the state was critical for acquiring the technical know-how to meet quality assurance standards. Here a focused intervention, requiring limited public investment and channeled through the local trade association, generated substantial benefits in the cluster. In contrast, the Brazilian case provided an example where the failure of the state to intervene, specifically to mediate the conflicting interests in the local supply chain, contributed to the collapse of a multilateral upgrading program.

The latter example indicates that, while more mature clusters tend to have more self-help organizations, the increasing differentiation also increases the potential for conflict. Existing literature has not really picked this up. We have tended to assume that more collective institutions would mean more pursuit of common objectives. This does not always follow. Where conflicts arise public agencies have an important function as mediators. This implies a more strategic concern with *local governance*. Future research will need to make clearer what such local governance means, how feasible it is in globalized sectors, what the respective roles are of public and private agencies, and whether public-private partnerships are needed continuously or only at times of crisis. Mitullah's (1999) analysis of collective failures in a Kenyan fish cluster reminds us that such local governance is a matter for political, and not just economic, analysis.

7. FURTHER RESEARCH

A previous Special Issue of *World Development* concerned with industrial organization in

developing countries concluded with an article "From models to trajectories" (Humphrey, 1995). It was a call for further research to study the *processes* that lead to success or failure. On this score, significant progress has been made. Most articles in this Special Issue adopt an explicitly dynamic approach. They also help to identify remaining deficiencies and to set the agenda for the next round of research. The key suggestions are: (a) more comparative work; (b) more attention to external linkages; and, (c) more concern with knowledge flows. Let us elaborate.

(a) *Comparisons*

Most existing empirical research consists of case studies of individual clusters. Systematic comparisons are rare.⁴ Future research would benefit from two types of comparisons: with other types of production organization, and between successful and less successful clusters.

Despite the emphasis in the literature on the gains from clustering, counterfactual analysis comparing clusters with dispersed firms is limited. A notable exception is included in this Special Issue. Visser provides statistical evidence that clustered producers, from the Gamarra (Peru) garment cluster, outperform dispersed firms. More comparative work, however, is needed both for incipient clusters (such as Gamarra) and for mature clusters. In addition, there is a need for comparisons between SME clusters and large integrated firms.

One of the common findings from the studies of mature clusters has been the increasing importance of large firms within the cluster. Although large, these firms grew from humble origins and benefited from clustering advantages. However, with increasing scale their reliance on local sources of competitiveness appears to decline. It could well be that the benefits of clustering diminish with growth. Few would now deny that clustering tends to help small firms to grow, but do firms become less dependent on proximity once they have reached a certain size?⁵ This calls for a comparison of firms that leave the cluster with those that operate from within.

More inter-cluster comparisons are also needed. This Special Issue adds important insights on factors that enabled clusters to respond to new challenges. In order to be more

confident about the identified success factors, systematic comparisons are needed with clusters that perform poorly. Some of the papers include comparisons of more and less successful market channels within clusters (notably Knorrington) but these are not a substitute for systematic comparisons of thriving and declining clusters.

(b) *External linkages*

The strength of the cluster literature lies in showing how incidental local synergies and deliberate co-operation help enterprises to compete. A distinctive contribution of this Special Issue lies in showing how local relationships changed over time. However, the limitation of focusing on *local* linkages is also apparent. Most papers contain initial explorations of links with external agents, especially buyers, and conclude that such links are important. We have already mentioned the importance of trade networks for incipient clusters (emerging particularly from Weijland's work). The articles on mature clusters take such trading connections as given and focus more on the quality of relationships with traders. For example, Rabellotti found that in the Mexican cluster ties with buyers had on the whole become more stable and collaborative, particularly in export markets. Export traders became an important source of knowledge on production organization, quality control, design and new technologies. Similarly, Nadvi found that greater co-operation in ties with buyers was the most significant variable associated with improvements in firm performance in the Sialkot cluster. Amongst external buyers, Nadvi observed foreign manufacturers to be a particularly important source of know-how on quality-related upgrading. A key finding emerging from Tewari's study of the Indian knitwear cluster was the importance of distinguishing between different kinds of buyers. Learning in export ties was greater when dealing with small and medium-sized (as opposed to large) foreign firms, and when orders were small but regular allowing for continuous feedback. Such "tutelage" not only acknowledges learning as being a gradual and on-going process, it also underscores the significance of learning from small mistakes, which would be less feasible where producers undertook large orders for large buyers.

The main question to be addressed in future research is under what conditions such external ties are conducive to upgrading. Tewari and Knorrington's contributions suggest that in quality-driven channels the learning from buyers is more substantial than in price-driven chains. This finding is supported by Schmitz, who stresses however that insertion into global buyer-driven chains—while raising competence in production—may block upgrading in design and marketing. In summary, the initial explorations of external linkages provide a rich menu for further research.

(c) *Knowledge systems*

The points made above, namely the need to compare cluster trajectories and to include external linkages, feature prominently in the concluding article by Bell and Albu. Their main contribution to this Special Issue, however, lies in identifying the analytical shifts that are needed to understand the technological dynamism (or the lack of it) of industrial clusters. They stress—quite rightly—that the understanding of technological capability in industrial clusters remains poor. More importantly, they provide a conceptual framework to guide future investigation. Their key point is that the research needs to shift from studying production systems to knowledge systems. While the two are ultimately inseparable, key actors in one may be unimportant in the other and vice versa.

The importance of knowledge flows from outside is highlighted by the experience of the poorer clusters. McCormick stresses that what the producers in some of the Kenyan clusters learn from each other are bad practices. Visser emphasizes the danger of cognitive inbreeding in the relatively closed cluster of Gamarra (Peru). Scanning the case material on the more advanced clusters—brought together in this Special Issue—suggests that they relied heavily on knowledge from the outside and its rapid diffusion inside. Many of Bell and Albu's other questions, however, remain unanswered. The most interesting question is who are the gatekeepers of knowledge from the outside: local technology institutes, large manufacturers, or external buyers? This seems to be *the* strategic question, especially for clusters that seek to move up the global value chain.

NOTES

1. In a recent paper, Porter adopts a definition of clusters which is essentially the same as that used in this Special Issue: "Clusters are geographic concentrations of interconnected companies and institutions in a particular field" (Porter, 1998, p. 78). However, in his previous work (Porter, 1990), the term "cluster" is used—at times—in a broader sense, referring to groups of enterprises with strong vertical linkages and located within one country, but not always geographically close.
2. One of the clearest examples of such progression occurring in manufacturing is the surgical instrument cluster of Sialkot, Pakistan (Nadvi, 1996). The auto parts cluster of Nnewi, Nigeria, is an example of the accumulation of capital and skills starting in trading and then progressing into manufacturing (Brautigam, 1997; Oyelaran-Oyeyinka, 1997).
3. See, for example, UNIDO (1997); UNCTAD (1998). The ILO and the International Institute for Labour Studies have for many years been particularly active in convening conferences and publishing policy-oriented research on industrial clusters; see, for example, Pyke, Becattini and Sengenberger (1990), Pyke and Sengenberger (1992) and Cossentino, Pyke and Sengenberger (1996). Less visible, but very substantial has been the involvement of the Department for International Development (London), particularly through the financing of new research on industrial clusters in Africa, Asia and Latin America. For short contributions aimed specifically at policymakers and practitioners, see the Special Issues of *Firm Connections*, Vol.4, No.6, Nov/Dec 1996 (Chapel Hill, NC, USA); of *Small Enterprise Development*, Vol. 9, No. 1, 1998, (London, UK); and *IDS Policy Briefing*, Issue 10, April 1997 (Sussex, UK).
4. The main exceptions are the comparisons of Italian and Mexican clusters by Rabellotti (1997) and the comparison of inward- and outward-oriented clusters in Pakistan by Nadvi (1996). Note also the comparative statistical research on rural Indonesian clusters by Weijland (1994) and Klapwijk (1997).
5. Audretsch and Feldman (1996a, b), for example, show that innovation activities in the United States tend to cluster but begin to disperse at the mature stage of industry life cycles.

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Historically, industrialization has been the main driver of economic growth and is the underlying core of the economic success of high-income countries in Europe and North America. Against this background, the re-introduction of Industry, Innovation and Infrastructure as a development goal (SDG 9) was overdue. Many economists assign great importance to this component, as the entire process of development is rooted in the transformation of the productive structure and its underlying capabilities (see e.g. Chang, 2010). This is why the creation of clusters and ecosystems, which are both characterized by a set of tightly interwoven activities, has become a cornerstone in many countries' industrial and development policies. Industrialisation (or industrialization) is the period of social and economic change that transforms a human group from an agrarian society into an industrial society. This involves an extensive re-organisation of an economy for the purpose of manufacturing. Historically industrialization is associated with increase of polluting industries heavily dependent on fossil fuels; however, with the increasing focus on sustainable development and green industrial policy practices, industrialization Industrial Clusters and Production Networks in Southeast Asia: A Global Production Networks Approach. 1. Introduction. Economic development at the regional scale is becoming an increasingly complex phenomenon to be analyzed satisfactorily. On the one hand, the accelerated globalization of economic activity has apparently rendered the region as the most significant site of competition across the global economy. Schmitz, Hubert & Nadvi, Khalid, 1999. "Clustering and Industrialization: Introduction," World Development, Elsevier, vol. 27(9), pages 1503-1514, September. Handle: RePEc:eee:wdevel:v:27:y:1999:i:9:p:1503-1514. as.