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The Case of the People's Republic of China

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1 ■ Introduction

The People's Republic of China (PRC) is a relative latecomer to modern industry and is—by most standards—a highly successful one. Its market-oriented reforms have produced remarkable results: the manufacturing sector has enjoyed high and sustained rates of growth, with shares of gross national product (GNP) and exports rising sharply. The emergence of dynamic small- and medium-sized enterprises (SMEs) is one of the most important outcomes of the reform process. Despite their significant contribution to the PRC economy, SMEs have largely been neglected in official thinking about technological issues; they now do rate a mention in the current long-term plan.

This policy brief examines the role of SMEs in technological issues such as innovation, research and development (R&D), and strategic clustering. It focuses on the questions that need to be addressed in any further attempts to reshape the PRC's industrial policy, in the context of the national innovation system (NIS): What challenges and constraints does the internal economic environment pose for SMEs seeking to grow? How does the external environment affect the ability of SMEs to operate and compete? What opportunities are available to the PRC's authorities seeking to make the NIS friendlier toward SMEs?



2. The Internal Environment and Input Conditions

Problems facing the PRC's SMEs are many and varied. The SMEs are primarily located in the coastal areas and are mostly limited to the production of standardized consumer or low-technology goods made for mass markets (such as furniture, consumer electronics, and textiles and garments). There is usually little innovation; R&D activity, if present at all, tends to be negligible. A subset of these firms may be integrated into global supply chains, but such integration is minimal, and the relatively homogeneous nature of their products makes the firms vulnerable to changes in demand from abroad. To the extent to which firms seek to be more competitive, the strategy is often through cost-cutting measures. Overall, complacency pervades the conduct of business, which is usually based on the copying or licensing of products, using imported machinery.

Lower prices are not enough to allow a firm to succeed in international markets: improvements in product, process, technology, and organizational functions such as design, logistics, and marketing have become the critical success factors in firm competitiveness. The PRC's SMEs are thus under pressure to innovate, to upgrade their operations in order to do business on the international level. Hence, as a late-industrializing economy, the PRC tends to be restricted by a gap in technology. This technology gap can be decomposed into three types of lags: (i) innovation lag (involves the levels of capability for creation



and development in science and technology); (ii) process capability lag (refers to the infrastructure and “infostructure” that supports human capital and the firm’s ability to make multiple copies of a product or to deliver repeatedly a service once the product or service performance specification is given); and (iii) customer lag (refers to such disadvantages as difficulty in attracting consumers, due in part to lack of brand recognition, and the high cost of switching to a new provider, due in part to large up-front costs).

3. The External Environment and Demand Conditions

While globalization and increased international competition should, in principle, make it easier to narrow gaps across countries, the accelerating pace of change and the difficulties for many developing countries in getting started may bring about the opposite result. Indeed, these trends may have given rise to three overarching challenges.

The first challenge concerns the existing institutional regime. Technological change combined with increased economic interdependency intensifies international competition and this adds to pressure for adjustment and restructuring. Such pressure can adversely affect late-industrializing economies such as the PRC, which are already facing pressure to change other aspects of their economic structures.



The second challenge involves the importance of a developed information infrastructure. In addition to physical facilities, non-physical infrastructure, such as the legal and regulatory regime and the intellectual and innovational climate, plays an important role. Addressing these needs will require developing a dynamic information infrastructure that can facilitate the effective communication, dissemination, and processing of information.

The third challenge concerns human resources development. Access to information (local or global) is meaningless unless the information can be applied. Hence, many information technology applications presuppose a highly skilled labor force. These applications require researchers and technicians capable of dealing with a spectrum of information technologies, a workforce that can use the new production technologies, and a general population that can use the resulting products and services effectively. In addition, the educational requirements for the information economy are growing ever more complex. The rapid development of human resources is a critical challenge for the PRC. In order to meet this challenge, the PRC must develop strategies to enhance and enlarge its core of knowledge workers.

4. Strategic Direction: A Network Cluster Strategy

While the PRC faces challenges brought on by globalization, some potential opportunities, when appropriately leveraged, can be used to offset disadvantages. In particular, a business



environment could be created to support the globalized fast follower innovation mode as an important means of facilitating the evolution of existing SMEs in the PRC, which have hitherto been mainly small firms focused on low-skill, final-goods assembly for the domestic market (see figure). Pursuing such a strategy would be most complementary to the PRC’s position as a late-industrializing economy that has high rates of technology transfer and is seeking to exit the applications specialist mode by developing indigenous innovative capability.

**Conceptual Framework for
Understanding Domestic Technological Capabilities**

		Product Technology Capability	
		High	Low
Process Technology Capability	High	Fast Follower Innovation Mode (Cluster Strategy)	Process Capability Pioneering Mode (Niche Strategy)
	Low	Product Technology Pioneering Mode (Niche Strategy)	Application Specialist Mode (Free-Riding Strategy)

Entering the globalized fast follower mode requires an upgrade of both size and technology in order to facilitate development and enhance the productivity of industries in global markets. More specifically, our analytical model suggests that a network cluster strategy, pursued alongside an international outlook, is the best approach for reaching this mode. The successful pursuit of such a strategy enables firms to increase in size, adopt technology that adds more value, and serve global markets.

Increasingly, empirical evidence suggests that the key constraint on firm growth stems not so much from size, but from the fact



that small firms face limited resources, and when operating independently, cannot access the resources available to larger firms. The economies of scale that exist in a cluster allow firms to access resources that are typically beyond the reach of a small firm. These include the purchase of inputs such as raw materials and technology; the creation of a common pool of skilled workers; the shared use of common capital (such as production machinery); and the pooling of production capacity in order to fill large orders from international buyers.

Moreover, economies of scope can be achieved in a cluster if firms employ common marketing and distribution channels, and learn from each other about areas such as common markets and improvements to products and processes. Alternatively, such economies could also be attained by collaboration through producer associations that help open access to international markets, and that increase small firms' access to government support services.

Working within a cluster may also give rise to greater specialization. Firms can concentrate on their core businesses and develop a division of labor among themselves, thereby achieving greater efficiency in production.

Weighed against these benefits are, of course, costs. These include the costs of ensuring coordination within a cluster (transactions costs), post-purchase distribution costs, the cost of scheduling conflicts when using common capital, and the cost of fulfilling the infrastructure and monitoring requirements needed to ensure compliance with a common system of operating standards. There may also be losses of human capital



investments due to worker departures to other firms within the cluster, as well as costs required for adaptation and learning. However, given the large external economies commonly associated with knowledge products, the benefits from operating in a cluster are likely to outweigh the costs in the case of technological issues. In order to reap the full benefits of economies from clustering, economic development in the PRC needs to involve collaboration between the government, private firms, and research and educational institutions. Cooperation among SMEs that share business interests such as markets, products, and infrastructure needs is best achieved when these clusters operate as a network within the framework of the broader NIS.

5. Opportunities for Future Development

Given the PRC's existing economic policymaking structure, any successful move toward the globalized fast follower mode must take into account the appropriate scope of government involvement. This suggests that reform of the SME sector vis-à-vis technological aspects—like establishment of cooperation among SMEs, as argued above—is best undertaken in the context of the existing NIS. Indeed, the key advantage of operating through the PRC's NIS is that most of the necessary actors are already in place. More important are the changes in organizational boundaries surrounding the activities that occur within the NIS, as well as the incentives that exist for actors to



undertake these activities and to perform well. These changes need to be undertaken alongside an effort to enhance the links between actors.

The dynamism of the network cluster induces local governments as well as intermediary agents to build up supporting institutions and target specific policies toward the rapidly evolving clusters. This feature distinguishes network clusters from simple agglomerations of foreign investments such as those that exist in export processing zones; in the latter, agglomeration economies are usually confined to the final assembly stage, and inter-firm cooperation is almost nil. Strengthening the NIS system in the PRC in this regard is therefore an important and useful step. We recommend the following components for a network cluster strategy oriented toward SME promotion.

Improving the Regulatory Environment for Private Business

The PRC's firms often suffer from a regulatory framework that imposes high costs in terms of time and money in their relationships with government authorities. In the short run, nationwide reform may not be realistic. A balance must be reached in terms of practical measures that would provide a positive environment for private business establishment and operation. These measures should include the establishment of long-term consultation mechanisms between the local business community and local government, the removal of unnecessary red tape and simplification of bureaucratic procedures to promote efficiency, the introduction of agencies that assist in business formation at the local level, and the provision of better



training to local civil servants, coupled with meritocratic recruitment policies.

Stimulating Inter-firm Cooperation

Firms in the PRC that are currently organized as clusters often do not engage in much inter-firm cooperation. Creating an awareness of the necessity for substantial improvements is a crucial precondition for intensified inter-firm cooperation. To accomplish this, government policy could offer tax incentives to highlight the advantages of cooperation within the network cluster. Alternatively, policymakers could adopt benchmarking schemes with firms elsewhere. Such benchmarks may show firms how far behind they are compared to the industry leaders.

Sharing Information, Advice, and Training

Informational asymmetries are currently a significant inhibitor of SME growth in the PRC, especially with respect to the financial constraints that they face. One advantage of the network cluster approach is that a network cluster may make it feasible for financial institutions to establish long-term relationships with the network cluster. The government could play a role in the dissemination of information by establishing dissemination standards.

A related problem that existing clusters in the PRC face is the poor match that occurs between the supply of and the demand for trained personnel. Often, the demand for qualified workers outstrips supply. The government could act as an intermediary agent that organizes clearinghouses that facilitate the exchange of human resource needs between firms and training institutions, and aid in matching skill training to firm needs.



R&D and Domestic Technology Transfer

The mere creation of an infrastructure for the promotion of R&D activities does not guarantee that the infrastructure will be put to use. Communication is key to ensuring the effective use of infrastructure. In industrialized countries, business associations often endogenously develop in order to fill the important roles of moderators and facilitators. A middle-ground approach would be for the PRC's policymakers to relax the rules that apply to business-related associations. Another approach would be for the government to establish intermediary organizations that act as brokers in the formation of inter-firm networks within network clusters. Such organizations could then assist companies in linking up with support services. The goal of such organizations would not be to actively promote technology transfer; rather, they would offer a medium by which SMEs could make clearer demands to technology suppliers such as universities, technological institutes, and industrial development centers. This would render technology transfer more demand-driven, and hence would cater to the idiosyncratic cultural aspects of the PRC's domestic market. At the same time, these organizations could also create a national referral network, which would permit these suppliers of technology and know-how to be better matched with SMEs that have need for their specific technology. As such, "innovation networks" could be established that involve firms and institutions such as universities, R&D institutes, and engineering consultancies. These networks could be the basis for indigenous research capabilities, which would help wean the PRC off its dependence on foreign designs and methods.



International Technology Transfer

International technology transfer has been somewhat limited by concerns over intellectual property protection. The PRC's intellectual property regime remains marginal at best. In the medium to long run the PRC will need to develop a more comprehensive intellectual property regime, especially if it is to encourage the indigenous development of research. A step forward may be to establish network cluster-specific intellectual property offices that take enforcement more seriously, especially within the network cluster. With repeated interactions, intellectual property violations may be more easily detected and enforced. In the future, these offices could be expanded into regional intellectual property strategy headquarters. This decentralized approach may be more feasible than the PRC's existing centralized approach, headed by the State Intellectual Property Office.

Technological knowledge could also be acquired from external sources by, for example, the use of international consultants, licensing arrangements between local and foreign companies, sending local workers abroad for training, and encouraging multinationals' affiliate plants to engage in mentoring partnerships with their local supply chains—all of which would benefit from the infrastructure and stability provided by a network cluster.



6. Conclusion

Certain industries—in particular, the small- and medium-sized enterprise (SME) sector—may play a significant role in terms of further economic reforms in the People’s Republic of China (PRC). As a late-industrializing economy, the PRC has the opportunity to enhance the competitiveness of its industries by limiting its shortcomings as a late entrant while tapping its unique strategic resources. This policy brief has shed light on these issues by proposing a strategy that is oriented toward SMEs.

An increasing number of studies suggest that the key constraint to firm growth stems not so much from size, but from the fact that small firms face limited resources: when operating independently, they cannot access the variety of resources available to larger firms. Clustering allows SMEs to benefit from the advantages of agglomeration and external economies of scale. The network cluster strategy is particularly suited to the PRC at this stage in its development and transition, since the collective nature of the cluster may also help resolve the problem of the “missing middle,” i.e., the absence of medium-sized enterprises. Therefore, we have made a case for a network cluster strategy that would enhance the links between existing actors while building on the PRC’s existing industry policies. The successful pursuit of such a strategy would enable SMEs to increase in size (collectively), adopt technology that adds more value, and serve global markets.

About this Research Policy Brief

The small- and medium-sized enterprise (SME) sector can play a significant role in further reforms of the People's Republic of China's national innovation system, which, in turn, could spur continued growth. This policy brief highlights how issues such as innovation, research and development, and strategic clustering influence the SME sector, and outlines internal and external conditions that may affect the further development of this sector.

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