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Strategy for Cluster-Based Industrial Development in Developing Countries

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Abstract

Discussions on industrial policy are back on the scene primarily because of the failure of the Washington Consensus as a development strategy. Having emerged is a new consensus that the industrial policy should address market failures while pursuing comparative advantage. However, it is unclear where markets fail, how market failures can be corrected, and whether governments can identify them. In the literature, credit provision, management training, and information externalities arising from industrial clusters and foreign direct investment are discussed separately as means to promote industrial development. This study proposes a strategy for cluster-based industrial development based on a comprehensive review of the relevant literature.

Introduction

Renewed interest in industrial policy has been emerging because of the failure of the Washington Consensus, which advocates liberalization and privatization of the developing economy, as a development strategy. The new consensus is that industrial policy ought to address market failures and target the development of industries that have a comparative advantage (e.g., Rodrik 2004; Lin 2012; Nathan and Overman 2013; Stiglitz et al. 2013; Calcagno et al. 2015; Noman and Stiglitz 2017; Higuchi and Shimada 2019; Aiginger and Rodrik 2020; Asian Development Bank 2020; Fernándex-Arias, Hausmann, and Panizza 2020). Surprisingly, it took more than a few decades to arrive at this new consensus because it is nothing more than the firmly established thrust of microeconomics.

The real questions are where markets fail and in what industries the comparative advantage resides. The related question is whether the government possesses the ability to identify market failures and promising industries. Rodrik (2004, p. 3) argues that “the task of industrial policy is as much about eliciting information on significant externalities and their remedies from the private sector as it is implementing appropriate policies.” This is what the South Korean government did to promote industrial development, according to Pack and Westphal (1986). On the other hand, Fernándex-Arias, Hausmann, and Panizza (2020) contend that market failures are so complex that policymakers do not know where markets fail. They advocate the establishment of national development banks staffed with experts of economics capable of designing effective development policies while paying attention to positive externalities.

My view is that it is the role of development economists to identify market failures and provide appropriate policy recommendations for industrial development,[1] possibly in collaboration with the private sector. In fact, there is voluminous literature in development economics concerned with failures of credit markets as well as markets providing management skills and positive externalities arising from the formation of industrial clusters and foreign direct investment. For instance, a large number of experimental studies examined the impact of credit on the performance of microenterprises (e.g., Banerjee et al. 2017; Fiala 2018), and many experimental studies have evaluated the impact of management training of entrepreneurs on the performance of their enterprises (e.g., McKenzie and Woodruff 2014; McKenzie 2020). Information externalities, particularly those arising from clustered enterprises, global buyers, and subsidiaries of foreign multinational companies (MNCs), have also been extensively analyzed (e.g., Sonobe and Otsuka 2006, 2011, 2014; Murakami and Otsuka 2020). In other words, development economists have already been analyzing market failures in developing economies.

The problem is that these strands of economic analyses have been carried out independently and separately. Thus, we do not know whether credit and management skills are complementary and which policy should be implemented first, subsidized credit or management training.[2] Furthermore, although it is well-known that innovation is an engine of economic development,[3] these studies, in general, do not pay attention

[1] In this article, I do not cover "industrial clusters for agro-processing," because there are additional issues related to the development of agriculture. See Otsuka and Ali (2020) for a discussion on the development of agro-based clusters.

[2] Giné and Mansuri (2020), however, attempted to analyze this issue without notable success.

[3] Innovation here does not necessarily refer to big change leading to constructive destruction as envisaged by Schumpeter (1934). It is defined to be new change leading to improvement of production efficiency.

to relationships between innovation and credit or management skills. While learning from abroad is known to be a significant source of innovations in the process of miraculous development of East Asian countries (e.g., Pack and Westphal 1986; Amsden 1989; Wade 1990a, 1990b; Hobday 1995; Sonobe and Otsuka 2006), such aspect of innovation has seldom been taken into consideration in the recent development economics literature.

This article attempts to propose an effective strategy for cluster-based industrial development based on a comprehensive literature review. I use the term *strategy* rather than *policy* because I would like to propose industry-specific policies targeting particular industries, rather than a comprehensive package of industrial policies encompassing not only industry-specific policies but also macro policies and functional policies affecting many industries.[4] I emphasize *cluster-based industrialization* rather than *industrialization* because industrial clusters' development ought to play a central role in industrialization in developing countries for a number of reasons that will be discussed in this article. I do not deny, however, the importance of all-encompassing industrial policies. I focus on narrowly defined targeted policies primarily because rich and useful empirical evidence is available for formulating such policies. Specifically, I would like to support the development of existing industrial clusters in developing countries by investing in entrepreneurs' managerial human capital and promoting subcontracting and other contractual relationships between foreign and local enterprises.

[4] Stiglitz et al. (2013) and Noman and Stiglitz (2017) argue that industrial policy refers to public policy measures aimed at influencing the sectoral allocation and accumulation of resources and choice of technologies.

The structure of this article is as follows. While Section 2 discusses the nature of market failures in industrial clusters, Section 3 explores how to identify promising industries with comparative advantage. Section 4 reviews the literature on the impacts of credit provision, including microcredit and management training on enterprise performance. Section 5 considers the role of foreign direct investment in the development of local industries. Finally, I would like to conclude the paper by offering several strategies that are expected to be conducive to industrial development in developing countries.

Market Failures and Industrial Clusters

More often than not, manufacturing industries are clustered both historically and currently in developed and developing countries. Hashino and Otsuka (2016) report that many industries are clustered in modern Japan, postwar Europe, and many contemporary developing countries. While Long and Zhang (2011) argue that industrial development in China is cluster-based, particularly in Zhejiang province where rapid industrialization was led by small- and medium-sized private enterprises (SMEs), Hobday (1995) points out that a major characteristic of manufacturing industries in Taipei, China is the overwhelming dominance of industrial clusters consisting of SMEs. Industrial clusters are also ubiquitous even in sub-Saharan Africa in such industries as apparel, footwear, metal products, and furniture (e.g., Sonobe and Otsuka 2011, 2014). These industries are common and typically run by microenterprises in low-income economies (Tybout 2000).

Sonobe and Otsuka (2006, p. 4) define “an industrial cluster as the geographical concentration or localization of enterprises producing similar or closely-related

products in a small area," which is a fairly representative definition of industrial cluster. On the other hand, Porter (1990) defines a cluster as the geographic concentration of interconnected companies, specialized suppliers, firms in related industries, and associated institutions (e.g., universities, standards agencies, and trade associations). A significant difference between the two definitions is the inclusion of the associated institutions in the latter. Such institutions emerge in the process of the successful development of industrial clusters (Hashino and Otsuka 2016). Hence, Porter's definition is generally applicable for successfully developed, mature industrial clusters in developed countries. Such institutions, however, should not be included in the definition when we analyze industrial clusters in developing countries where they seldom exist.

Manufacturing enterprises tend to be clustered because of the agglomeration of economies. According to Marshall (1920), there are three advantages of industrial clusters: (1) the specialization and division of labor among enterprises, (2) the development of skilled labor markets, and (3) information or knowledge spillovers among clustered enterprises.[5] Such agglomeration economies arise from low transaction costs due to the geographical proximity of enterprises. In other words, the industrial cluster is an artificially-created institution to reduce transaction costs so as to mitigate market failures, particularly in markets of intermediary inputs and labor. Such markets improve resource allocation and guide appropriate technology choice and development by providing appropriate price signals.

[5] Recently Greenstone, Hornbeck, and Moretti (2010) describe agglomeration economies differently but its essence is no different from Marshall's.

Information spillover, which is basically imitation through visual observation, reverse engineering, spin-offs of workers, and poaching of skilled engineers and managers from other enterprises, is also very important in industrial clusters. According to Audretsch and Feldman (1996), knowledge-intensive industries tend to be clustered in the United States (US). However, in developing countries, labor-intensive industries are also clustered (e.g., Sonobe and Otsuka 2006, 2011, 2014). Sonobe and Otsuka also point out, based on roughly 20 case studies conducted in Asia and Africa, that the formation of an industrial cluster is led, without exception, by spin-offs of workers who establish new enterprises producing the same products as those produced by their former employers, using the same technologies, and selling them in the same market. This is prima facie evidence that information spillovers are prevalent in industrial clusters. Greenstone, Hornbeck, and Moretti (2010) observed substantial increases in total factor productivity among incumbent plants following the opening of large plants, particularly in areas in the US where similar technologies are adopted.

Given innovative ideas, knowledge spillovers enhance the production efficiency of both existing and those that have just entered a cluster. Simply put, firms' productivity in an industrial cluster is a function of the density of economic activity (Kline and Moretti 2014a). Knowledge spillovers, however, reduce incentives to innovate by creating the gap between private and social benefits. Bloom, Reenen, and Williams (2019, p.166) rightly point out that "knowledge spillovers are the central market failure." If this is the case, as it certainly is, the industrial cluster reduces failures in a few markets but creates failure in the *knowledge market*. This is why collective action is needed to internalize the externality associated with information spillovers. In fact, trade associations, particularly in successfully growing clusters, play a critical role in

introducing new ideas from other areas, providing training to member enterprises to disseminate them, and enforcing quality standards to maintain a cluster's reputation as a producer of decent products.[6] If trade associations do not work or work only nominally, policy interventions to support the generation and dissemination of innovations can be justified. In the case of Japan in the early twentieth-th century, the government advised local trade associations, which were spontaneously established primarily in industrial clusters, to set up training schools and experimental and testing stations, and responded to the request for assistance by sending officials and engineers (Sugihara 1994). In Silicon Valley, fierce competition for innovation led to cooperation and the sharing of knowledge among competing firms for collective benefits (Boldrin and Levine 2008).

Indeed, economic geographers argue that the presence of agglomeration economies can justify the implementation of place-based policies (Glaeser and Gottlieb 2008). While place-based policies are likely to be welfare-enhancing for the target community, they may be welfare-reducing for the nation as a whole because of the economic losses associated with the geographical diversion of economic activities and resources (Kline and Moretti 2014a).[7] However, this is unlikely to be the case for supporting a particular industrial cluster in developing countries because competing industrial clusters, from which laborers may move, are either absent or limited in these countries. Thus, this study advocates policy support for developing industrial

[6] See, for example, Nadvi (1999) for the case of a surgical instrument cluster in Pakistan, Schmitz and Musyck (1994) for the case of several industrial clusters in post-war Europe, Ruan and Zhang (2016) for the case of a number of industrial clusters in Zhejiang Province in China, and Hashino (2016) for the case of silk-weaving clusters in modern Japan.

[7] There are empirical studies which confirm the positive effects of place-based policies in the US (e.g., Busso, Gregory, and Kline 2013; Kline and Moretti 2014b).

clusters by generating or importing useful new technologies and management practices and providing management and technology training, which amounts to correcting the failure of "knowledge markets."[8]

Comparative Advantage, Target Industries, and Technological Change

While it is not easy to identify market failures, it is more challenging to identify industries with a comparative advantage because it depends on factor endowments and a country's technologies vis-à-vis that of many other countries. Therefore, it is a formidable task to identify a particular industry's comparative advantage in a particular country. Emphasizing the importance of following the changing comparative advantage for developing economies to succeed in industrialization, Lin (2012) argues that developing countries should target mature industries in countries with a similar factor endowment that is not too far advanced compared with their own level of per capita income. According to Komiya (1988), the desired industries targeted by the Japanese government were those that had already been pursued by countries more advanced than Japan. Wade (1990b) suggests that following Japan's experience, the Industrial Development Bureau and its predecessor Industrial Development Commission in Taipei, China in the 1960s assisted in establishing and developing promising industries (i.e., plastics, rayon, cement, and fertilizer) and later supported the electronics industry. Lin's argument, therefore, would be consistent with industrial policies in Japan and Taipei, China.

[8] Support for industrial clusters is unpopular in developed countries, because declining clusters are often supported without success (e.g., Martin, Mayer, and Mayneris 2011; Beason and Weinstein 1996).

Rodrik (2004) argues that the government may not know what they do not know. Thus, he argues that the right model of industrial policy is to facilitate strategic collaboration between the private sector and the government to uncover where the most significant obstacles to restructuring lie and what types of interventions are most likely to remove them. Consistent with this argument, the South Korean government closely consulted with the private sector in designing its industrial policy (e.g., Pack and Westphal 1986). Suspecting governments' inability to identify market failures and industries with the comparative advantage, Fernándex-Arias, Hausmann, and Panizza (2020) advocate the establishment of national development banks capable of carrying out industrial policy effectively. According to them, a national development bank, whose staff include professional analysts of the economy, has the advantage in identifying promising firms and industries through loan screening and lending activities. I agree with them that professional staff with proper knowledge of economics must design and implement an effective industrial development policy.

It seems that Rodrik (2004) and Lin (2012), as well as Stiglitz et al. (2013), implicitly assume that there are few industries in developing countries, particularly in sub-Saharan Africa. This is, however, not true. There are a large number of garment, leather shoe, metalworking, fish canning, furniture, and food processing clusters in sub-Saharan Africa (McCormick 1999; Akoten and Otsuka 2007; Galvez-Nogales 2010; Sonobe and Otsuka 2011, 2014; Mano et al. 2012, 2014; Higuchi, Mhede, and Sonobe 2019). These industries are labor intensive and, hence, consistent with factor endowments of low-income economies.

Table 1 summarizes the basic characteristics of 17 industrial clusters in Asia and Africa studied by Sonobe and Otsuka (2006, 2011, 2014). Some of the clusters are huge; there are an estimated 900 small leather shoe enterprises with an average employment of 10 workers in Addis Ababa in Ethiopia and 1,000 small metalworking enterprises in Kumasi in Ghana. The founders of these clusters were mostly small family enterprises, including former farmers and tailors. Gradually the clusters have been formed spontaneously by private enterprises without any or much government support. This clearly supports the view that these clustered industries have a comparative advantage. Therefore, we strongly argue that the government should target existing industrial clusters for development. Porter (2000) also argues that the government should reinforce and build on established and emerging clusters rather than attempt to create entirely new ones because new industries and new clusters emerge from established ones as economies develop. This view is consistent with Hidalgo et al.'s (2007) observation that new products gradually evolve from existing ones rather than emerge from scratch.

Comparative advantage is strengthened and transformed with technological change and changes in factor endowments over time. There is a broad agreement among development economists that learning advanced technology and management from abroad is critical to the catch-up growth of low-income economies (e.g., Mazzoleni and Nelson 2006). Indeed, this view is supported by the development of Japan, South Korea, and Taipei, China. The story of technological change based on learning from abroad in the long-term process of economic development since the late 19th century in Japan is well-known. The Japanese government sent hundreds of Japanese, many of whom were recruited from local trade associations, to Europe and the US to learn

western technology (Sugihara 1994). Japan also invited a large number of foreign advisers and consultants (Odagiri and Goto 1996). Hobday (1995) argues that although industrial structures are quite different between South Korea, which is dominated by large conglomerates or *chaebol*, and Taipei, China which relies on SMEs, there are similarities in mechanisms for acquiring new foreign technology. Hobday (1995) and Wade (1990a, 1990b) observed that local and foreign traders were important technology conduits, as were the subsidiaries of MNCs, through their subcontracting arrangements, including training of local engineers and technicians. Levy (1991) observed that Japanese traders supported the development of the footwear industries in both Taipei, China and South Korea, and both countries sent vast numbers of workers abroad for training (Amsden 1989; Wade 1990b). Amsden (1989) also points out that the star of technology transfer to South Korea was the short-term independent consultants from Japan.[9]

Another common strategy for industrial development in Taipei, China and South Korea is the institutionalization of technology imports. In Taipei, China the Electronics Research and Service Organization, under the guidance of the Industrial Technology Research Institute, for example, was given the responsibility of guiding the development of core technologies and new products and for training microelectronic engineers, some of whom moved to private industry and established spin-off companies (Wade 1990a, 1990b). Wade (2015) argues that the Industrial Development Bureau plays an extension role in Taipei, China similar to an agricultural extension service. In other words, the introduction, assimilation, and diffusion of new

[9] According to my ongoing research, a large number of Japanese private consultants contribute to the improvement of technologies and management of local companies in the motorcycle and automobile industries in Thailand as well as in India.

foreign technologies were assisted by public organizations in Taipei, China. Similarly, the South Korean government set up the Electronics and Telecommunications Research Institute, which helped major conglomerates enter the telecommunications industry, and the Korean Institute of Science and Technology to absorb and adapt foreign technologies and to promote R&D in private firms (Amsden 1989; Hobday 1995). Although it is not easy to quantify the impact of such government technology policies on the development of industries in Taipei, China and South Korea, there is no question that governments of these two countries made serious efforts to nurture promising industries with dynamically-growing comparative advantage by facilitating *learning technology from abroad*.

To the best of my knowledge, the most spectacular example of the successful development of industrial clusters based on learning from abroad is the case of the garment industry in Bangladesh (Mottaleb and Sonobe 2011). When the Daewoo company of South Korea planned to initiate garment production through a technology agreement with a Bangladeshi company in 1979, there was no garment factory in the country. Thus, Daewoo invited 130 newly-recruited employees to Korea for nine months of training on garment production, quality control, marketing, and so on. Knowledge acquired by training was not company-specific but general for the garment industry. After returning to Bangladesh, all of the trained workers quit in a few years, either to initiate their own garment companies or to launch trading companies to assist the procurement of materials and export of final products for new garment companies. Approximately 4,000 garment enterprises with an average employment of 700 workers operated in 2010, and they accounted for more than 80% of exports from this country. The garment industry in Bangladesh would not have developed so dramatically without

intensive learning of useful knowledge from South Korea. Another lesson we must learn from the Bangladeshi experience is that the social benefit of training exceeds the private benefit because of the *information spillovers* brought about by the trained workers who quit. Thus, no other foreign enterprises have followed the policy of intensive training of employees abroad adopted by Daewoo, even though it resulted in the dramatic development of Bangladesh's garment industry.

To sum up, it makes sense to support the development of existing industrial clusters, which are deemed consistent with the country's comparative advantage, by enabling or facilitating the learning of new useful knowledge from abroad.

Impacts of Microfinance and Management Training

It is widely believed that credit markets do not function well because of the asymmetric information, adverse selection, and moral hazard, coupled with the lack of collateral of borrowers and high default costs associated with risky small businesses. Management skills in developing countries are inadequate partly because their value tends to be underestimated and partly because management training, such as an MBA program, is not practical. Access to credit and management skills, therefore, are widely considered critical factors affecting manufacturing enterprises' performance. To assess the importance of credit and management skills in enterprise performance, many randomized controlled trials (RCTs) have been conducted primarily for microenterprises in developing countries. This section attempts to review briefly the results of recent studies on the impacts of microfinance and management training to draw implications for a strategy for cluster-based industrial development. Note, however, that only a small number of studies are concerned with management training

in industrial clusters.[10]

Assessment of microfinance and credit provision

Reviewing the experimental studies of microfinance, Banerjee, Karlan, and Zinman (2015) argue that microcredit has modestly positive but not transformative effects on business activities. Similarly, Banerjee et al. (2017) conclude that microcredit provision has a modest impact on business activities, but there is very little evidence of increased consumption. These findings indicate that microfinance clients do not seem to be severely constrained by the lack of credit. In contrast, however, de Mel, McKenzie, and Woodruff (2008) and Fafchamps et al. (2014) found that the provision of grants, particularly in-kind grants, to microenterprises had significant and large impacts on the rate of return; 60% per year in Sri Lanka and 15% per month in Ghana. These studies also found that grants had no or little effects on female-owned businesses, particularly female-managed subsistence enterprises. Later Fiala (2018) found that in Uganda, microcredit has no effects on business and household income because of particularly weak effects among women.

The provision of credit does not have significant effects on women's business activities because they may not be major decision-makers or the most capable in managing microenterprises, or their behaviors may be constrained by culture and tradition. More recently, Banerjee et al. (2019) discovered that although the provision of microcredit to women had no effect on their microenterprise's performance on average, it has

[10] Ruan and Zhang (2009) demonstrate in the context of China that because of the fine division of labor among enterprises in industrial clusters, each firm specializes in a narrow range of production processes, which saves working capital and initial fixed capital investment. Akoten, Sawada, and Otsuka (2006) find that access to formal credit is not a decisive factor affecting the performance of microenterprises in the garment cluster in Kenya, because of the development of informal credit markets within a cluster.

positive and persistent effects on women already running a business, who must have accumulated business skills through experience. They conclude that heterogeneity in entrepreneurial ability is an essential factor affecting microcredit's impact on business activities. Such a conclusion is consistent with the findings of Gindling and Newhouse (2014) that only a small portion of self-employed business people have the potential to be successful. Thus, if possible, interventions, such as microcredit, should target the minority of those who are self-employed but with high growth potential.

It appears that the provision of credit alone may not be sufficient to significantly improve the performance of microenterprises unless entrepreneurs have the ability to manage their businesses efficiently. We now turn to the role of managerial ability, which has received considerable attention in the literature, particularly since the highly stimulating paper by Bruhn, Karlan, and Schoar (2010).

Assessment of management training

The importance of management in enterprise performance was strongly suggested by Bertland and Schoar (2003), who found that differences in management practices are systematically related to differences in enterprise performance; by Bloom and van Reenen (2010), who found that one crucial explanation for the large difference in productivity between firms and countries is the variation in management practices; and by Bandiera et al. (2018) who found that the work hours of chief executive officers are a critical determinant of enterprise performance. In addition, a review of studies on small enterprises in several developing countries by McKenzie and Woodruff (2017) found that variation in business practices explain much of the variation in sales, profit, and total factor productivity. A pathbreaking study in this area is Giorcelli (2019), who found that small-scale Italian manufacturers employing about 50 workers who were

invited to the US to take management training under the Marshall Plan significantly improved enterprise performance even 15 years after the program.[11] Furthermore, he found that management and new machines were complementary and that those enterprises which received only new machines without taking management training improved their enterprise performance but only temporarily. He concludes that credit access or access to new machines mattered only after enterprises improved their management skills.

There is significant evidence based on the RCT that management training improves not only the management practices (e.g., quality of products, inventory management, sales, return on assets, and profit) but also the performance of small to medium enterprises, in the cotton weaving plants in India (Bloom et al. 2013) and the manufacturing, commerce, and service enterprises in Mexico (Bruhn, Karlan, and Schoar 2018). Furthermore, in conducting a resurvey of the same plants, Bloom et al. (2020) found that the intervention generated persistent or long-term impacts on treated plants in India. Bruhn, Karlan, and Schoar (2018) also found long-term impacts of management training on employment generation.

Results of management training for microenterprises with a few or no paid employees seem puzzling. According to the survey of 13 RCT-based studies by McKenzie and Woodruff (2014), most studies found significant impacts of management training on adopting improved management practices but did not find statistically significant impacts on firm profitability. Another survey by McKenzie and Woodruff (2017), which

[11] He used, as a control, a group of Italian entrepreneurs who were initially invited but their invitations were later cancelled due to a budget cut caused by the outbreak of the Korean War.

includes non-RCT studies, basically supports their earlier findings. They also point out that impacts on firm performance are small because the training programs achieve changes in management practices that are not large enough to translate into higher enterprise performance. According to them, possible causes for such results may be (1) small sample size, (2) assessment of very short-run impacts, (3) large heterogeneity of sample enterprises, (4) short training courses, and (5) focus on microenterprises. These points are sensible, and I would like to add that because the sample enterprises in the existing studies belong to a variety of industries with different requirements for efficient management and because the management of microenterprises is not complex compared with SMEs with sizable numbers of employed workers, it would be difficult to detect statistical differences in enterprise performance between treated and controlled enterprises.

More recent RCT-based studies of management training by Karlan, Knight, and Udry (2015) in Ghana; Lafortune, Riutort, and Tessada (2018) in Chile; Brooks, Donovan, and Johnson (2018) in Kenya; Iacovone, Maloney, and McKenzie (2019) in Colombia; and Giné and Mansuri (2020) in Pakistan tend to make similar findings,[12] even though several new findings are made such as the effectiveness of the use of mentors and ex-students and group training.

The lack of significant management training effects on enterprise performance may be interpreted as showing that traditional management training does not work or does not have large effects. However, McKenzie (2020) attributes this to low powers of

[12] Sample enterprises of Iacovone, Maloney, and McKenzie (2019) are medium with the average employment of 58 workers, whereas those of the others are microenterprises. It must also be noted that Giné and Mansuri (2020) find significant impacts of management training on business income and household expenditures for male businessmen.

statistical analyses; his meta-analysis demonstrates small but significant effects of management training on enterprise performance.

In my view, a major defect of management training studies is the lack of analysis of information spillovers. The majority of sample enterprises are engaged in different businesses, so that information spillover, if any, may not be substantial. Then, how can we justify the provision of management training by the public sector from the social point of view? Many entrepreneurs indeed underinvest in learning about improved management practices because they are not aware of the real value of management training (Bloom and van Reenen 2010; Bloom et al. 2013; Suzuki, Vu, and Sonobe 2014; Shimada and Sonobe 2018; Iacovone, Maloney, and McKenzie 2019). If so, the best policy is to disseminate the right information but not offering subsidized management training programs. Another shortcoming is the exclusive focus on management without considering how improved management can facilitate technological innovation. I believe that management training should be combined with technical training.

A few studies applied RCT to the management training of small enterprises, with an employment size of 5–25 workers, in industrial clusters. These are in the metalworking cluster in Ghana (Mano et al. 2012); garment and steel bar clusters in Vietnam (Higuchi, Nam, and Sonobe 2015); and garment cluster in Tanzania (Higuchi, Mhede, and Sonobe 2019). The training programs commonly employ standardized methods of business development training, such as the International Labour Organization's *Start/Improve Your Business* program covering the areas of marketing, costing, record-keeping, and financial planning. Moreover, these training programs have also

included quality control and production management called *Kaizen* or continuous improvement, which used to be viewed as Japanese-style management but is now considered a world standard. *Kaizen* is inexpensive and makes use of a common-sense approach focusing on waste reduction, including the elimination of inventory, equalized work burdens of all workers in the same production line, quality management, routinized machine maintenance, and maintenance of clean and uncluttered workspaces.[13] *Kaizen* experts are generally industrial engineers who provide managerial knowledge and technological advice for the layout of production lines, division of labor among shop-floor workers, and inventory management. Although reliable statistics are unavailable, it is no exaggeration to argue that many large manufacturing enterprises in developing countries employ *Kaizen* (Kaplinsky 1994; Otsuka, Jin, and Sonobe 2018). Since information spillovers are prevalent within an industrial cluster, the RCT studies would have suffered from information spillovers from trainees to non-trainees, which dilutes the measured impacts of management training. Yet, it is remarkable that some of these RCT studies find significant effects of management training on enterprise performance, even in the medium-run of a few years after the training programs as *Kaizen* is designed to facilitate a continuous improvement of management efficiency.[14]

If management training is used as an instrument to develop manufacturing industries, it should be implemented in industrial clusters. A major challenge for empirical researchers is how to assess the impact of information spillovers from trainees to non-

[13] Suzuki, Vu, and Sonobe (2014) and Shimada and Sonobe (2018) found that after *Kaizen* management training, trainees became more willing to pay significantly larger amounts for training fees.

[14] By applying the propensity score matching method, Mano et al. (2014) found significant effects of management training, including *Kaizen*, on enterprise profit in the metalworking cluster in Nairobi.

trainees within a cluster, rather than ignoring research on the impact of management training in industrial clusters.

Role of Foreign Direct Investment

There have been many econometric studies on the impact of foreign direct investment on the productivity of local firms (see Murakami and Otsuka [2020] for the most recent literature review). Typically, total factor productivity of a local firm is regressed on (1) the presence of foreign firms in the same industry (e.g., measured by the share of production) to determine the effect of horizontal linkage; (2) the extent of connection with foreign firms in the upstream industries, also known as forward linkage; and (3) the extent of connection with foreign firms in the downstream industries, which is related to the effect of backward linkage. Roughly speaking, the horizontal linkage effect is negative due to the loss of local firms' market share, the forward linkage effect is small or negligible, and the backward linkage effect is positive and significant. Since Javorcik's (2004) pathbreaking study, many studies have found positive and significant backward linkage effects. While the linkage effects may be closely related to the information spillovers, it may not necessarily be so because other channels affect the flow of useful information. In fact, one may wonder how the technology of downstream foreign firms or their subsidiaries spills over to upstream local firms despite the difference in products and technologies.

According to Table 1, the average size of enterprises in terms of the average number of workers per enterprise is much larger in industrial clusters where foreign enterprises, be it subsidiaries or joint ventures, operate. This includes the case of the garment industry in Bangladesh. In contrast, the size of enterprises is generally

smaller in clusters where foreign enterprises do not operate. These observations suggest that technology might have been transferred from foreign to local enterprises in industrial clusters because of the ease of information spillovers.

As Hobday (1995) points out in the context of East Asia and from what I personally observed in Thailand, India, and South Africa, foreign subsidiaries, which are often engaged in assembly, provide blueprints, technical advice, and training of engineers to subcontracted local firms. Since the procurement of cheap and decent quality parts and intermediary products is critically important for foreign subsidiaries, they have clear incentives to transfer useful skills and know-how to the subcontracted local firms. This is, however, not information spillovers but the market transaction of information. Such technology transfer, however, is bound to fall short of the social optimum because parts-supplying local firms do not work exclusively for the subcontractor and may use acquired technology for purposes other than the delivery of parts and intermediate products to the subcontractors.

Technology may be transferred to local firms not only by foreign subsidiaries through subcontracting but also by global buyers (mostly large supermarkets in developed countries) and foreign traders, and foreign manufacturers offering original equipment manufacturer (OEM) contracts to local firms in which the former provide blueprints and technological advice to the latter to produce products of their brand, and own-design manufacturing (ODM) in which local firms are also engaged in designing for the products of foreign manufacturers. As was argued by Gereffi, Humphrey, and Sturgeon (2005), among others, global buyers may play a critical role in technology transfer in the apparel and other light industries.

Regardless of whether information spillovers or training and other conscious efforts to transfer technology are important, it is obvious that local firms' absorptive capacity is the key to transferring advanced technological and management information. The point here is that so far as information spills over from foreign to local enterprises or from subcontracted local enterprises to others, the "information market" is bound to fail. Thus, it must be the role of governments to invest in the transfer of valuable information to entrepreneurs, managers, and industrial engineers through training in order for local firms to receive greater benefits from foreign firms, traders, and buyers.

Strategy for Industrial Development

The efficiency of the economy improves primarily with (1) improved resource allocation, (2) technological change, and (3) improvement of management skills or accumulation of managerial human capital. I argued in this article that industrial clusters contribute to improved resource allocation by reducing transaction costs and thereby facilitating market transactions. I also argued that because of information spillovers, investments in new technology and managerial human capital tend to be insufficient unless trade associations organize collective action to internalize the externality or the government provides appropriate support for such critical investment activities. By way of summary and conclusion, I would like to specify four essential elements of an effective strategy for cluster-based industrial development in the following subsections.

Promote the development of existing industrial clusters

Industrial clusters consisting of microenterprises and SMEs are ubiquitous even in non-industrialized, low-income economies. They have been formed spontaneously

without government support in order to reduce market failures by reducing transaction costs. Such clustered industries must have the comparative advantage. Thus, I would like to recommend to support the development of such industrial clusters. Many of them, however, are stagnant. As Porter (1990, 2000) points out and Sonobe and Otsuka (2006, 2011, 2014) observe, such industrial clusters, or at least some of them, have the potential to evolve and develop to become dynamically-growing clusters. Page (2012) agrees with this recommendation.

Invest in the human capital of entrepreneurs for innovations

Since entrepreneurs' managerial human capital is a major missing factor that constrains the growth and productivity of micro and small enterprises, I recommend investing in their managerial human capital by offering management training. Management training is essential not only for enhancing human capital but also for screening promising and non-promising entrepreneurs because the difference in innate management ability between them becomes apparent after the training (Otsuka 2018). Since only a small fraction of small enterprises have the potential to be successful, as discussed by Gindling and Newhouse (2014), this screening function is highly important. Nevertheless, management training is only one aspect of learning from abroad. For successful innovation, training to learn advanced technologies from abroad is also essential. Thus, I recommend combining management and technology for local entrepreneurs to stimulate innovations or enhance their absorptive capacity.

So far as access to credit is indispensable for innovations, support for credit provision to promising entrepreneurs can be justified after the management and technology training. A possible alternative is introducing *Kaizen*, as it intends to promote low-cost or cost-saving management without requiring substantive additional investments. The

establishment of industrial zones for promising entrepreneurs will also be useful once identified by the training.[15]

Strengthen contractual relationships with foreign enterprises

As the East Asian experience amply illustrates, there are many channels through which enterprises in developing countries can learn advanced technologies and management methods from abroad. They include foreign traders and global buyers, who provide blueprints and basic technology to local enterprises; foreign manufacturers which order OEM and ODM; and subsidiaries of MNCs, which provide training to subcontracted local part-supplying firms. Local enterprises employing foreign advisers who used to work for foreign companies seem to be another effective way of learning from abroad.

Attracting the attention of foreign traders, buyers, manufacturers, and MNCs to local production in developing countries is not an easy task. The establishment of industrial zones with appropriate infrastructure and the promulgation and enforcement of the rules of fair transactions are necessary. Also, the availability of trained managers, engineers, and workers, and the services of supporting industries, which provide parts and intermediary products and repair services, are indispensable. To nurture such labor force and industries, the upgrading of existing industrial clusters by investing in competent entrepreneurs' human capital seems to be a prerequisite.

Role of government

The role of government is to stimulate innovations by correcting market failures arising

[15] The establishment of special economic zones (SEZs) is not successful in Africa (Farole 2011), presumably because of the failure to nurture entrepreneurs willing to locate their factories in SEZs.

from information spillovers. More specifically, the government should support the development of existing industrial clusters by investing in managerial and technological training for entrepreneurs, establishing industrial zones, supporting credit provision, and enforcing rules of transactions. It is also appropriate for the government to support trade associations' activities while clearly recognizing a critically important role played by these associations in internalizing the benefit of information spillovers. These are precisely the policies consistent with the new consensus of industrial policy, which mandates the government to correct market failures and assist industries with comparative advantage.

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Table 1. Location, product, origin, number of enterprises, average number of workers, and presence of foreign enterprises in selected industrial clusters in Asia and Africa

	Location	Main Product	Origin	No. of Enterprises[a]	Average Number of Workers[a, b]	Presence of Foreign Enterprises
1	Taichung, Taipei, China	Machine tools	Small enterprises	100	17	No
2	Zhili, China	Baby clothes	Farm households	2,000	15	No
3	Wenzhou, China	Electric fittings	Farm households	120	339	No
4	Bac Ninh, Vietnam	Rolled steel bars	Farm households	133	25	No
5	Sargodha, Pakistan	Electric fittings	Small enterprises	1,200	11	No
6	Addis Ababa, Ethiopia	Garments	Tailors	700	10	No
7	Nairobi, Kenya	Garments	Tailors	640	13	No
8	Kumasi, Ghana	Metalwork	Small car repairers	1,000	5	No
9	Hatay, Vietnam	Garments	Cooperatives	160	20	No
10	Addis Ababa, Ethiopia	Leather shoes	Migrant artisans	900	10	No
11	Nairobi, Kenya	Metalwork	Spin-offs from FDI	150	8	No
12	Dar es Salaam, Tanzania	Garments	UNIDO training	700	5	No
13	Addis Ababa, Ethiopia	Metalwork	Migrant artisans	130	70	No
14	Suzhou, China	Printed circuit board	SOEs	*n.d.*[c]	28	No
15	Kunshan, China	Printed circuit board	SOEs	*n.d.*[c]	146	Yes
16	Shinjhu, Taipei, China	Printed circuit board	Foreign enterprises	60	1,100	Yes
17	Dhaka, Bangladesh	Garments	Foreign enterprises	4,100	1,231	Yes

Source: Sonobe, Higuchi, and Otsuka (2012) and Sonobe and Otsuka (2015)
Notes: [a] Data refer to the period between 2000 and 2010.
[b] Average number of workers of sample enterprises.
[c] Data is not available.