Clusters and Economic Growth in Asia

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development process to better understand factors that play a role in the take-off stage of an industry cluster. Second, the focus on the biomedical cluster was chosen as there has been a dearth of literature on such clusters in Asian countries. The most important finding is that the presence of successful venture firms in the early cluster development stage can play a pivotal role in the growth of clusters.

The contribution by Henning Kroll and Daniel Schiller, in Chapter 5, presents a critical discussion and analysis regarding Chinese growth models. Quite evidently there have been a number of different sectoral and regional growth models in China before the slowdown in the world economy. The authors argue that we are in need of a differentiated understanding of the impact that the crisis had on different drivers of growth in China.

At the end of the 1980s, Vietnam embarked on an ambitious economic reform programme with the aim of promoting economic development. The foreign-invested sector has made contributions to average GDP growth rates, exceeding 7 per cent over the period. In Chapter 6, Curt Nestor examines the technology intensity of FDI in Vietnam and the implications for economic growth and emerging clusters. Finally, proposals for future industrial cluster policies and economic development are discussed.

For a number of reasons, an increasing number of developing countries have tried to build up an internationally competitive aircraft industry. During Suharto’s rule the establishment of a domestic aircraft manufacturing industry was the largest and most ambitious investment to promote technology development in Indonesia. Chapter 7 by Sören Eriksson investigates the main factors behind the long-term failure and discusses critical arguments against creating this kind of industry for the purpose of economic and industrial growth.

Already in the 1980s statements were made that aircraft production would be an important industry in China’s new stages of economic and industrial growth. The government also expressed the interest in and ambition to develop aircraft-related clusters. In Chapter 8, Sören Eriksson investigates the origin and characteristics of foreign technology transfer into Chengdu, one of the country’s most important locations for the aircraft manufacturing industry.

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1. Cluster policies and entrepreneurial states in East Asia

Alexander Ebner

INTRODUCTION

Cluster policies aim to activate and sustain the competitive interaction of firms in local and regional business agglomerations. Policy instruments tend to augment market forces by providing distinct types of collective goods. As such, cluster policies differ markedly from traditional types of industrial policy that highlight the nationwide targeting of particular firms and industries by means of market intervention. Still, the logic of cluster policies is most convincingly derived from the persistent relevance of national institutional frameworks, most prominently involving nation-states, and their ongoing transformation in the process of economic development. This line of reasoning is most appropriately exemplified by the East Asian development experience. Indeed, it may be argued that the increasing relevance of cluster policies in East Asia parallels the advent of a new model of government–business relations that may be labelled ‘entrepreneurial state’. This concept suggests that entrepreneurial aspects of state activity, which were already prevalent within the East Asian developmental states, currently turn out as dominant policy features, thus changing the dominant rationale of government towards an entrepreneurial direction, implying a shift from the developmental assimilation of technological novelties in catch-up growth to their entrepreneurial creation in a setting that allows for technological leadership. The related policy rationale promotes innovation as the source of international competitiveness, framed by a multi-level architecture of governance that strengthens a regionalized type of industrial policies, which points to the formation of cluster policies.

Therefore, in examining this relationship among clusters, cluster policies and the advent of the entrepreneurial state in East Asia, the following explorations proceed in three sections. First, the matter of cluster policies and the role of the state in the promotion of clusters are brought to the fore. The discussion highlights the Porterian cluster approach and its
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policy implications, underlining the impact of the national institutional framework on the actual orientation of cluster policies. The second section then takes on the transformation of the East Asian developmental states and their interventionist industrial policies. As the process of catch-up growth proceeds, new types of state functions arise that are well summarized under the label of entrepreneurial states. Corresponding changes in government–business relations allow for the promotion of cluster policy as a new kind of multi-scalar approach to industrial policy. Thus, cluster policies are an extension of the advent of the entrepreneurial state. The third section illustrates these arguments by pinpointing recent efforts in East Asian cluster policies.

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likely to emerge. Accordingly, the most pressing research challenges to the Porterian approach to the ‘microeconomics of competitiveness’ focus on the institutional and structural match between company sophistication and the related business environment (Ketels, 2006).

Still, Porter’s arguments are said to neglect the institutional substance of clusters, that is, their social structuration, their organizational outlook and the related logic of complementarity and coherence (Stiehle et al., 2007). A more interaction-oriented perspective developed in parallel to Porter’s work, with authors mainly rooted in the preceding Marshallian tradition of industrial district research (Becattini, 1991). This has been complemented by research on the ‘innovative milieu’ of interconnected firms in dynamic regions (Crevoisier, 2004). An innovative milieu can be defined as ‘the set of relationships that occur within a given geographical area that bring unity to a production system, economic actors, and industrial culture, that generate a localized dynamic process of collective learning and that act as an uncertainty-reducing mechanism in the innovation process’ (Camagni, 1995, p. 320). In these views, local culture plays an important role in cluster formation, with a particular form of collaboration and competition being made possible by a common socialization and a common ideal of regional allegiance. Consequently, institutional networks and their impact on cluster dynamics have been assessed more prominently, for clusters contain inter-organizational networks that are indispensable for generating and disseminating knowledge and innovations (Bergmann et al., 2001; Visser, 2009). In this manner, clusters may be interpreted as structures of co-located industry insiders that engage in flexible modes of experimentation with distinct network arrangements within and among clusters. This implies that the organization of learning processes becomes a most decisive strategic aspect of economic development (Malmberg and Maskell, 2002; Maskell and Lorenzen, 2004).

A delicate balance between competition and cooperation among firms is a necessary feature of this constellation, as the interlinking of cooperative partnerships is strategically important to capturing the benefits of learning-based competitiveness (Asheim, 2007). Thus, concepts such as the ‘learning region’ correspond with a Portarian cluster structure, which is augmented by the institutional architecture of regional coalitions for learning and innovation (Polenske, 2008). In this line of reasoning, the region is viewed as a geo-institutional set of socioeconomic resources and relations, involving components such as human capital and production routines. Spatial proximity matters, too. It enhances the competitiveness of firms by facilitating interpersonal processes of learning and innovation, which tend to reduce transaction costs by establishing common symbols and codes (Maskell and Malmberg, 1999). Crucially, then, the dynamics of

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The competitive advantages of firm-specific interactions within a particular regional setting of industries and institutions are usually addressed in terms of industrial clusters. It is a widely shared insight that industrial clusters serve as the backbone of regional competitiveness. This implies that related approaches to the analysis of clusters provide conceptually sound, empirically significant and politically viable research perspectives. To some, however, the concept of clusters is still controversial (Benneworth et al., 2003; Martin and Sunley, 2003; Benneworth and Henry, 2004). A paradigmatic definition by Michael Porter defines clusters as ‘a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities’ (Porter, 1998, p. 199). Cluster dynamics are shaped by the competitive conditions of firms, namely factor supply and demand profile conditions, and the industrial structure in related and supporting industries, as well as firm strategy and structure. The underlying relationships that form a distinct cluster within a national economy are either of the vertical type that links buyers and suppliers, or of the horizontal type that links common customers, technologies and distribution channels – while the interchange among industries in a cluster is best organized in geographical agglomerations (Porter, 1990, pp. 149, 157). This means, in the Portarian framework, that regional development with its comprehensive innovation, income and employment effects is driven by the dynamic constellations of industrial clusters (Porter, 2000, 2003). Yet Porter’s approach has been repeatedly criticized for its somewhat mechanistic, structurally oriented cluster concept, which essentially implies that as long as all actors deemed necessary are present in a region, a cluster with all associated benefits is
economic development are determined by the structure of innovation networks with their systemic linkages among knowledge-producing organizations such as universities, intermediary organizations such as government agencies, and the regional set of industrial clusters with its profile of both small and large firms (Cooke, 1998; Cooke and Schienstock, 2000).

In addition to that, the assessment of the developmental dynamics of clusters also requires a reconsideration of the external linkages of the involved firms and related organizations, quite in line with the overall developmental pattern of an increasing openness of clusters (Giuliani et al., 2005). The importance of non-regional networks is decisive for the absorption of new technologies and organizational practices. The scope of these strategic interactions contributes to various degrees of external economies and increasing returns in an evolving setting of organizational as well as territorial modularity (Whitford and Potter, 2007). Accordingly, the external linkages of cluster firms in learning regions serve as systemic carriers of knowledge transfers and learning effects. They support the systemic openness of clusters and thus tend to obstruct an institutional and technological lock-in of development trajectories by promoting adaptive flexibility, an aspect that becomes paramount when the cluster life cycle reaches maturity (De Martino et al., 2006; Zucchella, 2006; Menzel and Fornahl, 2010). Thus, the availability of external partners for innovation is paramount in furthering the openness of clusters. Apart from 'local buzz' and localized capabilities, the requirement for knowledge exchange leads to a reconsideration of 'global pipelines' in cross-cluster knowledge flows (Bathelt et al., 2004; Maskell et al., 2006). The underlying capability to integrate new knowledge into local routines depends on complementarities with established routines and skills, for pieces of knowledge originating in a context too far away from the recipient may be difficult to absorb (Loasby, 2001). In summary, these considerations on cluster dynamics acknowledge their multi-scalar structuration, which is reflected in the multi-level governance structures of internal and external cluster linkages. Such a perspective implies the need for a more elaborate differentiation of external linkages, thus transcending the simple dichotomy of the local versus the non-local by addressing issues such as network interactions on different levels and scales (Lagetjik and Oinas, 2005; Ebner and Schiele, 2012). Indeed, the evolution of the competitive capabilities of cluster firms and related organizations is subject to local, national and international interactions (Hassink, 2005; Whitley, 2007). In this context, the national level of the business environment still stands out in shaping the routines and practices of cluster firms (Gertler, 2001).

At this point, the role of the state needs to be taken into account as an institutional force that shapes the economic dynamics of clusters by means of cluster policies. Indeed, the state matters first of all as a provider of regulatory standards and rules of the diverse national administrative and legal subsystems. Also, informal institutions such as social norms and cognitive models that are said to constitute a cultural setting are shaped by governmental activities. As Robert Wade put it during the heyday of the globalization controversy, 'National boundaries demarcate the nationally specific systems of education, finance, corporate management and government that generate social conventions, norms, and laws and thereby pervasively influence investment in technology and entrepreneurship' (Wade, 1996, p. 85). Accordingly, in the setting of local, national and global linkages, the institutional specificity of the national level may be assessed as a dominant factor in the external interaction of cluster firms—despite the fact that the national level is mainly absent in the established discourse on knowledge spillovers within and across cluster boundaries (Lundvall and Maskell, 2000; Maskell, 2001; Isaksen, 2009).

This basic assessment is well reiterated in Porter's notion of the 'competitive advantage of nations' that suggests that competitive industrial clusters mirror distinct advantages that are rooted in the historically evolving institutional and structural features of national economies. Porter addresses the persisting role of the national business environment as follows: 'Competitive advantage is created and sustained through a highly localized process. Differences in national economic structures, values, cultures, institutions and histories contribute profoundly to competitive success' (Porter, 1990, p. 19). The corresponding national innovative capacity with its interactions among firms, research institutes, universities and other innovation-oriented players reflects specialization patterns that are derived from interlinked factor conditions such as skilled human resources, adequate R&D endowments and an efficient financial system (Furman et al., 2002). In this context, Porterian cluster policy puts the private sector in the focus of proactive efforts in industrial upgrading. Corresponding prescriptions may be synthesized as follows: first, policy support should be available for all productive clusters, involving both domestic and foreign companies; second, existing clusters with their linkages and complementarities across industries should be the basis for further refinement and upgrading, while attempts to create entirely new clusters are problematic; third, cluster initiatives should be advanced by the private sector, while government serves as a facilitator; fourth, policy strategies should be designed in a bottom-up manner that allows for deliberation among all stakeholders on various policy levels, in particular the local level. It follows: 'Enhancing cluster externalities and spillovers will increase productivity and prosperity in any cluster. Hence government should not choose among clusters but create policies that support
upgrading in every cluster present in a location' (Porter, 2007, p. 6). The latter argument emphasizes that the Porterian cluster approach underlines a dynamic understanding of competition as a positive sum game - with productivity as a key policy concern (Porter, 1998, pp. 248-9). This perspective differs markedly from those traditional types of industrial policy that highlight the national targeting of particular firms and industries, based on government interventions through subsidies, protective measures and related means, which alter the results of market competition (Woodward and Guimaraes, 2009).

In summary, Porter’s concern with regional agglomerations of cluster firms mirrors both the multi-scale and multi-level qualities of the innovation-driven process of economic development. Porter’s recent emphasis on the role of clusters as export-oriented agglomerations with distinct external linkages points in this direction (Simmie, 2008). This line of reasoning goes well together with the neo-Schumpeterian systems of innovation framework and its proposition that industrial structures, the institutional set-up of a national economy and its policy orientation stand out in determining the innovation performance of firms and industries, thus complementing regional and supranational constellations (Freeman, 2002; Lundvall et al., 2002). The national level matters with regard to learning and innovation, because the policies of national governments, national laws and a shared culture delineate an institutional arena that affects the intensity and direction of innovation (Nelson and Rosenberg, 1993; Lundvall, 1998). This persistent relevance of national institutional frameworks shapes the developmental trajectory of whole economies and thus plays a key role in the formation of policy approaches to support industrial clusters - as exemplified most appropriately by the East Asian development experience. The key question is whether the increasing relevance of cluster policies goes well together with an institutional differentiation of the state and the related national setting. The following section argues that cluster policies in East Asia parallel the advent of a new model of government-business relations that may be labelled ‘entrepreneurial state’.

TOWARDS ENTREPRENEURIAL STATES IN EAST ASIA

The historically specific developmental impact of government-business relations in East Asian economies is subject to persistent discussions that have been most prominently fuelled by the World Bank’s 1993 policy research report on the ‘East Asian Miracle’. Capital accumulation, resource allocation and technological catch-up are identified as functions of economic growth, which have been promoted by a mixture of competitive market processes and supporting public policies (World Bank, 1993, pp. 10–11). Growth-promoting market interventions in the domain of industrial policy are addressed as components of these public policies with clear cost-benefit considerations and performance criteria (ibid., pp. 5–8). These considerations point to further discussions on the role of the state in East Asian economic development. A key issue has been the concept of the ‘developmental state’, as informed by Chalmers Johnson’s research on Japanese industrial policy. Johnson maintains that the regulatory function of states in Western economies that pioneered industrialization focuses on rules governing the economic process, whereas states in late industrializing economies, such as Japan, exhibit a developmental function, as they administratively guide industries and markets (Johnson, 1982, pp. 19–20).

Yet, developmental states exhibit a transitory character, for the notion of the developmental state covers only a fraction of state functions. The functional priorities of states thus determine their institutional essence while following situational imperatives (ibid., pp. 305–7). The developmental imperative of catch-up growth refers to the role of the state in late industrialization, perceived as a process that is based on gradual upgrading and learning how to improve technology already in use abroad (Amsden, 1989, pp. 3–4). This process of state-guided adaptive technological learning in late industrialization may face stagnation as soon as the technology frontier is approached without the formation of local innovation capabilities (Amsden and Hikino, 1993, p. 259). Thus, the transitory character of the developmental state reflects its relative success in moving the economy towards the technological frontier.

The notion of ‘governed markets’ addresses corresponding attempts in leading the market by political means, which then aim at stimulating innovation in the private sector. Governing markets thus requires both institutional capacity and shared knowledge (Wade, 1990, pp. 28–9). State capacity serves as the institutional basis for the corresponding policy strategies of developmental states, which foster entrepreneurial perspectives in the long term by promoting transformative investments and lowering associated risks. ‘Embedded autonomy’ then marks the internal organization of developmental states and their capacity for promoting industrial transformation (Evans, 1995, p. 12). However, the results of this transformation feed back upon the state itself, for the actors that emerge from the policy-related state interventions tend to recreate the underlying conditions of their activity - which is most relevant in terms of the shifting balance of powers among the social forces and their political articulation. Successful industrial transformation makes industrial capital less dependent on the
state, thus allowing for a reconfiguration of government–business networks. Therefore, the reconstructive self-transformation of the transitory developmental state mirrors an increasing complexity of the socioeconomic domain (ibid., pp. 226–34). This line of reasoning refocuses on the strategic interdependence between government and business. As exemplified by East Asian development, corresponding modes of governance involve a ‘catalytic state’, usually acting in cooperation with the private sector while exercising negotiated leadership in the coordination of policy networks that support technological upgrading and innovation (Weiss, 1998, p. 67). Transformative capacity then implies that government–business cooperation is subject to adaptation over time. Accordingly, the East Asian developmental state is subject to a country-specific transformation with state capacity approaching a less hierarchical mode of coordination that relates to ongoing changes in the economic setting (ibid., pp. 64–5). Thus, the developmental motive of catch-up growth is gradually replaced by a strategic concern with continuous technological upgrading in an internationalizing competitive setting (Weiss, 2000, p. 22).

Echoing these concerns, more recent World Bank policy discussions on East Asian development highlight the promotion of innovation as means for enhancing productivity, based on strengthening public–private interactions, local coherence and international connectedness, while claiming that major policy challenges relate to how East Asian countries cultivate creativity within their economies (Yusuf et al., 2003, p. 29). Therefore, the articulation, intensity and content of entrepreneurial effort becomes ever more knowledge- and science-intensive in approaching the technological frontier, building on established capabilities that are embedded in nation-specific institutional frameworks (Lall, 2000, p. 14). In addressing these tendencies, the theory of the developmental state has become subject to various modifications. For instance, it is argued that the developmental state undergoes a transformation towards a new rationale in coping with staying ahead of or keeping up with international competitors, in particular by assisting in industrial restructuring. A more gradual and continuous mode of upgrading skills and technologies is at stake – as witnessed by the maturing of Japanese and Taiwanese industries whose restructuring is guided by strategic policies that resemble the rationale of a ‘transformative state’ (Weiss, 2000, pp. 27–9). Related arguments pinpoint the ideal type of ‘transitional developmental state’ that allows for a transition from interventionism to liberalization – which need not entail a retreat of the state but even its strengthening with regard to the enforcement of the market order (Wong and Ng, 2001, pp. 43–7). In associated terms, developmental and regulatory state functions are differentiated. The ‘neo-developmental state’ for high-tech industries copes with the promotion of competitive economies of scale, the support of industrial R&D and employment creation in industrial change, complemented by the ‘regulatory state’ for liberalized services, governing competition and international openness (Amsden and Chu, 2003, pp. 167–72). Moreover, the rationale of government shifts towards locational policies in support of industrial networks and technology-intensive interactions – resembling a pattern of state-led networking (ibid., pp. 15–16). Clusters and cluster policy thus become key issues in this institutional transformation of the state and its policy concerns, which may be interpreted in terms of an ‘entrepreneurial state’.

Indeed, the concern with entrepreneurship in the creation, modification and adaptation of technological and organizational innovations resembles a distinct set of state functions, which requires a conceptual framework of its own: the entrepreneurial state. The underlying reasoning suggests that entrepreneurial aspects of state activity that were already prevalent with the East Asian developmental states currently turn out as dominant policy features, thus changing the dominant rationale of government towards an entrepreneurial direction that implies a shift from the developmental assimilation of technological novelties to their entrepreneurial creation. The innovation capacity of the entrepreneurial state addresses the potential for exercising policies that promote innovation on an economy-wide scale, either by direct interventions in the economic process or by conditioning through institutional and physical infrastructures (Ebner, 2007, pp. 118–19). Ideal typically, it may be argued that three sets of state functions shape the process of economic development, as outlined in Table 1.1. They are simultaneously present, yet the overall outlook of the state will depend on the hegemonic type of function, which is subject to historically specific variation in the development process.

The commercialization of technology resembles the operations of a regulatory state, typical for the model of liberal market economies. The
policy rationale of regulatory states highlights resource coordination through an institutional enforcement of the market order. Accordingly, industrial policies of regulatory states emphasize the guidance of market forces in the innovation process, which may be termed as an innovation style of commercialization. In contrast to that, the developmental state, which has been prevalent in East Asia, combines its policy rationale of factor mobilization with long-run goals of national development. The concern with entrepreneurship in the generation of technological innovations resembles a distinct set of state functions, which is represented by the notion of the entrepreneurial state. It points to recent transformations of the state all over the OECD countries – and beyond. Its policy rationale promotes innovation as the source of international competitiveness, framed by a multi-level architecture of governance that strengthens a regionalized type of industrial policies, which involves distinct cluster policies (Ebner, 2009, pp. 382–3). Furthermore, the scalar policy dimension of the entrepreneurial state is more differentiated than that of the regulatory or developmental types. Indeed, the entrepreneurial state transforms the national policy range towards a multi-scalar setting that strengthens regional interactions and thus paves the way for distinct cluster policies.

In summary, the notion of the entrepreneurial state entails the following set of preliminary propositions that may be subject to further scrutiny (ibid.):

- The concern with the formation of entrepreneurial capacity in the generation and carrying out of innovations becomes a crucial feature of industrial policy. This involves both direct measures that include selective interventions in the market process as well as indirect measures involving the moulding of formal and informal institutions that shape innovation efforts of the private and public sectors alike.
- Policy efforts shift from catching up within an established technological paradigm to a rationale of paradigm creation that involves a potential for technological leadership in an uncertain environment. State capacity remains crucial for mediating between interest groups and for communicating broad developmental orientations.
- The reorientation of policy concerns towards self-sustaining knowledge-based interactions in promoting competitiveness co-evolves with an institutional transformation of government and administration. Framed by a common discourse on entrepreneurship and innovation, governance structures evolve as complex policy networks.

- The institutional architecture of the entrepreneurial state underlines the role of knowledge transfers and communication in state-society relations that form reflexive policy modes. Experimentation, learning and innovation characterize the paradigmatic efforts in government and administration for problem-solving efforts.
- The policy rationale of entrepreneurial states reflects the diversity of structural, institutional and spatial patterns of globalization, highlighting the combination of global production networks and local clusters of innovation activities. The spatial dimension of innovation becomes a crucial component of industrial policy.
- The policy orientation of entrepreneurial states combines international competitiveness, capability-building and locational strategies that address the entrepreneurial orientation of both local and foreign firms. The formation of knowledge-based clusters becomes a key element of related policy efforts.

Thus, stated in terms of the Schumpeterian theory of economic development, the institutional dynamism of the entrepreneurial state reflects the co-evolution of state and market in the process of economic development (Ebner, 2006, pp. 511–12). In this line of reasoning, the logic of cluster policies reflects the transformation of East Asian newly industrialized economies towards an innovation-driven pattern of development.

CLUSTER POLICIES AND THE ‘EAST ASIAN RENAISSANCE’

Following the decades of high performance growth from the 1970s to the 1990s, the East Asian emerging economies have been witnessing the challenge of the Asian financial crisis of 1997 and its aftermath. While some observers had argued that this crisis would actually herald the end of East Asian catch-up growth, the empirical situation evolved in a different direction. Indeed, fuelled by the growth dynamics of the Chinese economy and supported by a reconstruction of transnational business networks within the East Asian division of labour, former ‘tiger economies’ such as South Korea, Taiwan and Singapore have regained most of their developmental strengths while undergoing changes in both their industrial and institutional settings. Despite its less convincing growth dynamics, Japan still serves as the regional centre of high value-added and knowledge-intensive manufacturing and service operations. All of this has amounted to the World Bank’s slogan of the ‘East Asian Renaissance’. Decisively, this notion of a resurgence of the East Asian development
Cluster policies, however, have regularly taken the shape of urban planning programmes, infrastructure projects or financial assistance schemes for certain locations such as science parks and export processing zones. These substitute formats for distinct cluster policies have been largely insufficient in combining physical, knowledge and social capital to promote cluster interactions. According to the World Bank, a favoured pattern of cluster policies in East Asia involves the following aspects: first, network governance operations, which initiate networking dynamics and cooperation among firms and business associations; second, the provision of specific kinds of public goods involving the means for technological information and workforce training, both of which tend to be under-supplied by private firms; third, well-organized cluster management that prevents clusters from phenomena such as network closure and thus maintains their adaptive flexibility in turbulent world markets (Yusuf et al., 2003, pp. 249–54). Accordingly, East Asian cluster policies are set to mirror both domestic economic conditions and the actual position in the international division of labour that is moulded by the informal dynamics of East Asian regional economic integration (Suehiro, 2009). This array of distinct responses to the technological and organizational challenges of catch-up growth and late industrialization, with its new emphasis on industrial cluster strategies, reflects even more comprehensive institutional changes that herald the emergence of the East Asian entrepreneurial states. Yet this tendency does not imply a convergence towards a best practice model. Rather, it upholds a diversity of institutional frameworks and structural conditions that is even enlarged through the new strategic options for firms and governments, which are provided by the cluster perspective. The notion of a ‘modular economy’ illustrates this diversity of strategic options in the East Asian economies:

The organisation of production obeys less and less a single predetermined model which would be a must for everyone, reducing the field of possible spaces. On the contrary it opens up this field. The agglomerations of enterprises, districts, clusters or poles of competitiveness can perfectly benefit from the variety of their systems of organisation. (Ganne and Lecler, 2009, p. 22)

Accordingly, East Asian production networks become part of multi-layered ‘global networks of networks’, which combine diverse national models and their components – with clusters serving as network hubs in a complex setting of transnational flows of resources, goods and services (Ernst and Kim, 2002).

These considerations apply first of all to Japan as the regional technology leader. Indeed, a restructing of government and administration lies at the heart of the reorientation of the Japanese development
pattern towards a more competitive and entrepreneurial setting (Aoki, 2002, p. 2). Japan’s economy has been gradually opening its competitive structures both domestically and internationally, thus expanding patterns of competitive pressures that were already prevalent in most of the internationally competitive industries (Porter and Sakakibara, 2004, pp. 35–6). Decisively, in the course of these policy reforms, the rationale of generating innovations through flexibilization, decentralization and competitive reorientation of governance structures has become prominent (Whittaker, 2003, pp. 80–81). Japan’s Ministry of Economy, Trade and Industry (METI), which has championed Japanese industrial policies on a national scale for decades, is currently spearheading a set of regionalized innovation and entrepreneurship strategies that address the cluster aspects of innovation, thus allowing for new spatial and institutional components in industrial policy (Ibat-Arens, 2004, pp. 4–5). Already since the late 1990s, the emphasis of industrial policy in Japan has refocused from the support of small business networks in the manufacturing sector to the restructuring of industries that face the challenge of international relocation, primarily to China and other East and Southeast Asian countries. These new types of cluster strategies in terms of distinct policies that aim to promote regional industrial agglomeration in order to raise competitiveness and innovation have played a key part in the formation of complex regional patterns of interaction between firms, universities, research institutes and related organizations (Kitagawa, 2007). During the 2000s, national government initiatives in the domain of cluster policies have been promoting diverse cluster projects and models that highlight cluster formation through regional networking among established firms and research organizations, as well as through entrepreneurial startups. Yet these top-down approaches are increasingly complemented by bottom-up initiatives, in particular in support of science-based clusters (Sanz-Menendez and Cruz-Castro, 2005).

Both South Korea and Taiwan have evolved as major challengers to the Japanese leadership in technological innovation. South Korea is actually said to be challenged by a paradigm shift from an ‘industrial learning paradigm’ to a ‘technology creation paradigm’ – with policy-assisted innovation efforts in biotechnology as an outstanding example that points to the strategic focus on knowledge-based cluster policies (Wong et al., 2004, p. 46). Yet this transition towards industrial leadership and cluster-oriented policies is differentiated with regard to product groups and market segments within the large Korean conglomerate firms; an aspect that adds to the diversity of cluster types and their distinct logics (Hobday et al., 2004, pp. 1455–6). Similar implications hold for Taiwan, where sustaining competitiveness implies continuous technological upgrading towards high-tech sectors – involving institutional change, industrial upscaling and agglomeration economies (Amsden and Chu, 2003). Taiwan has actually emerged as the most innovative economy among the East Asian newly industrialized economies, as measured in terms of R&D indicators. Its performance provides evidence for the argument that global production networks are also important as sources of knowledge for firms from late industrializing economies. This holds especially with regard to the globalized structures of knowledge-intensive and high-tech industries, which involve clusters of local capabilities that need close connections with global production networks and related operations of multinational firms (Hu and Mathews, 2005, p. 1347). The corresponding need for attracting globalized knowledge flows requires that local and global resources are adequately recombined. The Singaporean development model illustrates this case by promoting the vision of a local knowledge agglomeration in a global knowledge-based economy. In this setting, multinational enterprises introduce novelty into the local economic system; yet, also included in the sample of entrepreneurial agents are government-linked companies, as well as government boards, which may enforce and coordinate innovation-driven economic change. As Porterian cluster strategies have been put to use already since the 1990s, it is safe to argue that the globalizing local economy of Singapore actually pioneered the logic of cluster policies in an evolving entrepreneurial state (Eben, 2004, pp. 56–9; Low, 2004).

CONCLUSION

The increasing relevance of cluster policies in East Asia needs to be understood as a manifestation of an ongoing institutional and structural transition of the East Asian newly industrialized economies towards an innovation-driven pattern of development, involving both the expansion of transnational business networks and localized government–business interactions. In this context, the national institutional frameworks of the East Asian economies are subject to comprehensive changes that involve the transformation of the model of the ‘developmental state' towards specific kinds of ‘entrepreneurial states'. Corresponding policy efforts have shifted from a rationale of catching up within an established technological paradigm to a rationale of paradigm creation that involves a potential for technological leadership on an international scale. This means that traditional types of industrial policy, which have targeted certain industries on the grounds of national development goals, are augmented and even replaced by industrial clusters policies, which put an emphasis on
the competitive performance and innovation capacity of agglomerations of firms and industries. Entrepreneurial capacities in the generation and carrying out of innovations and the spatial dimension of production and innovation become crucial components of this new kind of industrial policy. Consequently, the cluster policy approach of East Asian entrepreneurial states reflects a diversity of structural, institutional and spatial patterns that highlight the adaptive recombination of global production networks and local industrial clusters. This strategic combination of international competitiveness, capability-building and locational strategies addresses both local and foreign firms. In this manner, it emphasizes the transnational connectedness of firms and clusters in East Asia — and thus also points to the transnational range of the related entrepreneurial states and their cluster policies.

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2. Information and communication technology and economic growth of four Asian industrialized economies

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INTRODUCTION

There has been a widespread debate among economists about the role of information and communication technology (ICT) in economic growth since the late 1990s, especially in the progress of the New Economy in the USA. Despite the Solow Paradox, it is generally agreed that ICT production and application have been a major force of economic growth in the USA since 1995 (Jorgenson and Stiroh, 1999, 2000; Oliner and Sichel, 2000; Jorgenson, 2001). Additionally, much effort has been devoted to investigating why the European countries generally lagged behind in utilizing ICT to promote growth performance in terms of real GDP and labour productivity growth, as well as why ICT investment in the USA declined but labour productivity growth continued to accelerate after the year 2000 (Gordon, 2004). The literature has suggested that the promotion of growth performance by ICT does not happen automatically. Rather, it is conditional on many factors including organizational innovation/investment (Brynjolfsson and Hitt, 2000) and sequential complementary innovations for ICT as a general purpose technology (GPT) (Helpman and Trajtenberg, 1996; Basu et al., 2003), as well as sufficient high-skill labour to apply ICT (Basu et al., 2003). It is also found that those service industries (mainly wholesale trade, retail trade, finance and insurance) that invest heavily in ICT are the major non-ICT-producing industries that contributed to the late 1990s’ labour productivity acceleration in the USA (Jorgenson et al., 2002; Stiroh, 2002).

While many studies have been found to focus on the contribution of ICT to economic growth in the USA and EU, only a few studies have been reported for Asian countries. Japan has been examined in studies covering OECD countries and in studies for specific cross-country comparison. Van Ark et al. (2002) and Jorgenson and Motohashi (2005)