

Rethinking Silicon Valley: New Perspectives on Regional Development

IAN COOK & RICHARD JOSEPH

ABSTRACT *Silicon Valley in Southern California has, over the past 30 years, become a model for high technology development in many parts of the world. Associated with Silicon Valley is a common rhetoric and mythology that explains the origins of this area of high technology agglomeration and indeed the business and entrepreneurial attributes needed for success. Governments in many parts of the world (including Southeast Asia and Australia) have tried to emulate this growth through various industry and regional development mechanisms, in particular, the science or technology park. More recently, promoting developments in information technology has come to be seen as an integral feature of these parks' activities. In this paper, we argue that the modeling process used by governments to promote Silicon Valley-like regional development has tended to model the wrong things about Silicon Valley. The models have tended to be mechanical and have failed to reflect the nature of information and information industries. While we have not sought to develop a model for Silicon Valley in this paper, we address a number of issues that require attention on the part of anyone serious about this project. After discussing problems with previous attempts to model Silicon Valley and problems associated with the activity of modeling itself, we move to consider four issues that must be addressed in any real attempt to model Silicon Valley in Southeast Asia. The first is the role of the state and the problems that state involvement may create. The second concerns the contribution that universities can make to the project. The third is the role of firms, particularly Chinese firms. The fourth is the cultural context within which the 'model' will sit. Since technology parks are seen as a popular way of promoting high technology development by governments, the revised history suggested in this paper provides fresh thinking about modeling Silicon Valley in the Southeast Asian region.*

Introduction

Economic development is not a new phenomenon but it can be argued that the context under which it is being promoted, the new information economy, has transformed the way we understand its basic principles. In an investment-hungry world, where there appears to be an ever increasing 'digital divide' between rich and poor, this poses very real problems for policy-makers in developed and

developing countries alike. The temptation for developing countries to copy or model the successes they see in the developing world is very great and it carries with it the advantages of 'not reinventing the wheel' for many countries. However, there are significant problems associated with basing economic development policy around models of what is happening elsewhere, and indeed around models that may be downright misleading. An example of the role of models in policy making is the spectacularly influential role that Silicon Valley has had on the policies of many countries (more recently in Southeast Asia) that are aiming for development through high technology.

This paper is about these policy problems. So influential has the Silicon Valley model been that it is very difficult to see its constraints and to envisage where it is possible to depart from it. A model can be a very powerful guide but it can be misleading at times too. That governments in many countries in the region are seeking to create their own Silicon Valleys is a clear indication that the model has enormous intellectual and political power. This makes it particularly important that the 'model' be understood for what it is. This paper is in three parts. First, the conventional model of Silicon Valley is discussed and it is argued that the conventional wisdom is flawed. These flaws are discussed with the aim of highlighting the challenges they present for the promotion of technology-based economic development in Asia specifically. Second, the process of modeling itself is discussed with the aim of identifying the interests behind the Silicon Valley model and the implications that modeling has for policy-makers. Finally, we consider the issues associated with promoting technology-based economic development in the Southeast Asian region. We argue that it is necessary to 'rethink Silicon Valley' from a regional development perspective. Specifically, there are a number of areas that need attention in this process of 'rethinking' models of Silicon Valley: the first stems from the discussion of modeling in the first two sections. Modeling needs to move from a mechanistic form to a focus on the sorts of effects that are sought. Further, those who design 'models' need to accept that the state will play a role in any initiative of this sort in the region, but need to pay particular attention to the problems that states can create for Silicon Valley models. Another issue that 'modelers' need to address concerns how universities can contribute to the attempt to create Silicon Valley effects. Universities can make a positive contribution in this context, but what this contribution might look like requires careful consideration. Another issue that 'modelers' must consider is the nature of firms and, in particular, firms in the region. Finally, 'modelers' must consider the cultural context within which their initiatives are being developed. While we do not consider culture to be some form of permanent inscription, it does represent a contextual factor that requires consideration.

Conventional Modeling of Silicon Valley

It is widely accepted that Silicon Valley has been a model for economic development. While Silicon Valley has had a relatively short history, some 50 years, policy-makers have yearned for its benefits—job growth, new start-up firms, a wealth of venture capital and innovation. We call the process by which policy-makers of other regions and countries attempt to copy Silicon Valley, modeling. However, what is being modeled requires some conception of what is worth modeling, or more pragmatically, what can be easily modeled. We shall call this

conception or framework, a model. As a result, a Silicon Valley model can be identified. The Silicon Valley model incorporates a narrative about how the region came about, its future and its elements of success. Typical features of the Silicon Valley model are:

- a faith in entrepreneurialism;
- a vital role for venture capital;
- a critical role played by research universities;
- a healthy supply of highly qualified researchers;
- benefits from firms co-locating (agglomeration economies); and
- a strong role in the free market with limited government interference.

Paradoxically, regions trying to stimulate high technology growth along the lines of Silicon Valley have generally had to do so with state involvement. While there are many industry development measures available to regional and state governments, one of the more popular ones has been that of the technology park. A technology park can be seen as refinement of the more familiar industrial park. It is a vehicle for attracting high technology development by providing the right sort of environment for the growth of such firms—a campus-like setting; proximity to a major university; and a setting which allows personnel to interact informally to create innovative ‘synergies’. Nearly all developed countries have technology parks (many private and some sponsored by the state). They were very popular in the early 1970s in the US and during the 1980s, the idea spread to Europe, Australia and elsewhere. Their popularity seems not to have waned, with new ventures being announced in Asia over the past couple of years.

Our concern here is not so much with the success or failure of technology parks, nor with the extent to which they have been used as an industry development measure in many countries. Rather, our concern is with the accuracy of the underlying premises of the Silicon Valley model, which has given rise to them. We have four concerns here, three of which reflect the observations of Stuart Macdonald in his recent book *Information for Innovation*.¹

First, policy makers who have modeled Silicon Valley have consistently misunderstood the crucial role that information plays in Silicon Valley itself. Policy makers interpreted the essence of Silicon Valley as being such things as a clean environment, good universities, pleasant weather and somehow missed what was important. Macdonald points out, with respect to Silicon Valley, that:

there was no understanding at all of what makes its industry tick. Even at the most practical level comprehension was missing . . . Policy makers saw in Silicon Valley and high technology not so much what they wanted to see as what they were prepared to see. What they missed were the intricate networks of surging information channels that supply high technology firms with their basic equipment. Without these, Silicon Valley would be nothing special, and without these this is just what most of the myriads of pseudo-Silicon Valleys have become.²

Second, the Silicon Valley model provides for a misinterpretation of the sort of information that is important to high technology. It had been thought that, for example, scientific information, based on basic research, provided the necessary sort of information for innovation. To this end, technology park initiatives have

frequently been located next to universities or research institutes. Macdonald observes that this belief promotes a view of innovation that perpetuates the linear model of innovation. What is more to the point is that a location next to a university provides a prestigious address for companies desperately seeking credibility in the marketplace.³ Furthermore, Macdonald notes the importance of tacit and uncoded information:

While they are certainly dependent on information, high-technology firms are not dependent on the sort of information available from university science and engineering departments. Even if they were, it would be unrealistic to expect any more than a tiny fraction of this information to be contained within the departments of a single university. The blend of commercial and technical information has always been of more use to high-technology firms than the purely technical. Blending comes through personal experience and results in a package of tacit and uncoded information.⁴

Third, the Silicon Valley model has given rise to a view that the Stanford Industrial Park, established by Stanford University, somehow caused the growth of Silicon Valley itself. Consequently, technology parks, as a mechanism for promoting high-technology growth, took on an importance that far exceeded their potential. Macdonald, points out that:

Stanford Industrial Park is very much the product of Silicon Valley's industrial prosperity, rather than vice versa. Yet, Silicon Valley and Route 128 around Boston, both quite unplanned high-technology concentrations and nothing to do with technology parks, were commonly used to justify technology park development elsewhere.⁵

Finally, the Silicon Valley model has placed considerable emphasis on the role of individual entrepreneurship. In emphasizing the role of the entrepreneur, the important role of government has been correspondingly de-emphasized in the Silicon Valley model. This has implications for development, especially if countries are trying to copy Silicon Valley. McChesney observes that such thinking plays the role (in the US at least) of enforcing the view that the market is the natural order of things: corporations are meant to shape the future, not governments.⁶ It must be remembered that much of the initial impetus for research in Silicon Valley grew from the extensive US federal government support for military research during the Second World War⁷ and that 'at one point fully 85% of research and development in the US electronic industry was subsidized by the federal government, although the eventual profits accrued to private firms'.⁸ Evidently, the state has little role to play in the Silicon Valley model, but this can be interpreted more as a rhetorical feature of a peculiarly US political situation rather than a view based on a careful understanding of history or the development process.

In sum, our argument is that the Silicon Valley model is persuasive but nevertheless, flawed. We are suggesting that, while there may be 'a grain of truth in this sanitized version of capitalism',⁹ it is not enough to use it as the basis for a policy for development, as many countries would seem to have done. We argue that a more theoretical, historical and critical approach is needed. Compounding the problem is the modeling process itself. We shall turn our attention to this problem next.

Problems with Modeling

The discussion in this section follows the work of Joseph¹⁰ which, in turn, draws on the work of Braithwaite.¹¹ We have argued that while there are flaws in the Silicon Valley model itself, there are also problems with the process of modeling itself. Modeling is defined as ‘action(s) that constitute a process of displaying, symbolically interpreting and copying conceptions of action (and this process itself). A model is a conception of action that is put on display during such a process of modeling. A model is that which is displayed, symbolically interpreted and copied’.¹² We believe that the process of attempting to copy Silicon Valley is an act of modeling.

There are some major problems with modeling as a policy technique. These present difficulties for policy-makers. First, since time and capacity is often a factor in decision-making processes, proponents of models will usually present a solution to a problem that is ‘good enough’. This means that the models are often not well thought through, and worse still, such models are attractive to governments that are after a quick and easy solution. Second, those modeling processes will often misunderstand what they are modeling. This is our argument above concerning the flawed nature of the Silicon Valley model. Finally, models usually gain acceptance if they resonate with symbols that give them legitimacy. In practice, this means that models often reflect the symbols of progress that come from rich or dominant countries. In addition to this, the policy process itself often allows policy-makers to obscure mistakes when models don’t work.¹³

Issues Central to the Project of Developing a Model to Produce Silicon Valley Effects in Southeast Asia

Thus far, we have discussed general problems associated with modeling Silicon Valley. These will undoubtedly have an effect on any attempt to successfully model Silicon Valley in the Southeast Asian region. The following discussion of the issues that must be addressed in designing Silicon Valley models for the Southeast Asian region begins with some preliminary observations that we feel are essential in any planning process. Avoiding the mistakes associated with modeling must be a prerequisite. Understanding and providing for the involvement of states in Southeast Asia is also important, as is imagining a role for universities, or research institutes. Dealing with the general characteristics of firms and the specific characteristics of firms in the Asian region comprises another set of issues that must be addressed in the modeling process. The final issue that we discuss is culture. While culture affects the operation of states, universities and firms in the Southeast Asian region, its importance is such that it deserves separate and special consideration in the modeling process. Imagining a role for states, universities and firms in a Silicon Valley model in Southeast Asia will also require addressing issues of regional culture. These issues are so profound that they deserve extended consideration.

Starting Points for an Alternative Model

The first point that must be made as a result of our discussion of the problems with modeling leads us to believe that, in any attempt to model Silicon Valley, it is necessary to move away from mechanical models. Indeed, we believe it necessary to change our approach to modeling; it may become necessary to cease to refer to the

model as a model of Silicon Valley. If we move away from mechanical models, the question that must be addressed concerns the nature of that which we are seeking to model. Rather than focus on the nature or form of the model, we prefer to focus our attention on the effects that we are seeking to create. This directs our attention to the more important issue of what these models are intended to produce. A model, then, must be one in which, what may be described as Silicon Valley effects are sought and not one in which something called Silicon Valley is replicated.¹⁴

The third point that must be made in this context is that careful attention needs to be paid to the different types of effects that are often associated with attempts to model Silicon Valley. Three effects seem to be important to initiatives of the sort that we are discussing. The first are invention effects. 'Invention is the act of insight, a new combination of pre-existing knowledge, by which a new and promising technical possibility is recognized and worked out in its essential, most rudimentary form.'¹⁵ These relate to the stimulation of imagination or creativity¹⁶ on the part of those who are engaged in these initiatives. The effects we seek to create may include the imagination of products or services that have not been previously supplied, or the imagination of services that have not been previously supplied in the form in which they are imagined.

A second set of effects that initiatives of this sort are often designed to produce is product innovation. This refers both to the imagination of a new product or service, invention, and the development of new forms or changes in existing firms, such that these products and services are produced and delivered on a marketable scale. The final effects that might be associated with initiatives of this sort are process innovation effects. Process innovation effects are produced where there is a mechanism through which existing firms can take advantage of new, in this case information technology based, techniques in the production or distribution processes within their enterprises.

The three effects may be interrelated, but they are unlikely to be produced in the same manner. Invention need not necessarily result in marketable products or services and may have little role in process innovation. New firms will require new products and services, but they will require more than the invention of new products or services. Process innovation does not have to occur as a result of new inventions, but may simply reflect the effective adoption of an existing invention. Differentiating between these three possible effects is important in that different mechanisms may be required for their generation. While some choices may be made concerning the priorities associated with each of these effects, it is more likely that the benefit of differentiating them is that it allows for the development of a model which may provide for all of them.

Identifying the particular sorts of effects that are desired from a Silicon Valley model is a vital preliminary to any attempt to produce Silicon Valley effects. Few of the attempts to create Silicon Valleys in Southeast Asia have involved an active engagement with this issue. Mechanical models, in which a variety of parts are agglomerated and expected to produce the desired effects, are the normal procedure. While determining the particular sorts of effect that are desired is an important step in the modeling process, more issues need to be considered and must be considered in light of the specific regional context into which they are introduced. These concern the inputs, and possible problem with the inputs, from states, universities and firms. Another issue that merits attention is the possible consequences that cultures in the region will have on the 'model'. Each of these issues is considered in the following sections.

States and Silicon Valley Models in Southeast Asia

While some disagreement may exist as to the role played by the state in the development of Silicon Valley, we believe that the state was important to Silicon Valley.¹⁷ Even if we are wrong in this respect, we see little hope that Silicon Valley models will be created in the Southeast Asian region without the participation of states. As Wade has argued, industry policy, in which states identify and promote the development of specific desired industries, is an important part of economic development in the Southeast Asian region.¹⁸

States in Southeast Asia. If states are to be involved, an issue that needs to be addressed is the tendency for states in the Asian region to adopt interventionist and authoritarian political and social practices. A debate has already emerged with respect to the destabilizing effects of information technologies on authoritarian style regimes.¹⁹ If this is the case, one question that must be addressed concerns whether it is possible to separate the thirst for information, that might drive innovation in the context of information technologies, from the thirst for information that might result in unconventional social and political attitudes. Silicon Valley is pervaded by anti-state mentalities that privilege individual entrepreneurial spirit over any apparent commitment to a particular nation-state. This may not create problems if the anti-state mentality is both reflected in society more generally and is part of the hegemonic ideology in the country concerned (both claims can be defended in the context of the United States). A significant problem may arise if the promotion of an individualist entrepreneurial spirit, as may be required in any attempt to reproduce innovation effects, produces an anti-state mentality and key state actors reject such a mentality.

An option, if a regional approach is to be adopted, may be to situate the core element of the initiative in countries that have less interventionist or weaker states. However, this option may not satisfy the needs of states that are more oriented to control and direction and almost all states in the region will tend to be so oriented, as we will discuss. The leadership in these states may be reluctant to relinquish control and not encourage participation on the parts of their best people.

Despite their problems, states are likely to have a significant input into initiatives of the sort for which we are seeking to develop a model. One of the differences between the cultures of the Asian region and that of Silicon Valley is that there is a greater willingness to accept a role for states in economic and technological development. While free market ideology is part of the rhetoric of a number of governments in the region, there remains a tendency for states to take up significant roles in economic development.²⁰ Whether the notion of the developmental state²¹ is still the best characterization of states in Southeast Asia may be questioned.²² Certainly, an argument can be put that the Asian economic crisis has severely affected the developmental state.²³ This may open up the possibility that the developmental state is in a process of transition, in at least some of the countries in the region. Whatever its precise form, however, the state remains an important player and where it has ceased to play a leading role, it has sometimes been replaced by unclear relationships between private and public sectors.²⁴

The strong links between regional entrepreneurs and regional states is such that these entrepreneurs will tend to expect the state to take up an important role in the development of their projects. This has been the experience in Malaysia's Multi-Media Super-Corridor, Singapore's One and Hong Kong's Cyberport project. States

have tended to adopt central positions in the initiatives designed to stimulate the development of information technology. There can be little doubt, then, that states will be active in attempts to produce Silicon Valley effects in the region. State participation may be limited to providing a favourable taxation environment, rezoning and infrastructure supply. It may extend to supplying funds or acting as underwriters for loans. Political support will also be a likely form of state participation. All these forms of state participation will create a symbolic and, possibly, monetary investment in these projects that will give state actors a stake in the outcomes of the initiative. This will be a likely source of the problems that are associated with state participation.

If nothing else, states are important in terms of their participation in a suitable political and social environment. The most desirable taxation regime would be the most likely location for a successful Silicon Valley model.²⁵ This environment, however, might not provide the most attractive residential environment.

Problematic State Effects. That states will be involved in Silicon Valley models means that one of the most important tasks that must be addressed, if Silicon Valley effects are to be modeled, is to ensure that a particular set of state effects are occurring. These state effects may be understood to be a function of the tendency of those who occupy central positions in states, rather than a function of states themselves. Nonetheless, the modeling of Silicon Valley in the Asian region is unlikely to be successful if it is not supported and facilitated by states and this will create the potential for unhelpful state effects.

Three state effects will constitute problems for any attempt to model Silicon Valley. The first is the tendency on the part of those who occupy central positions in states to require controlling and directing capacities. Those in states may want to feel that they are 'in control' or otherwise directing the enterprise. Those involved directly in policy making in this context may seek to maintain a level of oversight and a regulatory capacity that may conflict with the modeling attempt itself. Another problem that the presence of states may introduce is a preoccupation with outcomes and outcome measurement. Much pressure is placed on states to measure the outcomes of their policies; this is despite the fact that the statistics thereby produced may not make much sense.²⁶ The point is that states are increasingly generating legitimacy for their policies by producing statistics that allegedly measure the outcomes from their policies. While a concern with outcomes is acceptable, the way that states tend to measure outcomes and their predisposition to producing measurable outcomes, rather than less tangible effects, is important. The final problem with states is that they often have a preoccupation with the short term. This is particularly true of those states that are organized in terms of representative democratic procedures. However, all members of states will tend to want results, and results in time to provide them with some form of political advantage. Any attempt to model Silicon Valley in this region will need to engage with each of these features of states.

Control/Direction Orientation. The first state effect that is unlikely to be beneficial in any attempt to model Silicon Valley is the control direction effect. If the state is involved, it is likely that state representatives will seek to exert control over or impose direction on the model. That they may see themselves as having driven the

initiative gives politicians a particular interest in the enterprise. Irrespective of their capacity to claim the initiative as their own, few people in senior positions in the public or private sector are there because they do not want to be in control. That the initiative is likely to be expensive means that those to whom politicians are accountable are unlikely not to require that they account for the initiative.

Politicians are not the only problem in this regard, however, for any initiative of this sort will be open to identification as relevant to the expertise of one or more departments of the public service. These departments have long been engaged in developing policies and regulations designed to produce the effects that Silicon Valley models are designed to produce. One of the central tenets of some recent discussion of the behaviour of senior officials in the public sector, is the view that those engaged in the public sector must be understood as agents who seek to promote their own values and interests.²⁷ Thus, their decisions and policies reflect certain desires to maximize personal outcomes (which, in this case, may be understood to be either control or authority). This cannot simply be understood as an effect of highly interventionist states as it can also be understood to reflect the interplay between departments concerned with service provision, and those involved in fiscal management.²⁸ Whatever their motives, the institutional position and general stake that people in senior positions in the public sector have in initiatives makes them a serious obstacle to attempts to produce Silicon Valley effects.

Outcomes Driven. The second state effect that may create problems with respect to initiatives of this sort is that states, and their leading officials, place great value on the production of measurable outcomes. Politicians, who are oriented to direction and control, will tend to want to prefigure outcomes and to create measures that will identify success with respect to those outcomes. A preoccupation with measurement creates a tendency to value that which can be measured (which may be less of a problem in terms of inventions, but more of a problem with respect to product and process innovation). Another problem created by a preoccupation with measurement relates to the increase in cost that this creates. This leads either to a reduction in expenditure on the core activities or an increase in expenditure. The problems associated with measurement are, probably, the more important of these, as some of the most desirable Silicon Valley effects that are sought will be less tangible.

An even more important problem with an outcome orientation is that it is rare for such an approach to accept failure as an outcome. Cash-burn in Silicon Valley can be understood to be a direct reflection of failure. While statistics concerning cash-burn are not easily extracted, that Silicon Valley absorbed something in the order of \$7 billion during the second quarter of 2000²⁹ provides some indication of the money required to fuel it. Only a limited number of good ideas result in start-ups. Only a limited number of the start-ups created will become viable firms. Only a limited number of viable firms survive the middle term. In short, failure is an essential part of the activity (and not an undesirable outcome). Failures might have positive effects, in terms of the information flows that they have created and in terms of the inter-personal connections that they produce. However, failures will still be measured as failures. While many public officials are responsible for monumental failures, they are not prone to champion initiatives on the basis that they will have significant failure rates. Attempts to engender political support based

on less tangible outcomes may be adopted, but this will require particular skills on the part of public officials.

Short-term Focus. The final state effect that might create problems for any attempt to produce Silicon Valley effects is the preoccupation with short-term outcomes. While he may have had the development of a much larger region in mind, it is salutary to bear in mind Herbig's argument that any attempts to create a hotspot like Silicon Valley ought to be thought of as involving a 15–25 year process.³⁰ Politicians in representative democracies are particularly concerned with the short-term. The election cycle of 3–4 years means that initiatives, which will generally have taken more than a year to introduce, have little more than 2 years in which to produce the sorts of outcomes that politicians will tend to want to use to justify their re-election. Governments in those countries in which representative democratic practices are weak, require legitimacy and will be oriented to seek short-term outcomes from their initiatives, which they can use to justify their political control. These governments will be prone to seeking short-term outcomes that they can use to justify their position.

Universities and Silicon Valley Models in Southeast Asia

While the significance of Stanford's role in the emergence of Silicon Valley is open to question, the desirability of linking universities to models designed to promote Silicon Valley effects remains.³¹ One reason for this is that a respected university provides status and connotes a connection to a significant research capacity and technical expertise. While the former is important, and probably real, the latter is open to question. This is not to suggest that those in universities play no role, but does require that the nature of that role be carefully considered. Universities are, at best, complex organizations within which a variety of interests are embedded.³² Understanding these interests provides a basis upon which the role of a university, or a number of universities, might be approached. There can be little doubt, however, that universities can provide a means by which talented people can be encouraged to contribute to the production of Silicon Valley effects.

Need for Universities

Yet, apart from a good address, universities can offer much to a Silicon Valley model. One of these is the potential for the Silicon Valley model to link to an accreditation process, that will allow the Silicon Valley model to attract those who seek qualifications that will position them for lucrative employment in information industries. Universities also contain people who possess, and can bring others to possess, skills that may be attractive to those who are desirable participants in the Silicon Valley model. Most important, however, is the fact that universities contain, in terms of both students and staff, information seekers and it is these who are most likely to contribute to a Silicon Valley model. Universities have always played a role in bringing together people with like interests and allowing them to participate in communities seeking particular sorts of information and skills. In short, universities contain people who can be made central to the activity of encouraging individuals to contribute to the production of Silicon Valley effects.

The basic question that arises in Southeast Asia concerns the quality of the universities that are found in the region. Certainly, there are many good universities in this region, but whether they will attract the staff and provide the resources necessary to participate effectively in attempts to produce Silicon Valley effects may be open to question. The educational cultures of universities in this region must be carefully examined if they are to be understood to make a positive contribution to the creation of Silicon Valley effects.

While Diez was referring to research institutes, he makes the important point that it is the embeddedness of these institutes in national and international scientific or knowledge networks that is an important contribution that they make with respect to stimulating innovation.³³ It is their place in, information network or 'information milieu' that is crucial to their contribution to the production of Silicon Valley effects.

Universities seem to offer one conduit through which information may flow in order to produce Silicon Valley effects. Simply clustering firms will not provide for the flow of information that is important for Silicon Valley effects. This is a point that Antonelli has emphasized. 'Agglomeration is not a sufficient condition for a clustering of technological innovation and a diffusion of technological externalities. A number of important communication channels are necessary, and only their combination provides a conducive environment for encouraging the rate of accumulation of collective knowledge and the eventual introduction of technological innovations.'³⁴ Universities with research, teaching and seminar capabilities might be understood as a meaningful source of a variety of communications channels.

Diez's work provides some valuable insights into the issues that must be addressed in this context—though his study was focussed on research institutes. The first of his findings was that research institutes tended to be more oriented to facilitating product innovation.³⁵ The second was that research institutes tended to support larger firms. He concluded with the following comment:

If research institutes are to play a leading role in supporting regional innovation processes, . . . then the incentive structures for research institutes must change in such a way that co-operation with local small and medium-sized businesses becomes a matter of course. In view of the fact that the technology fields of research institutes and businesses differ greatly, the question must be asked whether research institutes ought not to be aimed to a far greater extent at the support of the fostering of university spin-offs, instead of supporting existing local businesses which operate in technology fields that cannot be covered by the local research institutes. One possibility might be to motivate and support current students in the start up of business.³⁶

That people in universities will be important to Silicon Valley models and that universities represent difficult organizations with which to work, mean that they must be approached carefully. Indeed, the most important first step in conceiving of the role of the university may be to disaggregate the institutions. Universities, in short, are composed of people. Some of them will be useful to a Silicon Valley model and some will not. Some of those who are most likely to offer something for a Silicon Valley model are those who have acquired significant status in technical or other fields that relate to information industries. Many of these, however, may be too far from the 'game' to render their expertise current. Their status may be important in

attracting people to a Silicon Valley model, but their expertise may not. Their access to technology and knowledge networks and various information or knowledge milieus may be their most important contribution in this context. Other members of universities might provide the skill associated with fostering product and process innovation. Another important contribution, in this context, is from those people in universities who can provide an environment that fosters invention.

There can be little doubt that few single universities could provide all of these people. The Silicon Valley model must itself function as an attractor for those members of university communities, who are bearers of the various forms of knowledge, that will be useful to those who are attracted to a Silicon Valley model. It may well be the case that activities that allow for the selection and attraction of members of university staffs must accompany those activities that allow for the selection and attraction of members of academic communities.

One possibility that might allow for disaggregation, without losing a prestigious connection, is to allow for a consortium of universities in the region to be associated with the project. Such a consortium would reflect the potential on the part of these universities to supply staff with the various forms of expertise required for the success of initiatives of the sort that we are describing. This would create problems of management and organization, however. Yet, universities in the region are already embedded in knowledge networks and milieu, so the problem may not be insurmountable. That this might be possible is reinforced by Tornquist and Kallsen's findings that 'the proximity of firms and higher education institutions is not as important in the knowledge and technology transfer arena as has been commonly assumed'.³⁷ Tornquist and Kallsen's findings related to the aircraft and electronic equipment industries would appear to provide even greater support for a refusal to consider proximity as a vital issue in the context of information technology industries, involved in software creation and Internet services generation (which can rely more readily on virtual networks).

Firms and Silicon Valley Models in Southeast Asia

Firms must also play an important role in the sorts of initiatives that we are trying to model. Local firms offer important contributions both to an environment in which invention may be facilitated and in which product innovation can occur. They are central to process innovation. Multinational or foreign firms may also play a role and many of these initiatives, such as Hong Kong's Cyberport, have been based upon the participation of multinational or foreign firms. Firms provide both personnel and facilities that may be useful in the context of Silicon Valley models. They may provide experience with respect to production and distribution that may be unavailable through any other means. Certainly key enterprises have been associated with the development and success of regions like Silicon Valley.³⁸ Firms often possess imaginative entrepreneurs whose skills and understanding would be vital to invention and product innovation.

Firms create a variety of problems for the success of these initiatives, however, such that their involvement will have to be carefully managed. Firms can often constitute rigid structures that prevent the permeation and, more importantly, the escape of information. They constitute points of resistance to both product and process innovation. One of the problems with firms is that they sometimes fail to acknowledge the importance of those with tacit knowledge of production and distribution processes, yet it is these people who are central to process innovation.³⁹

Competing firms may transpose their rivalries into the Silicon Valley model and create a difficult environment for invention and innovation.

Firms are not simple organizations and embed a variety of networks and power relationships that must be understood and dealt with for successful product and process innovation. As Hislop, Newell, Scarborough and Swan suggest, sensitivity must be demonstrated with respect 'to complex ways in which the use of power is shaped by the specificities of the organizational context'.⁴⁰ This is even more significant in the context of process innovation. From their study of the appropriation of Enterprise Planning Systems in two firms, Hislop *et al.* concluded that 'for the type of innovations examined not only was the development and use of networks and knowledge of central importance . . . , but that the knowledge utilized and the networks developed were inextricably linked. The typically embodied nature of the knowledge utilized during the course of the appropriation process examined meant that accessing it involved the development of personal networks'.⁴¹

The fact that firms are power structures in which people maintain their identity through maintenance of a controlling position led Suchman and Bishop to conclude that innovation could be understood as a conservative project. In their view, rather than innovation being about fundamental change to an organizational structure, 'change agendas may actually be directed at least as much at the reproduction of existing organizational and economic orders as at their transformation'.⁴²

This point seems particularly salient in the context of the Southeast Asian region. If we treat the dominant firm in the Southeast Asian region as reflecting a Chinese management style, then the characteristics of this style of management need to be understood in the context of initiatives designed to create either or both product and process innovation which affect local firms. Lee has suggested that four key features distinguish Chinese management. These are 'human-centredness, family-centredness, centralization of power and small size'.⁴³ Pun seemed to support such an assertion of a basic characteristic of Chinese management. In Pun's view, Chinese cultural values have 'strongly influenced the Chinese management systems, and centralized authority, hierarchical structures as well as informal co-ordination and control mechanisms prevail in both the Mainland Chinese government and the overseas Chinese business'.⁴⁴

These factors are also important in the context of attempts to bring local firms into contact with multinational corporations. Xing has suggested that any firm seeking to do business in China must understand that, amongst other things 'Confucianism, family-ism, group orientation . . . have heavily influenced the direction of business practices'.⁴⁵ These characteristics do not appear very different from those that Pun identified as typical of overseas Chinese businesses, so they must be provided for if Silicon Valley effects are to be produced.

Culture

We do not want to appear to be obsessed with the issue but we believe that cultural factors are likely to be important. The cultures in the region, specifically Chinese cultures, may create problems for an attempt to create a model designed to produce Silicon Valley effects in the region. We wish to discuss three cultural factors in this final section of our paper. These are a tolerance of failure, individualism and language. Confucian dynamism may ameliorate these cultural effects to some extent, but Herbig's conclusion in this regard suggests that the greater innovative capacities associated with Confucian dynamism was more with respect to lower

order innovations,⁴⁶ with lower order constituting a combination of continuous innovation ('involving only the introduction of a modified product') and modified innovation (which 'is more disruptive than continuous innovation, but stops short of altering behavioral patterns').⁴⁷

Before we develop these points, we feel it necessary to point out that, while these cultural values are dominant in countries in the region we do not presume that culture maps directly onto individuals. Indeed, the contribution that people from the region make to the development of Silicon Valley is a clear demonstration that culture need not be treated as a sole determinant of identity. Saxenian's *Silicon Valley's New Immigrant Entrepreneurs* identifies the contribution that Chinese and Indian entrepreneurs are making to the region.⁴⁸ Culture, from our perspective, is a possible source of constraint on the behaviour of people in the region. If we assume that there are significant differences between the culture in which Silicon Valley is located and those that pertain in Asian countries, then these cultural differences are likely to have a significant impact on any attempt to model Silicon Valley in the Asian region. Even if we deny cultural differences, we must still be aware of a tendency on the part of state elites in these countries to promote a sense of cultural distinctiveness (sometimes played out in terms of the 'Asian values' position). We are not suggesting that Asians are different, more social and community oriented, but that the cultures in which they find themselves may preclude the values associated with innovation.

The first characteristic that has often been associated with Silicon Valley and which may create problems in this region is failure. We have already discussed this point in terms of problems with the tendency on the part of those in prominent positions within states to reject failure. The question that arises in this context concerns whether there may be problems associated with accepting failure in societies in which hierarchy and authority are significantly valued. Herbig's suggestions that the Japanese are more risk averse than their American counterparts and that this affects their capacity for entrepreneurial activity⁴⁹ may not directly transpose to the Southeast Asian region. It deserves some consideration in this context, however.

The next cultural factor that must be considered concerns the promotion of individualism. According to Herbig,⁵⁰ collectivist societies are less prone to produce innovation than societies in which individualist values are strong. If Southeast Asian societies are more collectivist (and Herbig seems more willing to denote 'Oriental cultures' as collectivist⁵¹) and workers show greater levels of loyalty and connection to communities and firms, then they may not flow as freely as they have done in Silicon Valley. A lack of commitment to a firm may reduce movement on the part of those who might be engaged in a Southeast Asian version of Silicon Valley. A tendency not to connect with those from other communities/firms may also be a problem. The flow of information and personnel around and across firms in Silicon Valley seems to constitute one of the regions' distinctive features.

The third cultural issue relates to the language that might be necessary if desirable information effects (including process innovation and innovation stimulation effects) are to be produced. This is a greater problem if the effects are to be regional and not country specific. However, it remains an issue for country specific initiatives. English language may prove something of a necessity, especially if foreign firms, usually American firms, are to contribute to the production of Silicon Valley effects. However, the effects of this on process innovation, in

particular, may create problems. Innovation may well be stimulated, however, in the context of information products and services that are tailored to a domestic market. Innovation, to create internationally desirable information products and services may not be facilitated if the dominant idiom is not English.

Conclusion

Much of the alleged modeling of Silicon Valley in this and other regions appears to us to be fundamentally flawed. Insufficient consideration has been given to the models of Silicon Valley that have dominated planning in this context. These problems are compounded by a failure to consider problems associated with the very activity of modeling itself (including those introduced by the interests of those involved in the modeling process itself). Mechanistic copying will not prove, in our view, to be a viable approach. Concentrating on producing Silicon Valley effects is a more promising starting point. Careful consideration of the specific innovation effects that are sought is essential. Considering this question may even lead to the conclusion that innovation in the region is likely to more reflect that of a 'second mover', rather than a rapid product innovator. A next step is to give due consideration to the fruitful employment of the resources of states and universities. The dominant form of firms in the region is another factor that must be taken into account in this context. Dominant cultures in the region are yet another contextual factor that requires careful consideration. Certainly, technical 'know-how' is a vital ingredient, but, in our view, only one of the ingredients of what is inevitably a complex mix. While we believe that we have dealt with the most important issues that face any attempt to produce Silicon Valley effects in Southeast Asia, we believe that other issues will also need attention. Intellectual property issues, for example, constitute yet another issue that must be addressed in this context.⁵² Our intention in this paper was not to provide a model for Silicon Valley, but to draw attention to the many factors that need to be taken into account in any attempt to create a model. We do not think that the project ought to, or will, be abandoned. However, we believe that it must be more carefully thought through if a Silicon Valley model is to be created that will successfully contribute to development in the Southeast Asian region.

Notes and References

1. S. Macdonald, *Information for Innovation: Managing Change from an Innovation Perspective*, Oxford University Press, Oxford, 1998, pp. 160–88.
2. *Ibid.*, p. 171.
3. *Ibid.*, p. 179.
4. *Ibid.*, p. 181.
5. *Ibid.*, pp. 180–81.
6. R. McChesney, 'The Internet and US communication policy-making in historical and critical perspective', *Journal of Communication*, 46, 1, 1996, pp. 98–124.
7. A. Saxenian, 'The genesis of Silicon Valley', in P. Hall and A. Markusen (eds), *Silicon Landscapes*, Allen and Unwin, Winchester, MA, 1985, p. 22.
8. McChesney, *op. cit.*, pp. 109–10.
9. *Ibid.*, p. 109.
10. R. A. Joseph, 'Political myth, high technology and the information superhighway: an Australian perspective', *Telematics and Informatics*, 14, 3, 1997, pp. 289–301.

11. J. Braithwaite, 'A sociology of modeling and the politics of empowerment', *British Journal of Sociology*, 45, 3, 1994, pp. 445–80.
12. *Ibid.*, p. 450.
13. R. A. Joseph, 'New ways to make technology parks more relevant', *Prometheus*, 12, 1, 1994, pp. 46–61.
14. An issue that may need to be addressed before any attempt to produce Silicon Valley effects is begun, concerns whether these effects are more likely to be most forthcoming in the context of software products and Internet delivered services, rather than hardware. Silicon Valley itself may be undergoing a shift toward a focus on software, rather than hardware. See C.-M. Lee, W. F. Miller, M. G. Hancock and H. S. Rowen, *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship*, Stanford University Press, 2000.
15. P. A. Herbig, *The Innovation Matrix: Culture and Structure Prerequisites to Innovation*, Quorum Books, Westport, CT, 1994, p. 5.
16. Invention may be understood as closely related to creativity. The relationship between creativity and innovation is discussed extensively in the work by Ford (C. M. Ford, 'A theory of individual creative action in multiple social domains', *Academy of Management Review*, 21, 4, 1996, pp. 1112–42).
17. 'Both Silicon Valley and Route 128 took off after the Second World War with heavy support from military and space programs. It is obvious that *government funds, support, and encouragement* provided strong incentives and play the role of a catalyst for high-tech innovation.' Taken from Herbig, *op. cit.*, p. 238.
18. R. Wade, 'The visible hand: the state and East Asia's economic growth', *Current History*, 92, 578, 1993, pp. 431–41.
19. See J. Hertling, 'Internet growth challenges China's authoritarian ways', *The Chronicle of Higher Education*, 41, 39, 9 June 1995, p. 22; J. Robinson, 'Technology, change, and the emerging international order', *SAIS Review*, 15, 1, Winter–Spring 1995, pp. 153–74; G. Rodan, 'The Internet and political control in Singapore', *Political Science Quarterly*, 113, 1, Spring 1998, pp. 63–90.
20. Stubbs even suggests that capitalism has taken a different form in the Asia Pacific region characterized by 'the strong, developmental state; . . . the structure of industry; and . . . the role of Japanese and Chinese firms' (R. Stubbs, 'Asia Pacific regionalisation and the global economy: a third form of capitalism?', *Asian Survey*, 35, 9, 1995, pp. 785–98, quote from p. 788).
21. See A. Leftwich, 'Bringing politics back in: towards a model of the developmental state', *Journal of Development Studies*, 31, 3, 1995, pp. 400–13.
22. Y. T. Kim, 'Neoliberalism and the decline of the developmental state', *Journal of Contemporary Asia*, 29, 4, 1999, pp. 441–61.
23. See E.-S. Pang, 'The financial crisis of 1997–98 and the end of the Asian developmental state', *Contemporary Southeast Asia*, 22, 3, 2000, pp. 570–87.
24. See M. W. Peng, 'How entrepreneurs create wealth in transition economies', *Academy of Management Executive*, 15, 1, 2001, pp. 95–108, in particular pp. 100–1 and 102.
25. Herbig, *op. cit.*, pp. 157–68.
26. See R. Eisner, 'Black holes in the statistics', *Challenge*, 40, 1, 1997, pp. 6–10.
27. This theory has been stated in a variety of forms. Breton has suggested that 'bureaucrats seek to maximize the relative size of their bureaus . . . [in order] to achieve the highest possible income and prestige . . .' (A. Breton, *The Economic Theory of Representative Government*, Aldine, Chicago, 1974, p. 162). Public choice theory, or at least its New Right or Virginia school variants, represents other iterations of this position. (See P. Dunleavy, *Democracy, Bureaucracy and Public Choice: Economic Explanations in Political Science*, Prentice Hall, New York, pp. 154–56; and J.-E. Lane, *The Public Sector: Concepts, Models and Approaches*, Second Edition, Sage, London, pp. 201–16.)
28. See H. M. Schwartz, 'Public choice theory and public choices: bureaucrats and state reorganization in Australia, Denmark, New Zealand and Sweden in the 1980s', *Administration and Society*, 26, 1, 1994, pp. 48–77.

29. 'Business: a squeeze in the valley', *The Economist*, 357, 8191, 7 October 2000, pp. 71–72.
30. Herbig, *op. cit.*, p. 240.
31. See Lee *et al.*, *op. cit.*, Herbig, *op. cit.*, and J. R. Diez, 'The importance of public research institutes in innovative networks—empirical results from the metropolitan innovation systems Barcelona, Stockholm and Vienna', *European Planning Studies*, 8, 4, 2000, pp. 451–63.
32. Bird, Hayward and Allen provide an interesting discussion of the tensions that can emerge amongst university staff and between university staff and staff in firms that reflect different values, status and workload considerations (see B. Bird, D. Hayward and D. Allen, 'Conflicts in the commercialization of knowledge: perspectives from science and entrepreneurship', *Entrepreneurship Theory and Practice*, Summer 1993, pp. 57–77, see especially pp. 59–61).
33. Diez, *op. cit.*, p. 459.
34. C. Antonelli, 'Collective knowledge communication and innovation: the evidence of technological districts', *Regional Studies*, 34, 6, 2000, pp. 535–47, quote from p. 544.
35. Diez, *op. cit.*, p. 461.
36. *Ibid.*, p. 462.
37. K. M. Tornquist and L. A. Kallsen, 'Out of the ivory tower: characteristics of institutions meeting the research need of industry', *Journal of Higher Education*, 65, 5, 1994, pp. 523–39, quote from p. 533.
38. Herbig, *op. cit.*, p. 237.
39. Macdonald, *op. cit.*
40. D. Hislop, S. Newell, H. Scarborough and J. Swan, 'Networks, knowledge and power: decision making, politics and the process of innovation', *Technology Analysis & Strategic Management*, 12, 3, 2000, pp. 399–411, quote from p. 410.
41. *Ibid.*, p. 410.
42. L. Suchman and L. Bishop, 'Problematising "innovation" as a critical project', *Technology Analysis & Strategic Management*, 12, 3, 2000, pp. 327–33, quote from p. 331.
43. J. Lee, 'Culture and management—a study of small Chinese family businesses in Singapore', *Journal of Small Business Management*, July 1996, pp. 63–67, quote from p. 63.
44. K-F. Pun, 'Cultural influences on total quality management adoption in Chinese enterprises: an empirical study', *Total Quality Management*, 12, 3, 2001, pp. 323–42, quote from p. 329.
45. F. Xing, 'The Chinese cultural system: implication for cross-cultural management', *SAM Advanced Management Journal*, 60, 1, 1995, pp. 14–21. Chen and Boggs have suggested that firms engaged in joint ventures in China must address the issue of building trust. 'Western MNCs tend to trust contracts, but in China, because of weak property rights laws and an uncertain, dynamic institutional environment, informal relationships and the development of trust between partners may play a more important role than contracts' (R. Chen and D. J. Boggs, 'Long term cooperation prospects in international joint ventures: perspectives of Chinese firms', *Journal of Applied Management Studies*, 7, 1, 1998, pp. 111–27).
46. Herbig, *op. cit.*, p. 108.
47. *Ibid.*, p. 7.
48. A. Saxenian, *Silicon Valley's New Immigrant Entrepreneurs*, Public Policy Institute of California, San Francisco, CA, 1999. See also Herbig, *op. cit.*, p. 233.
49. *Ibid.*, p. 97.
50. *Ibid.*, pp. 91–5.
51. *Ibid.*, p. 91.
52. Like most parts of the world, countries in the Asian region are net importers of the Intellectual Property associated with high-technology hardware and applications. Silicon Valley is located in the United States, which is a net exporter of IP. Firms in Silicon Valley do not develop IP in order for that IP to be repatriated elsewhere. Silicon Valley models in other countries than the United States, which rely on the participation of American firms, run the risk of contributing to IP imbalances. The problems associated with generating IP and retaining it in the Asian region require some consideration in the context of the sort of modeling that we are discussing in this paper.