

Table 7 (continuous)

According to value of issues of municipal bonds 1999 year	5,0	7,0	55,5	32,5
2000 year	7,0	8,5	55,0	29,5
2001 year	8,0	9,0	48,0	35,0

Source: CERA S.A. Central European Rating Agency; at present - Fitch Polska S.A.

Table 8

Rating marks for some cities with powiat status

CITY	RATING AGENCY	RATING MARK	RANGE OF RATING MARK
GDAŃSK	Standard & Poor's	BBB	International
KRAKÓW	Standard & Poor's	BBB	International
ŁÓDŹ	Standard & Poor's	BBB	International
SZCZECIN	Standard & Poor's FITCH IBCA	BBB	International
WROCLAW	Standard & Poor's	BBB	International
OSTRÓW WIELKOPOLSKI	CERA	A-	Domestic
TYCHY	CERA	AA-	Domestic
ŻORY	CERA	BBB	Domestic

Source: CERA S.A. Central European Rating Agency; at present - Fitch Polska S.A.

Silicon Valley Model: Origins, Institutions and Replication

Mari Sako*

Abstract. Silicon Valley continues to receive attention as a resilient cluster of high-tech entrepreneurship. This article lays out the essential elements of the Silicon Valley model, specifically by identifying key supporting institutions and complementarities amongst them. In the US context, the article argues that the large Chandlerian modern corporation and the Silicon Valley cluster of small start-ups are in a dialectical relationship, corresponding to different stages of the growth of firms. The article then offers a framework for analysing how the Silicon Valley model might be replicated, with or without modifications. In the case of Japan, national institutions in financial and labour markets are becoming weaker and heterogeneous, giving greater scope for hybrid forms of corporate governance to evolve. Nevertheless, Japanese entrepreneurial firms are bound by existing norms, and are likely to continue to find resources for competitive advantage by linking to large corporations.

Key words: entrepreneurial firms, Silicon Valley, corporate governance; Chandlerian modern corporations.

* Professor of Management Studies, Said Business School, University of Oxford. Please send comments to mari.sako@sbs.ox.ac.uk

Introduction

Silicon Valley is a specific locality in the US, but the essence of what makes this high-tech cluster or eco-system work may be captured by calling it a Silicon Valley Model. Various authors have studied and written about this (e.g. Saxanien 1994, Kenny (ed.) 2000). The aim of this section is not to replicate their efforts but to use their work to understand the following. First, what national institutions are necessary and sufficient for the Silicon Valley model to function well? What institutional complementarities characterize the model? Second, are the institutions of the US liberal market economy able to support the large Chandlerian modern corporation and the Silicon Valley cluster of small firms equally well, or is one corporate form able to better exploit the current US institutions than the other? Is the Silicon Valley model an alternative to the Chandlerian modern corporation, or two equally viable equilibria in one institutional setting? Third, is the Silicon Valley model replicable elsewhere in the world?

In order to answer these questions, this section starts with the analytical framework of Varieties of Capitalism (Hall and Soskice 2001) that emphasises complementarities between institutions as much as among practices (Milgrom and Roberts 1995). In particular, this framework directs our attention to examining the strength of complementarity of institutions within and between the four subsystems, namely in corporate governance, inter-firm relations, labour markets, and education and training.

Silicon Valley model described

At the core, the Silicon Valley model may be described in terms of a clustering of entrepreneurial firms that develop new technologies in high risk, high return, high growth markets. The 'high risk, high return' characteristic of the markets is due to the fact that the underlying technologies (1) require R&D and marketing expenditures that are relatively large in relation to production costs; (2) enable significant network externalities in demand that rewards first movers that can set de facto standards with increasing returns; and (3) lead to short product cycles and hence the frequent introduction of new products. It is in the nature of such technologies – in information technology, software, and biotechnology – that small start-ups can succeed in achieving rapid growth in a short period of time. In particular, the rapid pace of technological change gives much scope for small start-ups to get ahead as large corporations cannot keep up with the whole range of products and technologies for the future. Small start-ups can also make decisions more rapidly than large firms to realise ideas into commercialisable products or services. Moreover, these products and services tend to be knowledge-based, and therefore can be brought to market without large investments in physical assets. The following institutions facilitate the emergence and maintenance of entrepreneurial firms in these specific sectors.

(a) Corporate governance: Venture capital is a key institution alongside law firms and investment banks in the Silicon Valley (Kenney (ed.) 2000). Venture capitalists are more than financial intermediaries; they also provide managerial oversight and advice to entrepreneurs through having seats on the firm's board of directors. The growth of venture capital as an institution is predicated on the availability of an active stock market where finance is ultimately available on publicly assessable information. Venture capitalists need stock markets to realise capital gains from successful investments – 'exit' via IPOs (initial public offerings) -- and it is in this sense that venture capital and active stock markets are complementary institutions.

(b) Labour markets: Mobility of high-skill labour that is a long-standing feature of Silicon Valley facilitates radical innovation in a number of ways. Perhaps the most significant is the movement of engineers from existing firms to establish start-ups. But equally important is flexible employment that enables managers and engineers to move from firm to firm in pursuit of more challenging projects, better stock option packages and other attractions. As compared to a situation in which stable employment patterns with internal career ladders are the norm, inter-firm mobility means that information and knowledge circulate more rapidly, that trained personnel is readily

available to staff start-ups, and that the cost of business failure is alleviated by low costs of hiring and firing.

(c) Education and training: Labour mobility in and out of university and industry is also a feature of the Silicon Valley model. In the model, a specific type of university, such as Stanford University and MIT, does not merely educate and train engineers and scientists to high standards, but also creates an incubator environment for new ideas and socialises graduates into pursuing an entrepreneurial career rather than working for established corporations. This educational orientation permits labour mobility, retraining, and career changes. It also means that people generally value others by the novelty of ideas and individual achievements regardless of formal qualifications or the prestige of established firms to which they are affiliated. Notably, there are no set qualifications to set up entrepreneurial firms or to become venture capitalists.

(d) Inter-firm relations: An unusually high level of inter-firm cooperation – by American standard – is noted as a feature of the Silicon Valley model. Long-term, trust-based partnerships that blur the boundaries between interdependent but autonomous firms in the region are of recent vintage (Saxanien (2000)). Spin-outs from large firms have been a long-standing feature of the region, as Sturgeon (2000) notes. But in the computer industry, it is the shortening of product cycles and faster pace of technological change that led to the de-verticalisation of production, superseding the mass production mode. Computer systems firms act as integrators of the design and assembly of a final product, by developing cooperative relationships with suppliers of microprocessors, PCBs and other components within the region. Heavy reliance on outsourcing forces firms to improve coordination through cooperative relationships.

There are many significant complementarities among these four sets of institutions. For instance, the availability of venture capital encourages mobility of highly skilled people to form start-ups, whilst labour mobility is crucial for venture capitalists to operate in the way they do, namely in effect to sponsor individuals, be they employed by a university or a firm, to change their employment status. As another example, a loosely integrated network of firms is necessary to cope with product market volatility, and de-verticalisation through spin-outs is facilitated by inter-firm labour mobility. Discussing the nature of complementarities heightens our understanding of how institutions and incentives are well aligned along multiple dimensions.

But one essence of the Silicon Valley model that is not made totally explicit in the above characterisation of the model is the importance of locality in all the key relationships: between local venture capitalists and local entrepreneurs, between local industry and research universities in the area, and between buyers and suppliers within the region. The pronounced regional agglomeration of activities that results from the importance of such local links is due to the relational nature of many of the links that rely on particularistic relationships in which people's identity matters. The evaluation of success or failure may be ultimately by the invisible hand (in financial and product markets), but the productive relationships that lead to such success or failure are of the particularistic, non-market, sort.

Are Silicon Valley firms and the Chandlerian modern corporation two equally viable equilibria in the US liberal market economy?

Silicon Valley is often portrayed as a region that exists largely outside the purview of the large Chandlerian modern corporation and financial institutions of the East Coast. This is an attractive proposition and is plausible when we allow for multiple equilibria given a specific set of institutions. In support of this view, one may argue that Silicon Valley and the Chandlerian modern corporation operate with different principles in non-competing domains. In particular, Silicon Valley start-ups rely on local venture capital as the main source of finance, and high inter-firm mobility of labour and close links to local research universities for sources of labour. By contrast, large corporations rely on stock markets for finance, recruit and retain managerial and technical labour for internal career ladders, and develop more bureaucratic internal structures. Consequently, Chandlerian modern corporations have a comparative advantage in producing goods and services that require large capital investment for production, whilst Silicon Valley start-ups reside in niches or

technologies that require more agile decisions than those produced by large firms. In sectors (such as drugs) that require high R&D expenditure with uncertain outcomes, the pressures of stock markets may be responsible for a clear division of labour between start-ups that engage in basic R&D and large pharmaceutical companies that focus on clinical trials and product launch.

Nevertheless, there is sufficient evidence for interaction between the two seemingly distinct corporate models (or social structures) in the US to assume that they are separable and stable conditions. As noted earlier, spin-outs from large established firms had always been a feature of the Silicon Valley from the times of telegraph and radios in the early twentieth century. Labour is therefore mobile, not just within the small firm sector, but between large and small firms. Also, again as noted earlier, objectives of many Silicon Valley start-ups are not to remain small but to grow, and some of the most notable start-ups, among them Hewlett-Packard, Intel, Microsoft and Sun Microsystems, have crossed the line to resemble the Chandlerian modern corporation. In this sense, the two forms can be seen as different stages in lifecourse of some firms, suggesting a more dialectical relationship between the two. Lastly, the US government has funded much of the development of key technologies in electronics and aerospace that constitute the heart of the Silicon Valley expertise, and the beneficiaries of US defence contracting (at R&D labs in universities and large corporations) have a significant presence in the Silicon Valley. This is why it appears incorrect to characterise the Silicon Valley model as an exceptional pocket of relational activities in an inhospitable liberal market-based system of the United States.

Replication of the Silicon Valley Model elsewhere in the world?

This is a frequently posed question but not one that is addressed in a systematic manner. For example, Kenney states that his book is about the uniqueness of Silicon Valley (Kenney (ed.) (2000) on p.12). Comparative work in this area, studying the diffusion of the Silicon Valley model as a whole rather than just venture capital or entrepreneurial labour only, is yet to be made. In this subsection, we develop a framework to answer the specific question: can the Silicon Valley model be transplanted in Japan?

In order to prepare the scene for a discussion on Japan, it is necessary to develop a framework for analysing the diffusion of production models and institutional change. A useful starting point is the hybridization framework that was developed in order to investigate the diffusion of Lean Production in the 1980s and 1990s (Boyer et al (1998) (see Exhibit 1). Whilst the context is different, the framework gives a number of pointers when examining the possibility of adopting the Silicon Valley Model in Japan. In particular, when the home and host countries have different sets of national institutions, imitation (i.e. attempt to transplant an exact replica) is unlikely to succeed. Consequently, one should be seeking a form of hybridization that is likely to involve a search for functional equivalents, i.e. different forms of institutions that satisfy the same function. The extent to which hybridization – taking elements from different national systems – is possible depends on whether or not the host country's national institutions allow for some diversity despite a pull towards homogeneous and coherent practices. Institutions that are too strong and cohesive (i.e. with strong institutional complementarities) are likely to undermine efforts at adopting the new model, and may lead to failure. In most cases, however, the process is likely to involve an element of trial and error and learning, leading to novel arrangements. Thus, rational institutional design may not always lead to intended outcomes.

Based on this perspective, the adoption of the pure Silicon Valley model in Japan requires a drastic restructuring of financial market institutions, as neither venture capital nor stock markets operate as in the US system. Labour market institutions would also need to be reformed, away from lifetime employment towards more flexible forms of employment. Institutional complementarities in the Japanese system – for example between venture capital and labour mobility of engineers (Aoki 2001) -- had been very strong, making piecemeal changes more difficult. Nevertheless, complementarities may matter for performance but may not necessarily prevent institutional change from taking place.

More recently, the restructuring of financial markets that have suffered from an accumulation of huge non-performing loans have weakened the main bank system, cross-shareholding, and other notable features of the Japanese financial institutions. Consequently, bankruptcies (notably Hokaido Takushoku, Yamaichi Securities) and bank mergers (e.g. to form the Mizuho Group) have accelerated the reduction in headcount and disruptions to lifetime employed careers. The prolonged recession more generally also quickened the erosion of lifetime employment practices in major corporations. In short, the weakening of national institutions in Japan has resulted in an environment more conducive to the adoption or development of new institutional arrangements and employment practices.

In the context of Lean Production, multinational companies are the agents of diffusion. When the context is high-tech start-ups, individual entrepreneurs fulfil that role (cf venture capitalists tend to remain surprisingly localised). The equivalent of the multi-nationalisation of the Chandlerian corporation in the Silicon Valley Model is the cross-border networking of immigrant entrepreneurs. Saxenian (1999) argues that instead of a 'brain drain', what we are seeing is 'brain circulation' in which immigrants particularly from Taiwan, Mainland China and India are creating a rich fabric of associational activities not just within Silicon Valley but in conjunction with their social networks in their originating countries. These immigrant entrepreneurs serve as a conduit for the diffusion of the Silicon Valley Model. Japanese-born engineers also feature in her study, but they are not noted for developing the same sort of bridge between Silicon Valley and Japan. In fact, most of the Japanese entrepreneurs who were interviewed as part of this study had solely domestic experience.

In conclusion, national institutions in Japanese financial and labour markets are becoming weaker and heterogeneous, giving greater scope for hybrid forms of corporate governance to emerge. But rational institutional redesign (e.g. to establish new capital markets for start-ups) has not led to intended outcomes. Entrepreneurial firms are bound by existing norms, and are likely to continue to find resources for competitive advantage by linking to large corporations.

References

1. Aoki, Masahiko (2001) *Towards Comparative Institutional Analysis*, MIT Press.
2. Boyer, Robert et al (eds) (1998) *Between Imitation and Innovation: The Transfer and Hybridisation for Productive Models* Oxford: Oxford University Press.
3. Hall, Peter and Soskice, David (2001) *Varieties of Capitalism* Oxford University Press.
4. Kenney, Martin (ed.) (2000) *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region* Stanford: Stanford University Press.
5. Milgrom, Paul and Roberts, John (1995) 'Complementarities and Fit: Strategy, Structure and Organizational Change in Manufacturing' *Journal of Accounting and Economics* 19.
6. Sahlman, William A. (1990) 'The structure and governance of venture-capital organizations' *Journal of Financial Economics* 27, pp.473-521.
7. Saxenian, Annalee (1994) *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* Cambridge Mass.: Harvard University Press.
8. Saxenian, Annalee (1999) *Silicon Valley's New Immigrant Entrepreneurs*, Public Policy Institute of California.
9. Sturgeon, Timothy (2000) 'How Silicon Valley Came to Be' in Kenney (ed.) *Understanding Silicon Valley*, Stanford: Stanford University Press.