A cross-national comparison of knowledge management practices

Leo-Paul Dana
University of Canterbury, Christchurch, New Zealand
Len Korot
Institute for Global Management, Philadelphia, Pennsylvania, USA, and
George Tovstiga
ABB Switzerland and University of Twente, The Netherlands

Abstract

Purpose – A distinguishing feature of the successful "post-Network Age" enterprise is its intrinsic entrepreneurial character that manifests itself in key organizational knowledge practices relating to organizational culture, processes, content and infrastructure. The purpose of this article is to explore organizational knowledge-based practices.

Design/methodology/approach – The article reports on the outcome of field research in which entrepreneurial firms in four geographic regions were analyzed with the help of a diagnostic research tool specifically developed for profiling organizational knowledge-based practices. The diagnostic tool was applied in firms located in Silicon Valley in the USA, Singapore, The Netherlands and Israel.

Findings – Key practices that were found to be common to leading-edge firms in all regions included: a propensity for experimentation; collective sharing of knowledge, and collective decision making. The paper describes the research in terms of a cross-cultural comparison of the four regions, derives key determinants of competitiveness, profiles regional characteristics which enhance innovation and entrepreneurship and closes with a discussion on the implications of the research outcomes for entrepreneurial firms seeking to build a global presence.

Originality/value – The research provides evidence that innovative, entrepreneurial firms – no matter where they are located – tend to exhibit organizational knowledge practices, cultural beliefs, values and behavioral norms that are more akin than dissimilar, regardless of national context.

Keywords Knowledge management, United States of America, Singapore, The Netherlands, Israel

Paper type Research paper

1. Conceptual background

Knowledge is the integration of information, ideas, experience, intuition, skill and lessons learned that creates added value for a firm. Innovation is the process by which knowledge is transformed into new or significantly modified products and/or services that establish the firm's competitive edge.

Nonaka and Takeuchi (1995) define two realms of knowledge: "tacit" and "explicit". Explicit knowledge is easily identifiable, easy to articulate, capture and share – it is the stuff of books, manuals and reports. By contrast, tacit knowledge consists predominantly of intuition, feelings, perceptions and beliefs, often difficult to express and therefore difficult to capture and transfer. Of the two, tacit knowledge carries the greater value in that it is the essence of innovation.

Managing knowledge and innovation in the post-Network Age is a multidimensional challenge. It requires understanding and application of four inextricably linked domains (Figure 1): culture, content, process and infrastructure, all

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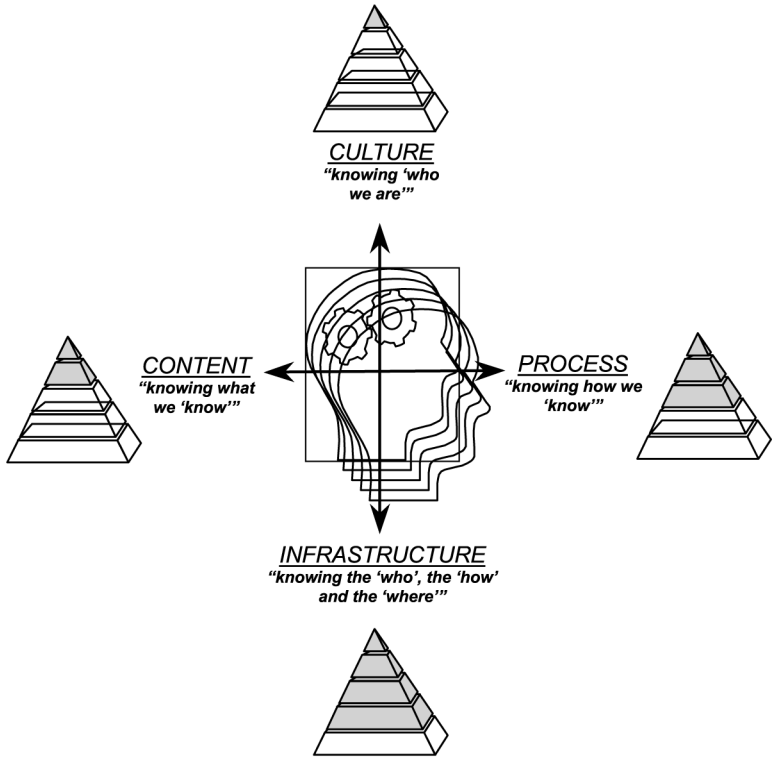


Figure 1.
Organizational knowledge domains

of which also have a tacit as well as an explicit dimension. In Figure 1, the solid areas indicate our estimation of the explicit knowledge portion; the open areas, the tacit knowledge for each of the four dimensions (Birchall and Tovstiga, 1998; Chait, 1998; Tovstiga and Korot, 2000):

(1) *Knowledge culture or "knowing who we are"*
It is in this domain that the values, beliefs and behavioral norms are played out. It is the most elusive domain but is the prime determinant in the success of knowledge management. It is here where we find the cutting distinction between Industrial Age and Network Age enterprises. With reference to Schein's (1992) three levels, culture ranges from the highly explicit, visible organizational structures and procedures ("artefacts") to those highly tacit, largely out-of-awareness, deeply imprinted core beliefs that guide an individual's behavior

(2) *Knowledge content or "knowing what we know"*
This domain comprises the firm's stock of strategically relevant knowledge – both explicit and tacit. It exists in the firm in the form of:

- *experiential knowledge* – highly tacit, derived from previous experience and often difficult to articulate;
- *formal knowledge* – refined, documented, highly explicit in nature; and

- *emerging knowledge* – both tacit and explicit, emerging at the interface of highly innovative and cross-disciplinary interactions in the firm such as new product development projects.

(3) *Knowledge infrastructure or "knowing the 'how' and the 'where'"*
This domain encompasses all functional elements in the firm that support and facilitate the management of knowledge. Information and communication technology is one such element. For many organizations, knowledge management stops here. But, knowledge infrastructure is much more – it includes the carriers of knowledge such as cross-functional, cross-national project teams. Fluid processes (Maira, 1998) and flexible teams ensure the rapid transfer of knowledge across complex and shifting internal and external organizational boundarie

(4) *Knowledge process or "knowing how we know"*
A firm's knowledge process domain incorporates how knowledge is created, converted, transferred, applied and ultimately discarded. Nonaka and Takeuchi (1995) have identified four key knowledge conversion processes – "socialization" (tacit to tacit), "internalization" (explicit to tacit), "externalization" (tacit to explicit) and "combination" (explicit to explicit). Knowledge processes can also involve roles played by knowledge workers in the firm (Tovstiga, 1999).

The diagnostic tool used in this study was created to measure knowledge management practices in these four domains.

Related concepts and research

In this paper, we are examining organizational practices in four different regions of the world. In the field of comparative management, much writing and research has been devoted to understanding the influence of national culture on organizational behavior and practices. Hofstede's landmark cross-national survey of IBM (Hofstede, 1980, 1991) has catalyzed a number of studies in which cultural dimensions drawn from Hofstede and others have been used to examine a broad range of topics. For example, recent studies have used these cultural dimensions to look at national differences in achievement motivation (Sagie and Elizur, 2001) and at the relationship between national culture and capital structure (Chui *et al.*, 2002).

The prevailing conclusion drawn from these cross-national studies is that national culture similarities override similarities in management thinking and processes. By contrast, Korot (1989, 1997) pursued the hypothesis that there is a high-technology subculture that transcends national culture boundaries. This research was based on a survey of 17 high-tech startups in Ireland, the UK and France.

Pursuing the concept of a high-technology subculture that is cross-national in nature, Tovstiga *et al.* (2000) compared eight knowledge-driven organizations in The Netherlands, 31 in Singapore and 30 in Silicon Valley and concluded these firms demonstrated remarkably similar key practices and underlying cultural values.

2.Methodology

Research sample

The survey data for this study was collected from managers and technical professionals in knowledge-intensive organizations: 32 Silicon Valley enterprises, 26

enterprises in Israel, 30 Singaporean enterprises and eight Dutch enterprises. Surveys were distributed to each of the organizations by the researchers or by internal research assistants. The average return rate was 45 percent. The firms that were surveyed in each of the four regions were drawn from a broad spectrum of industry sectors including computer hardware and software, biotech, bio-medicine, and telecommunications. The study sample included both region-specific startups as well as established multinationals.

Survey instrument

The Knowledge Practices Survey (KPS) instrument was developed by Tovstiga and Korot (1999). The instrument consists of 21 items, which tap into the four major domains of knowledge management described previously. The four knowledge domains provide the basis for the instrument's four constructs: knowledge culture, knowledge content, knowledge infrastructure, and knowledge process. Respondents are asked to give their perceptions of the current practices within their organization and how important they consider a specific practice to be on the basis of a five-point Likert scale. Knowledge culture items include learning focus, experimentation, participation, openness and trust, and organizational structure. Knowledge content items include: where knowledge resides, sources of knowledge, knowledge dissemination and knowledge flow. Knowledge process items include strategy process, learning process and gap management. Knowledge infrastructure includes items such as access to key knowledge, sharing of knowledge, and degree of interpersonal networking.

Assessment of the KPS instrument

In a recent doctoral dissertation (Robertson, 2001; McCall, 2001) the internal consistency reliability of the instrument was assessed using Cronbach's Alpha. A sample of 142 respondents representing three Silicon Valley firms and one firm in The People's Republic of China yielded coefficients ranging from 0.76 to 0.91. According to Nunally (1978) the generally accepted standard for reliability estimates are values greater than 0.70. This implies that the KPS subscales are sufficiently homogeneous; implying, in turn, that the items do measure the same construct satisfactorily.

The survey instrument was translated and back-translated in the native language although English was chosen by the majority of the companies, reflecting the reality that for high-technology, knowledge-intensive companies around the globe, English and "technotalk" are rapidly becoming universal.

3. National/regional cultural context

Silicon Valley

In a small area, 35 miles long and ten miles wide, south of San Francisco, once heavily agricultural, lies the most concentrated source of technological innovation in the world. Despite the current economic downturn, precipitated by the bursting of the dot-com bubble, Silicon Valley is already on the way back, entering the early stages of yet another cycle of innovation (Levy, 2002). Fuelled by an extraordinary fusion of technical talent, imagination and capital, unhampered by the traditional Industrial Age management constraints of the industrial age, the Valley continues to set the pace for globally driven entrepreneurship. There remain over 6,500 technology companies

crammed into this narrow corridor. This unique center of the evolving Network Age may be accounted for by the following:

- Sheer density, providing access to a deep, constantly refreshed, pool of talent.
- In formal and informal forums, in coffee houses and restaurants and through the constant movement of people from company to company, technology "geeks" continue to transfer knowledge, both tacit and explicit, and figure out how to translate their ideas into fundable, commercial applications. This continual exchange is enhanced by an advanced, broad, networked infrastructure.
- A regional culture that amply rewards innovation and risk-taking, and accepts failure as a natural consequence of experimentation.
- A global perspective in which product marketing and manufacturing knows no geographical boundaries.
- A concentration of universities and research laboratories (Stanford, University of California, Xerox and Fuji PARC's, NASA Ames Research Center, Lawrence Livermore Laboratory) that provide R&D resources for technology transfer.
- Multi-ethnic, young knowledge workers driven by the opportunity to be on the frontier of innovation and by the possibility of creating personal wealth.
- Venture capital – despite the increased caution of venture capitalists, the Valley still remains the major global source of capital, $6 billion invested in 2001.

Israel

Only this tiny nation rivals Silicon Valley in technology innovation. Israel now ranks third in the industrialized world (behind the USA and The Netherlands) in terms of university degrees per capita; it has 135 scientists and technicians per 10,000 workers – more than any other industrialized country. Israel has 14 qualified engineers per 1,000 workers vs eight 8 per 1,000 for the USA and 7.5 per 1,000 for The Netherlands. This extraordinary base of knowledge professionals, coupled with high expenditures on research and development, has enabled Israel to transform itself from an agricultural based economy into a technology-driven economy. High tech products and services now account for three-quarters of exports.

In the year 2000, the Global Entrepreneurship Monitor ranked Israel third in the world in entrepreneurial activity. Investors and multinationals are attracted by Israel's highly educated and trained workforce and by the concentration of technology parks and technology incubators. And akin to Silicon Valley, high technology enterprise in Israel is represented by the presence of major companies such as IBM, Intel, Microsoft, Motorola, AT&T and by the generation of indigenous new technology ventures.

Singapore

Only 646 square kilometres in area, Singapore is home to almost 100,000 entrepreneurs, the majority of this being small family enterprises. Early entrepreneurs in Singapore were middlemen in the international trade of spices between Indonesia and Europe. In 1869, the inauguration of the Suez Canal made Singapore an important node along the route from England to Australia; this made Singapore a distribution hub for

international trade. The British promoted commerce and this attracted entrepreneurs to Singapore.

Singapore became an independent republic in 1965. Until 1985, it relied on foreign multinationals to industrialize the economy. Then, a recession prompted the State to focus efforts on promoting entrepreneurship. In 1985, B. G. Lee introduced the Small Enterprise Bureau of Singapore, a single agency to create schemes for entrepreneurs and to provide a one-stop service for small enterprises. At the time $100 million was set aside for the promotion of Singaporean entrepreneurs. In 1995, the Singapore Productivity and Standards Board was created. It undertook to promote entrepreneurship, and to help enterprises expand.

In the last 20 years, government has invested heavily in moving Singapore into a technology-centered future. Every other home has a personal computer, taxis are rigged with GPS systems and Singapore ONE is the world's only nationwide high-speed broadband network. Hardware, software and IT industries generate more than $7 billion in revenue. Supporting this development of technology-based enterprises are Nanyang Technological University, a major resource for technology R&D and for trained knowledge professionals. Venture capital can come from the extended family, from Chinese clan associations and from venture capital firms (Acs and Dana, 2001).

The Netherlands

This small nation, approximately twice the size of the state of New Jersey with a population of 16 million ranks second only to the USA in terms of university degrees per capita, providing a rich source of technical professionals and knowledge workers. The services sector, primarily trade, financial services and government contributes 50 percent of GDP; 25 percent of GDP is represented by industrial activity – food processing, chemical, petroleum refining, electrical machinery and microelectronics. High technology activity is found primarily in large companies such as Philips with few indigenous high technology entrepreneurial firms. Some of the earliest technologies parks were founded in The Netherlands. These still function as hot beds for innovation and are traditionally linked with technical universities and research labs. The graduates of these programs typically move into large enterprises, government agencies.

4. Analysis of the four regions included in the study

In an analysis of high-technology centers around the globe, *Wired* magazine rated 46 regions from 1 (low) to 4 (high) on each of four factors (Hillner, 2000):

(1) the ability of area universities and research facilities to develop new technologies and to provide skilled knowledge professionals;

(2) the presence of established companies and multinationals to provide expertise and economic stability;

(3) the population's entrepreneurial drive to start new ventures; and

(4) the availability of venture capital to ensure that ideas make it to market.

Three of the four regions represented in our study, Singapore, Israel, and Silicon Valley were rated by *Wired*. Singapore was rated 7, Israel 15, and Silicon Valley received the highest rating, 16. Based on the experience of two of the researchers who have worked

extensively with Dutch industry and universities, the ranking they would assign The Netherlands is 10 – strong in universities and research facilities, moderately strong in terms of the presence of established companies and multinationals, weak in entrepreneurial drive and the availability of venture capital.

If regional infrastructure and culture are key drivers for high technology innovation, we hypothesize that the KPS results for the highest performing organizations will be found in Silicon Valley and in Israel, with lower performing organizations found in The Netherlands and Singapore.

Research findings

Research findings can be found in Figures 2 to 6.

Analysis of the findings

Averages of the four regions for all 21 of the KPS items are shown in Table I.

Contrary to our hypothesis, there is no statistically significant differences among the four regions in terms of current practices, although The Netherlands lags behind the other three regions. In terms of the gap between current practices and importance assigned to the practices, there is a significant gap in Silicon Valley, close to a significant gap in Israel, no significant gap in Singapore and a very significant gap in The Netherlands.

Our interpretation is that in both Silicon Valley and Israel you have highly motivated knowledge workers with a strong sense of their own capabilities, but with their organizations falling short of the employee expectations. The major gaps both

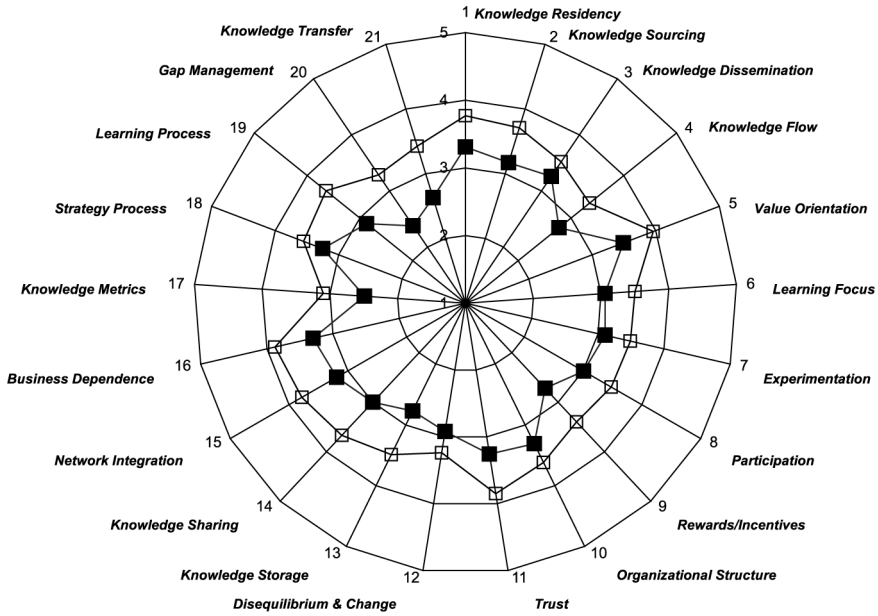
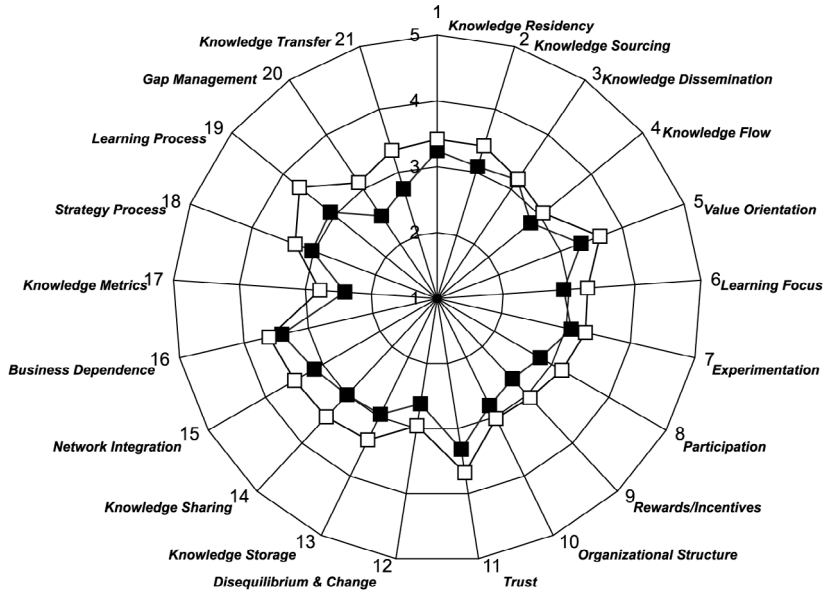


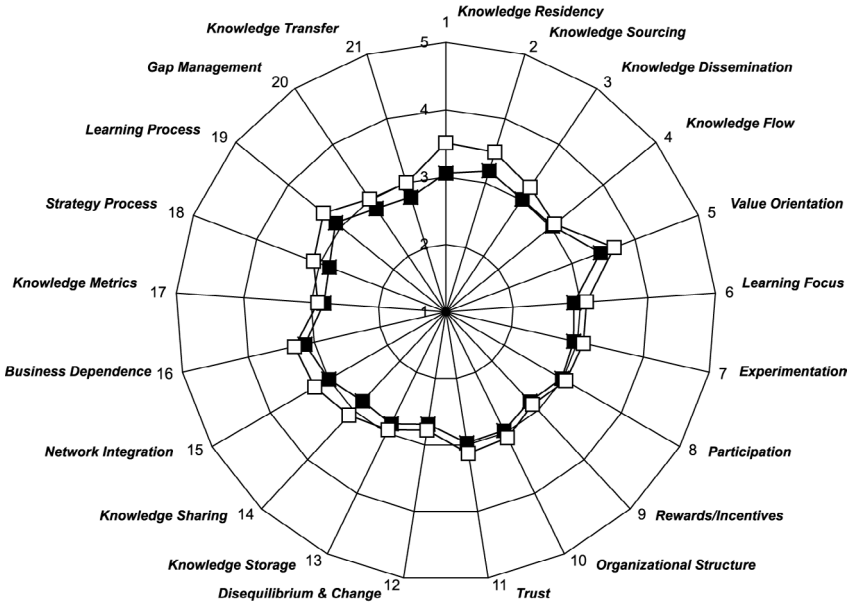
Figure 2.
Silicon Valley

Note: KPS results – comparison of perceived "current" (■) practices vs. "importance" (□)



Note: KPS results – comparison of perceived "current" (■) practices vs. "importance" (□)

Figure 3.
Israel



Note: KPS results – comparison of perceived "current" (■) practices vs. "importance" (□)

Figure 4.
Singapore

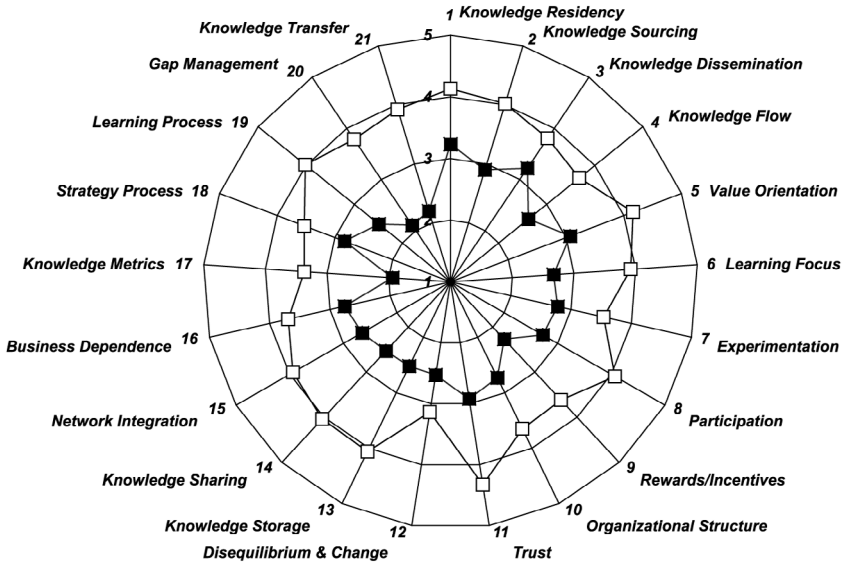


Figure 5.
The Netherlands

Note: KPS results – comparison of perceived "current" (■) practices vs. "importance" (□)

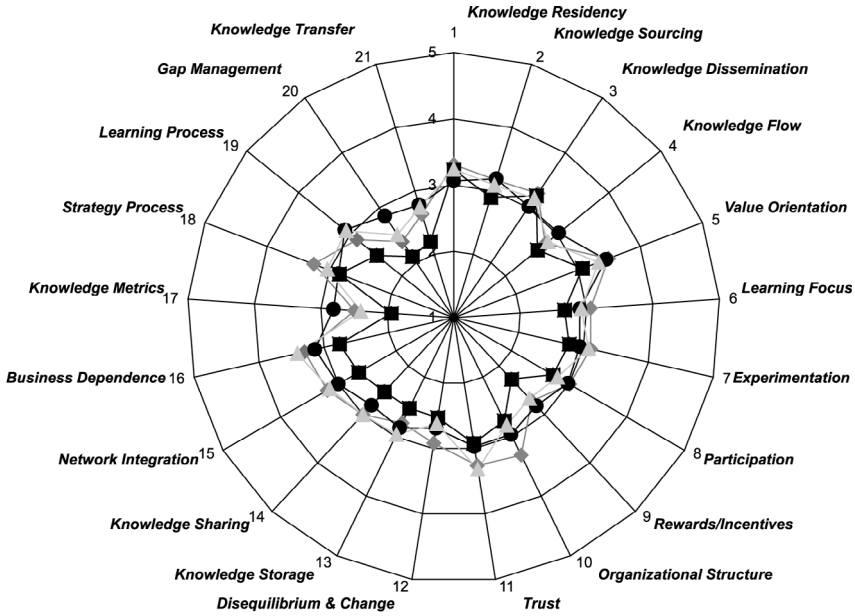


Figure 6.
Overall comparison

Note: KPS results – comparison of perceived "current" practices – Silicon Valley (◆), Israel (▲), Singapore (●), Netherlands (■)

groups identify are centered on lack of openness and access to knowledge, limited sharing of knowledge across both internal and external boundaries and the lack of opportunity for training and development.

Singapore shows a minimal gap between current practices and importance, probably reflecting a relatively low level of expectation and cultural comfort with a more authoritarian, hierarchical work environment.

The Netherlands group shows the lowest level of current management practices in virtually every area of managing knowledge and innovation. Compared to the other three regions, there is a very significant gap between current practices and the importance of those practices. In follow-up discussions with respondents, what emerged is that the employees see a major discrepancy between what top management preaches and what is actually practiced. In the employees' view, management espouses creating a much more open, collaborative, team oriented corporate culture but is unable to relinquish its traditional grasp on knowledge and decision-making power. This discrepancy has been magnified as the Dutch government is withdrawing subsidies and demanding that organizations such as IT consulting groups stand on their own. As the KPS results demonstrate, this transition from old economy to new economy practices has been difficult and for the employees, painful and frustrating.

To get an even clearer picture of the practices that drive innovation, the authors drew from their total research sample those companies that we characterize as "leading-edge". The firms in this sub-sample are all from Silicon Valley. To be included in this sub sample, the KPS average current practices score must be above 3.5 and the technology driving the firms must be regarded by the investment community as state of the art. For these leading edge firms, the average scores in the four domains are:

(1) Knowledge culture = 3.6.

(2) Knowledge content = 3.7.

(3) Knowledge infrastructure = 3.7.

(4) Knowledge process = 3.2.

Leading edge companies

When comparing current practices to perceived importance, two intriguing reversals from the expected emerge – experimentation and dependence on external networking (Figure 7). Follow-up interviews with members of these firms revealed a need to slow experimentation and give the organization an opportunity to digest and solidify new products and processes. In terms of external networking, there was a feeling of information overload accompanied by an expressed need for more internal focus.

	Current practices	Importance	Gap
Silicon Valley	3.01	3.56	0.55
Israel	2.96	3.30	0.34
Singapore	2.96	3.14	0.18
The Netherlands	2.65	3.83	1.18

Table I.
Averages of the four regions

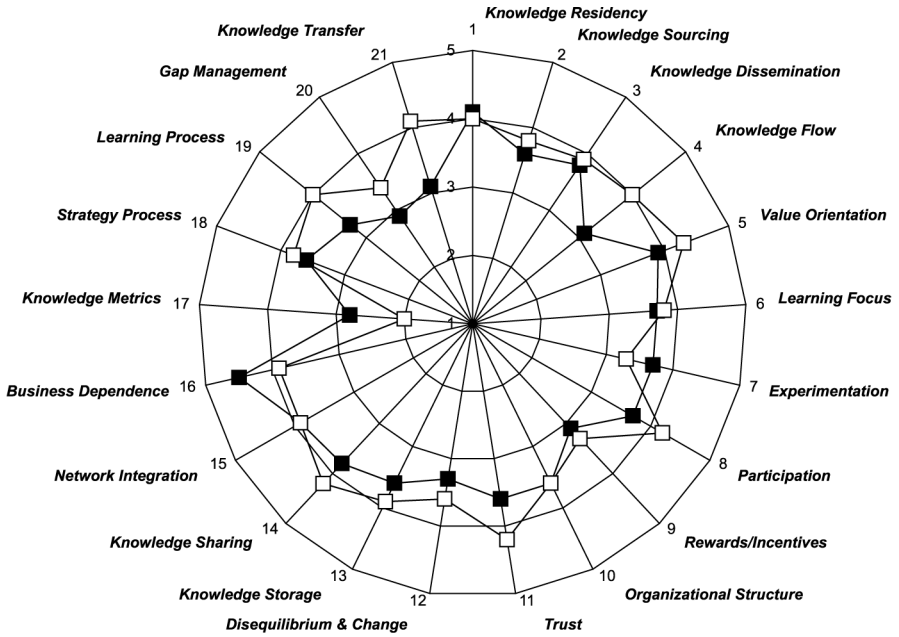


Figure 7.

Note: KPS results – comparison of perceived "current" (■) practices vs. "importance" (□)

The four areas where current practice falls significantly short of perceived importance are flow of knowledge throughout the organization, openness and trust, learning process and tacit knowledge transfer. In interviews, members of these firms related these gaps to their intense sense of urgency – to a concern about staying ahead of fierce competition. Under this stress, management sometimes fails to communicate key information, generating some lack of trust and barriers to information flow. This constant pressure to create and get new products to market leaves little time for members of the organization to get together informally and also prevents the organization from investing time and resources in professional development programs.

What is strikingly clear in this leading edge KPS profile, the current practices of the firms demonstrate an extraordinary commitment to constant experimentation, open and collective sharing of knowledge, dissemination of that knowledge through formal and informal networks, flexible strategy, loose organizational structures, dedication to customer needs, and a team centered, participative management culture – in short, the epitome of network age organizations.

5. Conclusions

What this study partially demonstrates is the tight symbiosis between regional culture and infrastructure in the development of innovative, high technology, knowledge-driven organizations. The region which most clearly demonstrates that symbiosis is Silicon Valley. Both the *Wired* ranking and the results from the KPS leading edge analysis coincide, illustrating the powerful interdependency between

knowledge management and innovation practices within organizations and a region's infrastructure.

Singapore also demonstrates a symbiosis between regional cultural values and norms in that there appears to be a comfort with the status quo and little appetite for risk-taking and experimentation.

The Israel results show that this country is very akin to Silicon Valley in terms of infrastructure and the drive for high technology innovation. It is difficult to determine the effect that the current Palestinian-Israel conflict is having on organizations within Israel – on the mood of members of knowledge-based organizations.

On the negative side, The Netherlands has not yet been able to achieve this symbiosis despite an espoused commitment by organizations and government to encourage the development of more open, innovative, self-reliant technology/knowledge-driven organizations.

We believe that the area we have chosen for this study – the bond between regional culture and infrastructure and the creation of highly innovative organizations within the region – is valuable in that it can illuminate the key regional and organizational factors essential to entrepreneurial development. Obviously, more investigation needs to be done.

References

Acs, Z. and Dana, L.P. (2001), "Contrasting two models of wealth redistribution", *Small Business Economics*, Vol. 16 No. 2, pp. 63-74.

Birchall, D.W. and Tovstiga, G. (1998), "Methodology for assessing the strategic impact of a firm's knowledge portfolio", paper presented at the 8th International Forum on Technology Management, Grenoble, November 2-6.

Chait, L. (1998), "Creating a successful knowledge management system", *Prism*, 2nd quarter, p. 83.

Chui, A.C.W., Lloyd, A.E. and Kwok, C.C.Y. (2002), "The determination of capital structure: is national culture a missing piece of the puzzle?", *Journal of International Business Studies*, Vol. 33 No. 1, pp. 99-128.

Hillner, J. (2000), "Venture capitols", *Wired*, July.

Hofstede, G. (1980), *Culture's Consequences: International Differences in Work-related Values*, Sage, Beverly Hills, CA.

Hofstede, G. (1991), *Cultures and Organizations*, McGraw-Hill, London.

Korot, L. (1989), "Technoculture: leading edge to European integration or an organizational anomaly?" *Proceedings of the 17th Annual Conference of the Association for Business Simulation and Experiential Learning*, Honolulu, MI, January.

Korot, L. (1997), " A cross-cultural comparison of the organizational cultures of hi-tech start-up ventures", presentation, Executive MBA Group, Pepperdine University, Malibu, CA.

Levy, S. (2002), "Welcome back to Silicon Valley: how the dot-com crash saved technology", *Newsweek*, March 25.

McCall, C.H. (2001), "An empirical examination of the Likert scale: some assumptions, development, and cautions", paper presented at the 80th Annual CERA Conference, South Lake Tahoe, CA, November 15-16.

Maira, A.N. (1998), "Connecting across boundaries: the fluid-network organization", *Prism*, 1st quarter, p. 23.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge Creating Company*, Oxford University Press, New York, NY.

Nunally, J.C. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.

Robertson, E.D. (2001), Personal communications.

Sagie, A. and Elizur, D. (2001), "Entrepreneurship and culture as correlates of achievement motive: a multifaceted approach", *International Journal of Entrepreneurship and Innovation Management*, Vol. 1 No. 1, pp. 34-52.

Schein, E.H. (1992), *Organizational Culture and Leadership*, 2nd ed., Jossey-Bass, San Francisco, CA.

Tovstiga, G. (1999), "Profiling the knowledge worker in the knowledge-intensive organization: emerging roles", *Int. J. Technology Management*, Vol. 18 No. 5/6/7/8, pp. 731-44.

Tovstiga, G. and Korot, L. (1999), "Profiling the twenty-first century knowledge enterprise", in Wright, R. and Etamad, H. (Eds), *Research in Global Strategic Management*, JAI Press, Greenwich, CT.

Tovstiga, G. and Korot, L. (2000), "Knowledge-driven organizational change: a framework", *International Journal of Entrepreneurship and Innovation Management*, Vol. 1 No. 1, pp. 22-3.

Tovstiga, G., Korot, L. and Dana, L.P. (2000), "International entrepreneurship: a cross-cultural comparison of knowledge management practices", paper presented at the 2nd Annual McGill Conference on International Entrepreneurship: Researching New Frontiers, Montreal, September 22-25.