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Leadership in Knowledge Sharing: Creating Value through Collaboration

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Abstract

This study aims to understand the antecedents of knowledge sharing behavior amongst tenant firms in Science and Technology Parks (STPs) which has been highlighted as a key factor for the development of an epistemic culture of innovation in STPs. Components of a model of knowledge management leadership with a focus on knowledge sharing and innovative value creation in STPs are developed inspired by the work of Nonaka, Nahapiet and Ghoshal, Guns and others. Collection of data on various relevant measures is ongoing, covering technology firms and STPs in Singapore and other Asian countries. Besides outlining model components and hypotheses, tentative findings of qualitative interviews and survey work (with a focus on KM leadership in Singapore's STPs) are presented aimed at identifying strategic ingredients for the creation of intelligent STPs with a conducive culture of R&D works and innovation as well as synergistic collaboration between tenant firms.

1. Knowledge Creation through Science & Technology Parks: Issues and Challenges

The construction of an effective and innovative culture of knowledge production or 'knowledge habitat' is seen by many as a crucial precondition for the creation of new knowledge and product/service innovations (Keeble et al. 1999; Koh, Koh and Tschang 2004, Menkhoff et al. 2005). As Schrage (1997:173) puts it, it takes shared space to create shared understandings and hence to generate new knowledge, e.g. through the combination of various knowledge resources and competencies via knowledge transfer (Nonaka 1995; Ensign and Hebert 2003). In the case of Singapore, administrators, policy planners and technocrats have been proactive in promoting an 'innovative milieu' and conducive R&D environment in certain spaces and areas. A prominent example is the Singapore Science Park, a specific state-initiated corporate entity to boost R&D in Singapore. Its origin can be traced back to the late 1970s when policy-makers and planners started to discuss the need for a national R&D programme and a more conducive R&D environment aimed at giving Singapore's industrialization a further boost and to enhance the country's competitiveness in an increasingly global economy (Rodan 1989). The successful development of the Jurong industrial zone (as vehicle for export-led growth) served as role model (Phillips and Yeung 2003:714). The park was set up in 1980 "as a place where R&D can converge and create synergies with institutions and firms alike, and researchers can work anytime, meet and share ideas" (NSTB spokesman interviewed by Phillips and Yeung 2003:715).

The number of companies has grown from 117 in 1994 to a total of approximately 250 in 2004, incl. several 'research facilities'. Academic support is provided by its neighbor, the National University of Singapore (NUS). Comprising both local and non-local firms, the Park has attracted big multinational firms (MNCs) as well as small and medium enterprises (SMEs) and start-ups. Local R&D facilitators include the Singapore Productivity, Innovation and Standards Board (SPRING) and the Infocomm Development Authority (IDA). The Economic Development Board provides various R&D benefits and incentives for tenants in form of the so-called Research and Development Assistance Scheme (RDAS) or the Research Incentive Scheme for Companies (RISC). Another key player is the Agency for Science, Technology and Research or A*Star, the former National Science and Technology Board (NSTB), whose goal is to 'create knowledge and to exploit scientific discoveries for a better world by fostering world-class scientific research and nurturing world-class scientific talent for a vibrant knowledge-based Singapore'.

Many of the companies in the Science Park belong to the information technology sector, incl. electronics, telecommunication and life sciences. The tenants' profile is in line with the premises of the National Technology Plan which identifies various main R&D areas: information technology (IT), manufacturing and engineering technology, pharmaceuticals, telecommunications, chemicals, electronics and, lately, the life sciences.

The central location of the Singapore Science Park can be traced back to the National Technology Plan (NTP) formulated in 1991 which mapped out a technology corridor along the south-western area of Singapore in line with the Strategic Economic Plan (Ministry of Trade and Industry 1991). The blueprint for the technology corridor has contributed to the spatial integration of science habitats, business parks and tertiary institutions.

The Singapore Science Park is strategically located within this corridor in close proximity (1 km radius) to the National University of Singapore, the National University Hospital and research institutions as the Institute of High Performance Computing etc. as well as national

agencies like the DSTA (Defence Science Technology Agency). Proximity is the key, and there is no doubt that the tenant firms within the park can potentially benefit from such geographical advantages and agglomeration economies. Planners hope that networking among R&D companies, academia and research institutes will result in collaborative R&D projects.

Key questions in this context which we will try to address in this paper are: What are the ingredients of such as culture of innovation? What is going on in STPs in terms of knowledge flows both within and between tenant firms and their local / regional / international counterparts and collaborators? What does it take for knowledge sharing to take place? Which factors do influence knowledge transfer both within and amongst tenant firms and other stakeholders in STPs which has been highlighted as a key requirement for the development of an epistemic culture of innovation?

2. Creating an Effective Culture of Knowledge Production in STPs

What are the ingredients of such a culture of innovation? STPs are designed to support R&D oriented enterprises. By concentrating them in one designated area it is hoped to increase the productivity of knowledge production (Koh, Koh and Tschang 2004; Davis 2004). There are many similar types of organizations producing new knowledge: research institutes, think tanks, universities, R&D divisions of companies, government departments, and also STPs. These organizations share characteristics which are similar to those of other organisations but there are also distinctive features. K-producing organisations usually: (i) are organized in departments sharing the same disciplinary outlook, the same domain of knowledge; (ii) they employ highly trained professionals, other k-workers and support staff; (iii) they maintain strict boundaries across and within highly structured networks of knowledge sharing; (iv) they are therefore knowledge monopolies; (v) they have an ICT backbone and data banks of digitalized knowledge (intra/internet based) and; (vi) they develop a distinct epistemic culture of knowledge production (Evers 2005).

Quite often the special proximity is given as a reason for the effectiveness of STPs and “Science Corridors”. Social interaction is facilitated, knowledge can be shared and knowledge output is enhanced. On the other hand intense competition or even conflict may arise, especially when organizations with similar research interests or business plans are located next to each other. Machiavellian strategies may then be pursued rather than amicable cooperation.

As has been shown in recent sociological studies, the production of knowledge can not be explained and stimulated as a rational process alone as it rests as much on social interaction, life-world experience and culture. The emergence of a productive “epistemic culture” (= culture of knowledge production) is difficult to achieve (Knorr Cetina 1999). Culturally deterministic explanations trying to show why certain cultural values hinder the development of science and research are as unsatisfactory as theories that tried to explain business success or failure in cultural terms alone. But what are the preconditions for the development and the growth of epistemic cultures, what should be their shape and contents?

The theory and methodology of epistemic cultures was developed by Knorr Cetina (1999:1): “Epistemic cultures are cultures that create and warrant knowledge, and the premier knowledge institution throughout the world is still, science”. The emphasis is not just on the creation of knowledge, but on the construction of the machineries of knowledge production, on what we should like to term “knowledge governance” (Menkhoff, Evers and Chay 2005 eds.).

Through k-governance technical, social and symbolic dimensions of intricate expert systems are combined into epistemic machineries of scientific research, R&D and the production and dissemination of new knowledge. Creating STPs (set up to facilitate the production of new knowledge) represents a major component of knowledge governance. It pertains to physical infrastructure, social organization and the epistemic culture of STPs. The boundaries of epistemic cultures are not drawn between natural sciences and the humanities, but right across the sciences in general.

Building and governing institutions that transmit or consume knowledge is difficult enough, but filling them with a culture of knowledge sharing, a culture of debate, a productive culture of a pursuit of knowledge is a vastly more difficult undertaking (Helmstadter 2003; Hutchings and Michailova 2004). The institutional contours of epistemic cultures appear to be the following: (i) there have to be a sizable number of persons who are relatively independent of outside control; (ii) who work closely together; but (iii) are pitted against each other in competition for resources, recognition and excellence (Evers 2005).

In many aspects epistemic cultures resemble the following culture of markets: (i) There are stringent rules of conduct, but (ii) no undue regulation of values or prices; (iii) there is competition but no open conflict and (iv) there is a high degree of autonomy of decision-making.

Special knowledge producing units in organizations, like R&D divisions, research labs, research groups or research networks transform objects or observations into signs and metaphors. There is a withdrawal from reality, distancing from every day life by manipulating signs in mathematical formula, transforming survey data into statistical tables, of transforming metaphors into concepts and theories. In doing so, the researcher himself is transformed into an instrument of observation, but he also turns practices of every-day life into epistemic devices for the production of knowledge (Knorr-Cetina 1999:29). Thus conversation becomes discourse, drinking tea in a staff canteen a method for the creation of an epistemic community. Collective practices, networks of social interaction and communication constitute epistemic communities beyond the boundaries of large-scale organisations, like STPs.

3. Understanding Knowledge Flows and Effective Knowledge Sharing within STPs

What is going on in STPs in terms of knowledge flows both within and between tenant firms and their local / regional / international counterparts and collaborators? What does it take for

effective knowledge sharing to take place? To shed light on these questions we conducted some exploratory interviews with corporate representatives of Singapore's Science Park.

3.1 Case Studies

MetCorp (not the real name) is a metrology measurement organization and organizationally linked to a national statutory board. MetCorp became one of the first tenants of Singapore Science Park I in 1987. MetCorp's mission is to enhance the competitiveness of Singapore's economy by providing a national system of traceability of measurement for industry, trade and other users; as well as raising the level of measurement technology in Singapore. To achieve that, MetCorp has to ensure that all the measurements made by Singapore companies are traceable to synchronize international units (SI units). MetCorp has 3 atomic clocks located in the Science Park aligned with 250 other clocks around the world to ensure the standardization of time; and hence the time standard in Singapore.

Each year, MetCorp calibrates thousands of instruments for hundreds of companies. Whenever any of the industries require equipment calibration or measurement needs, they approach MetCorp to either come out with a new device or to improve current devices. Other core functions of MetCorp include providing calibration and metrology services to industry, consulting and collaborating with industry, doing research and development to meet emerging needs of industry, promoting and educating to generate awareness of metrology, as well as involving in international negotiations and standards setting. MetCorp is also part of the international metrology community and disseminates the latest information obtained from international metrology bodies to local Singaporean organizations through seminars and other means.

According to an MetCorp representative who was interviewed by our research team¹, knowledge sharing often takes place without people realizing it. This is mainly because people

¹ The authors are grateful to Goh Jun Yi, Tan Kaixin, Hsu Yu, Le Thuy Duong, Chin Wenying and Toh Yihua for their inputs.

are used to communicate their knowledge and often share information and what they have learned on a routine basis. It was pointed out that knowledge sharing in any industry is crucial for innovation as new ideas or improvised products are often introduced through knowledge sharing processes. Since the initial stage, knowledge sharing within firms located in the Science Parks has been omnipresent. It is not restricted to firms within the Science Park. Indeed, there are a lot of knowledge sharing activities involving organizations and firms from outside the Science Parks. For instance, MetCorp actively engages in knowledge sharing activities with other statutory boards and the nearby university.

A prominent type of knowledge which is regularly shared among MetCorp and its collaboration partners or staff is ‘industry-related technical knowledge’. As the interviewee pointed out, the transfer of hard data and skills tends to limit potentials conflicts both within and between collaborative teams and helps to enhance interpersonal relations. Conflicts tend to occur when people share personal opinions, engage in religious issues or political discussions. “Sensitive issues” are avoided which allows researchers, e.g. those from China and Taiwan, to work together and to share their knowledge during collaboration projects despite the political issues affecting both countries.

Due to the close proximity and information networks available to firms located in the Science Parks, MetCorp has an added advantage when it comes to obtaining speedy information, feedback and HR inputs from other STP tenants.

While playing an active and integral role in facilitating knowledge sharing with external organizations, MetCorp also emphasizes internal knowledge sharing. Through initiatives started by top management to encourage free sharing of information and knowledge, knowledge sharing takes place during training, consultation, collaboration and joint projects etc., involving all levels of the hierarchy and including both the rank and the file. As stressed by the interviewee, the process of knowledge sharing should be natural, organic and self-initiated. If formal SOPs are required to initiate knowledge sharing, creativity and spontaneity

may be compromised. In fact, extensive sharing of knowledge, ideas and information has become part of MetCorp's culture and no specific guidelines or procedures have been instituted to encourage knowledge sharing. MetCorp selects and sends its staff for needs-based training stints abroad every year. Upon completion of the training stints, staff will then share their newly acquired knowledge with their colleagues and with organizations within the industry via seminars and information sessions.

While the MetCorp interview serves to illustrate how knowledge sharing activities take place within Science Parks, be it with external organizations or within the organization itself, the following summary of interviews with representatives of smaller tenant firms illustrates the relative challenges of knowledge sharing within STPs.

According to representatives of NetTech and GlobalEnterprise (not the real names respectively), collaborations with other firms located in the Science Parks are often limited because there is a diverse mix of firms located within the Science Parks. It is thus not easy to locate appropriate firms to effectively share work experiences and knowledge. Furthermore, being small companies, both company representatives insisted that freely sharing knowledge with other companies may lead to the loss of competitive edge as industry competitors can use this knowledge to eliminate the individual advantages the firms have due to specific knowledge or information assets. Being small firms, it is not easy to find companies which are willing to engage in knowledge sharing activities on an equal basis. One reason suggested by our interviewees is that larger companies tend to have more to offer. They are generally unwilling to share their knowledge with smaller companies which may not provide any significant value added at a mutually beneficial level.

However, what is common amongst all three companies is that knowledge sharing takes place within the organizations. The representative of NetTech stressed that the company's motto is to inculcate a family culture where its staff (a total of ten people altogether), regardless of rank and file, are able to communicate freely without restraint so as to induce creativity and the free sharing of ideas and opinions. A relaxed social setting is created within the confines of

NetTech's office to ensure that staff feels at ease to openly communicate and share information and ideas. Weekly meetings are part of NetTech's culture as it is believed that these sessions allow brainstorming for new ideas as well as to allow the latest news and information to be effectively shared. Work improvement projects are also initiated so that good suggestions provided by staff are rewarded; hence encouraging further participation and feedback from its people. This way, NetTech will be able to "constantly improve and be on the edge of technology."

Similarly, the interviewed representative of another small firm stated that knowledge sharing within the organization is effectively carried out, partly due to the small staff size (four employees altogether). Meetings and discussions are often one of the most effective ways to disseminate knowledge, information and ideas to other staff members. One key advantage of having a small and closely knitted staff is that joint meals or tea breaks help to create a perfect environment for knowledge sharing. In fact, no specific guidelines need to be issued to encourage knowledge sharing as it is prevalent in their everyday communication during office hours.

3.2 Analysis of Knowledge Sharing within the STP

As both the successes and challenges of knowledge sharing in national bodies such as MetCorp and smaller corporate entities located in the STP show, space, size, organizational form and leadership matter when it comes to an understanding of effective knowledge sharing in STPs. It seems that external knowledge sharing is difficult to realize by SMEs in contrast to larger organizations (e.g. MetCorp) with their strong capital and knowledge base / depth. MetCorp (being a feeder company of a national statutory board) is a government linked organization. The presence of government influence arguably seems to coincide with the way with which this organization approaches knowledge sharing activities. It is highly possible that having links with the government dictates the need for MetCorp and other actual or potential collaborators to more actively participate in knowledge sharing, as an indication that they are on the forefront of the government initiative to move Singapore into the Knowledge Based

Economy (KBE). The government plays a KM leadership role in Singapore and serves as a role model as evidenced by the various KM implementation pilot projects in public sector organizations under the auspices of the Prime Minister's Office. Here we have a fine strategic case of goal-oriented KM and knowledge sharing.

Small private sector enterprises such as NetTech and GlobalEnterprise arguably lack this same motivation and backing to embrace knowledge sharing, either due to reasons such as wary of competitors' knowledge theft or due to lack of contacts with appropriate firms. That in itself seems to pose a big doubt over whether knowledge sharing activities do take place across all firms located within Singapore's Science Parks. After all, the presence of government linked organizations (GLO) is limited. If the private and smaller firms fail to follow the initiatives of these larger firms, then the effectiveness and prevalence of knowledge sharing will be severely crippled. And this will prove to be a major obstacle towards Singapore's drive to become a KBE.

4. KM Leadership: A Key Ingredient for Developing an Epistemic Culture of Knowledge Sharing and Innovation in STPs

Besides the importance of socio-organizational and cultural factors as drivers of knowledge sharing (Menkhoff et al. 2005), our analysis so far underlines the importance of leadership in KM which is an underresearched topic. A key objective of KM is to maximize return on an organization's tangible and intangible knowledge assets and resources such as the tacit knowledge, competencies and experiences resident in the minds of employees. KM aims at creating a 'smart' organization, which is able to learn from experience-based knowledge and to transfer it into new knowledge in the form of product and/or service innovations.

Accordingly, KM leaders are tasked with converting knowledge into profit by leveraging the organization's intellectual assets (Guns 1997). In this paper, we consider knowledge leaders to be senior executives and top managers of organizations who lead and promote the knowledge

management agenda by channelling an enterprise's knowledge into initiatives that are expected to become a source of competitive advantage. Knowledge leaders come in many guises and with many titles such as director of knowledge management, strategic knowledge manager, director of intellectual capital, chief knowledge officer, executive director etc.

Organizations and their leaders, however, are not always familiar with the conceptual basis and potential benefit of KM models, the latest KM software tools and so forth. Earl and Scott (1999) found that there is little or no job specification for knowledge leaders such as chief knowledge officers (CKOs) but their organizational goals were fairly clear. They suggest that the knowledge leader's task is to correct one or more of the following organizational deficiencies: (i) inattention to the explicit or formal management of knowledge in ongoing operations; (ii) failure to leverage the hidden value of corporate knowledge in business development; (iii) inability to learn from past failures and successes in strategic decision-making; and (iv) not creating value or "making money" from knowledge embedded on products or held by employees. These deficiencies suggest that organizations are doing an inadequate job of managing or leveraging their intellectual assets. In addition, Guns (1997) observed that little emphasis has been channeled to matching the competencies and tasks of knowledge leaders to organizational strategy.

To develop people's capacity to learn as well as the collective intelligence of an organization requires KM competencies (Abell and Oxbrow 1999; Earl and Scott 1999; Neilson 2001), visionary leadership (Guns 1997; Bonner 2000), and a "high organizational care culture" (Von Krogh 1998) so that they are willing to share ideas, information, knowledge and space, and - last but not least - an efficient and suitable communication and information infrastructure. Another challenge is the effective utilisation of KM tools. Firms do make use of various KM tools in their day-to-day business such as maintaining CV databanks, having discussions with customers, conducting market inventories and so forth. However, the development of a truly visionary KM strategy and creation of a business-driven, IT-based knowledge information system are often neglected. Organizations often do not have a systematic KM policy on the strategic level with regard to the monitoring and evaluation of available, 'nice to have' and

‘must have knowledge’ or the development, acquisition, organization, sharing, utilization and/or creation of (innovative) knowledge. Another problematic area is to the creation of facilitative structures for simple KM activities such as capturing existing knowledge or more complex ones such as the continuous creation of new knowledge. Very often cultural barriers such as distrust, lack of recognition and communication, ‘knowledge is power’ mindsets, retrenchment concerns and so forth act as demotivators with regard to effective knowledge sharing and utilization of ‘what we know’.

The particular KM implementation needs of an organization depend on the size, needs, market position, strategic outlook and resources/assets of the respective firm. Potential strategic business objectives of KM include risk management, improvement of operational efficiency and innovativeness, customer-driven learning through fully integrated customer feedback systems etc. (Von Krogh 1998; Von Krogh, G., Ichijo, K. and Nonaka, I. 2000; Von Krogh, G., Nonaka, I. and Nishiguchi, T. 2000). Firms which put emphasis on risk management and uncertainty reduction, often integrate KM into scenario planning activities aimed at assessing the impact of external factors such as changing government policies and regulations on the particular business. SWOT analyses are suitable means to generate knowledge about competitors’ behavior, possible reactions and counter strategies. Most organizations are eager to improve operational efficiency. KM can be a great help here by initiating activities aimed at sharing knowledge about intra-organizational best practices (e. g. in the field of sales and marketing or technical support), e. g. through institutionalized best practice forums, share fairs etc. In many organizations, islands of knowledge (silos) exist that could be effectively linked with the help of a KM system so as to improve knowledge exchange, learning and performance. Strategy goals with regard to innovation can be attained through the proactive creation of new knowledge (e. g. in the form of new ideas, service forms etc.) by exploiting potential synergies between different types of experts and their tacit knowledge assets in the context of communities of interest, dedicated study groups etc. Very often management does little to facilitate such endeavours. According to the Japanese KM gurus Nonaka and Takeuchi (1995), the “combination” of different knowledge resources is a key modus for the generation of new knowledge. Innovations on the basis of real collective learning are often created in

small teams whose members share a mutual context of experience and collaborate on a joint task bonded by a common sense of purpose and the need to know what the other 'community members' know.

4.1 Propositions about KM Leadership and K-Sharing

While leadership styles and behaviours differ, effective KM leadership roles, competencies and patterns have been established in the literature across organizations. Hence, we argue that KM leaders who are recognised and respected, know KM concepts and strategies, show commitment and enthusiasm for knowledge acquisition and sharing, are competent in using KM tools and technologies, are able to align KM with strategic imperatives of the organization and are effective communicators will ultimately have a positive impact on knowledge sharing and positive organizational outcomes. Thus, we hypothesized the following:

- Proposition #1: KM leadership and management are positively related to knowledge sharing. As stated above, the ability to influence followers so that knowledge sharing takes place is a key enabler of KM.
- Proposition #2: Personal knowledge and cognitive capabilities of KM champions are positively related to knowledge sharing. This includes the ability to identify possible cultural barriers towards knowledge transfer and up to date KM know how.
- Proposition #3: Personal behaviours of KM leaders are positively related to knowledge sharing. KM leaders must demonstrate with actions that knowledge hoarding will not be rewarded in the organization.
- Proposition #4: KM leaders' know-how of KM tools and technologies is positively related to knowledge sharing. This includes low tech approaches such as storytelling and more advanced technologies such as portals.
- Proposition #5: Strategic thinking capacity of KM leaders is positively related to knowledge sharing. Without a good business case KM is unlikely to produce results!

- Proposition #6: Communicative abilities of KM leaders are positively related to knowledge sharing. Persuasion and effective change management skills are important attributes of good KM leaders.

4.2 Method and Sample

In understanding the KM leadership dimensions that influence knowledge sharing, a model was developed based on the work of Neilson (2001) who examined the competencies, skills, and behaviors of individuals charged with task of implementing a KM vision. The model is presented in Figure 1.

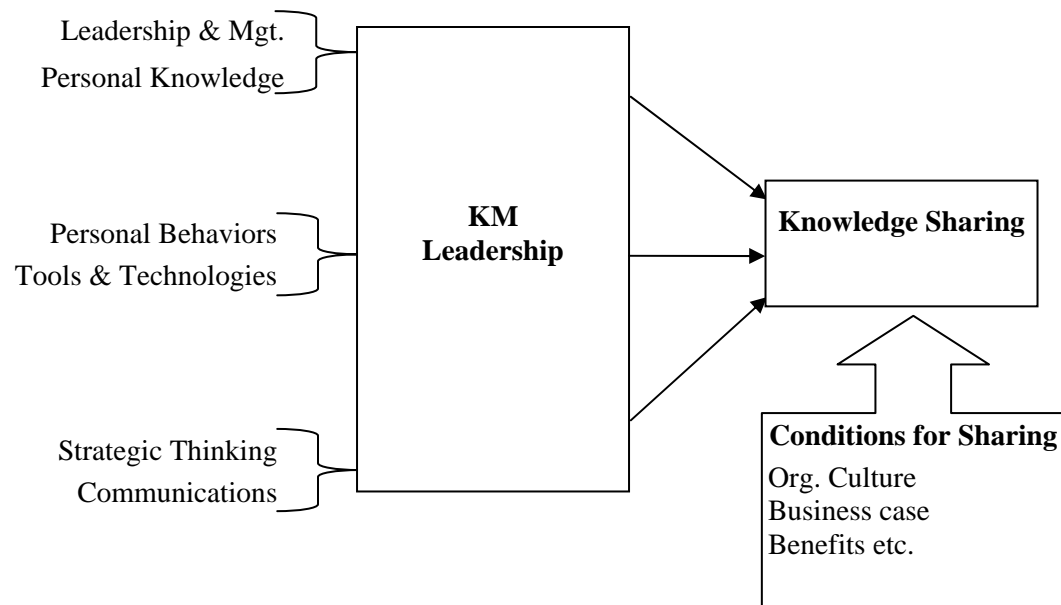


Figure 1. Antecedents of KM Leadership and K-Sharing

To assess the various KM leadership dimensions, several scales were identified, analyzed and used to measure knowledge leadership, knowledge sharing and so forth. Data were collected in Singapore in 2003/04. An online internet survey was set up and invitations to participate were sent via email to all members of a tertiary education institution and individuals drawn from a list of private sector companies obtained from a commercial database (Singapore). Qualitative data were also collected through interviews. A total of 262 persons responded to the survey. 42% of the respondents were male (N=110) with 74.4% (N=195) of Chinese ethnicity. Indians

made up 11.1% (N=29), Malays 3.8% (N=10) with the remaining 10.1% belonging to other ethnic groups. 81.3% (N=209) of the sample was involved in education with the remaining respondents drawn from private sector companies in banking and finance, IT, and service industries. The academic community of respondents comprised 30.9% students, 40.8% administrative staff, and 10.3% faculty members (see Tables 1 and Table 2).

	Frequency	Percent	Valid Percent	Cumulative Percent
HEI*	213	81.3	81.9	81.9
Banks	4	1.5	1.5	83.5
Consulting Firm	3	1.2	1.2	84.6
IT	6	2.3	2.3	86.9
Others	36	13.7	13.0	100.0
Total	262	100.0	100.0	

Table 1: Sample Distribution by Organization

	Frequency	Per-cent	Valid Per-cent	Cumulative Percent
Students	75	35.9	36.4	36.4
Admin Staff	107	51.2	51.2	87.6
Faculty	27	12.9	13.3	100.0
Total	209	100.0	100.0	

Table 2. Sample Distribution – Higher Educational Institution

4.3 Measures

The outcome measure was knowledge sharing.

Knowledge Sharing: A 5-item measure adapted from Liebowitz (1999) was used to measure knowledge sharing orientation. Response options ranged from (1) 'strongly disagree' to (5) 'strongly agree'. Sample items are 'Ideas and best practices are shared routinely' and 'It is part of the culture of this organization to share knowledge'. The scale's alpha reliability in this study is .93.

Six key competencies of knowledge leaders were identified as antecedents of knowledge sharing: leadership and management, personal knowledge, personal behaviors, tools and technologies, strategic thinking, and communication. Respondents were asked to assess the person who champions KM in the organization based on the competencies. Response options ranged from (1) 'strongly disagree' to (5) 'strongly agree' for each of the items.

Leadership and Management: A 3-item measure adapted from Neilson (2001) was used to measure KM leadership with a focus on the competencies of the person in the organization who champions KM. Sample items are 'Is recognized and respected in the organization' and 'Is able to influence large numbers of employees to share knowledge'. Cronbach's Alpha Reliability for all the scale measures are better than 0.90.

Personal Knowledge: A 3-item measure adapted from Neilson (2001) was used to measure personal knowledge. Sample items are 'Understands the organizational culture well' and 'Has knowledge of KM concepts and strategies'. Cronbach's Alpha Reliability for all the scale measures are better than 0.91.

Personal Behaviors: A 3-item measure adapted from Neilson (2001) was used to measure personal behaviors. Sample items are 'Walks the KM talk by demonstrating good behaviors of learning and knowledge sharing' and 'Shows unwavering commitment and enthusiasm for

knowledge acquisition and sharing'. Cronbach's Alpha Reliability for all the scale measures are better than 0.93.

Tools and Technologies: A 3-item measure was partly adapted from Neilson (2001) and constructed to measure competencies with regard to tools and technologies. Sample items are 'Has knowledge of technology tools' and 'Has the ability to assess effectiveness and applicability of technology tools to promote KM'. Cronbach's Alpha Reliability for all the scale measures are better than 0.90.

Strategic Thinking: A 3-item measure was partly adapted from Neilson (2001) and constructed to measure strategic thinking. Sample items are 'Knows the business imperatives of the organization and aligns KM with those imperatives' and 'Has the ability to plan at the macro level'. Cronbach's Alpha Reliability for all the scale measures are better than 0.94.

Communication: A 3-item measure adapted from Neilson (2001) was used to measure communication. Sample items are 'Is an excellent presenter of new ideas and knows how to garner support' and 'Is highly persuasive'. Cronbach's Alpha Reliability for all the scale measures are better than 0.94.

4.4 Analysis

Controls. Three variables, age, full-time work experience and gender were employed as control variables. These variables were chosen because of the demographic diversity of the participants. Gender was coded (0) 'male' and (1) 'female.'

Regression analysis was used to examine the predictors of knowledge sharing. Explanatory (independent) variables were entered into the regression in a specified order as a means of determining their individual and joint contributions to explaining the outcome variable.

Variable	Model 1	Model 2
Intercept	15.42* **	6.27** *
Age	.02	-.02
Work Experience	-.07	-.01
Gender	.88	.90
Leadership & Management		.12
Personal Knowledge & Cognitive Capability		.57
Personal Behaviours		-.66
Tools & Technologies		1.59**
Strategic Thinking		.38
Communications		.87
<i>F</i>	.785	3.328**
<i>R</i> ²	.043	.389
ΔR^2	.043	.346

* $p < .05$, ** $p < .025$, *** $p < .01$

The β values are the unstandardized coefficients from the final regression equation, each term being corrected for all other terms.

Table 3. Regression Model of the Predictors of Knowledge Sharing

4.5 Results

The results do show a significant difference, at least in terms of the frequency count, between those who agree (and strongly agreed) and those who disagreed with the leader's six core KM competencies. We ran a simple chi-square test.

Results of regression analyses carried out to determine whether leadership dimensions predict knowledge sharing are presented in Table 3. In one of these, the KM tools & technologies scale measure (made up of 3 questionnaire items) is significant in predicting knowledge sharing (p

value is 0.02). This is a 'main effect', that is, there is no interaction with the other constructs we measured which predicted knowledge sharing.

5. Preliminary Conclusion and Discussion

Knowledge and innovation-driven organizations and industries such as those in STPs are constantly engaged in learning cycles and collaboration. This requires certain skills and competencies in terms of knowledge leadership (Guns 1997) and good cultural management (Krogh 2003) so as to initiate and support effective knowledge sharing both within and between STP tenants and their various stakeholders. As argued by Powell (1998:233), innovation-driven firms such as those in biotechnology and pharmaceutical fields "are rapidly developing the capability to collaborate with a diverse array of partners to speed the timely development of new [products]". The capability to collaborate and share knowledge involves learning *from* collaborations and *how* to collaborate, and both will benefit from the development of skills and competencies of knowledge leaders. As emphasized earlier in the paper, one of the key tasks of knowledge champions as leaders is to convert knowledge into something profitable by leveraging the organization's intellectual assets as well as to lead and promote the knowledge management agenda by channeling an enterprise's knowledge into initiatives that are expected to become a source of competitive advantage. Based on our simple k-leadership model which was influenced by Neilson (2001) and our ongoing research in Asian STPs, we found that leaders of knowledge-intensive organizations play a significant role as enablers of KM and k-sharing.

Amongst the six knowledge leadership dimensions measured, technological KM know how turned out to be the predictor of knowledge sharing. This has interesting implications for the management teams of STPs and their tenants as KM software solutions can help them in their KM efforts. The market for these 'solutions' is rapidly changing, and KM champions need to be well informed about the latest tools and applications as well as their value added (and potential pitfalls). The data analysis result contradicts somewhat the notion that culture and not

technology is the key to successful KM. Nevertheless, we argue that a combination of cultural and technological know how are key ingredients for building successful epistemic cultures of knowledge production in STPs. KM leaders who have technological KM know how can make a difference in knowledge-intensive organizations. They often have legitimacy qua technocratic competency. But all this is contingent upon organizational culture dimensions, personality and people skills as elaborated elsewhere (Krogh, Ichijo and Nonaka 2001; Truch, Batram and Higgs 2004; Menkhoff et al. 2005).

While technology is important, challenges remain, e.g. the ability of leaders to leverage multi-cultural talents and IC resources in STPs and to motivate team members from different cultures to collaborate and share (Mueller et al. 2005). Other unresolved and underresearched issues include the impact of k-leadership on organizational performance and the relative difficulties of smaller firms vis-à-vis high industry in Asian STPs. Pre-existing (often transnational) social networks do play a strategic role with regard to knowledge flows and access to actionable knowledge as well as other resources. Small entrepreneurial firms have to invest substantial resources into network-building before they can accumulate knowledge and do business successfully (this is much less the case for large, established firms).

To sum up, ‘leadership as KM enabler’ has various critical connotations which need to be further systematized in future research so as to provide a basis for meaningful empirical work. One is the leadership role played by policymakers, statutory boards and GLCs which is so crucial in driving local and international knowledge sharing initiatives as illustrated by Singapore’s multi-agency development approach during the SARS crisis in 2003 which led to the development of a new diagnostic tool, the so-called ‘glowcard’, or the China-Singapore Industrial Park project in Suzhou, PRCh. Other aspects include MetCorp’s technical leadership and collaborative work in the area of measurement technology as well as the leadership qua organizational culture and OD work of the founders of NetTEch and GlobalEnterprises. Leadership matters obviously but so do the existence or non-existence of government links, strategic imperatives to collaborate with external entities (as in the case of MetCorp’s industrial support mission) or the informal social relationships and capital fostered and

generated in smaller firms. An impact analysis of all these factors across a wider range of people and sectors remains to be done.

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