

Lodhi, Suleman Aziz; Ahmad, Munir

Article

Dynamics of voluntary knowledge sharing in organizations

Pakistan Journal of Commerce and Social Sciences (PJCSS)

Provided in Cooperation with:

Johar Education Society, Pakistan (JESPK)

Suggested Citation: Lodhi, Suleman Aziz; Ahmad, Munir (2010) : Dynamics of voluntary knowledge sharing in organizations, Pakistan Journal of Commerce and Social Sciences (PJCSS), ISSN 2309-8619, Johar Education Society, Pakistan (JESPK), Lahore, Vol. 4, Iss. 2, pp. 120-131

This Version is available at:

<https://hdl.handle.net/10419/188004>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc/4.0/>

Dynamics of Voluntary Knowledge Sharing in Organizations

Suleman Aziz Lodhi (Corresponding author)
School of Business Administration
National College of Business Administration and Economics, Lahore, Pakistan
E-mail: sulemanlodhi@yahoo.com

Munir Ahmad
Professor of Statistics
National College of Business Administration and Economics, Lahore, Pakistan
E-mail: drmunir@brain.net.pk

Abstract

Knowledge has become prime source of economic production in modern enterprises; conceptualized by many researchers as the only source of sustainable competitive advantage. Therefore many organizations are restructuring themselves to gain maximum value from their knowledge sources.

The paper investigates the influence of management policies on voluntary knowledge sharing behaviors at individual and group level and presents a model to understand the dynamics of voluntary knowledge sharing by employees in an organization. The problem is approached with a tacit view of knowledge, considering that true knowledge is located only in the minds of the professionals working in the organization.

Keywords: Voluntary Knowledge Sharing, Knowledge Management, Organizational Knowledge, Organizational Learning, Communities of Practice, Knowledge Networks.

1. Introduction

Recent developments have revolutionized business paradigm, emergence of knowledge economy, rapid globalization, networking of economies, developments in ICT and rise in social awareness has made the environment far more complex than in the previous decades. Knowledge has earned itself a status of critical resource in the modern enterprise; many consider it as fundamental for gaining competitive advantage in a knowledge-based view of enterprise, [Grant (1996), Spender (1996) and later by Cole (1998)]. Ever since the popularity of knowledge management in business domain, a number of models have been presented for understanding knowledge sharing in organizations with a view that somehow knowledge can be managed objectively. Managers in knowledge centric organizations are especially concerned as the major portion of their organizational wealth is in the form of knowledge assets, which are intangible and therefore difficult to trace or control. A new class of knowledge workers have emerged which is different from the traditional worker class that the managers were accustomed to deal with in the past. Measuring their performance or controlling these

knowledge workers is very complicated because the product they deliver is basically intangible and their productivity cannot be determined by using traditional methods.

Purchasing the best of equipment and hiring the most expensive knowledge workers would show some improvement in organizational performance, but it cannot guarantee efficiency or ensure creating maximum value from the knowledge already present in the firm. The management can gather the brightest brains available and bring them together, but the social interaction needed to create true knowledge cannot be forced. The employees would share knowledge on need-to-know bases but avoid sharing their insights on the subject.

Therefore a fundamental research issue for the knowledge-centric organizations is to understand the behaviors that promote voluntary knowledge sharing in firms. The knowledge sharing behaviors can be observed firstly at individual level, where employees working in an organization work collaboratively to attain firms' objectives; secondly the collaboration can also be between employees working in the same group or department and lastly between different departments.

Studies have shown that technology has been over sold in the pretext to solve the knowledge flows barriers in organizations and in reality the organizations have not been able to improve their performance as significantly as envisioned. Snowden (2002) even stated that Organizational Knowledge Management (OKM) offers a little beyond what Information Managers were already doing. Sveiby (1994, 1997, 2000) have dismissed explicit knowledge arguing that technology can only manage information.

Holsapple and Joshi (1999) discuss early models on Knowledge Management in organizations given by Wiig in 1993 to models proposed up till 1997 including Alavi's (1997), Sveiby (1997), van der Spek and Spijkervet (1997). It is seen that most of these models give us a rather mechanistic view of KM. Sveiby (1997) and Nonaka (1994) have different observations on knowledge, they believe that knowledge is more closely related to human interactions. Recent models given by Tannembaun et al (2000) advocate that knowledge management in organizations should be studied by examining four aspects which are knowledge sharing, accessibility, assimilation and application. Later Laverde et al (2003) also gives a review of some principal KM models including Rastogi (2000), Probst et al (2000), Heisig (2001) and McElroy (2002). Probst et al (2002) and Heisig (2001) view knowledge management as a dynamic cycle that is going through continuous evolution. The Probst et al. model, also called "The Building Blocks of Knowledge Management", involves eight components that form two cycles, one inner cycle and other outer cycle. The inner cycle is composed by the building blocks of Identification, Acquisition, Development, Distribution, Utilization and Preservation of knowledge. There are two more processes in the outer cycle, which are Knowledge Goals and Knowledge Assessment. The goals provide the direction to the whole Knowledge Management cycle, and determine which capabilities should be built on which level. While Knowledge Assessment completes the cycle, providing the essential data for strategic control of Knowledge Management. Similarly Heisig (2001) model is composed of four processes among which a different process "Create" is added. McElroy (2002), proposed "The Knowledge Life Cycle", KLC - framework of Knowledge Management. The model assumes that knowledge exists only after it has been produced, and after this it can be captured, codified and shared. McElroy model divides the Knowledge Creation Process in two big processes, namely, Knowledge Production and Knowledge

Integration. Knowledge Production is the process in which new organizational knowledge is created. This is formed by Individual Group Learning, Knowledge Claim, Information Acquisition, Codified Knowledge Claim, and Knowledge Claim Evaluation. The Model uses this process as synonymous with “organizational learning”. Knowledge Integration is formed by some activities that allow the knowledge sharing and distribution. It includes knowledge Broad-casting, Searching, Teaching, Sharing and other social activities that communicate. The model also, introduces two new concepts of Demand Side and Supply Side in this aspect. Supply-side is the practice of Knowledge Management in any way that is designed to enhance the supply of existing knowledge to workers in an enterprise. While the Demand-side focuses on the supply of existing knowledge to a workforce and seeks to enhance their capacity to produce. The mission of demand-side Knowledge Management, then, is to enhance an organization’s capacity to satisfy its demand for new knowledge. The important assumption is the impact on an organization’s capacity to produce and integrate knowledge by making interventions aimed at supporting, strengthening, and reinforcing related patterns of behavior. Allee (2002) argues for a value network approach for managing knowledge organizations and recently Newell et al (2004) are focused on social networks analysis, as they consider social network much better than databases for transferring knowledge. Community of practice is another popular approach, where a community becomes self-sustaining, which may even be defined as self-defining or autopoietic. (Hall 2003).

We observe a development direction for KM models, earlier models are more focused on hard structure of organizations while later models have shifted the focus to soft structured approach, viewing knowledge as a dynamic entity rather than an object.

The paper investigates the link between behaviors and voluntary knowledge sharing in an organization, exploring whether certain behaviors from individual level to company culture promote or hinder voluntary knowledge sharing. It is kept in mind that the working group in its self is a collection of individuals. Secondly the study explores the possibility of promoting knowledge sharing behaviors in a firm by adapting appropriate management policies.

2. Conceptual Framework and Hypothesis

Constructivists argue that true knowledge can be contained in human cognition exclusively, databases and research documents contain potentials for generating knowledge, but these potential resources are converted to knowledge by human interaction. Maturana and Varela (1987) while maintaining systems approach view behavior as “a description an observer makes of the changes in a system with respect to an environment with which the system interacts”. The most elementary type of behavior is vegetative, which include breathing or metabolism, the next higher behavior is reflex behaviors that are action-response-based such as a reaction to pain. Higher to it in order of complexity of behaviors comes reactive behaviors, these depends strongly on external stimulus, or a set of sequence of external stimuli (McFarland, 1981). These behaviors require an action and selection process in contract to reflex behaviors which are executed when ever the triggering stimulus is present.

The motivated behaviors depend not only on the external stimuli, but also on internal motivations. Exploring for food is performed when there is an internal stimulus of hunger (see Beer, 1990; Maes, 1991). Reasoned behaviors are those that are determined by

manipulations of abstract concepts or representations. These manipulations can be considered as use of logic (Clark, 1998). It is believed that behaviors in the higher levels are evolved or developed from the behaviors in the lower behavior levels, as in animals we cannot find higher levels of behaviors without the lower ones. As Piaget, (1968) states that children have to develop from lower stages to reach higher stages. Thus higher types of behaviors in many cases can be seen as complex variants of the lower ones.

Reasoned behavior requires abstract representation or concepts of the perceived world, and an accurate manipulation of these concepts to produce a specific behavior. It seems that these behaviors are learned from the regularities in the perceptions of the objects and events, this requires embodiment and situated-ness (Clark, 1997). As humans we live in a society, which is shaped by us and shapes us at the same time; we critically depend on language to externalize our ideas and access the concepts generated by other humans to enlarge our knowledge. Language and human thought are strongly interrelated; making language necessary for complex manipulation of concepts (Clark 1998) and an individual can develop language only in a society (Steels and Kaplan, 2002).

Developing this argument further, it can be stated that it is through generations, a culture is formed by accumulation of past experiences (Dunbar 1998). Based on the arguments given by constructivists an investigation is initiated to explore the link of behaviors on voluntary knowledge sharing in a firm. It is hypothesized that if employees at individual level treat each other with respect and equality in their business as well as daily contact in a firm. The employees would voluntarily like to share their knowledge with their office workers and on the other hand discriminating behavior practiced by employees; even individually, would hinder knowledge flow.

H₁: Higher the level of discrimination at individual level, would lower the voluntary knowledge sharing by individual

The group behavior is examined on the same lines; since group leader enjoys maximum authority in a group his/her behavior is critical. The hypothesis is that the group leader must show equality and non-discrimination in his behavior. The group members must be treated with respect and encouraged to share their thoughts.

H₂: Higher the level of discrimination at group level, would lower the voluntary knowledge sharing by individuals in the group

The third behavior actor is the organization itself. The actions of an organization are rooted in its policies and the actions taken by the management in the light of the company policies. It is hypothesized that non-discrimination and fair company policies towards its knowledge workers would promote voluntary knowledge sharing. A company's sensitivity towards knowledge workers needs promote knowledge sharing whereas a disparity in policy implementation from written documentation hinders knowledge flow.

H₃: Higher the perception of management regarding fair play and sensitivity towards knowledge workers needs, would higher the voluntary knowledge sharing by individuals

The role played by the communication channels in an organization is that of a facilitator for knowledge sharing. The communication channels include computer networks, software and social occasions like seminars that provide opportunities for social

interaction. It is hypothesized that existence of communication channels is a must for knowledge sharing.

H₄ : Availability of Communication Channels, would higher the voluntary knowledge sharing

The model in figure (1) presents the conceptual framework, linking behaviors with the voluntary knowledge-flow in a firm and the value produced by the firm. This value product can be in the form of winning a new project, a research report, formula for a pharmaceutical product or any patent. The firm would later convert knowledge product formed by knowledge-flow into dollar terms, but first the firm must create value from knowledge.

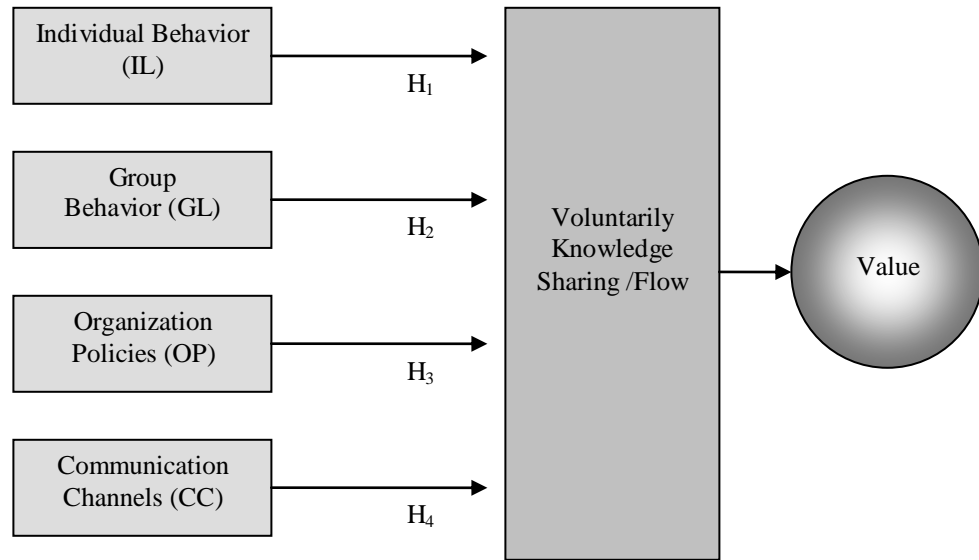


Figure: 1. A Model linking behaviors with knowledge sharing in an organization

3. Methodology

Primary data on behaviors which promote voluntary sharing of knowledge in organizations was gathered with the help of a questionnaire. It is assumed that based on their previous experiences knowledge workers would be able to identify behaviors that promote or hinder them from sharing their knowledge voluntarily with their fellow workers.

The definition of “knowledge worker” is difficult as “knowledge”, it is a very abstract concept. Pears (1972) recognizes that there are many categories of knowledge worker, which may some time look even contradictory, but for the purpose of survey, definition of knowledge workers as given by Nomikos (1989) is considered. Nomikos categorizes knowledge workers as a group that includes scientists, engineers, professors, attorneys, physicians, and accountants.

A survey was conducted to test the above four hypothesis. A total of four hundred questionnaires developed on seven point Lickert's scale were distributed at random among senior teachers, professors, researchers and postgraduate research students of six postgraduate institutions located in Lahore Pakistan. Services were offered for explaining the question naire and the study background to all participants, requesting for assistance. After a follow-up on telephone and personal visits to participants, 198 fully completed questionnaires were received back, giving a response rate of 49.5%.

4. Results

Out of the 198 responses received, 121 respondents were females and 77 respondents were males. A total of 99 respondents had 2 or lesser years of research related experience, 71 respondents had 3 to 5 years of experience, and 28 respondents had over 6 years of research experience. Female respondents were in the age bracket of 36 years or less were 39 in numbers, 62 were between 36 to 45 years and rest 20 were in the age bracket of 45 years and above. Male respondents in the age bracket of 36 years or less were 35 in number. The respondents from the age bracket between 36 to 45 years were only 7, while the last age bracket of 45 years and above were 77.

Table: 1. Demographics of Data collected

Research- Years	Female				Male				Grand Total
	Age				Age				
	<36	36-45	<45	Total	<36	36-45	<45	Total	
=< 2	37	35	7	79	14	4	2	20	99
3-5	2	27	12	41	20	1	9	30	71
= > 6			1	1	1	2	24	27	28
Grand Total	39	62	20	121	35	7	35	77	198

Analyzing female knowledge workers sample, it is seen that maximum female respondents (i-e 79) had 2 or less years of experience in research related activities, while 41 are in the bracket of 3 to 5 years of research and only one female had more than 6 or higher research experience. On the male respondents' side, 20 respondents had 2 years or less research experience, 30 respondents had 3 to 5 years of experience and 27 were related with research activity for over 6 years. A comparison of education degree achieved by the respondents, with the research experiences is shown in table 2 below:

Table: 2. Research experience and Qualifications of Knowledge Workers

Research- Years	Female				Male				Grand Total
	Mas	M-Phil	Phd	Total	Mas	M-Phil	Phd	Total	
=< 2	67	12		79	20			20	99
3-5	31	7	3	41	24	1	5	30	71
= > 6	1			1	14	6	7	27	28
Grand Total	99	19	3	121	58	7	12	77	198

Dynamics of Voluntary Knowledge Sharing

Most of the female respondents (i-e 99) held Masters degree, while 19 were M-Phil and 3 held Phd, On the male respondents 58 held Masters degree, 7 held M-Phil and 12 Phd. The descriptive statistics for the responses is given in the table 3:

Table: 3. Descriptive Statistics of the respondents

	Combined	Male	Female
Communication Channels			
Mean	5.8662	5.6266	6.0186
Std. Dev	1.2670	1.4971	1.0699
Individual Behavior			
Mean	5.9773	5.7175	6.1426
Std. Dev	1.1865	1.3414	1.0447
Group Behavior			
Mean	5.7866	5.3084	5.9897
Std. Dev	1.3478	1.5875	1.1804
Organization Policies			
Mean	5.6477	5.0000	6.0599
Std. Dev	1.3449	1.5526	0.9961

The data showed that the knowledge workers strongly agreed with the hypothesis regarding the factors influencing them on sharing knowledge with their coo-workers. It is seen that the female population is generally more in agreement than the male population, giving a higher mean value in all of categories. The Std. Dev of the females is also lower than the males, showing more consistency in their responses. The Std. Dev for the female population is very consistent; especially with their responses on organizational Policies. One reason for the differences between responses made by the male and female participants could be due to the difference between the research and qualifications of the participants. The t-Test is applied to test the hypothesis according to the response of the knowledge workers. Table 4 shows the results of t-Test at 95% significant level.

Table: 4. Descriptive Statistics for t-Test (One-Sample Statistics)

	N	Mean	Std. Deviation	Std. Error Mean
Individual Behavior (IL)	792	2.02	1.19	0.0422
Group Behavior (GL)	792	2.21	1.35	0.0479
Communication Channels (CC)	792	2.13	1.27	0.045
Organization Policies (OP)	792	2.35	1.34	0.0478

The standard deviation for the responses on Individual Behavior (IL) and its influence on knowledge sharing at individual level is 1.19. The standard deviation for the responses at group level (GL) is measured as 1.35, while the standard deviations for Communication Channels (CC) and Organizational Policies (OP) come out to be 1.27 and 1.34

respectively. The significance of the results are shown in Table (5). The p value for the test is lower than 0.001 for the behaviors at Individual level (IL), Group level, (GL), influence of Communication Channels (CC) and the Organizational Policies (PO) indicating that the results are of significant value in all of the above cases.

Table: 5. t-Test Results (One-Sample Test)

	t	df	Mean Diff	Sig. (2-tailed) P- values	95% Confidence Interval of the Difference	
					Upper	Lower
Individual Behavior (IL)	35.039	791	1.48**	0.000	1.56	1.39
Group Behavior (GL)	26.865	791	1.29**	0.000	1.38	1.19
Communication Channels (CC)	30.345	791	1.37**	0.000	1.45	1.28
Organization Policies (OP)	24.017	791	1.15**	0.000	1.24	1.05

Rated on seven point Lickert scale
0.001

Test Value = 3.5

** p<

The results show very interesting insight, when we analyze the correlation between the above actors. Table 6. presents a summary of correlations. The correlation between organizational policies and communication channels is highest, with the correlation coefficient 0.906. Next in rank is the correlation between organizational policies and behavior at group level (0.882) followed by the behavior at individual level, and organizational Policies giving the correlation coefficient of 0.878 and then the correlation of communication channel with group behavior (803) and communication channel and individual behavior is nearly the same (0.800). This could indicate that the knowledge workers aspire for better communication channels at individual as well as group level.

Table: 6. Showing correlation between main categories

Group Correlations	Abbreviation	Correlation Coefficient
Organization Policies & Communication Channels	OP-CC	0.906
Organization Policies & Group Behavior	OP-GL	0.882
Organization Policies & Individual Behavior	OP-IL	0.878
Communication Channel & Group Behavior	CC-GL	0.803
Communication Channel & Individual Behavior	CC-IL	0.800
Individual & Group Behavior	IL-GL	0.861

Knowledge-workers inspiring for better communication channels also vote for organization policies that are sensitive to employee needs. Similarly workers that were agreeing with the conditions for knowledge sharing at individual and group level also inspired for a corporate policies for promoting knowledge sharing. Table 6 shows that organizational policies play a very important role in controlling voluntary knowledge sharing behaviors at Group level as well as Individual level. The next high relationship lies between the organizational policies and the knowledge sharing at Group level. This

can be interpreted as an indication that the organization policies affect organizational groups at first level and then the group interaction influences an individual.

The study concludes that firms can develop policies that will promote its employees to share their knowledge voluntarily with their fellow workers and similarly firm policies can be a major source of hindrance in employee motivation to share knowledge. Organizational policies are therefore a very effective lever in the hands of a management for creating a culture for knowledge sharing in an organization.

5. Voluntary Knowledge Sharing Model

Based on the literature review of Knowledge Management domain and the view of knowledge discussed above, a model of Voluntary Knowledge Sharing focusing on corporate culture is proposed. The model considers that the only source of knowledge in an organization is its employees. Books, manuals, computer programs etc. are not a true source of knowledge, but they represent Knowledge Assets.

These knowledge assets are converted into knowledge, when an employee interacts with them, and uses his/her intellect to create value from these assets. The true value creation therefore comes from the cognition ability of employees. The importance of knowledge assets are not overlooked, rather it is suggested that its management may be considered by organizations under Intellectual Capital Management frame-works. The proposed model focuses on dynamics of knowledge sharing. A book written by an author, a film, rules of business, Management procedures or a computer program communicates with the user and convey the message of its creator to the user. Knowledge assets can thus be viewed as potential resources for knowledge, creating knowledge when invoked.

The model would be useful in analyzing the knowledge flow bottlenecks in an organization and developing strategies to improve knowledge utilization in organizations. The Knowledge Sharing Model proposed is represented by diagram Fig (2). The four actors according to the model, that influence knowledge flow in an organization are:-

1. Communication Channels
2. Individual attitude
3. Group attitude and
4. Organization Policies

a) Communication Channels

The model places books, technical documents, research reports, data bases, Internet portals, seminars, interest groups and communities of practice as channels that facilitate knowledge transfer. Early human civilization was able to transfer knowledge from generation to generation because they were able to develop a language. Later on development of written script improved the process, similarly in mathematics development of integration and differentiation was able to convey very complex concepts, which were not possible before. Similarly the coming years may see newer channels for knowledge transfer.

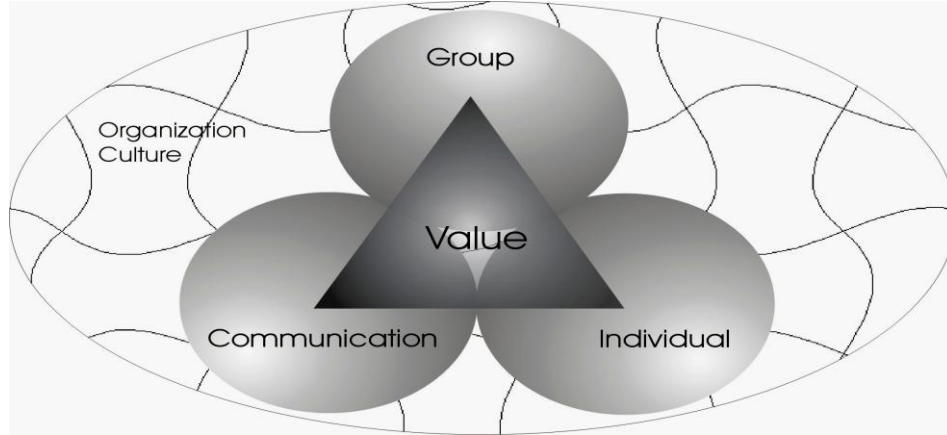


Fig 2 – Voluntary Knowledge Sharing Model

b) Individual attitude

The model considers individual attitude from the point of view of attaining new knowledge from others in the group and secondly passing knowledge to colleagues working in the group. Mutual respect, equality and non-discriminative attitude are considered to be vital for knowledge sharing by individuals.

c) Group attitude

Individuals interact together to form a group; good individuals would naturally lead to good a group. But influence of group leader and group culture greatly influence group interaction. Large organizations have groups and sub-groups. The model considers group dynamics very important to increase knowledge sharing.

d) Organization Policies

The organizational policies navigate an organization towards better productivity or disaster; it is an extension of the values maintained by the management. Corporate culture is developed from the policies followed by an organization, and plays an important part for the promotion and development of knowledge sharing/ innovation activities in an organization.

Strongest criticism on the model may come from IT domain followers, objecting to the need of a cultural change for the success of Knowledge Sharing initiative and not the other way around. But recent research has proved that Knowledge Management is more a culturally based issue, rather than a technical matter. Similar to patriotism or love, patriotism cannot be grown directly in a child or an adult, but a culture is developed to promote the feelings. If an orchard is planted in a desert, it will never grow to blossom, until we provide it with a suitable environment. The model provides a framework for analyzing dynamics of knowledge flow in an organization and guide management in taking initiatives to improve it. The model advocates for dealing justly with knowledge-workers, being careful in providing an encouraging environment for the knowledge workers.

Correlation between knowledge sharing behaviors of knowledge workers and organizational policies of a firm, (results discussed earlier) show a positive and a strong

correlation between factors. Indicating that managers can control knowledge sharing behaviors in the firm by adopting a policy that promotes knowledge sharing, like correlation at individual level behaviors is 0.878 and Group level behavior is 0.882 which are quite strong. This shows that knowledge workers are much more aware of organizational policies than their predecessors. A change in organizational policy or its deviation from its documentation and practiced version is noticed by knowledge workers much more effectively than the labor class. This implies that managers, which themselves are knowledge workers have to develop company policies much more carefully, while keeping in mind the new paradigm.

6. Limitations and Future Research

The research was conducted by studying a sample population of knowledge workers engaged in research activities in higher education institutions. A large number of knowledge workers relating to other sectors may differ in their experiences and therefore may give different opinions. Secondly the study population was of Asian origin, knowledge workers belonging to other nationalities may have different perspectives with regards to knowledge sharing.

There are many avenues on which future research can be conducted. Firstly a cross sectional study for different sectors can be conducted to further generalize the results. Secondly knowledge sharing behaviors in different culture can be compared for an analysis. Thirdly the study can be extended to explore inter organizational knowledge sharing, investigating factors that would promote organizations to share their knowledge for completing larger projects but at the same time maintain their organizational individuality. Another avenue will be to study the values and beliefs that motivate knowledge sharing behaviors using Social Network Analysis and Game Theory approaches.

References

- Alavi, M., KPMG. (1997). *One Giant Brain*. Harvard Business School (Case). 9-397-108.
- Allee, V. (2002). *A Value Network Approach for Modeling and Measuring Intangibles*. Presentation at Transparent Enterprise Madrid November.
- Ber, R. D. (1990). *Intelligence as Adaptive Behaviour: an Experiment in Computational Neuroethology*. Academic Press.
- Clark, A. (1997). *Being There: Putting Brain, Body, and World Together Again*. MIT Press, Cambridge, Massachusetts.
- Clark, A. (1998). Magic Words: How Language Augments Human Cognition. In Carruthers, P. and Boucher, J. (Eds.) *Language and Thought. Interdisciplinary Themes*. Oxford University Press.
- Cole, R.E. (1998). Introduction. *California Management Review*, 45(3), 15-21.
- Dunbar, R. I. M. (1998). The social brain hypothesis. *Evolutionary Anthropology*, 6, 178-190.
- Grant, R. M. (1996). Towards a knowledge-based theory of the firm. *Strategic Management Journal*, 17 (3), 109-122.

- Hall, P. William (2003). Organizational Autopoiesis and Knowledge Management. ISD 03 *Twelfth International Conference Information Systems Development*, Melbourne, Aug 25-27.
- Heisig, P., Mertins, K. and Vorbeck J. (2001). *Knowledge Management. Concepts and Best practices in Europe*. Second edition. ISBN 3-540-00490-4. Springer-Verlog. Berlin Heidelberg. New York.
- Holsapple, C.W, and Joshi, K.D (1999). Description and Analysis of Existing Knowledge Management Frameworks. *32nd Hawaii International Conference on System Sciences*.
- Laverde, O., Baragano A. F. and Jose, M. (2003). Knowledge Processes: On Overview of the Principal Models. *3rd European Knowledge Management Summer School*. 7-12 Sept, 2003 San Sebastian, Spain.
- Maes, P. (1991). *Designing Autonomous Agents: Theory and Practice From Biology to Engineering and Back*. MIT Press.
- Maturana, H. R. and Varela, F. J. (1987). *The Tree of Knowledge: The Biological Roots of Human Understanding*. Shambhala. Press, Boston.
- McElroy, M. (2002). *The New Knowledge Management, Complexity, Learning, and Sustainable Innovation*. ISBN 0-7506-7608-6. Butterworth-Heinemann. Burlington, England,
- McFarland, D. (1981). *The Oxford Companion to Animal Behavior*. Oxford University Press.
- Newell, S., Laurent, S., Edelman, L., Scarbrough, H., Swan, J., Bresnen, M. (2004). Sharing learning across projects: limits to current 'best practice' initiatives, *The Fifth European Conference on Organizational Knowledge, Learning and Capabilities*, Innsbruck 2-3 April 2004. – [Online] Available: http://www.ofenhandwerk.com/oklc/pdf_files/D-4_newell.pdf
- Nomikos, G.E. (1989). Managing knowledge workers for productivity. *National Productivity Review*, 8 (2), 165-174.
- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5 (1), 14-37.
- Pears, D.F. (1972). *What is knowledge?* George Allen & Unwin: London, UK.
- Piaget, J. (1968). *Genetic Epistemology*. Columbia University Press.
- Probst, G., Raub, S. & Romhardt, K. (2000). *Managing Knowledge- Building Blocks for Success*, West Sussex: John Wiley & Sons, Ltd.
- Rastogi, P. N. (2000). Knowledge Management and Intellectual Capital - The new virtuous reality of competitiveness. *Human Systems Management*. 19(1), 39-48
- Snowden, D. (2002). Complex acts of knowing: paradox and descriptive self-awareness. *Journal of Knowledge Management*, 6(2), 100–111.
- Spender, J.C (1996). Making Knowledge the Basis of a Dynamic Theory of the Firm. *Strategic Management Journal*, 17 (Special Issues), 45-62.
- Steels, L. and F. Kaplan (2002). The Social learning of language and meaning. *Evolution of Communication*, 4 (1), 3-32.

- Sveiby, K. E. (1997). *The New Organizational Wealth: Managing and Measuring Knowledge Based Assets*. Published by San Francisco : Berrett-Koehler
- Sveiby, K.E., (1994). *Towards a knowledge perspective on organization*, Doctoral Dissertation 1994 University of Stockholm S-106 91 Stockholm. [Online] Available: <http://www.sveiby.com/articles/Towards.htm> (Accessed on Jan 12, 2005)
- Sveiby, K. E., (1997). *Tacit Knowledge—An introduction to Michael Polanyi*, Sveiby Knowledge Associates. [Online] Available: <http://www.sveiby.com/articles/Polanyi.html>. (Accessed on Jan 2, 2005).
- Sveiby, K. E., (2000), Frequently asked questions, Sveiby Knowledge Associates. [Online] Available <http://www.sveiby.com/faq.html> (Accessed on Jan 2, 2005).
- Tannenbaum S., I., Alliger G., M. (2000). *Knowledge Management: Clarifying the Key Issues*. ISBN 0967923913. IHRIM,.Thousand Oaks, Ca: Sage Publications.
- Van der Spek, R., and Spijkervet, A (1997). Knowledge Management: Dealing Intelligently with Knowledge, in *Knowledge Management and Its Integrative Elements*, Liebowitz, J., L., CRC Press.
- Wiig, K.M. (1993). *Knowledge management foundations: Thinking about thinking - how people and organisations create, represent, and use knowledge*. Schema Press: Arlington, TX.