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ENHANCING END USERS' ICT SKILLS IN THE NEW ECONOMY

STUDY 3: Managing Knowledge in a High Tech Company: Knowledge Sharing about Information Systems

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ENHANCING END USERS' ICT SKILLS IN THE NEW ECONOMY

A linked series of papers

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STUDY 3:

MANAGING KNOWLEDGE IN A HIGH TECH COMPANY: KNOWLEDGE SHARING ABOUT INFORMATION SYSTEMS

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General Introduction

Clearly, the most widely perceived trend today is the increased need for computer skills training. As information technology becomes an integral part of more jobs, more employees need the skills to use information technology effectively (1997 National HRD Executive Survey: 1).

This set of papers explores empirically the effectiveness of computer skills training in the “new economy.” The above quote is from a 1997 national survey of Human Resources Development executives which concludes that additional training for employees in the use of information and communication technologies (ICTs) is the most critical need in today’s evolving American workplace. Indeed, ICTs and effective end user training are arguably the two most critical success factors for many contemporary organizations. Why is this the case?

- First, most analysts assert that people are an organization’s most valuable asset. As such, top executives and managers might assume that appropriate investments in human capital, such as programs that insure employees understand how best to use available resources (e.g. other people, technology, and information), should yield high dividends for their companies. A crucial means for achieving such employee expertise is the provision of appropriate support for training and learning.
- Second, information and the information systems are a vital strategic resource in most organizations. Many organizations commit substantial resources to information and ICTs on the reasonable assumption that these allocations will generate favorable impacts in achieving their organizational goals, whether profit, market share, productivity gain, or some other measure of efficiency or effectiveness.

While these ICTs are powerful tools, the benefits of using many of these ICTs are closely linked to the behaviors and skills of the organizational personnel who use them. Consequently, managers face the challenge of maintaining an appropriate balance between investments in ICT resources, on the one hand, and investments in the training of and assistance for ICT users, on the other hand. It is this strategic blend of information technology capabilities and skilled end users of information systems that supports the competitiveness and success of firms in the new economy. Thus the core of our analyses is an exploration of the nature and assessment of such training and assistance, based on survey and interview data from end users in a large, high-tech company.

There is widespread lip service paid to the homily that people are typically an organization’s most valuable resource. However, in many (perhaps most) organizations, a thorough and sustained program for the initial and especially for the continuing ICT training and assistance for those people is not among the top action priorities. Indeed, most firms do not even engage in serious, periodic assessment of the extent to which their personnel are satisfied with the ICT training and support provided.

These papers report on field research exploring such issues, undertaken in a progressive, high-tech manufacturing company which we call “TechMark”. This multinational company is very much part of the new economy, in which firm performance is based on a high technology infrastructure, work flexibility, and speedy adaptation to change. Our data are especially grounded in the responses of almost 400 sophisticated end users who are engineers, planners, managers and others in key positions. They report on their own training and learning experiences regarding the key information system with which they work. These “mission critical” systems include forecasting and marketing systems, supply chain systems, SAP systems, and so on.

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INTRODUCTION

Currently in the United States, technology encompasses an important set of artifacts which affect every aspect of our lives. Companies of all sizes are becoming more and more reliant on technology, and especially on ICTs (information and communications technologies). For companies in the new economy, it is vital that employees have adequate skills to use ICTs effectively, if they are to contribute to company performance. And, given the rapidly changing business environment and the constant changes in information systems-in-use, the organization's success in facilitating knowledge sharing about the organization's information systems is one vital component in improving employee understanding and use of ICTs. Inadequacies in such knowledge sharing not only limits employee satisfaction but is also detrimental to the efficiency of the company.

This paper addresses three questions regarding how end users learn about and share system knowledge in a new economy company:

- **Which sources do employees use most to gain information system knowledge?**

- **With which sources are employees most and least satisfied?**
- **What characteristics distinguish those who use certain sources of information?**

Answers to these questions might provide insights into the dynamics of knowledge sharing in a high-technology organization. The analysis utilizes the data from our extensive survey of ICT end users at the TechMark Company, and the data are analyzed with statistical programs from SPSS.

HYPOTHESES

Our analysis begins with a categorization of the modes of knowledge sharing that are available in TechMark, the organization under study. Broadly, we distinguish modes of knowledge sharing regarding information systems on two dimensions. First, the **formal-informal dimension**, with more formal sources providing knowledge that is systematic, detailed and organized, while the knowledge on informal sources is loosely organized and unsystematic. On the second dimension, the **technologically-based** sources provide information directly from information systems (such as Website and online help) or from printed documentation, while the **personal** sources are provided directly by people (such as coworkers or supervisors).

- Hypothesis 1: most employees at TechMark use more formal and technology-based sources of knowledge sharing to answer questions about the information systems with which they work. This expectation is grounded in the fact that the end users in our study operate in a high tech company, most are technologically skilled, and the role of ICTs is pervasive in their jobs. Given these factors, the tremendous time pressure under which they work, and the need for immediate, specific answers to system questions, we expect that sources such as the Website and online system help, and perhaps printed materials, will be utilized more often than informal and less technology-related sources.

- Hypothesis 2: the satisfaction of employees with each source of knowledge sharing will be correlated with the sources that they use most frequently to answer questions about the system. Employees have considerable discretion in determining how they will seek information regarding ICT use, and thus they will use a source more often because they are satisfied with its value.
- Hypothesis 3: there will be a correspondence between initial training methods and preferred modes of knowledge sharing. Thus training methods that are more technology-related, such as the CBT, will seek information from sources that are technology-related, such as the Website and online system help. And those who receive initial training from instructors or in one-on-one learning situations will tend to use human interaction-based sources, such as asking coworkers and supervisors for information.

DATA and METHODS

The data reported here were gathered primarily from self-administered, web-based surveys completed by 398 ICT end users in TechMark, a large, multinational company engaged in the fabrication of high technology products. The survey was distributed by the company itself, which explained to its employees that it was interested in learning more about the effectiveness of the company's training approaches. Our interpretations of the survey data are enhanced by onsite interviews with end users and with those in the training unit of the organization.

These end users, whose anonymity was assured, responded to an array of questions. Among other questions, they reported their levels of use and evaluation of various modes of ICT training (initial and ongoing) for the specific information system with which they work. The respondents also indicated the extent to which various sources are used to seek answers to questions about the information systems and the usefulness of those sources. They characterized the nature of their knowledge-sharing activities regarding the key information system and their preferences regarding further training. Some personal data were also collected, such as the end user's years of experience with the system and a self-assessment of his/her competency in using the system.

The coded data are analyzed using SPSS, a standard statistical analytic tool. Most tables report the distribution of responses by category and the mean scores on interval- or ordinal-level variables. The statistical significance of between-group differences is assessed by calculating the analysis of variance between group means.

FINDINGS

Which sources do employees use most to gain information system knowledge?

Table 1 indicates that employees at TechMark tend to approach coworkers more than any other source for answers to questions about the information systems-in-use. Nearly two-thirds of the employees seek answers from coworkers at least once per month.

Supervisors, the IT department and printed materials are the next most frequent sources of knowledge, although each of these sources is used less than half as frequently as coworkers. The telephone helpline and online system help are used at least once a month by less than one in six employees, and the website is used by only one in nine employees. The clear trend in Table 1 is that employees tend to approach people, especially coworkers, for answer to questions about the information systems. There is far lower utilization of technology-related sources, such as the Website and online system help. Even among technically sophisticated end users in the business environment that is growing more and more reliant on technology, there is a clear preference for sources of information that are more personal and informal.

TABLE 1: Frequency and Effectiveness of Sources Used to Seek Information about the System

Mode	% of all employees who use source at least 1-2 times per month	% of employees who rate source very good or good	Effectiveness rating ^a
Coworkers	63.4 %	44.5 %	1.86
Supervisor	28.7	25.7	1.74
IT department	28.6	23.4	1.80
Printed Materials	26.7	14.0	1.42
Telephone Helpline	16.9	12.6	1.54
Online System Help	16.4	7.8	1.12
Website	11.5	7.6	1.19

^a Very good = 3, Good = 2, Satisfactory = 1, Unsatisfactory = 0

With which sources are employees more and less satisfied?

Table 1 also indicates that employees rank coworkers as the most effective available source to answer questions about the system. More than 44% ranked coworkers as a very good or good source, almost twice the number of end users rating any other source so positively. Supervisors and the IT department were the next most favorably rated sources of help to answer questions about information system use. Printed materials and the telephone helpline were ranked “very good” or “good” by only about one in seven employees, and less than one in ten rated the Website or online system help as “very good” or “good”. The differences on mean effectiveness scores are less dramatic; but coworkers, supervisors, and the IT department are again rated most positively. As we hypothesized, there is a very strong correlation between a particular source’s rankings on frequency of use and the quality of answers and help attributed to that source. The central inference from these data is consistent with that from the earlier tables: employees use and favor information from informal, personal sources.

What characteristics distinguish those who use certain sources of information?

Both Table 2 and Table 3 are consistent in supporting the idea that the modes of training (both initial and ongoing) which the employee has experienced does seem to have an effect on the sources that the employee will choose in order to seek answers to questions about the system. Generally, those with “high touch” training are particularly likely to seek information from informal, personal sources, such as coworkers. In contrast, those who have had “high tech” training (i.e. CBT) are far more likely to use “high tech” sources of help than those whose training was “high touch”. Nonetheless, even the end users with more formal, technology-based training still rely heavily on coworkers when seeking system information. If training is from print-based materials, there is also a very high propensity to seek answers from written documents. Those who receive no training whatsoever tend to be somewhat less active in asking questions about the system, compared to other employees. Those with no training are especially unlikely to use print

materials for assistance and they generally prefer personal, informal sources, especially coworkers, to answer their questions about the system.

TABLE 2: Sources of Information Used by Employees with Various Initial Training Methods

Percent of end users with initial training in a particular mode who use a source to answer system questions at least 1-2 times a month

Source of Information	Mode of Training				
	CBT	Instructor-led	Printed Materials	One on One	None
Website	38.5 %	15.0 %	11.1 %	16.7 %	20.0 %
Online Help System	30.8	25.0	23.2	15.3	27.7
Helpline	53.8	25.7	28.6	17.2	20.6
IT Department	33.3	44.0	42.4	30.6	40.0
Coworkers	73.7	81.5	93.0	76.3	68.1
Supervisors	31.3	43.7	54.5	48.9	38.2
Printed Materials	75.0	50.4	65.5	34.2	17.8

TABLE 3: Sources Used by Employees with Various Ongoing Training Sources

Percent of end users with ongoing training in a particular mode who use a source to answer system questions at least 1-2 times a month

Source of Information	Mode of Training				
	CBT	Instructor-led	Printed Materials	One on One	None
Website	48.0 %	23.9 %	25.7%	9.0 %	12.6 %
Online Help System	43.5	33.3	38.9	16.7	18.6
Helpline	47.8	16.7	17.1	17.1	22.5
IT Department	30.4	41.5	44.2	40.9	30.2
Coworkers	79.2	72.7	87.0	82.6	70.8
Supervisors	28.6	61.4	52.9	50.0	32.0
Printed Materials	60.0	51.1	80.5	42.6	31.1

Table 4 indicates that, for the most part, the length of time that an employee has worked with an information system (what we term “experience”) does not substantially change

the likelihood of using a particular source of information. In general, the proportion of end users who seek information from a source does not alter, whether the employee has used the system for only a few months, a year, or a few years. The main exception to this observation is that seeking information from IT department rises dramatically after the end user has some experience with the system. There is also a proportionately high increase in use of the website. In contrast, information seeking from printed materials and from online system help seems to decline among end users with greater system experience.

TABLE 4: Sources of System Information Utilized by Employees with Various Levels of Experience Using the System

Mode	Experience with the System		
	Limited Experience	Some Experience	Most Experience
Coworkers	80.0 %	76.9 %	75.7 %
Supervisor	46.4	39.8	42.6
IT Department	13.3	35.9	40.2
Printed Materials	42.1	52.1	37.6
Telephone Helpline	20.0	21.6	23.5
Online System Help	20.0	19.5	16.6
Website	12.5	13.6	18.8

Table 5 continues the pattern of analyses in Table 4. Here, the extent of end users' experience with the system is related to the value that is attributed to the various sources of system information. In general, the length of experience with the system does not substantially alter the quality of information provided by the various sources. As in Table 4, experience has minimal effect on the value of system information from coworkers, supervisors, helpline, or online help. The most striking shift due to more extensive system experience, as in the previous table, is the dramatic and positive increase in the quality attributed to information from the IT department. In contrast, with greater system experience, there is a notable decline in the proportion of end users who judge the information from printed materials and from the website to be very good or good.

TABLE 5: Quality of System Information From Various Source, Given the End User's Level of Experience with the System

Percent of End Users Rating Source "Very Good" or "Good"			
Source of Answers	<u>Experience with System</u>		
	Limited Experience	Some Experience	Most Experience
Coworkers	91.7 %	92.7%	90.2%
Supervisor	89.5	87.2	81.7
IT Department	40.0	95.3	82.5
Printed Materials	100	83.3	76.7
Telephone Helpline	66.7	81.5	75.4
Online System Help	75.0	65.2	72.1
Website	80.0	72.7	64.2

Most employees respond that they likely or possibly will use most sources to answer system questions in the future (Table 6). About half of the employees definitely intend to use each of the seven sources of information in the future, ranging from 59% for printed materials to 46% for websites. The fact that the largest proportion expect to use printed materials is somewhat surprising, since it tended to have relatively less value for more experienced end users; but they might be pragmatic in recognizing the pervasiveness of printed materials as an available source of assistance. Like the half full glass, about 35-45% of the end users are only somewhat committed to future use of these seven sources, indicating that they will "likely" or "possibly" use the source. This might be interpreted as a mild dissatisfaction with the sources in general. The website is the only source which a substantial group are clearly not interested in using, with nearly one in five end users reacting negatively to future use of the source.

TABLE 6: Interest in Future Training, Given Frequent Use of a Source of Answers to System Questions

Source of Answers	<u>Willingness to Use Source in Future</u>		
	Definitely	Likely/ Possibly	Not Likely/ Definitely Not
Website	45.5%	36.4 %	18.2 %
Online System Help	46.2	44.6	9.2
Helpline	55.4	40.0	4.6
IT Department	52.5	51.2	5.9
Coworkers	49.6	44.7	5.6
Supervisor	55.8	39.8	4.4
Printed Materials	58.7	36.5	4.8

Table 7 considers whether the use of particular sources of help shapes the modes of training preferred in the future. Broadly, most employees want instructor-led training in the future. However, those who use technology-based sources to gain answers to questions (e.g., websites, online help) select computer-based training as their second choice, following instructor based training. In contrast, those who use personal sources to seek answers to questions about the system choose one-on-one training as their second choice, following instructor based training. Those who use printed materials are somewhat more interested in print-based future training than other groups; but print-based training ranks only third, behind personal training approaches. Thus there is some relationship between “high tech” versus “high touch” sources of assistance in the past and the employee’s preferences regarding future training.

TABLE 7: Preferred Mode of Future Training, Given Frequent Use of a Source of Answers to System Questions

Preferred modes of future training among those who currently use a source of system information at least 1-2 times a month

Source of Answers	CBT	Instructor-Led	Printed Materials	One-on-One	None
Website	44.4%	53.3%	31.1%	40.0%	0%
Online System Help	41.5	50.8	29.2	30.8	0
Helpline	32.8	61.2	32.8	40.3	.3
IT Department	36.3	61.1	39.8	45.1	0
Coworkers	37.5	61.3	37.5	43.5	0
Supervisor	38.9	68.1	42.5	49.5	0
Printed Materials	31.1	72.6	41.5	49.1	0

CONCLUSIONS

At least three broad conclusions emerge from these data from the information system users at TechMark.

- **First, employees tend to seek answers to system questions primarily from the most informal, personal sources, and especially from coworkers, not from the most technologically-based sources.**

- **Second, end users generally report more positive evaluations of the quality of system information they receive from personal sources, relative to the print-based support or computer-based support.**
- **Third, the initial training modes to which the end user is exposed (whether person-based or technologically-based) seem to shape their choices for sources of knowledge sharing.**

These data are significant and somewhat surprising. Even at a high-technology company, a strikingly large proportion of employees use more informal and personal sources to answer questions about the information system, relative to their use of tech-based sources. Ironically, this particular company is trying to develop more high-tech sources of end user support and it assumes that its employees will opt for these sources when they seek answers to questions about the system. However, their employees tend to rely and intend to continue to seek informal, personal sources, implementing such high-tech systems may not be well received.

Indeed, the data from end users suggest a decreasing enthusiasm among many employees for the website and for online system help, the technology delivery systems which TechMark expects to expand. If the company does desire to implement such high-tech systems, we suggest that initial training of employees should combine instructor-led approaches with more technology-related methods, such as CBT. If these high tech approaches are added to the initial training regime, it might stimulate employees to seek out more tech-related ways to answer questions about the system.

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