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Use of IT to support Knowledge Sharing: The New Zealand perspective

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Abstract

This paper reports on findings from a New Zealand survey of chief executive and knowledge managers on knowledge management systems. The paper focuses specifically on trends in the use of technology to facilitate knowledge sharing in New Zealand business and the issues with technology used to facilitate knowledge sharing reported by the respondents. Respondents report high use of on-line technologies such as Intranets and online information services. The study opens up several avenues for future research to understand the reasons behind the technology use to facilitate knowledge sharing using more in-depth data collection and analysis. Implications for New Zealand government investment in knowledge management and the New Zealand knowledge economy are drawn.

Keywords
Knowledge Sharing, Internet Systems

Introduction

Successful Knowledge sharing requires a skilful blend of change management, organisational learning, organisational processes and Information Technology (IT) (Damodaran 2001). Damodaran also reports that efforts to date to share knowledge through formal Knowledge Management processes have been disappointing. Hence, it seems that there is still much to learn about knowledge sharing. The focus of this paper is to tease out business perceptions about how IT is used to support knowledge sharing in New Zealand and to explore these perceptions in light of current studies reported in the literature. The use of IT to support knowledge sharing is well reported in our literature review, however, as many authors point out, it is merely a facilitator of knowledge sharing that many argue has nothing to do with actually sharing knowledge.

The next section of this paper covers the current literature looking firstly at the delicate balance between using IT to share knowledge and implementing the necessary cultural and organisational change needed for the IT system to be successful. Secondly, we look at the different technologies reported in the literature to support knowledge sharing. Thirdly, we explore the New Zealand business environment before presenting the method, results and drawing some implications for academia and industry from the analysis of the results from our study.

Potential for IT to support knowledge sharing
Users often have an expectation that computer systems will provide high quality information and that they can facilitate greater accessibility to information (Jarvenpaa & Staples 2000). However, as Jarvenpaa and Staples (2000) report, what a computer system transmits electronically is data or information and not knowledge. They conclude that for knowledge sharing to occur, a human who will give it meaning and context must acquire the information. Hence, computer systems are facilitators of information transmission and distribution, not a substitute for human interaction and communication (Fahey & Prusak 1998).

However, having said that IT is not a substitute for human interaction and communication, the implementation of a technological capability is the foundation of knowledge sharing (Ruggles 1998). A technological capability isn’t enough to facilitate knowledge sharing alone as current literature demonstrates that deployment of a technology solution alone won’t bring down many of the large organisational knowledge sharing barriers and motivate people to share (Jarvenpaa & Staples 2000; Marwick 2001; Ruggles 1998; Pan & Chen 2001).

Successful knowledge sharing depends on employees using the systems rather than merely the organisation possessing the capability to share knowledge (Ruppel & Harrington 2001).

Even though an IT solution to knowledge sharing is not the be all and end all of successful knowledge sharing, companies certainly need to know what technology is able to provide and have some knowledge sharing technological capability to be able to exploit it. For example, Gottschalk (2000) reported that whether law firms in Norway use information technology to support knowledge sharing is significantly influenced by whether they generally use IT. Similarly, they found that firms with low IT use have low skills or experience to implement information technology to support knowledge sharing.

Technologies used for information sharing

Expert systems, group systems and video conferencing have been used to support knowledge sharing in the past (Marwick 2001). More recently, the most important information technologies for knowledge sharing are data warehousing, groupware and the Internet (Song 2002). Use of groupware has been limited by technical complexity of the products and poor connections with Internet tools. The Internet has become a very useful source of information and Intranets have provided many organisations with the framework for sharing knowledge. Frappaolo and Cupshaw (1999) report on some 1998 Delphi Group data that suggests document management systems and intranets are perceived by managers as the most important technologies contributing to knowledge sharing. Jarvenpaa and Staples (2000) suggest that computer based collaborative systems (intranets, email) are useful knowledge sharing technologies as they encourage sharing of ideas in a free-flowing manner as well as in a form of structured repositories.

Intranets

Frappaolo and Cupshaw (1999) believe that the Intranet is a critical media for delivering knowledge throughout an organisation. As pointed out by Ruppel and Harrington (2001), Intranets initiate knowledge-sharing efforts because they allow for sharing of information at the document level rather than the record level provided by traditional systems. In a 1998 USA study, 69% of organisations surveyed had begun implementing Intranets and a further 22% were considering using them (Ruppel and Harrington 2001). Ruppel and Harrington (2001) summarise that Intranets support knowledge sharing so well by 1. providing compression of time and space, 2. offering flexibility to exchange information, and 3. supporting information transfer and organisational networking independent of contact.
between users. Note that this support of information transfer without contact between users is as close to knowledge sharing that a technological solution can come without human intervention.

Up until now, we have presented literature that reports on studies from countries other than New Zealand. In the next section, we report on the business environment in New Zealand and the likelihood of New Zealand businesses to use IT.

New Zealand IT use

Several studies have investigated IT use in small economically developed countries such as New Zealand. One important development for successful knowledge sharing is the development of a successful knowledge economy. Finland is one country that has worked on developing a knowledge economy and is of similar size and economic development to New Zealand. In a study comparing the IT success of Finland and New Zealand, Watson and Myers (2001) conclude that the three most important ingredients for successful industries such as the knowledge economy to develop are: (1) government IT promotion (2) private sector R&D investment and (3) a tertiary system that provides IT graduates.

Ein-Dor, Myers and Raman (1997) point out that New Zealand is perceived by some as successful in IT due to the perception that small country size is not an economic disadvantage. Myers (1996) attributes the way that New Zealand business has overcome geographical disadvantages to ‘Kiwi ingenuity’. However, such ingenuity encourages pockets of ad hoc development that fall short of the holistic capability required for a knowledge economy. New Zealand businesses are forced to rely on their ingenuity as the New Zealand IT industry lacks some of the facilities (except telecommunications facilities as discussed later) that are provided by more IT focused countries such as the United States (Ein-Dor et al. 1997). More widespread use of knowledge sharing systems in New Zealand and more government support may provide an environment where such facilities are induced.

New Zealand has succeeded in applying IT in interesting and new application areas but is not as successful in hardware (Myers 1996). The New Zealand economy relies heavily on agriculture, as it has done for more than 100 years now. Many New Zealand businesses have implemented IT to add value to agricultural products using computer software (Dedrick, Goodman and Kraemer 1995). Although ingenious, such development encourages a pocket of development around software that adds value to a product.

In its favour, New Zealand has a first rate telecommunications infrastructure providing advanced information services as a result of deregulation in the late 80’s (Dedrick et al. 1995). New Zealand businesses are adopting Internet technology as the number of IP-connected organisations has been steadily growing since 1996 (Gutierrez 2000).

One industry were IT is being rapidly implemented in New Zealand is the Health sector. This perhaps represents another ‘pocket’ of development within New Zealand. One example of such an implementation is ‘DoctorGlobal’, a commercial e-health service, operated by a General Practitioner based in Taranaki, New Zealand (Holt & Gillies 2002). New Zealand medical scholars are among early adopters and users of telemedicine video conferencing technology used to service remote regions of the country (Al Qirim 2002). IT has also been used in the New Zealand health environment for patient payment procedures, surgery medical services and surgery accounting processes (Lehmann & Wee 2000). Lehmann and Wee
(2000) report that many New Zealand surgeons value IT as something that they can’t live without.

In summary, New Zealand has been successful in IT on a small scale, especially in terms of software development for specific industries. However, a study completed in the mid-1990’s suggested that massive government intervention was needed to promote successful use of IT (Ein-Dor et al. 1997). To date, such government intervention does not appear to have happened. Government intervention would provide the much needed facilities and resources needed to develop IT across New Zealand. Government funding would also boost private research and development spending and would provide a market for tertiary graduates.

The first step in setting up funding and facilities is to understand the current knowledge sharing environment in New Zealand. In a survey of New Zealand organisations, we collected information on the type of systems currently in place, future plans and the perceptions of the people managing the knowledge. The next section of this paper presents the method, some brief demographics of the survey group and the results from our survey.

Method
The survey instrument used for the New Zealand study was that developed by the School of Information Management and Systems at Monash University, Melbourne, Australia (Zyngier, 2001) that was in turn based on that developed by the School of Management, University of Cranfield, UK¹. The survey instrument has also been used to collect data in both Europe and Australia.

A total of 410 surveys were distributed to private and public sector organizations. Private sector bodies were those included in the New Zealand Management December 2001 listing of the top 200 companies and top 30 financial institutions. These are the major New Zealand corporate companies in terms of financial performance. All central government ministries and departments, local government bodies, polytechnics and universities, healthcare administrative organizations and Crown Research Institutes were identified via the New Zealand government portal² and included in the survey population.

In order to maximize response, the surveys were mailed to a named individual where possible with an accompanying letter and reply paid envelope. Determining who the survey was addressed to was prioritized according to the following strategy:

- First choice was a chief knowledge officer (CKO) or chief information officer (CIO) where a name could be identified.
- The second choice was a named chief executive officer (CEO)

In the absence of a named individual being identified for any of the above positions, the survey was addressed to the position title ‘Chief Executive Officer’.

Of the initial population, 35 organizations responded that they were unable to reply due to organizational policy. A further 2 surveys were returned as incorrectly addressed. The initial positive response rate was about 18%. After the deadline for the return of the survey had

¹ Permission was sought and received from both Cranfield Institute and Monash University for use of survey instruments.
² www.govt.nz
passed a follow-up telephone call was made to all non-respondents, and the final positive response rate was 28.54%.

**Industry demographics**
Table 1 shows the industry sectors represented in the survey. Well over one third (46%) of the organisations were from the government sector, 12% were from the education sector and the remaining 42% of respondents were from the private sector.
Respondent demographics

A summary of the respondent’s role shows that high level officers and managers completed the survey (refer to table 2). The majority of respondents were CEOs (43.6%), 17.9% held the position of CIO or CKO, and 7.7% Human Resource Managers. Nearly 30% of respondents occupied other roles, including corporate, financial and general managers, information management roles, communications managers and company secretary. Since the majority of respondents are business people with less than 20% of respondents being in an IT role within the business, it must be recognised that these results are a business perspective of IT used to facilitate and support knowledge sharing, not an IT perspective. A survey of IT people would report very different issues and responses.

Not surprisingly, given that the majority of respondents occupied senior management positions, most were aged over 40, with about 17.3% aged 39 or under as shown in figure 1. Since most respondents are from senior management positions and over the age of 40 years, it must be recognised that these are the perceptions of management. A survey of a different group of respondent, for example, knowledge workers, may report a totally different perception of knowledge sharing in New Zealand organisations.
More than half (52.1%) the respondents had been employed with their organisation for six or more years, with one third (34.2%) having been employed in their organisation for more than 10 years. Less than half (47.9%) had been employed with their organisation for five years or less (see table 3). Long-term employees were however changing positions within the organization, as only 7.8% had been in their present position for more than 10 years. Over half (55.2%) had been in their role for less than 3 years (see table 4). This shows that respondents have been with their organisation long enough to make reasonable insights into how knowledge sharing works in their work environment.

People responded on behalf of their organisations just over 54% of the time, though the option did allow for personal opinion if preferred (see figure 2). Hence, the results are about equally divided between realistic New Zealand business experience and the perception of New Zealand business employees.

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3 For graphing, the minimum age was assumed to be 20 years and the maximum age was assumed as 69 years.
Results
In addition to the demographics analysis, we explored the technology that the respondents reported using to support knowledge sharing. We also looked at the respondents perceptions about the important of technology to knowledge sharing. Written comments from the questionnaire were also considered and these raised some important technical shortcomings. Some of the comments also raised interesting organisational issues that impact on the technology that are also reported here.

Technology to facilitate knowledge sharing
The most extensively used technologies included 'Internet' (73%), 'Intranet' (70.4%), and 'on-line information sources' (58.1%). These were also the most overall used at 99.1%, 90.4%, and 87.2%, along with 'CD-ROMs', 85.2%, and 'Document repositories/Document management', 80.3%. The technologies that were used to the least extent were ‘Groupware’ (37.5%), ‘Expert systems’ (30.7%), and ‘Video-conferencing’ (31.7%). (Refer to figure 3).

Respondents described other initiatives to use Information Technology to facilitate knowledge sharing as: document management and document tracking systems, data capture and storage.
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systems incorporating data gathered through eBusiness; data warehousing systems that capture information from independent database and store such information in a systematic way; Intranets incorporating FAQ systems; opening access to existing systems to all staff; using standardised metadata tags to aid accessibility to data and information.

Although only 14% of respondents were CIO’s, there is a difference in the technologies favoured by the CIO’s as shown in table 5. CIO’s use On-line information sources (82.4%), Intranet (88.2%) and Internet technologies (88.2%) more than the main group. This aspect of technology use shows promise for further exploration.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Reported as used extensively by all respondents</th>
<th>Reported as used extensively by CIO’s</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video-conferencing</td>
<td>11.1</td>
<td>5.9</td>
<td>-5.2</td>
</tr>
<tr>
<td>Expert systems</td>
<td>17.5</td>
<td>5.9</td>
<td>-11.6</td>
</tr>
<tr>
<td>Data warehousing/mining</td>
<td>26.1</td>
<td>17.6</td>
<td>-8.5</td>
</tr>
<tr>
<td>Search and retrieval agents</td>
<td>27.4</td>
<td>35.3</td>
<td>+7.9</td>
</tr>
<tr>
<td>Groupware</td>
<td>31.3</td>
<td>29.4</td>
<td>-1.9</td>
</tr>
<tr>
<td>Electronic bulletin boards</td>
<td>32.5</td>
<td>41.2</td>
<td>+8.7</td>
</tr>
<tr>
<td>CD-ROMs</td>
<td>36.5</td>
<td>41.2</td>
<td>+4.7</td>
</tr>
<tr>
<td>Document repositories/ Document management</td>
<td>39.3</td>
<td>29.4</td>
<td>-9.9</td>
</tr>
<tr>
<td>On-line information sources</td>
<td>58.1</td>
<td>82.4</td>
<td>+24.3</td>
</tr>
<tr>
<td>Intranet</td>
<td>70.4</td>
<td>88.2</td>
<td>+17.8</td>
</tr>
<tr>
<td>Internet</td>
<td>73.0</td>
<td>88.2</td>
<td>+15.2</td>
</tr>
</tbody>
</table>

Table 5. Use of technologies by organisations as a percentage

Perceptions of IT to facilitate knowledge sharing
Well over three quarters (89.5%) of respondents indicated that applications of technology are important in terms of meeting the objectives of the organisation. (See table 6)

<table>
<thead>
<tr>
<th>Importance</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all important</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Unimportant</td>
<td>10</td>
<td>8.8</td>
</tr>
<tr>
<td>Important</td>
<td>49</td>
<td>43.0</td>
</tr>
<tr>
<td>Very important</td>
<td>53</td>
<td>46.5</td>
</tr>
<tr>
<td>Unsure</td>
<td>1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Table 6. Importance of applications of technology in terms of meeting objectives

Just under half (40.5%) of the respondents felt that knowledge management was an extension of Information Systems. Just over half (59.5%) disagreed that knowledge management was an extension of Information Systems. (See table 7). This result was interesting as we expected that more respondents would disagree with the statement. However, the result reflected the level of disagreement evident in the literature. Some additional comments from the questionnaires suggest that there are at least two ways of interpreting this question. For example, one respondent commented that it was important that the organisation understood that Knowledge Management was not an IT function. Further qualitative enquiry is needed to investigate this issue further.
Technical problems
Respondents identified several technical problems that have arisen while using Information Technology to support knowledge sharing. Respondents commented on the need for training to be able to effectively use knowledge-sharing technology. Respondents also commented that in some areas, the technology capability has not developed sufficiently to allow for global online links with parent companies. The speed of change in Information Technology and the uncertainty of knowledge requirements are also raised as issues.

Organisational issues that relate to the technology
Many respondents commented on resource issues impacting on knowledge sharing technology projects, especially for smaller businesses. Our survey asked for organisational investment in knowledge management development as a percentage of revenue which gives us an indication of spending on knowledge management projects. Over two thirds (66.4)% of respondents estimated they currently spent five percent or less of organisational revenue on knowledge management. More than half (55.4) of the respondents estimated they would still spend five percent or less in three years time. Less than 20% (18.5%) estimated they would spend between 11 and 20 percent of organisational revenue on knowledge management in three years time, up 9% on the current estimation.

Some respondents also raised the need to standardise terms and technology, the need to have control over the quality and accuracy of the information stores and general problems assembling and distributing the information. Organisations seemed to struggle with competing priorities within their business, the need to be at the forefront of technology and to have appropriate information systems.

Implications
For industry, this paper provides some reassurance for New Zealand business that they are keeping in touch with global trends. The paper also provides a suitable measure of New Zealand business perceptions that individual New Zealand businesses can draw on for guidance. Our study suggests that spending on knowledge management systems is low and that New Zealand businesses are not planning to spend substantially more on such systems within the next three years. This means that resource issues will continue to be a major issue for knowledge managers.
Our study also suggests that some special characteristics of managers influences how extensively they use online technologies such as the Internet and Intranet. This may mean that organisations who want to use online technologies to facilitate knowledge sharing need to appoint a certain kind manager in charge of the knowledge sharing systems.

The survey data shows a trend toward extensive use of online technologies over other more traditional knowledge sharing technologies such as group support systems and video conferencing. This result mirrors the trend in the literature for online technologies to be favoured for facilitating knowledge sharing. Given the expense of video conferencing and groupware technologies relative to online technologies and the availability of online technologies and the high standard of telecommunications infrastructure within New Zealand, it seems that more and more companies will be adopting online technologies to facilitate knowledge sharing in the future.

For fellow researchers, this paper adds to a growing picture of knowledge sharing practise from around the world. This paper also serves to balance the importance of the role of IT in knowledge sharing so that is not overshadowed by more complex cultural and organisational learning issues. It also opens up several avenues of investigation for more in-depth studies looking at the type of technology used to facilitate knowledge sharing and why and to investigate the advantages and pitfalls of using the new on-line technologies to facilitate knowledge sharing.

**Future research**

Although this research shows the number of organisations using Intranets for knowledge sharing, it does not show how or to what extent the Intranets are being used. In a case study of how organisations use the Internet, Schwartz (1999) suggests that Intranets or often applied to one functional area of the organisation rather than a holistic solution. Schwartz (1999) also highlights the issue that even though the Intranet solution is installed, there are often several cultural knowledge sharing barriers that remain. In order to have a better overview of knowledge sharing in New Zealand, there needs to be a more in-depth study of how the technology and systems have been used. This would give researchers a more balanced view of the state of knowledge sharing in New Zealand.

Surveying different respondent groups, such as knowledge workers or IT workers would provide valuable information and a basis to triangulate the findings. Basing the findings over several levels of management and differing industrial perspectives would add rigour and would allow researchers to be more confident of their findings.

Our research doesn’t show whether investment in knowledge management technologies has any impact on the type of technologies used. Surveying the extent of investment, both internally and externally, would provide researchers with information on whether video conferencing and groupware technologies are declining simply because of the amount of investment required. Further qualitative research could also explore whether the popularity of Intranet and Internet technologies is based on the cultural belief that information on the Internet is free and readily available.

Our research also doesn’t show why the CIO’s used the on-line technologies more (on-line databases, intranets and the Internet). Future research could address this apparent difference in preference of technologies through in-depth interviews or case studies. It would also be interesting to find out what the on-line databases that these organisations have access to are,
and how they are provided. Whether they are provided by government or industry groups at very little cost to the user or whether they are expensive to acquire will either separate them or group them with the Internet and Intranet since these are significantly the highest three technologies used by the CIO’s.

In trying to capture the overall New Zealand picture of Knowledge Sharing, we have collected information from both government and private organisations. However, the results may be distorted by the difference in the nature of tasks undertaken by private and government institutions. Future research could explore this difference.

New Zealand government is currently working on fostering a knowledge economy and it is not clear how much impact government policy is having on knowledge sharing technologies used within New Zealand business. Future studies could explore the impact of government policy on the adoption of the on-line technologies and use of on-line information sources.

**Conclusions**

Although knowledge sharing technological solutions are not the be all and end all of successful knowledge sharing, they are certainly the foundation which facilitates human interaction and communication. Although often sidelined for more complex cultural issues with sharing knowledge in organisations, this paper shows that the foundation of knowledge sharing in New Zealand business depends on the IT systems implemented and there is still a lot to find out about IT knowledge sharing systems.

This study shows that Government departments are major users of knowledge management currently in New Zealand. An injection of Government funding would clearly boost the resources for government bodies and would provide much needed infrastructure and private investment. Particularly as lack of funding and resources has been identified as an issue by the respondents of this study.

**List of References**


