INFORMATION COMMUNICATION TECHNOLOGIES (ICTs) AND KNOWLEDGE SHARING: THE CASE OF PROFESSIONAL ACCOUNTANTS IN MALAYSIA

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Abstract: Based on the knowledge sharing model by Nonaka (1994), this study examines the relative efficacy of various Information Communication Technologies (ICTs) applications in facilitating sharing of explicit and tacit knowledge among professional accountants in Malaysia. The results of this study indicate that ICTs, generally, facilitate all modes of knowledge sharing. Best-Practice Repositories are effective for sharing of both explicit and tacit knowledge, while internet/e-mail facilities are effective for tacit knowledge sharing. Data warehousing/mining, on the other hand, is effective in facilitating self learning through tacit-to-tacit mode and explicit-to-explicit mode. ICT facilities used mainly for office administration are ineffective for knowledge sharing purpose. The implications of the findings are discussed.

Keywords: ICTs; information communication technologies; knowledge sharing; explicit knowledge; tacit knowledge; professional accountants.

INTRODUCTION

The speed of technological changes over the last decade has had a profound effect on business enterprises around the world. The widespread diffusion of computer technology and the greatly enhanced computing and networking capabilities have significantly modified the nature of work as well as information flows around and within organisations. These changes have important implications for the professional service providers, such as the accounting profession.

Traditionally, the accounting profession focuses mainly on providing financial reporting, auditing and taxation services. With advances in technological innovations and the use of increasingly smart and specialised software applications that

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support the automation of many accounting, auditing and taxation tasks, much of the laborious and mundane accounting-related tasks have been eliminated (Elliott and Jacobson, 2002). Consequently, the traditional services provided by the accounting profession, such as financial accounting, auditing and taxation services are now commoditised and heading for marginalisation. Nonetheless, the shift from the resource- and manufacturing-based economy to the knowledge-based economy has led to an array of new challenges and opportunities for the accounting profession. These new opportunities and challenges often involve the provision of services that require a growing diversity of knowledge and skills. The accounting professionals are, therefore, challenged to broaden their scope of knowledge and skills. Only services of those professional accountants with a wide array of corporate expertise are increasingly being demanded for a growing range of professional job assignments.

As the role of an accountant evolves from that of a bean counter to that of a strategic business advisor, the nature of his or her tasks is becoming more and more strategically focused. The range of services offered by the accounting profession also proliferates to include information systems work, risk analysis, assurance services, electronic commerce and strategic business advisory services. Hence, possession of a broader and varied set of skills and competencies becomes a necessity for the long-term survival of the profession. The new information professional must be prepared to identify and create decision useful information, arrange its availability when needed for decisions, and design feedback loops to ensure the continued readiness and effectiveness of the systems (Elliott and Jacobson, 2002). In other words, professional accountants must improve their individual abilities to identify, acquire and utilise the accumulated

knowledge more effectively. Since professional accountants are often assigned to job assignments that frequently vary in terms of task complexity, the ability to share clientele- or industry-specific knowledge, experience and insights is crucial for effective task performance, and knowledge management is of special relevance and importance to accounting firms for managing their capability to create and diffuse knowledge within the firms.

In addition to the rapidly changing and increasingly competitive business environment, the expanding disclosure and compliance requirements (i.e., new accounting standards and regulatory environment), as well as the growing diversity in information and service demands for business advisory and risk analysis, are leaving the professional accountants with little choice but to broaden and enhance their skills and knowledge to sustain their competitive advantage. To improve the quality, efficiency and effectiveness of their services, professional accountants must resourcefully identify, acquire and utilise knowledge. Information Communication Technologies (ICTs) could be effective tools to facilitate knowledge acquisition and sharing.

With ICTs, it is now economically feasible for professionals to collect and share valuable information, knowledge and ideas across functions, divisions and geographical boundaries (Boland et al., 1994; Davenport and Prusak, 1998; Fowler, 2000; Olson et al., 1993). ICTs provide the essential technical infrastructure for promoting and managing knowledge management activities (Bolisani and Scarso, 1999). Numerous studies have explored the relationship between ICTs and knowledge sharing (Bolisani and Scarso, 1999; Hendriks, 2001; Luan and Serban, 2002; Roberts, 2000; Johnson, 2003; Robertson et al., 2002; Song, 2002; Sproull and Kiesler, 1986). However, the effectiveness of ICTs in supporting knowledge creation and sharing depends largely on the nature of knowledge needed to be acquired

or transferred. ICTs in most organisations are used to support the capture, storage, retrieval and distribution of explicit knowledge, but relatively little attention is directed to tapping the tacitness of knowledge critical for successful performance of most unstructured tasks. As the relative effectiveness of various ICT applications in facilitating sharing of explicit and tacit knowledge among members of an organisation or a network of organisations has not been adequately investigated, especially among professionals in the developing countries, this study examines the state of ICT adoption among professional accountants and investigates the relative efficacy of various ICT applications in facilitating sharing of explicit and tacit knowledge among these professionals in Malaysia. In view of the pending threats from liberalisation of the professional services sector, the findings of this study may aid the choice of ICT for effective facilitation of the required mode of knowledge sharing that would lead to acquisition of the knowledge and skills necessary for successful task performance among professional accountants.

The reminder of this paper is organised as follows: Section 2 provides a review of the relevant literature on the applications of ICTs in knowledge management and the various modes of knowledge sharing; Section 3 explains the methodology and the sample examined; Section 4 presents the results and discussion and Section 5 provides the conclusions and highlights the implications of the findings.

LITERATURE REVIEW

Knowledge sharing

Review of knowledge management literature generally indicates a lack of consensus on the definition of knowledge. Nonaka (1991) and Nonaka and Takeuchi (1995) define knowledge as justified personal belief towards the truth. Knowledge has also been defined as mix of experiences and insights (Davenport and Prusak, 1998) and methodologies and know-how (Wiig, 1993). Bolisani and Scarso (1999) consider knowledge as a combination of information, ideas, procedures and perceptions that guide a person's actions and decisions. As such, knowledge is generated when we can connect, relate and establish meaning of the information obtained for subsequent action.

Tacit and explicit knowledge

The sharing of knowledge among employees is a vital component of any knowledge management activities (Cabrera and Cabrera, 2002; Jarvenpaa and Staples, 2000; Nahapiet and Ghoshal, 1998; Wasko and Faraj, 2000). Nonaka's (1994) knowledge sharing model, as shown in Figure 1, identifies four modes of knowledge sharing: socialisation, externalisation, internalisation and combination. This framework is based on the dichotomy between tacit knowledge and explicit knowledge as well as the distinction between individual knowledge and collective knowledge. Nonaka considers the conversion process as a 'knowledge spiral' in which tacit and explicit knowledge interacts and interchanges into each other in a never-ending spiral.

Socialisation is the sharing of tacit knowledge such as mental models and technical skills between individuals (Nonaka, 1994; Nonaka and Konno, 1998; Seufert et al., 2003). According to Nonaka and Konno (1998), tacit knowledge is shared through joint activities such as spending time together and being in the same environment. Informal networks are especially crucial for this process. Externalisation is the conversion of tacit knowledge into explicit knowledge, involving the transformation of one's idea, experience or insight into readily understandable form or formal models (Bolisani and Scarso, 1999;
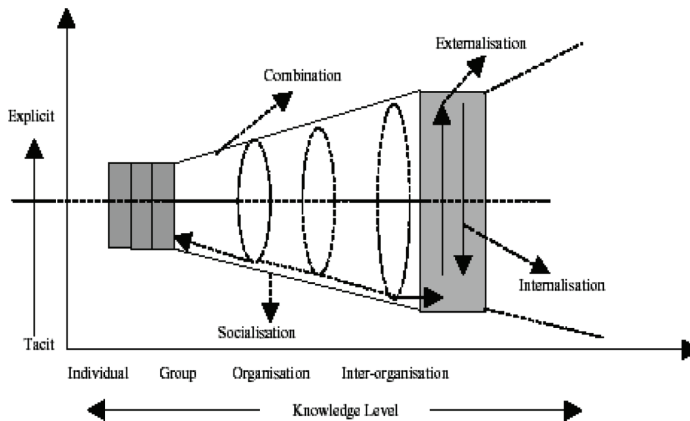
Figure 1   The knowledge-sharing model
Source: Nonaka (1994)

Nonaka and Konno, 1998; Seufert et al., 2003). Combination is the conversion of explicit knowledge into more systemised or complex sets of explicit knowledge (Nonaka and Konno, 1998; Seufert et al., 2003) to make it more usable. Internalisation is the conversion of explicit knowledge into tacit knowledge (Nonaka and Konno, 1998; Seufert et al., 2003). When explicit knowledge is internalised into an individual's tacit knowledge, a shared mental model is formed within the firm, thereby starting a new spiral of knowledge conversion. As the interaction among these four processes iterates, it facilitates the exchange, refinement and extension of organisational knowledge base.

ICT and knowledge sharing

In the early 1990s, knowledge management focused primarily on the management of data resources (Petrides, 2002). Consequently, many believe ICTs are nothing else but a tool for formatting, filtering and summarising data into information. Today, the creation, transfer and management of knowledge are regarded as the central issues in knowledge management, and the role of ICTs has become more than

that of just capturing data. A vital role is ascribed to ICTs as a technical infrastructure to facilitate information handling (Hedelin and Allwood, 2002) and knowledge sharing (Rumizen, 1998) due to the very nature of those technologies in coordinating and promoting communication. Previous research in knowledge management has acknowledged the critical role of ICTs in knowledge management. Ware and Degoey (1998) included workflow tools for knowledge dissemination. Loudon and Loudon (1997) identified computer-aided design system for knowledge creation and groupware for knowledge sharing. Ruggles (1997) included internet forum for knowledge transfer and Davenport and Prusak (1998) suggested data mining applications for knowledge discovery. Other studies (Flanagin, 2002; Lueg, 2001; O'Leary, 1998) also addressed the potential benefits of ICTs as facilitators of knowledge management. These studies are consistent with most of the other information systems literature that indicate ICTs are an important enabler in knowledge management (O'Dell and Grayson, 1998; Ruggles, 1998; Yeh et al., 2006). Therefore, an essential component of knowledge management infrastructure

will be a system that will not only collect, organise and disseminate data, but will also facilitate exchange of information, insight, experience, idea and knowledge.

The ability of ICTs to support knowledge management in a meaningful manner depends on the basic nature of knowledge. In general, ICTs have two capabilities for managing knowledge, codifying knowledge and creating networks. For the most part, ICTs focus on applications to support the capture, storage, retrieval and distribution of explicit knowledge, and relatively less attention is directed to tapping the tacitness of knowledge. Indeed, when ICTs were first used in accounting information systems, which generally involve extremely explicit rules and procedures, ICTs were used very much for automating various accounting processes (Bloodgood and Salisbury, 2001). ICTs are used to make explicit knowledge readily available from databases that may be accessible by decision support systems and expert systems. This approach of ICT application leverages on the knowledge of the firms by making explicit knowledge even more explicit and more transferable. On the other hand, it is difficult to extract, codify and disseminate tacit knowledge, as tacit knowledge is highly personal as it embeds in the human brain. Consequently, efforts to use ICTs to support tacit knowledge sharing can be costly and ineffective. ICTs alone will not be able to capture the conditions required to share tacit knowledge fully and effectively. This suggests that ICTs may only be useful for the exchange, coordination and articulation of explicit knowledge, particularly when team members are geographically far apart. The information richness theory (Daft and Lengel, 1986) asserts that the appropriate choice and use of media is heavily dependent upon the fit between tasks and media. Hence, ICT applications, such as e-mail, internet, and intranet, are considered as a relatively lean media

because even though they provide a channel for asynchronous interactions, they are limited to the written words only. Therefore, to make tacit knowledge more explicit, using a lean ICT can result in a loss of critical components of the tacit knowledge (Bloodgood and Salisbury, 2001). This type of 'less rich' ICTs is potentially useful for the exchange of explicit knowledge but may be inappropriate for the transfer of tacit knowledge. Roberts (2000) adds that ICTs only facilitate communication but it cannot replace face-to-face contact among individuals, which is often a prerequisite for the successful transfer of tacit knowledge.

However, other research studies on the choice and use of media have rejected the idea that a particular media should be chosen based on its rich or lean properties alone (Lee, 1994; Ngwenyama and Lee, 1997). Several empirical studies have found that the actual media choice and use are inconsistent with the information richness theory (Yates and Orlikowski, 1992; Markus, 1994). Lee (1994) highlights that individuals do not passively receive data from others, instead, they actively interpret data to produce meaning that makes sense in their own perspectives. Hence, the richness afforded to a particular type of ICT application is highly dependent on the interaction between the ICT, the individual and the organisational context in which it is applied. Moreover, with the advancements in ICTs, individuals may use a variety of ICT applications such as e-mail, chat room, bulletin boards and discussion group to communicate information, share knowledge and combine efforts across time and space barriers (Carneiro, 2001). With the technological push arising from more contemporary ICTs, such as groupware technologies, video conferencing, expert databases and synchronous collaboration tools, ICTs could not only harness the tacit knowledge exchange but also retain, at least partially,

its richness. ICTs can be used to catalogue employees with critical tacit knowledge and enable communication between those who need the knowledge and those who have the knowledge. Instead of codifying tacit knowledge, firms can make use of the networking capabilities to bring people together in sharing tacit knowledge without having to make it explicit. In this way, they may share tacit knowledge across distance in a virtual community. Through groupware applications and intranets that typically include features such as shared databases, collaborative spaces, advanced communication features, electronic yellow pages, automated knowledge maps and expertise databases, it is becoming easier to locate or connect people who either might offer or provide the relevant or required knowledge.

These earlier studies generally focus on the relevance of ICTs in supporting or facilitating knowledge sharing. However, these studies do not specifically examine the relationship between type of ICT application and mode of knowledge sharing. Since the type of tacit or explicit knowledge needed for effective performance of tasks varies with the task complexity, an understanding of the relationship between type of ICT application and mode of knowledge sharing would provide insight into the appropriate matching of the type of ICT application with the type of knowledge needed to be shared in a particular task setting.

RESEARCH METHOD AND DESIGN

Research instrument and data collection

This study used a structured questionnaire consisting of multiple-item measures to collect the required data for analysis. The items used to measure each variable were adapted from prior studies. The items for measuring knowledge sharing were adapted

from Nonaka et al. (1994), and appropriate changes in wordings were made to suit the context familiar to the accounting professionals. The items for measuring various ICT applications were also adapted from prior studies (Hedelin and Allwood, 2002; Loudon and Loudon, 1997; Ware and Degoey, 1998). The questionnaire was first pre-tested on a few practitioners and accounting academics to ensure that the questions asked were unambiguous and the items for measuring each construct were appropriate for the accounting setting. Responses to the questionnaire were made on a five-point Likert-like scale, ranging from 1 to 5.

The respondents were members of the Malaysian Institute of Accountants (MIA). The criteria used for the selection were: first, they were working in Kuala Lumpur or its vicinity at the time of the mail survey, and second, each respondent must have had been working in his or her current organisation for at least six months to ensure that he or she had a reasonable period to experience or to comprehend the knowledge-sharing practices of his or her organisation. Out of the 1000 copies of the questionnaire mailed, only 120 completed questionnaires were returned for analysis, despite reminders and follow-up calls being made in an attempt to increase response rate. The low response rate of about 12% was expected for mail questionnaire survey in Malaysia. The independent-samples t-tests did not indicate any significant differences between the early respondents and the late respondents.

Definition and measurement of constructs

ICT facilities and perceived effectiveness

Numerous studies have addressed knowledge management processes. Ruggles (1997) identifies the processes in knowledge management as knowledge generation, codification, and transfer. Marquardt (1996),

however, divides knowledge management into four processes; acquisition, creation, transfer and utilisation, and storage. On the other hand, O'Dell (1996) separates knowledge management processes into identify, collect, adapt, organise, apply, share, and create. Among these processes identified, knowledge-sharing-related activities, such as transferring (O'Dell, 1996), disseminating (Wiig, 1993) and distributing (Liebowitz, 2000) are important because firms can only realise the full value of knowledge when it is shared and used. Knowledge sharing is an iterative process whereby individuals within a firm share tacit and explicit knowledge (Nonaka and Takeuchi, 1995). Seven key ICT facilities were identified from prior studies (Hedelin and Allwood, 2002; Loudon and Loudon, 1997; Ware and Degoey, 1998) as proxies of ICT support for knowledge-sharing activities in organisations. The ICT facilities examined in this study were: Intranet, Internet/e-mail, Tele/Video conferencing, best-practice repositories, help desk/directory of expertise and data warehousing/mining. Respondents were first required to rate the extent of accessibility to each ICT facility on a five-point scale, '1 = Rarely' and '5 = Always'. Since unused or under-utilised ICT facilities cannot be an effective support tool, respondents were also required to indicate their perceived usefulness of each ICT facility to support knowledge sharing. The ICT support variable was then computed as a weighted score by multiplying the rating score for ICT accessibility and that for ICT perceived usefulness.

Modes of knowledge sharing

The knowledge-sharing model by Nonaka (1994) provided the basis for measuring the modes of knowledge sharing. This model has been widely used in earlier studies (Becerra-Fernandez and Sabherwal, 2001; Lee and Choi, 2003; Sabherwal and Bacerra-Fernandez, 2003). This study adapted the multiple items validated by Nonaka et al. (1994)

to assess the four modes of knowledge sharing by making changes to wordings to suit the accounting profession setting. All items were rated based on the five-point scale, with '1 = Rarely' and '5 = Always'. The Crobach's Alpha coefficients computed for items measuring the four modes of knowledge sharing were acceptable (Nunnally and Bernstein, 1994) and they ranged from 0.80 (Internalisation mode) to 0.77 (Socialisation mode).

RESULTS AND DISCUSSION

Demographic profile of respondents

The profile of respondents is summarised in Table 1. About 49% of the respondents were male and 51% were female, with slightly more than half of the respondents aged 34 and below. The respondents were generally well educated with approximately 64% of them possessing a Bachelor's Degree and about 20% possessing a Master's Degree. Besides being members of MIA, approximately 42% and 35% of the respondents were also members of UK-based professional bodies and Australia-based professional bodies, respectively. Employees of consulting and public accounting practices constituted about 37% of the total sample and those from the commerce and industry sector constituted about 48% of the total sample. Approximately 49% of the respondents held middle-level managerial positions and about 14% of the respondents were at the senior management level, with job designations such as partner, general manager and executive director.

ICT accessibility, perceived usefulness and support

The mean scores and standard deviations of the accessibility, perceived usefulness and support of the seven ICT facilities are presented in Table 2. The mean scores for ICT accessibility indicate that internet/e-mail

Table 1 Respondents' demographic profile

(a) Gender	No. of respondents	Percentage
Male	58	48.7
Female	61	51.3
Total	*119*	*100.0*
(b) Age		
34 and under	67	56.3
35–44	47	39.5
45 and over	5	4.2
Total	*119*	*100.0*
(c) Academic qualification		
Bachelor	68	63.6
Master's	21	19.6
Others	18	16.8
Total	*107*	*100.0*
(d) Professional qualification		
MIA members with UK-based qualifications	49	41.9
MIA members with Australia-based qualifications	41	35.0
MIA members with other qualifications	27	23.1
Total	*117*	*100.0*
(e) Monthly income		
Less than RM3000[1]	8	7.8
RM3001–RM5000 per month	34	33.0
RM5001–RM10,000 per month	50	48.5
More than RM10,000	11	10.7
Total	*103*	*100.0*
(f) Industry sector		
Commerce and industry	57	47.5
Public accounting and consultancy	44	36.7
Others	19	15.8
Total	*120*	*100.0*
(g) Job position		
Executive and Supervisory	39	35.4
Managerial	54	49.1
Senior management	15	13.6
Others	2	1.8
Total	*110*	*100.0*
(h) Working experience		
2–4 years	9	7.5
5–10 years	59	49.2
More than ten years	52	43.3
Total	*120*	*100.0*

[1]USD = RM3.50.

Table 2 Means (and standard deviations) for ICT accessibility, ICT perceived usefulness and ICT support

ICT facility	ICT accessibility	ICT perceived usefulness	ICT support
Intranet	3.86 (1.42)	3.55 (1.27)	3.71 (1.29)
Internet/e-mail	4.47 (0.96)	4.18 (0.93)	4.34 (0.87)
Tele/video conferencing	2.40 (1.44)	2.64 (1.37)	2.49 (1.29)
Best-practice repositories	3.12 (1.17)	3.13 (1.14)	3.09 (1.06)
Help desk/directory of expertise	3.02 (1.26)	2.97 (1.12)	2.98 (1.10)
Data warehouse/mining	2.85 (1.25)	3.00 (1.17)	2.90 (1.10)
Groupware	3.05 (1.57)	3.01 (1.34)	3.02 (1.40)

Scale for ICT accessibility: 1 = Rarely, 5 = Always.
Scale for ICT perceived usefulness: 1 = Not at all useful, 5 = Very useful.
Scale for ICT support: 1 = Not at all effective, 5 = Very effective.

and intranet were the two most frequently available or accessible ICT facilities. Best-practice repositories, help desk/directory of expertise and groupware were also fairly prevalent among the sample organisations. The ICT facilities that were least common were Tele/Video conferencing and data warehousing/mining. The mean scores for perceived usefulness of these seven types of ICT facilities similarly show that internet/e-mail and intranet were perceived as the two most useful tools for knowledge sharing, while Tele/Video conferencing and help desk/directory of expertise were the least useful for knowledge sharing. Best-practice repositories, data Warehousing/Mining and groupware were perceived as only fairly useful for knowledge sharing. To measure the ICT support, the product of the rating scores for accessibility and perceived usefulness of each ICT facility was computed. Consistent with the rankings for ICT accessibility and ICT perceived usefulness, the mean scores for ICT support indicate that the two most effective ICT support facilities were internet/e-mail and intranet. Best-practice repositories, groupware and help desk/directory of expertise were perceived as only fairly effective, while Tele/Video conferencing was the least effective tool for knowledge sharing.

Firm size is an important factor influencing the corporate knowledge management initiatives. For example, the Big 4 audit firms and their affiliated consulting arms have generally established policies with regard to their knowledge management initiatives. These international firms have invested fairly substantially in knowledge management related information technology to leverage their knowledge-based resources. Their knowledge management systems often consist of some hybrids of databases, bulletin boards and discussion forums. The smaller accounting firms, on the other hand, do not have established policies on knowledge management. Similar phenomenon is observed for non-accounting firms in which the other professional accountants are employed.

Relationship between ICT and mode of knowledge sharing

The correlation matrix of type of ICT support and mode of knowledge sharing is presented in Table 3. The relationships between the overall composite measure of ICT support and the four modes of knowledge sharing were all positively significant, with the strongest association being observed between the overall ICT support

Table 3 Correlation matrix for type of ICT support and mode of knowledge sharing

Type of ICT support	Mode of knowledge sharing								Overall knowledge sharing	
	Socialisation		Externalisation		Combination		Internalisation			
	r	p	r	p	r	p	r	p	r	p
Intranet	0.141	0.139	0.122	0.200	0.215	0.023**	0.194	0.040**	0.222	0.020**
Internet/e-mail	0.262	0.005**	0.250	0.008**	0.102	0.284	0.095	0.319	0.205	0.032**
Tele/video conferencing	0.151	0.115	0.109	0.256	0.213	0.026**	0.146	0.126	0.196	0.042**
Best-practice repositories	317	0.001**	0.304	0.001**	0.343	0.000**	0.324	0.001**	0.385	0.000**
Help desk/directory of expertise	0.080	0.403	0.091	0.340	0.222	0.019**	0.175	0.066*	0.181	0.060*
Data warehousing/mining	0.218	0.023**	0.174	0.072*	0.372	0.000**	0.224	0.019**	0.294	0.002**
Groupware	−0.078	0.421	−0.100	0.299	0.006	0.950	−0.069	0.474	−0.053	0.591
Overall ICT	0.236	0.017**	0.222	0.025**	0.305	0.002**	0.204	0.038**	0.301	0.002**

*Significant at 0.10 level.
**Significant at 0.05 level.

and knowledge sharing through the combination mode (explicit-to-explicit). However, the overall composite measure of knowledge sharing was only positively associated with six out of the seven types of ICT support facilities. The six types of ICT support facilities were: best-practice repositories, data Warehousing/Mining, Intranet, Internet/e-mail, Tele/Video conferencing and help desk/directory of expertise. Groupware was the only type of ICT support facility that was not significantly related to any mode of knowledge sharing.

Further analysis of the correlations reveals that the socialisation mode of knowledge sharing (tacit-to-tacit) was positively associated with best-practice repositories, internet/e-mail and data warehousing/mining. Externalisation mode (tacit to explicit) was significantly associated with best-practice repositories, Internet/e-mail and data Warehousing/Mining. Combination mode (explicit-to-explicit) was significantly associated with all types of ICT support facilities except for Internet/e-mail and groupware.

Internalisation mode (explicit-to-tacit) was significantly associated with best-practice repositories, data Warehousing/Mining, Intranet and help desk/directory of expertise. Only two types of ICT support facilities, namely best-practice repositories and Data Warehousing/Mining, had significant positive associations with all the four modes of knowledge sharing. The types of ICT support that facilitated sharing of tacit knowledge (through socialisation and externalisation modes) between individuals were best-practice repositories, internet/e-mail and data warehousing/mining. The types of ICT support that facilitated sharing of explicit knowledge (through combination and internalisation modes) between individuals were best-practice repositories, data warehousing/mining, intranet, and help desk/directory of expertise. Tele/video conferencing facilitated only explicit-to-explicit knowledge sharing (combination mode) and not explicit-to-tacit (internalisation mode).

Table 4 summarises the regression results of each of the four modes of knowledge

Table 4   Regression results of mode of knowledge sharing on types of ICT support

Type of ICT support	Mode of knowledge sharing								Overall knowledge sharing	
	Socialisation		Externalisation		Combination		Internalisation			
	Std. B	t	Std. B	t	Std. B	t	Std. B	t	Std. B	t
Intranet	0.041	0.36	0.031	0.28	0.124	1.12	0.153	1.34	0.129	1.18
Internet/e-mail	0.179	1.83*	0.179	1.80*	−0.027	−0.28	−0.029	−0.30	0.075	0.79
Tele/video conferencing	0.020	0.20	−0.017	−0.17	0.068	0.68	0.038	0.37	0.046	0.46
Best-practice repositories	0.290	2.48**	0.291	2.46**	0.204	1.77*	0.264	2.21**	0.301	2.63***
Help desk/ directory of expertise	−0.172	−1.46	−0.112	−0.94	−0.063	−0.54	−0.035	−0.29	−0.102	−0.89
Data warehousing/ mining	0.216	1.83*	0.158	1.32	0.337	2.89***	0.158	1.31	0.241	2.08**
Groupware	−0.220	−2.07**	−0.226	−2.10**	−0.232	−2.22**	−0.264	−2.44**	−0.268	−2.57**
R^2	0.198		0.175		0.218		0.042		0.235	
Adj. R^2	0.141		0.117		0.163		0.032		0.181	
F	3.492		3.00		3.947		4.40		4.311	

*Significant at 0.10 levels.
**Significant at 0.05 levels.
***Significant at 0.01 levels.

Table 5   Regression results of mode of knowledge sharing on overall ICT support effectiveness

Type of ICT support	Mode of knowledge sharing								Overall knowledge sharing	
	Socialisation		Externalisation		Combination		Internalisation			
	Std. B	t	Std. B	t	Std. B	t	Std. B	t	Std. B	t
ICT support	0.236	2.43**	.222	2.28**	0.305	3.20***	0.204	2.10**	0.301	3.13***
R^2	0.056		0.049		0.093		0.042		0.091	
Adj. R^2	0.046		0.046		0.084		0.032		0.082	
F	5.883		5.176		10.22		4.40		9.796	

*Significant at 0.10 levels.
**Significant at 0.05 levels.
***Significant at 0.01 levels.

sharing on the seven types of ICT support, while Table 5 presents the regression results of each of the four modes of knowledge sharing on the overall composite measure of ICT support. In general, the regression results are consistent with the coefficients in the correlation matrix presented in Table 3, suggesting that ICT support is crucial for the overall knowledge sharing, as well as for each individual mode of knowledge sharing. Best-practice repositories facility was consistently and positively associated with not only the overall knowledge sharing, but also to each of the four modes of knowledge sharing. internet/e-mail facility, on the other hand, was positively associated with

the overall knowledge sharing and only the two knowledge-sharing modes that relate to sharing of tacit knowledge. Similarly, data warehousing/mining was also positively associated with the overall knowledge sharing, and two of the four modes of knowledge sharing; Data Warehousing/Mining had no significant relationship with tacit-to-explicit knowledge sharing (Externalisation mode) and explicit-to-tacit knowledge sharing (Internalisation mode). Contrary to Loudon and Loudon (1997), groupware facility, which is used quite extensively in organisations for office administration, was found to be negatively associated with not only the overall knowledge sharing but also with each of the four modes of knowledge sharing.

The regression results support the general hypothesis that ICT support promotes knowledge sharing; greater ICT support would lead to greater sharing of knowledge. This study found that ICT support generally facilitated all modes of knowledge sharing. ICTs are critical for codifying explicit knowledge and therefore, it is not surprising to find that ICT support contributed most significantly to knowledge sharing under the combination mode (explicit-to-explicit). Best-practice repositories provide the tools to codify past events, experiences and knowledge, and this type of ICT facility was found to be highly associated with effective sharing of both tacit and explicit knowledge. On the other hand, the sharing of tacit knowledge through socialisation and externalisation modes involves dissemination or sharing of knowledge in a less formal manner, such as through interactions among individuals, and internet/e-mail facility, which enables dissemination of ideas and experiences, was found to correlate significantly with these two modes of knowledge sharing. Data warehousing/mining facility stores historical raw data and was found to mainly facilitate

individual self exploration and learning, as suggested by its significant impact only on tacit-to-tacit knowledge-sharing (socialisation) mode and explicit-to-explicit knowledge-sharing (combination) mode. Other ICT applications, such as intranet, tele-video conferencing, help desk/directory of expertise and groupware are used often to facilitate office administration and hence, have little impact on any mode of knowledge sharing. The results, however, indicate that ICT support only explains a small variance in knowledge sharing. Therefore, initiating knowledge sharing entirely through ICT support can be a risky proposition (Davenport and Prusak, 1998), because ICT support is only one of the important enablers (O'Dell and Grayson, 1998; Ruggles, 1998; Yeh et al., 2006) in knowledge management. ICT only provides the basic physical infrastructure for knowledge management and to promote knowledge management activities; there are other organisational or task-related variables that may play an even more important pivotal role in initiating knowledge creation and sharing (Bolisani and Scarso, 1999; Coakes, 2006).

CONCLUSIONS AND IMPLICATIONS

This paper examines how certain key ICT facilities could effectively support or promote knowledge sharing of explicit and tacit knowledge among professional accountants in Malaysia. This study adopts a process-oriented approach by using Nonaka's (1994) knowledge-sharing model. The results indicate that effective ICT support is critical for promoting knowledge sharing and certain ICT facilities tend to promote certain types of knowledge sharing more effectively. Best-practice repositories are effective in promoting both explicit and tacit knowledge, while internet/e-mail facility is more appropriate

for sharing of tacit knowledge. ICT applications that are used largely to facilitate office administration are generally not effective tools for knowledge sharing.

The preparation and provision of financial accounting information very frequently involve compliance of extremely explicit rules and procedures and ICT support is generally effective in making explicit knowledge readily available in databases for decision-making by using the decision support systems or the expert systems. Through ICT support, firms can quite easily leverage on the knowledge possessed by making such rules and procedures (explicit knowledge) even more explicit and more transferable. In the more complex task settings, however, it is the individual tacit knowledge or expertise rather than the explicit rules that differentiates task success from task failure. Hence, as the level of skills required for task performance advances, the efficacy of the various ICT support in an organisation would vary and a more discriminatory use of ICTs for knowledge sharing would be more cost-effective and efficient.

The findings of this study should be interpreted with caution, in view of the fact that this study only focuses on the effect of ICT support on knowledge sharing among professional accountants in Malaysia. Although professional knowledge is a source of competitive advantage and is of paramount importance to professional accountants in performing their task effectively, the results may or may not be generalisable to other professions or occupations. Nevertheless, the findings of this study may provide a better understanding of the efficacy of the various ICT facilities in promoting explicit and tacit knowledge sharing and hence, could enable the management to appropriately align the 'right' technology to the intended type of knowledge needed to be

created and shared for successful task performance under different task complexity settings.

BIOGRAPHY

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