Development of Knowledge Management Capability in an Institution of Higher Learning in Singapore

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1. Introduction

In the era of the knowledge economy, organizational knowledge that can generate competitive advantage is seen as an important asset. To transform intangible knowledge assets into business value, organizations need to be able to manage the processes of capturing, sharing, applying, and creating knowledge. To acquire and nurture such knowledge management (KM) capability, organizations must possess or invest in the right resources. But what are the right resources? How do these resources contribute to the development of KM capability? This article attempts to address these questions by studying the development of KM in an Institution of Higher Learning (IHL) in Singapore.

In the following sections, the concept of KM capability will be discussed. A typology of important resources in organizations is then presented. To identify the specific resources that can contribute to the development of KM capability, the KM journey of an IHL is described and analyzed.

2. KM Capability and Resources

KM capability refers to an organization’s ability to build, integrate, and exploit knowledge assets to achieve competitive advantage. Four important types of KM capability are knowledge capturing, sharing, application, and creation. Knowledge capturing involves collection, organization, and storage of knowledge for future retrieval. Knowledge sharing is concerned with how to disseminate knowledge among people. Knowledge application is concerned with how to use existing knowledge to create value. Knowledge creation refers to the generation of new knowledge.

To acquire and develop these capabilities, organizations must invest appropriate resources. According to the Resource-based View (RBV), organizations typically own or have access to three types of resources, namely physical resources, organizational resources, and human resources (Barney 1991). Physical resources include the physical technology used, plant and
equipment, and access to raw materials. Organizational resources include formal reporting structure, formal and informal planning, and controlling and coordinating systems. Human resources include training, experience, judgment, intelligence, relationships, and insights of individual workers in an organization. This typology of resources provides a useful framework for understanding the categories of resources that can contribute to the development of KM capability in organizations and will be used as the basis of our analysis.

3. Knowledge Management in an Institution of Higher Learning

Knowledge is seen as a critical asset in the IHL. This is reflected in its organizational vision, which highlights teaching, research, and administrative knowledge as important to the success of the organization. As a large institution comprising various schools and about 30,000 students and 4,000 administrative and academic staff, huge amount of expertise and knowledge relevant to different communities have been generated and reside at both institution-wide and school levels. To retain and improve access to expertise and knowledge in dispersed locations, facilitate collaboration, and leverage knowledge to improve operational efficiency and organizational effectiveness, the IHL decided to introduce KM solutions, including Document Management System (DMS), Web Content Management System (WCMS), and Collaboration Management System (CMS). The Information Technology Hub (ITH), which has been responsible for building the IHL’s IT infrastructure and managing campus-wide IT services, played a leading role in the adoption of KM tools and practices by incorporating them into the IHL’s IT infrastructure and making them available to various schools.

Schools in the IHL include Advanced Research Programme (ARP), School of Business (BIZ), School of Computing (COM), School of Design (DES), School of Science (SCI), and School of Social Sciences (SOS). In addition to the ITH, many schools are supported by their own IT Teams (ITT). This distributed IT governance structure is necessary as different schools have unique needs and generate different types of knowledge assets in different formats. For example, the DES manages large volume of design and drawing images, while the SOS focuses on storing and providing access to documents such as newspapers and journals. In general, each school has significant autonomy in determining how their knowledge assets are managed. They can choose between using services provided by the ITH or developing their own infrastructure and applications to address their schools’ specific needs. As a result of
such autonomy, each school has developed different levels of capabilities in capturing, sharing, applying, and creating knowledge. This created a unique

Figure 1. Chain of Events in the IHL’s KM Capability Development
opportunity for us to study each school as an independent entity in KM development. By analyzing and comparing these entities in terms of the resources they owned or invested to develop KM capability, we identified patterns highlighting specific resources important to the development of KM capability.

The chain of events in the IHL’s KM development is summarized in Figure 1. Driven by the needs to better manage institution-wide knowledge assets, support collaboration among staff, and improve work efficiency, the IHL evaluated several potential solutions and decided to implement KM systems, which included DMS, WCMS, and CMS. DMS can facilitate the efficient and secured capturing and retrieval of official documents such as policies, contracts, and meeting minutes. It can minimize loss or misplacement of documents and enable staff to access required documents conveniently. WCMS aims to provide user-friendly interface for staff to update website content easily and eliminate the webmaster bottleneck. Empowering content owners to develop and update web content directly helps to improve the timeliness
and accuracy of web content and promotes individual accountability. CMS facilitates team-based collaboration by supporting communication and joint development of documents (e.g., proposals) and solutions (e.g., IT applications). Unlike DMS, contents on CMS are frequently modified by different individuals and it is thus important to keep track of changes such as revisions and versions.

Implementation of these KM systems was planned and budgeted for. After gaining support from the senior management, the ITH engaged external consultants and vendors to install the systems. To encourage adoption by schools, the functionalities and benefits of the systems were marketed through newsletters and briefings. Training in the form of online user guides and seminars was also conducted. The ITH played a leading role by using these systems for their own purposes to demonstrate their advantages to other schools. Schools that had adopted the KM systems were also encouraged to share their experience with others. Through these promotions, many schools, especially the larger and more IT-savvy ones, gradually adopted a few or all the KM systems available to support their KM needs. In general, it was observed that use of the systems has improved their work productivity and service quality, while reducing costs and errors.

Other schools that were slower in adopting the KM systems faced more issues with user resistance to the new systems and changes to work processes. Some saw little need for the systems as they believed that paper-based management of knowledge and information and face-to-face sharing sufficed.

The KM journey of the IHL highlighted that to improve its KM capability, the IHL invested in physical resources through installing KM technology and providing non-IT KM support such as user training. Organizational resources such as senior management championship were also present to promote and encourage KM. Realizing that success of these efforts depended largely on users’ willingness to share their knowledge, several schools have also expended effort at strengthening networks of social relationships, which is a form of human resources. For example, some schools organize social gatherings regularly to cultivate relationships and encourage teamwork to engender norms of collaboration and cooperation.

4. **Comparison of Schools’ KM Capability**

To analyze and understand how the resources identified are related to the development of KM capability, the schools were categorized into two groups based on their level of KM
capability (see Table 1). Schools with high KM capability were then compared to schools with low KM capability in terms of the resources they owned or invested. KM capability of each school was assessed based on the extent to which schools are able to carry out KM activities, their experience with KM activities in years, and the type of knowledge captured and shared. In our assessment, schools are considered to be capable in a KM activity only when formal mechanisms supporting the activity exist and the activity is actually carried out. For example, while two schools might have adopted the same KM system that is capable of supporting all four KM activities, the school that uses it only for capturing knowledge is considered to be less KM-capable than the school that uses it for capturing and sharing knowledge.

<table>
<thead>
<tr>
<th>School</th>
<th>System Implemented</th>
<th>No. of Years Implemented</th>
<th>Capability</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td>Knowledge Capture</td>
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<tr>
<td><strong>Schools with High KM Capability</strong></td>
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<td></td>
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</tr>
<tr>
<td>COM</td>
<td>CMS (A)</td>
<td>4</td>
<td>✓</td>
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<tr>
<td></td>
<td>NP (A)</td>
<td>6</td>
<td>✓</td>
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<tr>
<td></td>
<td>WPC (A, R)</td>
<td>1</td>
<td>✓</td>
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<tr>
<td>DES</td>
<td>DMS (A)</td>
<td>4</td>
<td>✓</td>
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<tr>
<td></td>
<td>WCM (A, T)</td>
<td>4</td>
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<tr>
<td></td>
<td>CMS (A)</td>
<td>4</td>
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<tr>
<td>SCI</td>
<td>DMS (A)</td>
<td>4</td>
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<td></td>
<td>WCM (A, T)</td>
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<td></td>
<td>CMS (A)</td>
<td>4</td>
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<tr>
<td></td>
<td>WPC (A, R)</td>
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<td></td>
<td>URS (A)</td>
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<td>✓</td>
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<tr>
<td>SOS</td>
<td>DMS (A)*</td>
<td>4</td>
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<tr>
<td></td>
<td>WCM (A, T)</td>
<td>4</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>CMS (A)</td>
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<tr>
<td></td>
<td>APS (A, T)</td>
<td>3</td>
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<tr>
<td><strong>Schools with Low KM Capability</strong></td>
<td></td>
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</tr>
<tr>
<td>ARP</td>
<td>CMS (A, T)</td>
<td>4</td>
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<tr>
<td>Bi/Z</td>
<td>DMS (A)</td>
<td>4</td>
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* A, T, R denotes that the system was used for administrative, teaching/learning, and research purpose respectively.

Other than the KM systems provided by the ITH, schools also implemented their own systems and applications to address their specific knowledge needs. For example, the COM’s ITT developed the Network Portal (NP) and Web Project Community (WPC) to manage their knowledge assets. NP is a web portal that provides administrative staff and students access to various documents, applications, and work-flow systems on the school’s computer network. It consists of a document repository that houses user guides and tutorials as well as networking and operational documentations. It also features a request tracking system that tracks user requests, work orders, and troubleshoot reports. The system is used by helpdesk
and administrative staff to support their work which involves responding to user queries and resolving technical problems. WPC is a system that supports collaboration among students and staff. It provides utilities such as message forum, task management tool, source code versioning system, and documentation publishing tool to cater to the needs of different projects. In the SCI, WPC and a User Request System (URS) that is similar to COM’s request tracking system are also used. In the SOS, the Academic Planning System (APS) was developed to support student administration and teaching. It allows students to indicate their choice of major, classify courses, and check the courses they have completed against the graduation requirements. The system goes beyond providing basic information by empowering students with knowledge to plan and make decisions regarding their studies.

Overall, it can be observed from Table 1 that COM, DES, SCI, and SOS perform better in terms of KM capability compared to ARP and BIZ. Accordingly, in the following analyses, resource characteristics of the former group are compared to that of the latter group and the patterns that emerged are examined.

5. **Comparison of Schools’ KM-related Resources**

As discussed earlier, three major categories of resources owned by organizations are physical, organizational, and human resources. The specific resources under each category that can contribute to the development of KM capability are described below.

5.1 **Physical Resources**

Two important types of physical resources identified in the IHL’s KM development are investments in KM technology and non-IT KM support.

**KM Technology**

Funding has been an important determinant of whether schools adopt KM systems from the ITH or implement their own systems. As DMS, WCMS, and CMS are provided free of charge by the ITH, ITTs tend to consider these KM systems first whenever the need for new functions arises:

“There was very little cost. They only asked us to install a scanner…and that’s about it.”
Comparing schools with higher KM capability to schools with limited KM capability, it could be observed that the former group implemented more systems with varied functionalities to support different types of KM activities (see Table 1). In addition to the systems provided by the ITH, these schools also developed additional systems to address their specific knowledge needs. For example, the manager of SOC’s ITT explained the need to implement APS:

“We had to develop our own system because functions like course selection and counting of course credit in individual majors were not available in those tools provided by ITH…they are very generic. For example, systems catering to different degree programs cannot be done by the ITH because they don't have the domain knowledge. All these reside within the various schools and the IT teams had to be the ones driving the projects.”

Most managers in schools with high KM capability agreed that technology was essential to the development of KM capability in the IHL:

“It is an enhancer and underlying backbone for knowledge assets. Without technology, we won't have this kind of instant access. It is very important…like an enabler.”

In schools with limited KM capability, use of technology was often restricted by users’ IT efficacy, as highlighted by an ITT Manager:

“The challenge with implementing CMS was getting users who are not IT savvy to use electronic or online applications and tools.”

Overall, observations from the case highlight that KM technology is indispensable in the development of KM capability. Without adequate technological support, organizations’ efficiency and effectiveness in capturing, sharing, applying, and creating knowledge are likely to be hampered.
**Non-IT KM Support**

In the IHL, user training was an important means of facilitating users’ adoption and utilization of the KM systems. All schools that adopted the KM systems provided by the ITH relied mainly on the online user guides freely available to all schools to familiarize their users with the systems. The online user guides were generally effective in training users, as commented by the SCI’s ITT manager:

> “Conducting training courses is not necessary because the tools are quite easy to use. The users just need to go through the online guides then they will be able to use the systems…so far there’s not much problem.”

Compared to schools with limited KM capability, schools with higher KM capability tended to invest more in providing user support. In addition to the online user guides, they also organized workshops and provided helpdesk support to familiarize users with the KM systems adopted from the ITH as well as self-developed systems. Providing such user support can reduce users’ apprehension towards the new systems and encourage less IT-savvy users to participate in KM activities, which will in turn promote the development of KM capability.

Other than user support, incentive is another widely-recognized form of investment that can encourage users’ participation in KM activities (O’Dell and Grayson 1998). Although none of the schools in the IHL offered any formal incentives, there was an institution-wide program that rewards staff for contributing innovative ideas for improving work practices. Every year, awards are given to individuals and schools with best suggestions and this has been effective in promoting knowledge sharing and innovation:

> “It is a good thing…people are trying to come up with new or better ways to do their work and share it with others”

### 5.2 Organizational Resources

Two important types of organizational resources are senior management championship and organizational structure.

**Senior Management Championship**

In schools with high KM capability, managers of administrative and academic staff have been the main KM champions. For example, the SOS’s ITT manager pointed out that:
"I will share with them what are the benefits of the system to encourage them to use it. After they try they will be convinced about the pluses of the system."

In some cases, managers might even mandate the use of certain KM systems:

“Usage of the system for documentation is compulsory for certain groups. They are usually willing to do so…”

It was also important for senior managers to constantly promote KM to ensure continuous user participation and relevance of knowledge captured in the KM systems. For example, a manager in the ITH mentioned:

“I have to keep reminding them of the need to keep things up to date and the benefits.”

In schools with limited KM capability, senior management was generally less active in promoting the use of KM tools and participation in KM activities. For example, in one of the schools, the plan to implement a KM system had to be put on hold despite user requests due to the lack of support from the school’s senior management.

**Organizational Structure**

Other than senior management championship, organizational structure was also highlighted as an important organizational resource that can affect the development of KM capability in the IHL. Two important aspects of organizational structure are centralization and formalization. **Centralization** refers to the locus of decision authority and control within an organizational entity (Caruana et al. 1998). **Formalization** refers to the degree to which decisions and working relationships are governed by formal rules, standard policies, and prescribed procedures (Holsapple and Joshi 2001). Centralization and formalization can impede users’ participation in KM activities by imposing time-consuming communication channels due to over emphasis on authority and formal rules. The decisions and rules that can directly affect the development of KM capability include decisions about adoption of the KM systems, type of knowledge captured, level of access to knowledge stored, and right to reuse knowledge.

In the IHL, schools with higher KM capability were less centralized and formalized. For example, in one of the schools, the ITT was empowered to make decisions regarding KM
adoption and implementation. The implementation of some KM systems also required less formal planning, especially during times when manpower and time were limited:

“Sometimes when the project is urgent and users need the system up fast, we don’t really do detailed plan and cost-benefit analysis for approval. There is no time and manpower to do it.”

In contrast, schools with limited KM capability were more centralized and formalized. For example, although the ITT in one of the schools intended to adopt the KM systems from the ITH, the plan did not materialize due to the lack of permission from the school’s senior management. The KM systems were only adopted when a more IT-savvy senior manager joined the school and after rounds of formal planning and approval.

5.3 Human Resources

In the IHL’s KM development, employees’ expertise and the network of social relationships are the key human KM resources deployed to enhance its KM capability. The latter will be discussed in terms of social capital.

Expertise

Employees’ job-related expertise is the most critical ingredient in KM activities. It is the basic unit in knowledge capture, sharing, and application activities and the building block of new knowledge. In all schools, the development of expertise in administration and teaching was conducted at the institution level to which all schools have equal access. For example, the institution-wide staff intranet includes an online learning portal that provides training on desktop office applications, basic IT skills, and professional development (e.g., business communication). There is also a teaching and learning portal that provides resources on pedagogical concepts and practices.

To develop research expertise, each school held research seminars and conferences to encourage interaction among researchers. However, comparison of research expertise across schools was difficult because different schools focused on diverse research areas that varied greatly from research methods to knowledge content. Other proxies of research expertise such as the number of research publications and patents awarded are subject to the influence of many other factors such as subject, school population, level of funding, and school age and differences cannot be completely attributed to expertise alone. Hence, direct comparison of
research expertise across schools was neither feasible nor reasonable.

Although there was no observable difference in the level of expertise across schools, there was some evidence that expertise is an important component in KM capability development. For example, the SOS’s ITT manager highlighted the importance of IT expertise in facilitating knowledge sharing in application development projects:

“IT expertise is important. For example, we have some project managers who are very experienced and had been appointed as project managers many times. They are able to share their expertise and experience with the team members and kick start the project faster.”

A manager of another school shared a similar view:

“We encourage them [IT personnel] to go to websites to read up and keep up with changes as things change very fast. If they learn something new we may call for a meeting and share what they have learnt with everybody.”

Social Capital

The network of relationships among employees is the main channel through which knowledge is exchanged. The resources embedded within, available through, and derived from such networks have been termed social capital (Nahapiet and Ghoshal 1998) and have been found to be an important enabler of KM development (e.g., Lee and Choi 2003).

Social capital can be construed as having cognitive and relational dimensions. The cognitive dimension refers to shared understanding among employees, which includes shared representations, interpretations, and systems of meaning. Shared understanding serves as the platform for effective interaction and lack of shared understanding can hamper the efficiency of knowledge sharing and eventually other knowledge activities such as knowledge creation, as more time and effort need to be expended on comprehending knowledge content rather than focusing on more value-added knowledge tasks.

The relational dimension includes trust among employees, norms of sharing, openness, and reciprocity, and identification with the organization. These aspects can affect employees’ willingness to share their unique knowledge freely. Without trust and norms of openness, employees are likely to be concerned about the repercussions of expressing their views
openly. When there are little norms of sharing and reciprocity, employees see little need and value to share knowledge with others. Employees that do not identify themselves with the organization are unlikely to be willing to devote effort to participate in KM activities.

In the IHL, there was no observable difference in various dimensions of social capital among schools. Even in schools with limited KM capability, there seems to be a satisfactory level of shared understanding, trust, norms, and identification. Nevertheless, many schools have acknowledged the importance of various aspects of social capital in the development of KM capability. For example, the manager of a newly established school indicated that people seem more willing to share when they have developed trust in each other:

“When our school first got started people didn’t know each other so well. But after some time, we interacted more and got to know each other better and developed some trust. People began to be more willing to share the knowledge they have…I think it takes time to build relationships.”

Lack of trust was the main reason for duplicating a student management system in a school rather than using a similar system that had been developed by another school:

“Our management didn’t trust the system. They felt uncomfortable putting their whole schools’ student data in it. So they engaged their own developers to develop their own system”

In this incident, the lack of trust prevented the reuse and application of a previous solution that might help to save considerable time and cost.

The lack of significant variations in social capital between schools with high KM capability and schools with limited KM capability highlights that social capital may be a necessary but insufficient condition for developing KM capability. To build strong KM capability, organizations need to promote synergy among physical, organizational, and human resources by cultivating or investing in each of them adequately.

6. Conclusion

The case of KM development in the IHL highlights the specific physical, organizational, and human KM resources that are critical to the development of KM capability. To nurture robust KM capability, organizations need to develop or invest in different types of resources in a
balanced way. Armed with superior KM capability, organizations are better able to generate effective ways of improving organizational performance.

References


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