Meeting the challenges of knowledge management at the Housing and Development Board

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Abstract

In recent years, there has been increased emphasis on the importance of knowledge management (KM) in facilitating knowledge sharing, enhancing productivity, and increasing business competitiveness. This paper examines the development of a knowledge portal (called KnowIT) at the Housing and Development Board in Singapore. The issues and insights gained from HDB’s experience are examined. These issues and insights serve as important lessons to firms intending to embark on a KM project.

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1. Introduction

Knowledge, in the form of insights and practical experiences, that we possess is the fundamental resource that allows humans to function intelligently. Over time, considerable knowledge from insights and practical experiences is transformed to other forms such as books, practices, and traditions. These transformations result in accumulated expertise and best practices, which, when used appropriately, increase individual and organizational efficiency and effectiveness.

In general, firms hold substantial documented knowledge or explicit knowledge in the form of patents, technical specifications, and procedures. In addition, information on finance, marketing, production, and service is usually codified and distributed as management information. This makes up the majority of explicit knowledge. On the other hand, tacit knowledge (based on individual experiences and skills) tends to reside within individuals of the organization. Unless shared, this knowledge is lost when the individual leaves the organization.

There are various definitions of knowledge management (KM). In general, KM is the systemic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that others may make use
of it to be more effective and productive [2]. In a similar vein, Tiwana [31] conceptualized KM as the process of managing organizational knowledge for creating business values and sustaining competitive advantage. KM is also the process of making creative, effective, and efficient use of all the knowledge and information available to an organization for the benefit of its customers and thus the organization as a whole. O’Dell et al. [23] emphasized that the focus of KM should be on getting the right information to the right people at the right time, while Holsapple and Singh [15] suggested a knowledge chain model that identifies and characterizes KM activities for competitiveness.

There are several reasons as to why KM is important. First, organizations have come to recognize that acquisition and speedy distribution of information, coupled with business experiences, form the basis of knowledge capital assets with which to build great businesses. Thus, KM leverages each business’ core competencies to provide better, faster, and cheaper products or services.

Second, marketplaces are increasingly competitive and the rate of innovation is increasing; hence, knowledge must evolve and be assimilated at an ever faster rate. Further, competitive pressures reduce the size of the work force that holds valuable business knowledge. These reductions in staffing create a need to replace informal KM with formal methods to mitigate knowledge loss. In a similar vein, early retirements and increasing mobility of the work force lead to loss of organizational knowledge.

Third, there is a need to manage increasing complexity due to increased globalization and technological change. Products and services are becoming increasingly complex and often have a significant information component. KM helps firms deal with increased complexity and represents a key opportunity to leverage knowledge assets for achieving substantial savings, significant improvements in human performance, and competitive advantage.

Research on KM has increased steadily over the past few years. Researchers have debated on whether KM is a new or recycled concept [29]; examined issues, challenges, and benefits [2]; and proposed directions for future research [1,28]. Other researchers examined various aspects of KM, including knowledge barriers [21], strategies for KM [8,11], integrating KM with information services (IS) strategy [16] and business strategy [7], factors influencing KM [13], best practices [24], leveraging knowledge capabilities [3,9,26], and technology support for KM [6,22,31,32].

In addition, businesses that have successfully implemented KM are often described. Examples include IBM [19]; Nortel Networks [20]; Buckham Laboratories [34]; Dell and Hewlett-Packard [11]; Shell, McKinsey, and Company; World Bank; and DaimlerChrysler [33]. In a similar vein, cases on KM by the US Federal Government across a host of agencies have also been investigated. Examples include the US Social Society Administration [27], US Naval Surface Warfare Center [17], and US Department of Navy [4].

Although there is research on KM in both the public and private sectors, there are relatively less cases on KM implementation in Asia. Hence, this paper examines the development and implementation of a knowledge portal at the Housing and Development Board (HDB), a statutory board in Singapore. Data were gathered through interviews with the relevant persons in HDB as well as through in-house materials about the KM project. We examine the impacts of KM and insights gained from HDB’s experience, which would be useful for other organizations that intend to implement a KM system.

Although this paper focuses on the experiences of HDB in KM, it is important to note that the lessons learned are likely to be applicable to both public and private sector organizations. The insights gained from this study are useful to both researchers and practitioners in better understanding the various issues that need to be managed, as well as the potential impact of KM. Such issues suggest avenues for future research in terms of determining appropriate strategies for dealing with them. For practitioners, knowledge of such issues would enable them to better allocate resources and better focus their attention on key factors that affect KM success.

2. Background of HDB

The HDB of Singapore was set up as a statutory board on February 1, 1960. Within 45 years, it has
built more than 800,000 flats, housing 85% of the population. Of the people living in HDB flats, 9 of 10 own their own homes. HDB has 23 branch offices strategically located in each town to take care of lease and tenancy matters for all its residential, commercial, and industrial properties. HDB has about 5200 staff working in 13 different departments. The organization chart of HDB is shown in Fig. 1.

2.1. HDB’s Information Services Department

The ISD provides the information technology (IT) services to the entire HDB operations and business activities. The ISD has a staff strength of about 230 and is headed by the Director (Information Services). It is made up of five sections with 14 units, as shown in Table 1.

The KM portal in HDB’s ISD was spearheaded by the Customer Services Systems Unit, which is one of the units under the section of Business Information Systems (Section 2). We interviewed the Deputy Director of Business Information Systems (Section 2) and her staff on the KM portal implementation.

2.2. KnowIT: a KM portal

HDB staff are constantly encouraged to help to build a learning organization. One of its corporate objective
(to “build a learning organization that inspires creativity and develops staff to give their best”), coupled with HDB’s shared values of “care, learning, innovation, quality, and teamwork,” serve as primary motivations for the KM portal implementation initiative.

This initiative is also in line with the government’s vision to transform Singapore into a vibrant and robust knowledge-based economy. The Director (Information Services) of HDB commented that “every organization needs to create competitive advantage by effectively managing knowledge. Undeniably, knowledge is a key factor in the long-term success of an individual and organization.”

KnowIT was spearheaded by the ISD of HDB in year 2000 to provide the infrastructure to facilitate a knowledge-sharing culture (i.e., a corporate culture that facilitates, supports, and nurtures knowledge sharing) [18]. The portal acts as a one-stop gateway for ISD staff to contribute and retrieve knowledge from its repositories. With a supportive culture for knowledge sharing, HDB looks forward to increased productivity and innovation, better decision making, and improved competitive intelligence. Note that the implementation of KnowIT at ISD serves as a pilot project for subsequent implementation to other departments within HDB. Hence, KnowIT is part of a broader initiative to implement KM throughout HDB.

Prior to the implementation of KnowIT, a study was done on the business needs for such a system in HDB. The findings of the study indicated that there is a need to keep staff abreast of technological developments in the IT industry so that they have a better understanding of the technology. In turn, this will spur them to generate innovative solutions in providing better products and services to HDB’s customers. Further, in the course of their work, staff encountered various issues for which they found solutions. For example, a staff might discover a more efficient way of writing certain computer codes. He/she might share this new knowledge using KnowIT. Previously, these solutions were either not documented or were documented in a medium that was not accessible to most staff. There is a need to centralize these solutions so as to form a body of knowledge that all staff can tap to increase their productivity.

KnowIT provides the infrastructure to facilitate collaboration and knowledge sharing among staff as they are able to pose questions and share experiences. In doing so, KnowIT helps to build a knowledge-sharing community. This community, together with appropriate incentive systems for encouraging knowledge sharing (discussed later), helps facilitate a knowledge-sharing culture. The portal is also designed such that it is easy to post and share knowledge, thereby facilitating knowledge sharing. The homepage of KnowIT is shown in Fig. 2.

HDB’s Director (Information Services) further explains the business goals of KnowIT as follows:

To kick-start knowledge management initiatives within the organization by facilitating knowledge sharing in the department. By providing an infrastructure that facilitates knowledge sharing, we can achieve increased productivity and innovation, better decision making, and improved competitive intelligence for the overall organization.

2.3. Architecture of KnowIT

Based on the business needs and goals, the system architecture (Fig. 3) to support and enable KM in HDB was developed.

2.3.1. The portal

The portal was developed as a one-stop gateway for more than 230 staff within the ISD to acquire and share knowledge. From the portal, staff are able to access the “Bulletin Board” (Fig. 4), where information and news on the latest technology advancement are kept; the “Experience Sharing” column, where staff can read about the solutions other staff came out with when solving technical issues; and the “Virtual Learning Center,” where they can access formal courseware and briefing materials. It is also the gateway to KM services such as the discussion forum, search engine, and subscription. It also has links to other knowledge resources kept by the department such as the ISD Standards Manual, and the Papers and Reports Database. In short, this is the place that staff access when they need information for their work. For example, a staff member might search for knowledge on how to write a program in a particular language such as JAVA.

2.3.2. Contribution

KnowIT provides the facility for staff to contribute articles, experiences, and briefing materials to the
Fig. 2. Homepage of KnowIT.

Fig. 3. The HDB ISD’s knowledge management architecture.
portal (Fig. 5). In order to manage the content within the portal, a group of knowledge domain experts was appointed to filter the contributions relating to their areas of expertise and to repackage some of these contributions for clarity. An editorial team was also constituted to filter contributions of a more general nature not falling within the areas of expertise of the knowledge domain experts. The system provides workflow functionality for the contributions and publishing process. For example, when a staff contributes an article, KnowIT will electronically route the contribution to the knowledge expert who evaluates the article. On approval, KnowIT automatically informs subscribers to this topic/area of this new contribution. Generally, contributions made in specific areas tend to come from “domain experts” as well as other staff.

2.3.3. Subscription facility

A subscription facility is provided to address the concerns about information overload. Staff can specify in the system the areas about which they are interested in receiving information. The system will send an e-mail to notify the staff when there are new postings in the areas they have subscribed to, with links to the articles.

2.3.4. Search facility

In order for the staff to look for information in the knowledge repository, a search facility is provided, which can search across all the knowledge databases in KnowIT. Also, a “Learn a Subject” feature is provided in the system for staff to access all categories of articles (“Bulletin Board,” “Experience Sharing,” “Virtual Learning,” and “Forum”) using the established knowledge taxonomy of KnowIT.

2.3.5. Virtual learning center

To enable staff members to upgrade their skills constantly, a “Virtual Learning Center” for e-learning is provided in the portal, allowing on-demand train-
2.3.6. Discussion forum

The discussion forum is set up as a place where the staff can discuss all kinds of issues. Typically, if a staff member has a technical issue, he/she can make a posting in the discussion forum. The knowledge domain expert scans the forum regularly and provides inputs to the issues. Other knowledgeable staff members can also contribute their views. By using the discussion forum, better solutions can be achieved for technical issues posed.

2.4. KnowIT: technology platform

After the corporate KM architecture had been established, the project team looked into the development of a KM system based on the architecture. The project team had a choice of acquiring a commercial off-the-shelf KM solution or developing one in-house. After deliberating on the pros and cons of each approach, they decided on the latter approach for the following reasons. First, it would be premature to commit to a commercial KM solution at the initial stages of a KM implementation because of the big financial outlay. Second, commercial KM solutions in
the market were still evolving. Third, the implementation of an in-house KM solution was more flexible and could be tailored to the specific needs of the organization.

After studying the options available, Lotus Domino was chosen as the platform on which to build the system because it would be advantageous to leverage an existing technology investment, as Lotus Domino was the infrastructure for communication and collaboration in HDB. Further, the functions that were planned to be developed for KnowIT could be deployed reasonably well using the Lotus Domino platform.

The following are some examples of how the capabilities of the Lotus Domino platform were leveraged:

a. Intranet Portal: As Lotus Domino could deliver content over the web, it was suitable for KnowIT as the latter was positioned as a KM portal.

b. Forum: The project team could take advantage of the Discussion Database template provided by Lotus Domino to provide the Forum for staff to pose questions and raise discussion items. Instead of having to program the Forum function from scratch, the project team made use of the threaded discussion feature that came with the Discussion Database template.

c. Search Engine: Search is a critical component in the KM architecture. The ability to search through multiple databases can ease the retrieval and sharing of knowledge. The team developed a facility in Lotus Notes, which allowed a single search across multiple databases and file attachments.

d. Work Flow: KnowIT leveraged the Lotus Domino e-mail features to facilitate the routing mechanism required for its KM processes, such as forwarding contributions to the relevant knowledge domain expert for evaluation, or notifying subscribers of new articles in categories to which they have subscribed.

3. Insights from Implementing KnowIT

HDB encountered various challenges in implementing KnowIT. These challenges can be divided into (a) people and culture; (b) process; (c) content management; and (d) technology.

3.1. People and culture

3.1.1. Top management support and commitment

Past research has frequently emphasized the importance of top management support and commitment in any development and implementation process (e.g., total quality management [5], statistical process control [12], CASE tools [25], and expert systems [10]).

In HDB, senior management demonstrates their support and commitment to the use of IT in several ways. First, the Director (Information Services) is part of the management team and he reports directly to the Deputy CEO (Estates/Corporate). Such a high status of the Director (Information Services) would pave the way for closer relationships of IS with user departments. Second, senior management allocates appropriate and adequate resources for the development of IT applications. These resources are often necessary to ensure minimal delays and bureaucratic bottlenecks in critical IT projects. Third, the KnowIT project is fully supported by senior management through their recognition of staff involved in the project. Such commitment and support from top management helps to pave the way for implementation of KM at HDB.

3.1.2. Choosing project leader and team

For any project to succeed, an appropriate leader is critical. It is necessary that the leader is able to motivate and consistently encourage staff to participate in the project. The Director (Information Services) appointed a project leader with much experience in corporate databases implementation and management. The project leader understands how data flows and, more importantly, the politics of information as she was responsible for an earlier project on building a data warehouse in HDB.

The team had prior experience in overcoming resistance in the previous data warehouse project. People and culture challenges are harder to resolve than technical challenges. The data warehousing project was a success and details can be found at Teo and Ang [30]. Consequently, this team was ideal for implementing the KM system as this project was
expected to encounter some resistance similar to the data warehouse project.

### 3.1.3. Creating a knowledge-sharing and tolerant culture

Recent advances in communication technologies provide organizations with easier opportunities to acquire, codify, and distribute knowledge more effectively. However, in order to provide the leverage to turn this knowledge to competitive advantage, organizations need to create a cultural environment in which information and knowledge is shared, managed, and used.

HDB realizes that in order for staff to share knowledge, it is important to promote a knowledge-sharing and knowledge-tolerant culture. Hence, a clear message was sent by the Director (Information Services) stating that the aim of knowledge sharing is to emphasize “lessons learned” rather than “mistakes made.” This clear direction from the Director (Information Services) helps to facilitate contributions from staff about their experiences in various projects so that other staff may learn about the various pitfalls to be aware of and to avoid. Staff are encouraged to document actions taken in a project to resolve various problems so that other staff can adapt them to other projects should the need arise.

### 3.1.4. Providing recognition, incentive, and reward

It is important to change the “secret” and “confidential” mindset of staff and promote knowledge sharing. As such, an incentive system has to be put in place to promote a knowledge-sharing environment. The project’s success can be attributed to the Director’s (Information Services) innovative approach to getting end-user support—something that can only be achieved with the right incentive program. The HDB’s Director (Information Services) personally sends “thank you” letters to contributors of the KnowIT portal and, to further encourage knowledge sharing, he instituted an award to recognize top contributors.

During quarterly meetings held by the department, the top two staff who have contributed the most number of relevant “knowledge” (for the two main categories: bulletin board and experience sharing) are given a small token (in the form of monetary vouchers) as well as recognition (in the form of certificates). The Director (Information Services) personally gives out these awards. There is also a yearly award that is given out during the ISD’s annual dinner and dance function. HDB’s Director (Information Services) also presents this award. The top two contributors from the Bulletin Board and Experience Sharing categories are given due recognition in the form of certificates.

Such gestures from the Director (Information Services) demonstrate to the staff that the management takes a serious view of their contribution and appreciates knowledge sharing and learning among their peers. In fact, today, on average, there are about 100 contributions per month, of which 12% are “experience sharing” type of contributions. Further, KnowIT has an average page view hit of 2240 per month, which is relatively high for a staff strength of 230 staff.

### 3.2. Process

#### 3.2.1. Phased implementation

From the outset, the project team recognized that in order to sustain the interest in knowledge sharing, the project development period should be short so that some functions could be provided to the staff early. This would enable staff to realize the usefulness of the system and thereby minimize resistance. The project team adopted a phased approach in implementing KnowIT.

In the first phase, the project team concentrated on the basic functionality needed to facilitate knowledge sharing. The main functions provided at this stage were the knowledge contribution mechanism, bulletin board and experience sharing column, discussion forum, and simple search functionality. A knowledge taxonomy was also established to classify the contributions made to the portal. Such classification and organization of knowledge facilitate easy and fast retrieval of information. In addition, system design, such as taxonomy creation and the knowledge-capturing and publishing process, needs to be kept as flexible as possible to meet the needs of the staff.

In the second phase, more sophisticated KM functionality was introduced. This included the subscription and “Learn a Subject” features. E-learning functionality (or virtual learning), where staff can learn about various topics (e.g., programming lan-
guages and project management) using on-line courseware, was also introduced in this phase. This enables staff members to learn at their own paces and keep up with new developments in their field.

The project team is currently gathering feedback from staff on new KM functionality and enhancements to existing functionality that they desire to have in KnowIT. This feedback will be evaluated and will form the input to the further enhancement of KnowIT.

3.3. Content management

3.3.1. Knowledge domain experts

Good content management is also one of the key implementation strategies to achieve high usage and benefit realization for KM initiatives. Knowledge comes in many forms and needs to be dealt with in different ways according to its type. One useful framework classifies knowledge resources into various types in terms of schematic resources (which depend on the organization for its existence, e.g., purpose, strategy, culture, and infrastructure) and content resources (which exist independent of the organization, e.g., participants’ knowledge and artifacts) [14]. The particular form and nature of knowledge affect the way it is identified, captured, indexed, stored, disseminated, updated, and dealt with when it becomes obsolete.

Knowledge domain experts are nominated by management to assume the role of identifying, evaluating, and repackaging high-value content for publication and distribution. This is done on a part-time basis in addition to their normal duties. These experts filter through the contributions received from staff, and, if required, repackage some of the contributions to generalize the solutions provided by the staff. This helps to ensure that contributions are packaged in a form that is of value to staff, as well as helps to filter out duplicate or erroneous contributions, thereby ensuring that information in KnowIT meets a certain level of quality and usefulness. Good practices were also identified by the experts to be incorporated into the department’s standards and procedures.

There are several incentives for a staff member to be a knowledge domain expert. First, a knowledge domain expert is recognized by other staff as having specialized expertise in a particular area. Second, being a knowledge domain expert would count positively during annual performance review. Third, knowledge domain experts often tend to be active contributors. Hence, they may also be given due recognition in the form of certificates during the annual reward ceremony at the ISD Annual Dinner and Dance event if they are the top contributors for the bulletin board or experience-sharing categories.

3.4. Technology

3.4.1. Technology as enabler

Technology is recognized as an enabler to the KM initiative. As such, the choice of technology is driven by business needs to minimize costs and training required. In the case of HDB, they chose to build their KM system using the Lotus Domino platform as staff were familiar with using Lotus Notes. Consequently, less training is required to use the system. Further, given that the KM system was built in-house, relying on existing infrastructure, the technology investment was only $88,600 (US$48,100). According to the Director (Information Services):

Knowledge Management is not about buying tools. It is about processes in a company. It’s about how information flows and how the knowledge will be used.

4. Impact of KnowIT in HDB’s ISD

HDB’s knowledge-sharing culture has raised productivity levels and created an organization where the capabilities and knowledge of staff create added value for customers. For example, some staff regularly browse through various technical and nontechnical publications and post articles of interest. This helps to disseminate information as well as keep other staff up-to-date on the latest technologies available on the market. Staff are also encouraged to share knowledge about pitfalls to avoid in system development and implementation. In addition, nonwork-related postings such as jokes and recreational topics are also encouraged. By encouraging both work and nonwork-related activities, a conducive environment is created for staff to get to know each other on an informal basis, thereby making the working environment less stressful, more enjoyable, and more productive (due to
Successful implementation of KM in ISD is very much dependent on the promotion of KM awareness within the department and the implementation of a good reward mechanism to encourage contributions from ISD staff. The Director (Information Services) explained that HDB decided to have a pilot project within ISD in order to demonstrate to other departments that the implementation of such a system will benefit staff.

The management and the project team have put in a lot of effort to educate and promote KM awareness in the department. For example, during the annual Intelligent Week Program, each ISD unit shares with the rest of the department insights on a technology they use or know. Besides sharing articles, units may also conduct workshops during lunchtime for staff to share knowledge on a more informal basis. Staff are also encouraged to use KnowIT to share jokes, places to eat, latest technology news, etc. These measures help to encourage knowledge sharing throughout the department. In fact, the system has an impressive participation rate of 70% (up from 10% initially).

The KM system in HDB or KnowIT has several benefits. First, it enables convenient access to knowledge repositories that staff can apply to their own work area. The resource materials found in the knowledge repositories reduce the time needed to source from multiple sources when the need arises. Second, there is also enhancement of productivity through learning from someone else’s experiences as repetition of common mistakes is minimized. Further, expert help is available through on-line discussion forums. These on-line forums help staff to share information and experiences to resolve problems. Third, KnowIT provides the platform for staff to learn “on-demand” as training materials are conveniently accessible from the desktop. Staff can therefore learn at their own pace and at their own convenience, thereby enabling them to keep up with new developments.

5. Conclusion

The KnowIT project is one of the many successful projects undertaken by the ISD at HDB. In fact, HDB is among the earliest statutory boards to develop a KM system. In 1996, HDB won the National IT award for the public sector and the National IT Training Award in recognition for its leadership and innovative use of IT. In January 2002, HDB was one of the 20 organizations selected for the Intelligent20 Award, which gives due recognition for innovative use of technology. In a similar vein, in March 2002, Alex Siow (former CIO of ISD) was named IT Person of the Year by the Singapore Computer Society in recognition of his leadership in the use of IT within HDB and promoting IT certification within the industry. Hence, HDB serves as a role model to both private and public organizations in the successful deployment of IT.

In developing KnowIT, the HDB recognizes the importance of codifying and sharing knowledge in order to enhance productivity and ensuring that knowledge gained from various development projects is not lost. The ISD of HDB is currently refining KnowIT to provide more extensive knowledge repository for its staff. Other departments within HDB are also currently exploring the development of a knowledge portal to serve their needs.

In summary, this paper illustrates the development of KnowIT, a knowledge portal in the public sector. Previous research in Asia has focused more on the private sector. In doing so, the paper also illustrates that many issues in knowledge portal development (e.g., top management support and commitment, encouraging knowledge sharing) emphasized in previous research are also applicable to firms in Singapore.

In general, public sector firms tend to be less market-driven as compared to private firms. Further, as public sector firms are not profit-oriented, they may tend to be less efficient, more cautious, risk-averse, and more bureaucratic. The bureaucratic culture may pose several challenges to encouraging knowledge sharing. The case of HDB illustrates how this issue of culture and mindset is addressed through top management support as well as through recognition, incentive, and reward.

The importance of a phased approach to KM implementation is also emphasized. This phased approach encourages feedback and learning, which facilitate success. In the context of KM, public sector firms usually have large repositories of data that often
make KM implementation a necessity. Hence, IT implementation in public sector firms is often driven by productivity and efficiency considerations, while that for private firms is often driven by competitor push as well as business needs. The appointment of knowledge domain experts illustrates how knowledge may be better managed and shared.

The case also illustrates that technology is an enabler rather than the main driver for KM. People and culture issues tend to be more important and harder to resolve than technology issues. Overall, this paper traces the development of KnowIT as well as insights to be gained from HDB’s experience. Such insights should be useful in helping researchers and practitioners better understand the important issues to be managed during the KM project as well as the potential impact of KM on the organization. Further, by examining successful cases of KM implementation, practitioners can adapt and learn from other firm’s experiences. If similar challenges are illustrated in different cases, it would highlight that these challenges often occur in KM implementation, and firms intending to implement KM should take note of these challenges and the various measures to deal with them.

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