KNOWLEDGE MANAGEMENT FOR THE PUBLIC SECTOR



ASIAN PRODUCTIVITY ORGANIZATION

Report on the APO Research on Knowledge Management for Public-sector Productivity (11-RP-09-GE-RES-B)

Dr. Serafin Talisayon, the Philippines, served as the volume editor.

First published in Japan by Asian Productivity Organization Leaf Square Hongo Building, 2F 1-24-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan www.apo-tokyo.org

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ISBN: 978-92-833-2439-3 eISBN: 978-92-833-2440-9

Designed by Word By Design Creacomm Printed by Hirakawa Kogyosha Co., Ltd., Japan

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FOREWORD

As our society becomes increasingly knowledge based, enterprises and individuals must find ways to organize ideas and information so that they can be shared. The ultimate goal of sharing through knowledge management (KM) is to spark innovations that will allow people to think more creatively and work more productively. KM is supported by continuing advances in communication technologies, but is not limited to the high-tech digital world. As Peter Drucker famously pointed out, "If we apply knowledge to tasks we already know how to do, we call it 'productivity.' If we apply knowledge to tasks that are new and different we call it 'innovation.'" The KM concept is now being applied in new and different areas including community development and the mitigation of global climate change effects, combining both the productivity and innovation concepts.

The APO has promoted KM for more than a decade and in 2010 began to focus on its potential for innovations in the public sector. Five volumes on KM-related topics were published previously, and public-sector KM will continue to be on the APO agenda. This research report focuses on KM for the public sector as an effective tool to improve its productivity. Public-sector organizations everywhere strive to deliver better-quality services with limited budgets that continue to dwindle, and the national productivity organizations in the APO membership in particular are mandated by their governments to undertake initiatives to enhance public-sector productivity.

This publication contains the results of extensive research on and analyses of public-sector organizations in APO members conducted by a team of KM experts from Japan, the Republic of Korea, Malaysia, the Philippines, Singapore, Thailand, and the U.K. The team examined why KM is important in the public sector, and then explained the basic concepts in the context of the APO KM framework. Most importantly, they included five detailed case studies showing how KM is being applied in public-sector organizations in APO member countries to improve their productivity and offer better services and solutions to citizens.

I hope that this publication will help to spread the understanding of the many benefits of KM practices in the public sector. The APO would like to thank all the authors for their contributions in making this volume possible.

Ryuichiro Yamazaki

Secretary-General Tokyo December 2012

ACKNOWLEDGEMENTS

On 29-31 March 2011, a meeting of experts, who are also the authors, took place in Jeju, Korea to discuss and plan the writing of this book. The meeting was hosted by the Korea Productivity Center (KPC), for which, we thank the KPC and acknowledge Jun-ho Kim, Director of the International Cooperation Department of KPC, for continually inspiring the experts by introducing them to the beauty of Jeju Island and the very special hospitality of the Korean people.

As with all knowledge-driven products, this book is the result of physical and virtual collaboration, cooperation, learning and knowledge sharing, and support from many people across various countries.

First, we are grateful to the team of authors designated by the Asian Productivity Organization (APO) who gave us wonderful opportunities to research and write on this highly interesting and important subject.

We appreciate the efforts of Joselito Cruz Bernardo, Acting Director of the APO Research and Planning Department, for promoting knowledge management in Asia, including many previous APO publications in knowledge management, which the authors of this book referred to and made use of. We also wish to thank Masaya Amau of the APO Program Officer, who guided and supported us throughout this project, participated in our meetings and ensured that the book achieved APO's objectives.

Naturally, this book was made possible only with the excellent collaboration of each of the following case study companies, which form the heart of this publication - International Enterprise (IE), Singapore; Bharat Electronics Limited (BEL), India; Korea Customs Service; Taphanhin Crown Prince Hospital, Thailand; Agency for Science, Technology and Research (A*STAR), Singapore; and Malaysian Agricultural Research and Development Institute (MARDI). Many people from these organizations contributed to the writing of this book, several of which are specifically acknowledged in the individual case study chapters within the book.

The authors are especially grateful to Professor Serafin Talisayon, who carefully guided them through the editing process, as Technical Editor and Advisor.

As is the case in successful team collaborations, it was a pleasure to work with all the authors, to be able to learn, and share knowledge and insights together. More details about them can be found in 'About the Authors'.

Finally, we would like to express our deep appreciation to the APO Secretary-General, Ryuichiro Yamazaki, for initiating and supporting this important book project.

We hope this book will inspire the readers, and help them better implement knowledge management in the public sector.

Ron Young

Chief Expert and Team Leader

INTRODUCTION

1. WHY THIS BOOK?

To our knowledge, there has been no book published specifically on knowledge management in the public sector from the Asian region¹. Yet the public sector is very important.

In today's global economic climate, organizations are seeking to become more operationally efficient, and more effective in achieving their objectives through increased productivity, higher quality, and more knowledge-driven work processes and practices. Citizens are demanding the highest possible value for public money and all organizations, especially public-sector organizations, are looking to significantly reduce costs, improve decision making, and find innovative ways to develop and grow.

Furthermore, public-sector agencies involved in health, education, disaster management, and humanitarian services, for example, are looking for innovative ways to harness and apply critical knowledge captured elsewhere.

However, the greatest challenge to public-sector organizations lies in their natural inheritance of a mindset of compliance in administration. Furthermore, organizations must bear the periodic discontinuity of leadership in public-sector term appointments.

Finally, government and all public-sector organizations need to change, adapt and even, in some instances, reinvent themselves and review their governance. This book discusses the transition to 'collaborative organizations' in the public sector.

This book, 'Knowledge Management for the Public Sector' was finalized by a team of leading knowledge management consultants, practitioners, and government experts from Japan, Republic of Korea (ROK), Malaysia, the Philippines, Singapore, Thailand, and the U.K.

It contains case studies from six Asian government organizations, from different public-sector areas:

International Enterprise, Singapore Bharat Electronics Limited, India Korea Customs Service Taphanhin Crown Prince Hospital, Thailand Agency for Science, Technology and Research, Singapore Malaysian Agricultural Research and Development Institute

¹ A book about knowledge management in the public sector in Canada was published: Sinclair N., et al. Stealth KM: Winning Knowledge Management Strategies for the Public Sector. U.S.A.: Taylor and Francis; 2006.

2. OBJECTIVES

The key objectives of this book are to (i) help readers to be more aware that KM is a useful tool that increases public-sector productivity, (ii) introduce the readers to the application of KM tools and techniques through case studies, analyses, and references, and (iii) inspire readers to start KM in the public sector.

3. HIGHLIGHTS OF THE CASES

This publication provides case studies that show practical and exemplary applications of KM in public-sector organizations in the real world. Any case study may be read that is most relevant to pressing issues. Following is a brief summary that highlights KM practices and tools covered in each case.

International Enterprise Singapore: The agency provides advisory services to Singapore-based companies to promote expansion of their international trade. Their KM initiatives focus on tacit knowledge transfer from well-experienced staff to junior staff via various efforts such as storytelling sessions, RACK (Retention of All Critical Knowledge) program, and Knowledge Centre.

Bharat Electronics Limited (India): The organization is an enterprise of the Government of India under its Ministry of Defense. It develops and manufactures a variety of military electronic components. Their KM initiative started with a systematic approach in identifying knowledge gaps, develop a knowledge portal, and utilize self-assessments for collective gauging of the KM process.

Korea Customs Service: The agency has broad responsibilities in imposing custom duties, and managing regulations of imports and exports to contribute to economic development. Its long history in KM initiatives is based on holistic approaches that combine four management techniques: Balanced Score Card, Six Sigma, human resource management, and customer relation management.

Taphanhin Crown Prince Hospital (Thailand): This is a community hospital with about 300 staff in a rural area in Thailand. The hospital faced a challenging situation to maintain its service quality for a number of patients with limited workforce. Hence, the hospital effectively combined knowledge management and quality management by embedding its KM procedures into their daily PDCA (plan, do, check, act) cycle.

Agency for Science, Technology and Research (Singapore): A*STAR is the lead agency fostering world-class scientific research for an innovation-driven Singapore economy under the Ministry of Trade and Industry. Its KM focuses on creating knowledge ecosystems that drive knowledge creation for supporting the national strategy to make Singapore Asia's innovation capital. Malaysian Agricultural Research and Development Institute: MARDI has driven innovative research in agro-based industry under the Ministry of Agriculture. Its KM initiatives combined various KM tools and techniques such as coaching and mentoring, innovative and creative circle, public lectures, and assignment analysis, etc., to meet its organizational goal of increasing agricultural productivity.

4. WHY IS KNOWLEDGE MANAGEMENT IMPORTANT TO THE PUBLIC SECTOR?

Knowledge management (KM) is generally defined as a set of new organizational practices with wide relevance in the knowledge economy. Knowledge management deals with any intentional set of practices and processes designed to optimize the use of knowledge, in other words, to increase allocative efficiency in the area of knowledge production, distribution and use (see KM Basics in Annex A).

Government organizations worldwide are facing challenges as legislative, executive, and judicial bodies continue to evolve into an electronic work environment pushed by paperwork and cost reduction mandates, requirements to handle increased workloads with fewer personnel, and the rapid addition of electronic communication channels for use by taxpayers and citizens. Governments are often at the forefront of needing to adopt new approaches to electronic information management.

Knowledge management tools have increasingly been recognized by most governments in the world as strategic resources within the public sector. Some of the common challenges that affect the public sectors worldwide include enhancing efficiencies across all public agencies, improving accountability, making informed decisions, enhancing collaboration and strategic partnerships with stakeholders, capturing knowledge of an aging workforce as well as improving operational excellence. It is also noted that knowledge management plays an imperative role in providing strategies and techniques to manage e-government content to make knowledge more usable and accessible.

The term 'public sector' refers to the functioning agencies and units at all federal, state, country, municipal, and local levels of government. The sector includes all agencies, government corporations, the military, and departments that perform some form of public service. Some authors argue that there are characteristics that differ between the public and private sectors. For instance, there seems to be varying degrees of executive control among the employees of these two sectors. Other differences include organizing principles, structures, performance metrics, relationship with end users, nature of employees, supply chain, sources of knowledge, ownership, performance expectations, and incentives, among others. In private sector organizations, due to multiple levels of control, efficiency is paramount. While economic efficiency is essential to operations in the private sector, the same may not be true for the public sector. Public-sector organizations focus on enactment of public policies, whereas profit, revenues, and growth are the organizing principles of the private sector². Even before the advent of knowledge economy, citizens were expecting the same level of service and standard from government agencies, similar to the private sector. Making the government 'customer friendly' is one of the many challenges facing public administrators. All too often, citizens complain that they wait too long in lines, get bounced around from office to office, and find government offices closed during the hours most convenient to the public. Improving government services and providing accurate information are the objectives of most governments. They are expected, rightly or wrongly, to be a model of efficiency, innovation and service quality³.

Knowledge management provides the overall strategy to manage the content of e-government by providing knowledge organization tools and techniques, monitoring knowledge contents are updated accordingly, and availing all necessary information to citizens. Among the benefits of knowledge management are enhancement of governments' competence, raising governments' service quality, and promotion of healthy development of e-government.

Decision making is an intrinsic aspect of public-sector activities. Ill-informed decisions can have far reaching consequences. Knowledge is raw material, work in process, and deliverable in any decision. Sound decisions and effective action rely on having the right knowledge in the right place at the right time. 'Right' knowledge may be different for every decision.

Some decisions require only surface knowledge, some require more investigation and evidence-based, some use tacit expertise, and others, creative insight, intuition, and judgment. Knowledge management practices are well placed to improve decision making⁴.

In the past 15 years, a large number of public agencies has embraced knowledge management practices with the quest of creating more innovative systems to connect people to information and knowledge. There are various examples in literature highlighting the successful use of knowledge management policies and solutions at various government levels. A challenge in the adoption of diverse knowledge management initiatives in the public sector is changing organizational culture.

Based on the survey findings by the Organization for Economic Co-operation and Development (OECD) in 2003⁵, the factors motivating the establishment of knowledge management in the public sector are as follows:

² Roste, R. and Miles, I. Difference between public and private sector innovation. Publin Report, No. D21. Oslo. 2005.

³ Nair, P. Knowledge management in the public sector. E-Government in Asia, Times Publishing, Singapore; 2005.

⁴ McKenzie J., Winkelen C., Grewal S., Developing organisational decision-making capability: a knowledge manager guide. Journal of Knowledge Management 2011; vol. 15, no. 3, 403-421.

 $^{^5}$ OECD. Survey on knowledge management practices in ministries/departments/agencies of central government. Paris; 2003.

- Concerns for efficiency and productivity stood out as the main motivators for establishing knowledge management practices as well as to minimize the duplication of efforts between divisions and directorates
- Improving transparency and outward sharing of information as well as improving working relations and trust within organizations
- Promoting life-long learning, making organizations more attractive to job seekers and improving work relations, and sharing knowledge with other ministries

In particular, governments seem to face four critical issues.

First, drive efficiencies across all public services, for instance, by connecting silos of information across different levels of government and across borders.

Second, develop new or consolidating outdated systems to improve overall performance, and capitalize on a broader, more integrated, and more accessible knowledge base.

Third, improve accountability and mitigate risk by making informed decisions and resolving issues faster, supported by access to integrated, transparent information across all organizational boundaries.

Fourth, deliver better and more cost-effective constituent services such as enhancing partnership with, and responsiveness to, the public, thereby clearly demonstrating higher returns on taxpayers' money.

There is nothing new to knowledge management. It is simply using established management tools such as performance management tools, human resources and incentives tools, new information technology, etc., through the perspective of improving knowledge sharing within an organization and with the outside world. Knowledge management requires not just automation of processes, but also cultural change. Experiences in large private-sector firms comparable with large central government organizations show that a good knowledge management strategy systematically encompasses all management tools at the disposal of top management.

5. TOWARD A COLLABORATIVE ORGANIZATION

Today's complex and demanding work environments require collaborative organizations particularly in the public sector (see 5th Generation KM in Annex A). Individuals and isolated groups are no longer effective to solve increasingly complex problems. Collaborative organizations work together to be more efficient and effective, and are characterized by new forms of structures and operations. Organizational structures should be more flexible to cope with problems more creatively. Rigid and simple bureaucratic structures cannot adapt quickly to changing environmental conditions. They are also operated to motivate workers to work together to accomplish demanding tasks.

Beyerlein compared three levels of collaborative work systems: traditional teams, team-based organizations, and collaborative organizations⁶. Although each level aims to increase the organization's capacities to serve its customers, employees, and owners, there are significant differences among these levels. While the purpose of traditional teams is the better use of expertise at all levels of the organization, coordination and responsiveness are the key purposes of team-based organizations. In contrast, collaborative organizations aim at a fluid set of interdependencies existing inside and outside the organization.

A modern network society certainly requires government organizations to collaborate together to serve citizens more effectively⁷. Knowledge management is one of the essential elements in collaborative organizations since collaboration requires effective ways to share information and knowledge from different sources. In this regard, the use of information and communication technologies is particularly important because it provides capabilities to integrate information across organizational boundaries.

Further, the role of public managers should be changed from command and control to facilitation and coordination.

In this regard, the use of information and communication technologies is particularly important because it provides capabilities to integrate information across organizational boundaries.

6. KEY MESSAGES IN THIS BOOK

Peter F. Drucker, guru of management, described our challenges in the 21st century as follows:

"The most important, and indeed the truly unique, contribution of management in the 20th century was the fifty-fold increase in the productivity of the Manual Worker in manufacturing. The most important contribution management needs to make in the 21st century is similarly to increase the productivity of Knowledge Work and the Knowledge Worker."

This also applies to the public sector. Every single public organization today engages itself mostly in knowledge work. As could be seen from the case studies, advanced organizations have already applied KM and are producing appreciable results. This section is a summary and reflection of key messages that could be learned through the case studies so that readers are able to consider the ways on applying the learnings to their organization.

⁶ Beyerlein, M.M., et al. Beyond Teams: Building the Collaborative Organization. San Francisco: Jossey-Bass/Pfeiffer; 2002.

⁷ Pardo, T. A., Ramon Gil-Garcia J., Luna-Reyes L.F., at al. Collaborative governance and cross-boundary information sharing. In O'Leary R., eds. The Future of Public Administration, Public Management, and Public Service Around the World. Washington: Georgetown University Press; 2010, pp. 129-139.

6.1. KM Increases Productivity and Improves Quality of Tasks or Services

The more knowledge-centric a public organization becomes, the larger its direct impact to the productivity and quality of its tasks or services. International Enterprise Singapore improved its service quality by sharing key documents such as mission reports, and market and industry information, and transferring tacit knowledge from overseas business experiences through storytelling from senior to younger staff. This implies they are a knowledge-intensive public-sector organization. They have also successfully retained knowledge of officers who moved to another department, or left, or retired through the method that they called RACK (retention of all critical knowledge) within the organization. These resulted in maintaining and improving the quality of their knowledge-based advisory services delivered to Singapore-based companies to promote international trade.

Bharat Electronics Limited showed almost fourfold increase in knowledge productivity through its first pilot KM initiative. Korea Customs Service became a top ranked service provider in the world by applying KM wisely.

Taphanhin Crown Prince Hospital in Thailand adopted KM in response to pressing needs to improve productivity and to maintain service quality as the average workload of doctors reached 65 patients per day. The hospital has significantly decreased customer complaints and error rates through the KM initiatives that utilized high-touch methods such as communities of practices, after-action review, storytelling, and capturing of lessons learned. They were successfully enabled to acquire and share both codified and tacit knowledge of experienced hospital staff.

These cases illustrate how public organizations can benefit from KM to improve their productivity and work/service quality. Whether the organization advises private companies on international trade, develops defense-related electronics equipment, provides customs services, or delivers healthcare services to local communities, they are all knowledge-centric organizations, where managing knowledge matters to its productivity.

6.2. KM Accelerates Innovation

A*STAR in Singapore was able to drive industrial level innovation in the areas of biomedical technology and engineering. It has functioned as a hub of innovation tied to Singapore's national strategy that drives fusion and creation of knowledge for various cutting-edge research and business entities in these areas. A*STAR's approach was to build knowledge ecosystems in which diverse players are connected and able to collaborate by creating state-of-art research facilities for biomedical sciences, and physical sciences and engineering, called respectively, Biopolis and Fusionopolis,

and provide tailored supports and arranging collaborations among different research institutions residing in the polis.

The Malaysian Agricultural Research and Development Institute has also successfully driven innovation in the development of new crop varieties, technologies in food processing, and so forth, via effective KM tied to its strategic research themes. We can see innovation as creation of new knowledge and/or new combination of existing knowledge. A*STAR and MARDI applied good KM practices to drive innovation based on deep understanding of this principle.

The next question is which to choose - KM for improving productivity, KM for innovation, or a combination of both? This is a crucial question for successfully managing knowledge in public-sector organizations, and to answer it, one needs to go back to the strategy of the organization concerned.

6.3. Tying KM to Organizational Strategy and Critical Issues

The six successful public-sector KM cases took different approaches. The bottom line is that they have designed their own KM initiatives based upon their business drivers and critical issues that needed to be addressed. KM itself should not be the end, but the means to achieve organizational objectives. By returning back to its organizational strategy, one would be able to find urgent critical issues that could be seen as knowledge management challenges.

The more one understands the critical issues of one's organization, the more one can nail down important or less important knowledge. This is also critical as successful KM approaches must identify key knowledge that can make a difference in organizational performance, if it is managed better. Organizations should not try to manage all knowledge such as trying to put all data/documents/content into a "knowledge repository" as the approach is inefficient.

In the Taphanhin Crown Prince Hospital case, the management focused on improving service quality and productivity as each doctor had to diagnose 65 patients per day. This meant that they had urgent need for productivity improvement while maintaining their service level.

Thus, they introduced their unique KM approach focusing on communication among doctors, nurses, and staffs while sharing good practices (and even failures as not to repeat the same mistakes within the organizational) as critical knowledge embedded in their daily work.

A*STAR, on the other hand, focused on driving innovation because this has been its *raison d'etre*. It was built as one of the driving forces of Singapore's national innovation strategy that has strongly committed to Research and Development (R&D) innovation to grow its knowledge capital. As its focus was to accelerate industrial level innovation in biomedical technology and engineering on Singapore's soil, they focused on attracting top-notch R&D players and playing a role of coordinator and facilitator of knowledge collaboration.

Thus, all the six cases had basis to implement their unique KM initiatives as the KM strategies were tied to their organizational mission, vision, goals, and strategies.

Demonstrated results, especially in the early stage are also quite significant as KM initiatives often end up in failure, or lacked visible outcome. In the case of BEL Electronics India, they first launched a pilot to create and demonstrate results so that they can later expand KM initiative organization-wide.

As witnessed in Korea Customs Service and Malaysian Agricultural Research and Development Institute cases, they took phased approaches to ensure visible results at each phase are convincing before proceeding to the next level.

6.4. Embedding KM into Work Processes

Mindset or behavioral change of staff is one of the most critical challenges at public organizations to accomplish effective KM. If KM is viewed as additional work, it becomes difficult to get adequate buy-in from staffs because KM results are eventually achieved only through their participation. One of the key success factors is that the six successful public organizations were able to embed KM into their work processes, enabling staff members to create, store, share, and apply knowledge on a daily basis. For instance, at Korea Customs Service, the KM systems and processes such as EDI Customs Automation System, One-Stop Customs Service, KCS integrated Information System, and KM Portal System are installed into staff's daily work.

At A*STAR, facilitating knowledge collaboration among residential research institutions is the nature of work (they don't call it "knowledge management"). This seamless design of KM embedded into work processes encourages staff's natural participation, and it is the key because successful KM requires involvement of all staff.

7. KEY CHALLENGES IN PUBLIC-SECTOR KM

No matter what type of organization one belongs to, successful KM, by necessity, requires behavioral and mindset change of staff. Rome wasn't built in a day; KM takes time in implementing proper procedures. Many KM practitioners, both in private and public sectors, have shared that their KM journeys were largely about managing the process of behavioral and mindset change of their staff.

The authors' observation on both successful and unsuccessful cases back their view. Too often, KM initiatives go wrong because the importance of behavioral and mindset change is undervalued. For instance, if staff in an organization have the tendency to think that 'knowledge is power', and they lose their advantage

by sharing their knowledge with others, it becomes unnecessary for them to do so. Whatever sophisticated knowledge repository is built will simply become an empty box. Even if knowledge sharing is made mandatory, the most likely scenario that unfolds is staff pretending to share knowledge, or they rarely share what they think is their more significant or valuable knowledge.

The staff is not wrong; they are just behaving intelligently and rationally. The success of a KM journey depends on whether staff are convinced, demonstrated, and encouraged in adapting this new expected behavior (sharing knowledge, collaborating beyond organizational silos, etc.), which benefit both themselves and the organization.

In this book, six KM cases have been selected and researched as representing the Asian public organizations: International Enterprise Singapore, Bharat Electronics Limited (India), Korea Customs Services, Taphanhin Crown Prince Hospital (Thailand), the Agency for Science and Technology (Singapore), and the Malaysian Agricultural Research and Development Institute.

The key issues highlighted in these KM cases, more or less, also correspond to the desired behavioral and mindset changes. Based on our observations, we have categorized them into the following four key challenges (see Table I.1).

7.1. Creating a Collaborative Culture

Public organizations are usually vertically divided inter and intra-agency or department functions. This usually leads to a silo mentality (i.e., invisible mental or organizational walls) in each agency, department, or section with little communication with external players. One of the key scopes of most KM initiatives in public-sector institutions includes knowledge sharing and creation across and beyond silos. Breaking these silos often becomes one of the key challenges of KM in the public sector.

	CREATING COLLABORATIVE CULTURE	ACCELERATING INNOVATION	IMPROVING SERVICE QUALITY AND SERVICE- ORIENTED MINDSET	OVERCOMING BUREAUCRACY
IE SINGAPORE	x		x	
BEL	x		x	x
KOREA CUSTOMS SERVICE		x	x	x
TAPHANHIN CROWN PRINCE HOSPITAL	x		x	
A*STAR	x	x	x	
MARDI	x	x		

Table I.1. Key Challenges across the Case Studies

As illustrated in Table I.1, all the cases in this book dealt with similar challenges, and will provide some practical hints to overcome these difficulties, especially on ways to convince, demonstrate, or encourage managers and staff to share their knowledge beyond silos. It begins with providing a collaborative and learning environment, where employees could share and learn from one another (see Section 5).

7.2. Accelerating Innovation

One of the key challenges in KM for the private sector is accelerating innovation through knowledge creation. In the public sector, doing the same administrative work without any mistakes is often encouraged. Little competition requires little service innovation. There are many reasons for not pursuing innovation in the public sector. However, as widely discussed, the situation has changed; in the public sector, innovation has become a central focus. In an innovation-driven competitive environment, the cost of ignoring a good idea is too steep.

Thus, the lack of innovative mindset is the enemy of KM because the goals of knowledge sharing and creation are usually tied to innovation, or at least, to the improvement of service or process quality. Unless staff members fully understand the need for innovation and improvement, they will not spend their time for knowledge sharing and creation.

The authors hope that the case studies will provide guidance on ways to deal with these challenges. For instance, the Taphanhin Crown Prince Hospital case highlights the ways staff members mutually exchange their knowledge for better service quality and productivity. On the other hand, the A*STAR illustrates how they facilitate collaboration among customers in dynamic ways to drive business and technology innovation.

7.3. Improving Service Quality and Service-oriented Mindset

Private companies focus on particular customer segments, based upon their market strategy, to provide quality services demanded by customers. Public-sector organizations do not have such luxury and must serve all citizens equally. It is often said that this tendency, along with little competition, has resulted in public institutions lacking service-oriented mindset, which is another facet for successful KM. It hinders staff from learning about customers that are crucial for effective management.

Today, governments at all levels face various pressures to reduce spending, and maintain, or increase the level of services provided to citizens. A service-oriented KM approach is one potential way to address these challenges.

This book contains cases that describe how good KM initiatives can overcome these difficulties and build a service-oriented organization, such as the International Enterprise (IE) Singapore whose, KM initiative has enabled it to better serve its clients, namely, Singapore private companies that seek overseas business opportunities.

7.4. Overcoming Bureaucracy

The three challenges previously highlighted have discussed staff mindset and behavioral aspects. However, the bigger obstacles that KM often face in the public sector are rigid, inflexible organizational structures, work processes, procedure, rules, and systems that are usually the hotbed of bureaucracy.

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Too narrowly defined job descriptions often rule out knowledge sharing as it is not written in their role and responsibilities. Too fine-tuned work processes do not give any space or time to share knowledge with external stakeholders. Hierarchical structures may require formal permission from supervisors to exchange knowledge with staff in other departments. Bureaucracy inheres in public-sector organizations, where standardized routines, operating tasks, detailed rules, and hierarchical management systems have prevailed. The way to deal with these rigid systems to make KM work is the central issue in the context of public-sector KM. There is no one-size-fits-all solution, but we hope the case studies, especially Bharat Electronics Limited (India) and Korea Customs Service illustrate some ways to overcome these challenges.

CHAPTER 1 INTERNATIONAL ENTERPRISE SINGAPORE⁸ PRABA NAIR

ORGANIZATIONAL PROFILE				
Organization	International Enterprise (IE) Singapore			
Headquarters	Singapore			
Mission	Promote the overseas growth of Singapore-based enterprises and international trade			
Vision	Singapore to be a thriving business hub with globally competitive enterprises and leading international traders			
Number of Staff	500			

1. OVERVIEW

International Enterprise (IE) Singapore is the government agency driving Singapore's external economy. It spearheads the overseas growth of Singapore-based companies and promotes international trade.

With its global network in over 35 locations spanning many emerging markets, the agency connects businesses with relevant Singapore-based companies for their business expansion by:

- Helping to identify and cultivate relationships with the best Singapore-based partners
- Facilitating introductions to Singapore-based companies through business matching, industry and market-specific missions, and networking events
- Keeping companies abreast of the latest products and solutions to grow their business

IE Singapore also promotes Singapore as a base for foreign businesses to expand into Asia in partnership with Singapore-based companies. Singapore's unique advantages of strategic location, stable government, competitive workforce, and pro-business environment make it an ideal launchpad to the region.

⁸ The author wishes to thank Shaharudin Mohd Ishak, Senior Manager, Knowledge Management Division, Information Management Group International Enterprise Singapore, for his invaluable assistance and support.

2. HELPING COMPANIES INTERNATIONALIZE

Heightened global competition and opportunities drive IE Singapore to focus on helping Singapore's larger companies compete in the global arena as well as providing assistance to smaller firms to expand quickly and eventually be able to compete globally.



Figure 1.1: Reception at IE Singapore

To assist larger companies in their internationalization, IE Singapore sought to form closer partnerships with them. Doing so allowed the trade agency to get more involved in their internationalization plans while offering deep market knowledge, which benefitted companies in formulating their strategies to grow into global competitive companies.

For smaller firms, in addition to providing market access, IE Singapore offers a range of services and initiatives, which will help companies in brand building, intellectual property protection, mergers and acquisitions, and the creation of a coherent Internet and new media. To help companies understand new markets more quickly, the agency also provides expert knowledge to highlight the market opportunities and attractiveness, the existence of other players in the market, and the relevant government agencies for company set-up.

To achieve its strategy, IE Singapore undertook a fundamental review of its organizational structure and the capabilities needed, particularly in understanding customer needs and challenges during the process of internationalizing. Officers needed to do things differently. The agency's structure was reorganized with growing market specialization in mind, enabling staff to develop deeper knowledge of the markets that their customers are going to operate in, and provide more value-added assistance in their internationalization plans.

With the need to be a market expert, there is an increased awareness of the importance of knowledge management, specifically in the area of market knowledge. The Knowledge Management Division (KMD) was tasked to address IE Singapore's knowledge needs and oversee the management of IE Singapore's knowledge assets. The following are three initiatives that KMD has carried out to support IE's strategy.

3. KNOWLEDGE CENTERS

The knowledge possessed by IE Singapore staff is an important tool in assisting the effective internationalization of Singapore-based companies. To encourage expertise building and knowledge sharing, IE Singapore has developed an in-house intranet, IEX (Integrated Employee Exchange) in 2003 with a dedicated portal (Knowledge Center) to capture market and industry intelligence. The Knowledge Center is an information warehouse that provides access to information about missions, study trips and strategy papers. It taps into the wealth and depth of knowledge that have been built over the years. Through staff contribution, key knowledge documents on various markets, industries, and capabilities have been created and captured in the portal. Many of these documents contain in-depth ground level insights into international business environments. It also documents and integrates officers learning in a central knowledge database that is readily accessible across the organization.

Mission and study trips were organized to gain a better understanding of the market, and build market and industry knowledge. This resulted in the generation of key reports such as mission reports, study trip reports, and, market and industry information reports, trade, and economic briefs.

Market reports and staff learning in dealing with markets (such as business, political situation, and culture) were captured in the Knowledge Center. These were made available to all employees across the organization. In the past, each department kept their documents within their own library. However, with the implementation of the Knowledge Center, it encouraged collaboration and sharing between the departments.

As Dennis Tan of the Organizational Excellence Unit has shared, it is "a good source of additional information for me to have a sense of the work done by various divisions in the organization. It helps me in being a better business partner to various divisions. I would also think for a new hire or transfer, it is a great way to get up to speed on the sector or industry."

KNOWLEDGE MANAGEMENT FOR PUBLIC SECTOR



Figure 1.2: Screenshot of Knowledge Center

4. STORYTELLING

Programs were also developed to capture employees' overseas experiential knowledge to help those who are going to be posted abroad. This was also useful in helping their colleagues working in the Singapore headquarters to understand the nature of work in the country they are posted. One of the initiatives implemented by KMD is storytelling. In the past, most of the reports generated by overseas offices were market and industry reports. However, it was lacking in some of the nuances of working in and dealing with these overseas markets. These included understanding the living conditions of the countries, business challenges, and etiquette as well as survival skills in these countries. There was a growing recognition of the need to capture and share some of this tacit knowledge to the new and younger officers who will be posted in these countries. When employees returned to Singapore for meetings, they do sometimes share their knowledge and experiences with their counterparts. However, they are generally informal and on an ad hoc basis. Recognizing the importance of such tacit knowledge, KMD implemented storytelling in 2010 as a way to capture and codify these experiences overseas when they return to Singapore. To date, KMD has documented more than twenty stories.

To promote greater knowledge sharing, tea sessions called the Passport Series, provided staff with the opportunity to listen firsthand to the Regional or Center Directors' experiences, and accelerate knowledge acquisition in an informal

setting. Feedback was very positive, and these sessions are now organized on a quarterly basis. One of those who benefitted from these sharing sessions is Ong Leyu of the Trade Services and Policy Group. She finds that it is an "interesting feature that allows me to get an intimate perspective of what it is like to work in an overseas center."

One of the biggest challenges in storytelling is acquiring the story itself. The overseas staff have extremely tight schedules when they return to Singapore, and are very hard to get hold of. To overcome this, KMD assists in codifying the officers' stories by recording and transcribing their experiences into a story. Not only does this relieve them of having to actually craft the stories, it also ensures consistency in the manner those stories are told. It was a success.

5. THE RACK

A knowledge audit, conducted in 2010, revealed that IE Singapore needed to focus more on its valuable tacit knowledge, which was lost due to staff rotation, secondment to other government bodies, and natural attrition. Not capturing the knowledge and experience greatly affected the supervisors of these officers. This led to the birth of the RACK (Retention of All Critical Knowledge).

The objectives of RACK were three-fold:

- Minimize knowledge loss when a staff transfers to another department or leaves the organization
- Share captured knowledge with other employees
- Shorten employees' learning curve

The RACK is a tool designed to help supervisors retain knowledge within their team even after their officers with critical expertise have moved to another division, or left the organization. Captured knowledge is shared with other employees, thereby shortening their learning curves and minimizing knowledge loss. To garner support and buy-in from supervisors, KMD started the RACK as a pilot and approached the supervisors, whose employees were rotating, or leaving the organization.

Ivan Tan of the Trade Promotion Group has this to say of RACK:

"It is good for capturing certain tacit knowledge, like some tips and pointers to help officers 'survive' the first few months in the department. It is not, and can never be, a perfect replacement for experience but at least, it will definitely help a new staff avoid certain mistakes in the first few months of the job."

One of the challenges in formulating the RACK initiative is that there is no standard methodology and approach practiced in the industry. KMD studied

various industry practices and designed a simple process to kick-start the program. The methodology involved identifying the participant, scoping the critical topics to be discussed, interviewing the officers, transcribing the shared session into a readable article, and sharing it with the team and the organization. The RACK experience is stored in the Knowledge Center and is made available to all staff. One of the future plans of KMD is to harvest the codified experiential knowledge and develop good practices that can be adopted by officers throughout the organization.

6. KEY LESSONS LEARNED

One of the key lessons is the importance of leadership support and buy-in. IE Singapore was fortunate that it's CEO, Teo Eng Cheong, was very supportive, and recognized the importance of KM in supporting and accelerating continuous learning within the organization, preserving the organization's memory, and building employees' capabilities to help companies internationalize. Teo says that, "KM is important to every organization, especially one which is as knowledge-intensive as IE. IE's core competence lies in its market knowledge, insights and network. KM is a system to capture and consolidate individual knowledge into one system for sharing within the appropriate departments and for easy access. Furthermore, such knowledge will change over time. The KM must allow and encourage dynamic updating of knowledge so that it is always relevant. Only when knowledge is shared, updated and transformed into insights will it be useful. When this happens, each IE employee will be empowered with keen market expertise and be able to add greater value to our internationalizing customers."

He added, "The challenge of KM is (a) reluctance to share because of selfish reasons; (b) inertia to share because the system does not encourage sharing; (c) difficulties in retrieving and analyzing data because the system is not well-designed. Hence, policies, system design, and support from top leadership in the organization are keys to having a successful KM system."

Another lesson is the importance of understanding the business knowledge of IE Singapore. Knowing the knowledge required to perform key business activities allows KMD to understand and focus on the key areas of knowledge to be captured. This ensures that only useful business knowledge is captured and allows employees to acquire the right knowledge to help companies internationalize.

Apart from understanding the business knowledge, one area that should not be ignored is engagement with employees. Knowing and understanding what employees need will allow KMD to formulate an effective plan or initiative that will be well-received by staff.

When it comes to implementation, in cases where KMD is not sure of the outcome, or how employees would react, it is a good practice to start

small by doing a pilot on the initiative. By getting `KM-oriented' departments to be involved in the pilot, it allows KMD to run the initiative and assess the outcome. If the outcome is successful, KMD will produce a case study and use it as an example to others on how the initiative benefits the previous group.

7. NEXT STEPS

Knowing the importance of retaining tacit knowledge, KMD is currently working on a plan to extend the RACK initiative to capture the experiential knowledge of employees, who are account managers for companies, as well as employees who are currently working overseas. Apart from the case study and after-action review papers contributed by these officers, they will also share their market and sector knowledge, including the general challenges faced through the RACK. The captured knowledge will be fed back into IE's competency framework to groom and grow their employees into market experts.

Apart from that, to prepare employees for their overseas postings, KMD plans to capture the stories and experiences of officers who had gone for their short or long-term overseas attachment. The captured knowledge relating to the social and working aspects of that country will be shared with employees prior to their postings.

The captured knowledge, stored in a central repository, is easily accessible. Hence, two areas will be enhanced – the information architecture of the intranet and its usability. The KMD will also be looking into how it can 'connect knowledge' to allow officers to obtain relevant knowledge without having to go through the hassle of searching for information that is scattered in the intranet.

CHAPTER 2 BHARAT ELECTRONICS LIMITED, INDIA⁹ RON YOUNG

ORGAN	IZATIONAL PROFILE
Headquarters	Bengaluru, India
Organization	Bharat Electronics Limited India (government-owned)
Vision	To be the market leader in providing world-class solution for radar systems and allied products
Product lines	Advanced electronic products, mainly for the Indian military sector and leading international traders
Number of Employees	11,961 (March 2009)
Revenue	USD1.19 billion (2011)
Year Established	1954

1. OVERVIEW

BEL is an enterprise by the Government of India, under the Ministry of Defence. The registered office is located at Outer Ring Road, Nagavara, Bangalore-560045. BEL is a premier, professional electronics company in the country, engaged in the design, development and manufacture of a variety of communications equipment, radar equipment, systems, and electronic components. The customer profile is broad, which includes the army, navy, air force, paramilitary forces, police, BSNL and MTNL, the oil sector, port trusts, All India Radio, public-service broadcaster (Doordarshan), VSNL, ISRO, DSIR, DRDO, various institutions, laboratories, and industries ¹⁰.

Bharat Electronics comprises of nine units at different locations, viz. Bangalore, Ghaziabad, Pune, Machlipatnam, Panchakula, Taloja, Kotdwar, Chennai and Hyderabad. The Ghaziabad Unit of Bharat Electronics is one of the most modern factories situated in Site IV, Sahibabad Industrial Area, Bharat Nagar Post, Ghaziabad.

⁹ The author wishes to acknowledge the generous assistance and cooperation from the Lead, Tapash Bose, Deputy General Manager (HRD); the KM Core Team consisting of Mukesh, R. N. Pandey, Rajesh, Anita Srivastava and Aabha S. Mathur; and the KM Pilot Team of NCS Testing. He also acknowledges the great support from the team from NPC India led by G. S. Krishnan, Director (IT & KM), NPC India, and consisting of Nikhil Panchbhai, Deputy Director (IT&KM) and Usha Singh, Junior Field Officer (IT&KM).

¹⁰ Videsh Sanchar Nigam Limited (VSNL), Mahanagar Telephone Nigam Limited (MTNL), and Bharat Sanchar Nigam Limited (BSNL) are major telecommunications companies in India. The Indian Space Research Organization (ISRO), Department of Scientific and Industrial Research (DSIR), and Defence Research and Development Organization (DRDO) are some of the client government agencies of BEL.

The vision, mission, and core values of Bharat Electronics Ghaziabad are as follows:

Vision

To be the market leader in providing world class solution for radar systems and allied products

Mission

- To be a customer-focused company meeting present and futuristic requirements
- To strive for state-of-the-art technology and excellence in quality of products and services
- To promote R&D in the field of radar and command-and-control systems
- To provide conducive environment for the development of skills and creativity of human resources
- To be environment-friendly and socially responsible company

Core Values

- Customer focus
- Integrity
- Fairness and transparency
- Mutual respect and trust
- Participative culture

2. GHAZIABAD BUSINESS UNIT - SITE OF THE KNOWLEDGE MANAGEMENT CASE STUDY

The Ghaziabad unit is primarily engaged in design, development, manufacture of radars and allied products, Network Centric Systems, (NCS) and execution of turn-key projects for defense as well as non-defense sectors. It has two major manufacturing Strategic Business Units (SBU), namely, the Radar SBU and the Networking Centric System, or NCS SBU with support divisions. The knowledge management project focused on the Networking Centric Systems SBU covers satellite earth station communication systems, digital encryption equipment, VHF communications systems, digital microwave equipment, and command-and-control systems.

2.1. KM Demonstration Project - Mission, Objectives and Challenges

Mission

The mission of an APO Productivity Demonstration Company is to convey success stories on the development and implementation of productivity improvements and initiatives undertaken by all stakeholders. An APO Productivity

Demonstration Company should epitomize an enterprise-wide productivity movement that achieves business expansion, increases profits and customer satisfaction, reduces waste, enables energy savings, which leads to better knowledge sharing, and the creation of a learning culture mutually beneficial to management and workers.

Objectives

BEL was selected as the APO Productivity Demonstration Company, and was expected to work together with the APO and NPC India to do the following:

- Showcase how a company can successfully design and implement KM practices with the commitment and active participation of all stakeholders
- Demonstrate in a tangible manner how the implementation of the APO KM approach can lead to outstanding results
- Illustrate the benefits of KM implementation in promoting knowledge sharing and learning throughout the organization, and in boosting employee motivation and morale
- Serve as a model to inspire other enterprises, workers, and stakeholders to promote KM in their workplaces
- Provide an opportunity for the NPC India to involve all its trainers and consultants in KM, and expose them to KM training and implementation through the demonstration project, with the final objective of developing the capacity of the NPC India in the field of knowledge management

2.2. What were the Key Challenges?

A KM Team was formed between the APO, NPC, and BEL. The first task was to identify possible obstacles to the success of the KM Demonstration Project. They were identified by the KM Team as follows:

- Mindset [people's attitudes to knowledge management. Was it perceived as 'yet another initiative', 'extra to my work', or 'a quite important part of work', or discerned as the ideal, 'KM is my work']
- Seen as extra work
- Time consuming
- People are unaware of KM
- Willingness to share?
- What's in it for me?'
- Resistance to change

- Technology availability, awareness, skills
- Environment [was the work environment conducive to effective knowledge sharing?]
- January-March 2009, a busy period (unavailability of people)
- Unless knowledge is captured, it will be lost
- Senior management support
- Within the BEL Quality and Assurance Department (Q&A), the key challenge identified in Quality Circles was articulated as 'What is the global impact of our projects?'

Knowledge Gaps

The KM Team discussed knowledge gaps that were identified:

- There are knowledge gaps between operators and their knowledge of the technologies, thereby they required more training on the full capabilities of the tools and technologies that were used
- No Internet facility
- Competitive automatic testing software contains more embedded and updated knowledge in their software than BEL, which is semi-automatic
- The knowledge challenge for Integrated Air Command and Control systems is that it needs to be 99% software and 1% hardware
- Knowledge was needed in software flow. BEL recognized that their tools were not as automatic and advanced as they can be by inserting and automating the knowledge into software.
- The systematic flow of knowledge was not present
- Most manufacturers have working online systems, but this is not available to NCS
- Documented solutions provided to Q&A are contained in a database, but not actively reused for future problem solving
- Tacit knowledge was present, unlike explicit knowledge. Much more systematic effort is required to turn the vital tacit knowledge (confined in the minds of operators) into readable and knowledgeable instructions for others
- Some tacit and explicit knowledge is there, but staff is unaware on ways to integrate these knowledge
- A suggestion scheme exists within BEL

Information Systems and Technology

The KM Team assessed their information systems and came up with the following list:

- The IT currently supports and enables centralized `one-way' communication through databases, and an intranet and KM will require more frequent `two-way' participatory communication
- The Internet and World Wide Web resources are only available to the senior deputy general manager and all managers
- There are 1,300 desktop computers across 2,400 employees
- The mail system used is GroupWise by Novell
- Satellite conferencing is available in, and across, all nine units of BEL
- No collaborative platforms, work spaces, or discussion forums are operating currently
- Due to the high security nature of the BEL business, few mobile communications devices are available, especially laptop computers, usage of mobile telephones, cameras, webcams, etc.
- Web 2.0 collaborative tools for knowledge workers, such as web alerts, blogs and wikis are prohibited from use
- A BEL company-wide SAP implementation is underway, which will significantly improve organizational effectiveness across the businesses.
 SAP can contribute to BEL Corporate KM through the 'Dashboard'
- The HR internal website is beginning to implement some KM initiatives:
 - i. Documents from trainings 'what was learnt' and ways to improve work
 - ii. Book review sessions
 - iii. Work/life grooming (for e.g.: public speaking, planning, finance)
 - iv. 'What's latest'
 - v. Funtoos (sharing creative and inspirational items and videos)

3. SPECIFIC STEPS IN THE PROGRAM

A one-year Knowledge Management Demonstration Project was implemented in October 2008. There were three distinct stages:

Planning

The planning stage consisted of diagnosing KM implementation-related issues and challenges faced by the company, and setting the overall direction and specific goals to be achieved. It included identifying key knowledge gaps and performance areas, measurement instruments, and data to be collected to monitor and evaluate progress. The planning phase was completed by mid-December 2008.

Implementation

The implementation stage involved execution of the KM implementation plans in BEL. It referred to practical, action-oriented, on-site activities, with the involvement of international experts, counterparts from the NPC, KM teams, and other stakeholders from BEL. The implementation process was completed by the end of June and August 2009.

Dissemination

The dissemination stage evaluated the improvement efforts and initiatives implemented, and extracted the main lessons learnt to provide a practical guide, and encourage other enterprises to emulate them in the future. Among the main activities expected during that stage were the finalization and production of a practical manual and video/DVD, and organization of a national dissemination workshop. This was completed by the end of 2009.

It was very encouraging to meet with the Head of Human Resources at BEL, and the Executive Director of BEL Ghaziabad, who both fully supported the KM Demonstration Project. The Executive Director concluded, after listening to the presentation during his first visit to BEL Ghaziabad, by saying "Count me in your KM team," which demonstrated significant knowledge leadership and support for the project.

3.1 Manner of Implementation

Before starting the KM journey, BEL focused on the KM initiative and linked it directly to the BEL Organizational Vision.

This was achieved by using the APO KM Framework¹¹ as a reference throughout the KM initiative, with its 'Vision and Mission' central to the implementation (Figure 2.1 and Annex B).



¹¹ The complete APO Knowledge Management Framework, Consulting Methodology, and KM Toolsand Techniques, that were applied and implemented at BEL Electronics, Ghaziabhad, may be downloaded and obtained from the APO website 'Publications' at: http://www.apo-tokyo.org/publications/ebooks.html

Next, a detailed 'Stakeholder Investment Analysis' for the KM Demonstration Project was carried out at NPC India and BEL Ghaziabad. It was agreed that the expectations of all stakeholders will be monitored, measured, and reported throughout the project.

3.2. Implementing and Evaluating the APO KM Methodology

The complete outline of the APO KM Implementation Methodology was first presented to the BEL KM Team (Figure 2.2).

	KM Methodology Overview	(O)
•	Discover - 1.1 Find out where you are - 1.2 Create the Business Case	
	 1.3 Build awareness through Communications 1.4 Develop the KM Structure 	
•	Design - 2.1 Develop a KM Strategy - 2.2 Identify potential programs - 2.3 Design Processes in relation to programs - 2.4 Formulate an Implementation Plan	
•	Develop	
•	Deploy = 4.1 Implement the enhanced KM Plan = 4.2 Monitor implementation and improve = 4.3 Deliver promised benefits of KM Plan = 4.4 Sustain Stakeholder buy in	

Figure 2.2: The APO KM Implementation Methodology

3.3. Different Approaches to KM Implementation in BEL

The KM Team discussed different approaches to KM, specifically, 'Top Down, Bottom Up' and a combination of the two, known as 'Middle Out'. BEL agreed that the KM approach must be 'Middle Out', which incorporates both a definite KM plan linked to the BEL vision and objectives, and to allow naturally flourishing initiatives from individuals and teams.

A first assessment survey was performed for the BEL KM Team to provide an insight into the team's perception of where BEL stands at the start of the KM journey.

The survey results were calculated for the BEL KM Team. From the results in the assessment survey, the ranking, in order of strengths in BEL, was calculated as follows:

BEL Strengths

- Technology
- Business Process
- People
- Learning and Innovation
- KM Outcomes
- Knowledge Processes
- KM Leadership

The average readiness scoring from the survey was calculated as 120.1 points from a maximum of 210 points (Figure 2.3).

The perception from the BEL team was positive. It suggested on the 'Levels of KM Readiness' table that BEL is well on its way to an organization-wide KM implementation.



4. SOME OF THE KEY RESULTS GAINED

After designing, developing, testing, and implementing the Knowledge Portal in July 2009, significant work was carried out in improving communications, collaboration, learning, and managing knowledge. The following benefits were achieved:

- Created and implemented an Expert Locator System
- Created active discussion forums and communities pertaining to project knowledge
- Portal linked to quality manuals, SAP systems, business excellence, suggestion scheme, human resource
- Antenna, a separate unit, joined and linked staff's knowledge work within the portal
- New learnings were collectively and systematically captured in the portal, as evidenced month by month, resulting in improved Radar Display Testing knowledge
- Blogs were implemented
- BEL organization structure was linked

- A knowledge base for knowledge management was created
- A knowledge base for Radar Testing was created

Toward the end of the KM demonstration project, BEL emailed all BEL Ghaziabad Intranet users (approximately 1,000) and invited them into the Knowledge Portal with great enthusiasm, demonstrating that the KM system will continue to grow, as a better way to work with knowledge in BEL.

As a result of embedding the KM process in daily work, and implementing a Knowledge Portal, BEL increased their effective Knowledge Management Scorecard Maturity from an initial 35 points out of 200, in October 2008, to 128 points out of 200, a great result after only 6 months of the pilot.

This is a remarkable achievement and showed an almost fourfold increase in knowledge productivity in the pilot team within 12 months.

The Executive Director of BEL congratulated the team and said "Our most important job now is to roll this out to the rest of BEL. We must present this success story to all the senior executive management of BEL Ghaziabad within the next three weeks. What resources do you need to do this?"

Following the BEL success, NPC of India stated that they would like to implement the same intensive KM program for BEL within NPC, in line with its development of a KM Center, as top priority. At the time of writing this case study, NPC India is implementing effective KM within their own organization and developing the competencies and capabilities for knowledge management consulting nationally.

The scores using the Summary Knowledge Scorecard for effective knowledge working process implementation, and increased knowledge working productivity is illustrated in Figure 2.4, from an initial 35 points out of 200 in September 2008 to 128 points out of 200 in August 2009.

is illustrated in Figure 2.4, from an initial 35 points out of 200 in September 2008 to 128 points out of 200 in August 2009.

5. KEY LESSONS LEARNED

The project commenced in mid-October 2008. The first three months were filled with optimism, excitement, and enthusiasm, and the first stage of the APO KM Consulting Methodology Planning was completed on time.



Scores in September 2008
Scores in August 2009



Figure 2.4: Comparative Scores before and after KM implementation

For the second period of three months, to April 2009, the project had slipped back. In the following quarter to July 2009, there was even greater slippage, primarily due to a major disruption and immediate transfer of a senior manager from the project. This initially resulted in a lack of communication and progress between NPC India and BEL. For a period, it posed as a critical issue for the success of the project.

However, the project was completed in time with successful results, and a number of key learnings were achieved:

- Direct business improvement is difficult to measure exclusively as a result of KM. The key improvement was the 'visible change in mindset in the KM core team especially, and in the radar testing pilot group. Secondly, the culture was changing more toward a 'knowledge-sharing culture'
- BEL Ghaziabad used the KM pilot work as evidence for their recent visit and assessment for their annual Confederation of Indian Industry (CII) Business Excellence Assessment
- The year end for BEL (first quarter of 2009) was a busy period to implement the pilot. BEL has recognized to conduct pilots outside the busy time frame, and April is the ideal time
- The roles and responsibilities between BEL and NPC were not always clear. BEL stated that once they understood their role and responsibility, they took ownership
- BEL reported that in the beginning of the project, comparative case studies of other organizations using KM tools and their performance is necessary
- The KM approach agreed in the planning phase was `middle out', but BEL realized that in India, the common organizational culture is still too `top driven' or hierarchical

CHAPTER 3 KOREA CUSTOMS SERVICE DR. SHIN KIM

ORGANIZATIONAL PROFILE				
Organization	Korea Customs Service			
Established	27 August 1970			
Mission	To control customs borders for a strong economy and secure society			
Vision	World's best customs service to become an advanced trading nation			
Number of Staff	Headquarters (305), Affiliations (4,157)			

1. OVERVIEW

The Korea Customs Service (KCS) was established on 27 August 1970 as an independent organization. Its broad goals include the imposition and collection of customs duties, and overseeing the clearance of imports and exports; regulation of imports and exports for promoting national prosperity; and securing fiscal revenues to contribute to economic development. Some specific responsibilities include:

- Trade facilitation
- Revenue collection through imposition of customs duty and internal taxes on imported goods
- Protect domestic industries through rigorous monitoring of smuggling
- Prevent the smuggling of drug and firearms to promote the safety of society and public health
- Prevent the importation of dangerous chemical substances and implementation of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) for environmental protection
- Promote fair competition through prevention of fraudulent origin marking and Intellectual Property Rights (IPR) infringing goods
- Comprehensive enforcement of illegal transactions of foreign exchanges and money laundering

The organization upholds several values to achieve its objectives:

- Mission: To control customs borders for a strong economy and secure society
- Vision: World's best customs service to become an advanced trading nation
- Code of Conduct:
 - i. Think creatively (creativity)
 - ii. Listen carefully to the voice of the customer (listen)
 - iii. Work energetically (energy)
 - iv. Act on the spot (action)
 - v. Communicate and harmonize actively (relationship)
- Strategy: World Best Customs (WBC) 2012
- Core values:
 - i. Partnership
 - ii. Honor and Pride
 - iii. Change and Innovation
 - iv. World's Best

2. KEY CHALLENGES

The KCS is pressed with the need to adapt to the shifting environment, address new global challenges, and provide more effective customs services. The concept of KM implies sensitivity to the changing environment, active utilization of new information for updating traditional work practices, utilization of technologies for enhanced efficiency, and usage of innovative techniques for increasing the effectiveness of customs services. Knowledge management is not a choice, but a necessity, and requires organizational internalization.

a. The KCS must actively address the needs of the changing citizenry, business, and international society.

The KCS must view citizens not as mere beneficiaries but rather active customers who can evaluate the quality of customs service. In the business realm, as the multi-nationalization of domestic industries progresses, the KCS must raise the quality of customs service to global standards.

Finally, with regards to the international society, with the Republic of Korea possessing an economy of more than USD1 trillion, the KCS must increase enforcement of illegal goods trading.

b. Import-export management must utilize creativity and innovation to actively respond to the paradigm shifts in customs services, national and corporate responses to shifts in the global trade environment, and the development of information technologies.

After the 9/11 terrorist attack, the KCS' mission has shifted from rapid clearance to safer trade, thus simultaneously pursuing swiftness and safety. Also, online trading has increased due to a rapidly developing Internet environment. Finally, the development of radio frequency identification (RFID), Global Positioning System (GPS) and other ubiquitous technologies has enhanced both the speed and accuracy of logistics management.

c. Workload has increased due to the continuous increase in the scale of trade and travelers.

In 2010, the KCS had only 4,000 employees to handle trading valued at USD1 trillion and 50 million travelers. Compared to the 1970s, trade has increased 317 times, travelers 164 times, but customs employees have increased only by 2.3 times. In addition, the scope of law enforcement activities such as illegal online cyber trading has expanded. Finally, the scale of trade has undergone an exponential increase due to expansion of the global free trade.

3. PROGRAMS UNDERTAKEN IN THE PAST

After its establishment in 1970, the KCS implemented short to medium-term development plans in several phases for the purpose of creative innovation of the KM foundation. The following is a timeline of the main achievements during each of the developmental phases.

1970s

- Statistical computerization
- Establishment of import-export drawback processes
- Dispatching of customs agent abroad

1980s

- Computerization of work processes
- Establishment of specialized inspection agencies
- Introduction of customer service concepts

1990s (21C Customs Administration Reform Plan)

- Application of IT for work process automation
- Introduction of enhanced systems and processes for import-export firms
- Introduction of risk management for focusing and differentiation strategies

Early 2000s (Top First-Class Customs 3-Year Plan)

- Implementation of one-stop customs system
- Risk management, customer relations, integrated information, and knowledge management systems
- Introduction of management innovation techniques (performance management, Six Sigma, Human Resources Management and HRM)

Late 2000s (World Best Customs 2012 and Plan)

- Completion of the Integrated Knowledge Management Innovation System Model (realization of organizational self-development)
- Introduction of the Single-Window System in 17 ministries
- Marketing and export of the electronic customs system to countries abroad

4. RECENT PROGRAMS AND IMPLEMENTATION

The detailed implementation plans of major ICT strategies for knowledge-based management are examined in the following initiatives:

a. The Electronic Data Interchange (EDI) Customs Automation System

This is the result of customs processes innovation, namely, the construction of a customs integration system for declaration and information sharing between logistics agents through non-paper based Electronic Data Interchange (EDI). These results in enhanced efficiency through a quick and accurate customs system, increase in national competitiveness through cost cutting in import-export logistics firms, and establishment of an effective illegal trade activity monitoring system.

b. The operation of 3A (Anytime, Anywhere, Any device) service, and Internet customs portal

This facilitates import-export declarations from anywhere in the country without time or location restrictions. The application of cutting-edge information communications technology (ICT) and Internet services also allows for the construction of an advanced electronic customs system known as Uni-Pass. Through the reduction of time spent on customs and logistics, the economic effects amount to nearly USD2.4 trillion.

c. One-Stop Customs Service, Single-Window Customs (4th Three-Year Informatization Plan, 2006)

This allows for handling customs procedures in a single clearing through the Single Window system. Also, data can automatically be sent to agencies that require inspections or quarantine information such as the Korea Food and Drug Administration and other agencies. This enhances customs efficiency and early warning management for illegal trade activities. Single Window utilization has shifted from 4.3% in 2006, to 6.9% in 2007, 19.3% in 2008, 67.2% in 2009, and 91.6% in 2010.

d. The KCS Integrated Information System (2nd Three-Year Informatization Plan, 2000)

The operation of this system enhances the competency of accumulated information analysis. The Customs Data Warehouse (CDW) is an essential information analysis foothold for risk management. In addition, the system provides a convenient online analytical processing (OLAP) tool for employees to quickly and accurately process information.

e. Knowledge Management Portal System (the 2nd Three-Year Informatization Plan – 2003)

The operation of this system integrates and shares all of the internally and externally amassed information. It aims to enhance workplace productivity through the systematic accumulation and sharing of work knowledge and know-how, and seeks to establish a widespread culture of knowledge management to employees.

4.1. Overview of the Knowledge Management Portal System

a. Establish a knowledge management foundation through systematic use of ICT

Establishment of the Knowledge Management Portal System and construction of a ubiquitous customs clearance through introduction of mobile, RFID and other leading-edge technology, beginning late 2000.

b. Development into an Integrated Linkage System

Utilization as a KM gateway through the integration and linkage of consumer relations management (CRM), Six Sigma, performance management, and integrated human resource management (I-HRM), and linkage of import-export-drawback information processes.

c. Knowledge utilization structure of the Knowledge Management Portal System

The application of Web 2.0 technology to conveniently service individual on-demand for knowledge creation and sharing.

5. KM MECHANISM AND STRATEGIES

5.1. KM Mechanism

The impact on current knowledge management capacity occurs through the internalization of innovation to achieve a sustainable knowledge management mechanism. This is based on the Balanced Score Card (BSC), a strategic performance management system, and the establishment of an automatic KM system through linkage between the I-HRM and Six Sigma initiatives.

5.2. Overall Strategy

a. Optimization of a comprehensive innovation model for knowledge management

Interconnection of the four main innovative management techniques (BSC, Six Sigma, I-HRM, and CRM) and customs administration information system to derive the following process



- b. Achieve goals through introduction of knowledge management innovation techniques using the following four major programs:
 - Systematic Management of Customer Relations
 - Six Sigma: Innovative Problem Solving
 - Strategic Performance Management
 - Nurturing of Future-oriented Personnel: Comprehensive Human Resource Management

5.3. Program Details

a. Systematic Customer Relationship Management (CRM)

This is an on-demand service for customers, which provides information according to tax rates, product classifications, etc., resulting in a yearly economic effect of KRW30 billion. In addition, the notification of customs administration duty information through SMS service leads to the reduction of additional charges or fines, and increase in law abidance.

b. Innovative Problem Solving (Six Sigma)

This improves problem-solving abilities and contributes to human resource development. The details include knowledge management awareness through education of Six Sigma techniques to all personnel, establishment of a task management system for increased efficiency, Six Sigma belt certification, and training program for professionals.

Customer satisfaction can be enhanced through innovative quality improvement. The details include quality improvement of customs administration through solving chronic problems; active response to demand for quality sophistication of customs administration; development of a free trade agreement (FTA) business model, and encouragement of firm evaluation autonomy; and increased capacity for handling tax evasion, smuggling, narcotics, and other risk management areas. These lead to improved customer convenience based on customs Single-window, establishment of a customs system for imported cargo to reduce clearance time, etc. Altogether, the handling of a total of 446 defective elements in customs administration derived an economic effect of KRW760 billion from 2005 to 2010.

c. Operation of performance management systems as a strategic implementation tool (strategy optimization and data optimization for decision making)

Establish a strategic management system for enhancing performance through ranking and grading of the strategic tasks (sustain vision and strategy management); advancement of the goal as strategies become part of employees' daily tasks; use of Customs Data Warehouse (CDW) to establish real-time early warning system; set up BSC suitable for the KCS; and the automated record entering of fixed-quantity indicators.

Completion of the Large Scale Project: This is a performance management system that trickles down to the organizational and individual level (Organizational: 48, Departmental: 157, Individual: 4,281). The number of employees participating in indicator development and goal setting was up by more than 30 times, 1,219 (approximately 30% of all employees). Also, the KCS held a total of four BSC performance evaluation and report rallies.

d. Comprehensive integrated human resource management (I-HRM) for employee training, and management tool (Development of Career Development Program (CDP) and System)

Details of the program include an automatic competitive personnel placement system through comprehensive accreditation, which is a combination of BSC (70%) and job capacity (30%); establishing a grading tier consisting of executive manager, manager, professional agent, agent; setting up Six Sigma belt strategy in order to grant tasks through selection of Green Belt (GB) and Black Belt (BB) levels to develop core employee skills; and the selection of professional agents, position management, and codification of employee evaluation system.

Performance results are applied to personnel appointment and placement. The selection of talented individuals is accomplished using results from comprehensive performance evaluations. The aim is to expand to all employees, reflecting 100% of scores, and to appoint professional agents from the top 50% (1,382); to create an effective linkage between the employee selection system and Six Sigma belt appointment system; and to appoint those subject to Green Belt (GB) education.

e. Self-evolving organization, realization of self-development organization

The focus is to construct a comprehensive linkage between innovative management techniques for vision and goal achievement.

6. KEY RESULTS OF KNOWLEDGE MANAGEMENT

6.1. Major Achievements of Implementing KM in 2010

a. The establishment of an advanced customs and logistics system in line with G-20 standards resulted in an increase in RFID-based airline cargo clearance.

The RFID usage as of December 2010 was 60.4% inflow and an outflow of 29.6%, for a total average of 45.3%. Also, there was an increase in the usage of Single-Window Customs for imports inspection requirements, resulting in an increase from 86.5% in January 2010 to 87.8% in June 2010, and 98.1% by December 2010. The processing time for imported cargo decreased from an average of 2.92 days in 2009 to 2.45 days in 2010; individually, the processing time for airline cargo was 1.33 days and sea cargo, 5.3 days. Finally, there was a reduction in travelers' luggage clearance time, from 50 minutes in 1998, to 40 minutes in 2003, and finally 28 minutes in 2010.

b. Protection of public health and security

In terms of infringement on foodstuff, medicines, and other areas of public health, the figure decreased to 2,157 in 2010, compared to the previous year's figure of 2,233. However, the total amount increased from KRW1,184 trillion in 2009 to KRW1,847 trillion in 2010. Law enforcement for serious crime was strengthened through international cooperation, cracking down 80 in 2009 (confiscating KRW1.7 trillion) to 106 cases in 2010 (KRW1.8 trillion). In addition, there was an increase to the regulation of illegal trading activities through strengthening of foreign exchange monitoring, increasing from KRW5.513 trillion in 2009 to KRW5.546 trillion in 2010. Finally, there was an improvement on the crackdown of firearms and explosives. In 2010, 177 firearms were confiscated in 136 cases, 2,875 munitions in 51 cases, and 231 knives in 169 cases.

6.2. International and National Evaluations

The KCS received several international and national recognitions and awards.

a. International Organizations

- World Bank Business Environment Evaluation, Customs Sector, Top Ranking (population of 10.5 million and above, November 2010)
- Airports Council International Airport Service Quality Evaluation, Customs Sector, Five-Year Consecutive Top Ranking (2006-2010)
- Airports Council International Airport Service Quality Evaluation, Customs Sector, Five-Year Consecutive Top Ranking (2006-2010)

b. Government Ministries

- Ministry of Finance and Strategy Financial Services, Top Best Agency (August 2010)
- Ministry of Public Administration and Security
- Educational Training, Comprehensive Evaluation, Two-Year Consecutive Top Ranking (2009-2010)
- Creative application outstanding case study, Prime Minister Award, Minister Award (December 2010)
- Human Resource Operation Evaluation, 6-Year Consecutive Top Ranking Agency (2005-2010)
- Anti-Corruption and Civil Rights Commission
- Anti-Corruption Initiatives Evaluation, Two-Year Consecutive Top Ranking (December 2010)
- Transparency Evaluation, Top Ranking Agency (December 2010)
- Ministry of Gender Equality and Family
- The first-ever family-friendly government ministry, Top Grade (S) Certification (November 2010).

c. Others

 Electronic Customs Technology Support Center, ISO 10002 Certification (15 July 2010)

7. KEY LESSONS LEARNED

a. International Recognition

The KCS was ranked top in customs administration by the World Bank. This was the result of the use of leading-edge information technology for document digitization and networking; the construction of an Internet based import-export customs environment, leading to the reduction of trade costs; and the sophistication of the traveler customs systems, customer-focused management, etc., thus, attaining top rank in several customs service areas.

b. Increase in exports (Uni-Pass system)

The Uni-Pass system is an automated initiative through online, Internet or other non-paper electronic processing of product declarations, customs inspection, tax payments during import-export, and other clearance procedures.

The global branding and export promotion of electronic clearance system has led to the increase in the number of systems export destination countries: Kazakhstan (USD420,000), Kyrgyzstan (USD470,000), Dominican Republic (USD28.5 million), Mongolia (USD5.54 million), Guatemala (USD3 million), Ecuador (USD24.2 million).

c. Simple ideas lead to knowledge management

Improvements that benefited customers include the construction of a distribution network management system to prevent illegal domestic distribution; the expansion of the CARE Plan to ease small-to-medium firms' financial difficulties; the implementation of AEO policy to increase export firms' competitiveness; application of RFID-based air cargo management system for achieving an economic effect of KRW141.5 billion.

The outcomes were improvement of internal work efficiency through the database performance management optimization for strategy clarification and decision making; and the improvement of narcotics inspection capability through the successful detection-dog training program. This has resulted in an 82.9% increase in personnel satisfaction through the successful introduction of the electronic personnel system.

d. Improving the quality of knowledge through sustainable management programs

Fair knowledge evaluation was pursued through the process and outcome evaluations of KM system; educational training of the KM evaluator; and operation of the Poor Knowledge Report Center

Creation of the Outstanding Knowledge concept resulted in improved knowledge activity focused on core information creation.; improvement of knowledge mileage policy (evaluation criteria of 7 points and higher (17.2%)); and increase in overall knowledge rate through the implementation of continuous knowledge monitoring (total 17.5% of overall knowledge). Useful knowledge was substantially increased by improving knowledge mileage policy and implementing continuous knowledge monitoring.

e. Shift in ways of thinking, and establishment of creative organizational cultures such as conserving energy, decreasing pollution, or enhancing national image

The 'Hope Sneakers' design festival was an initiative that used confiscated counterfeit shoes for alternative purposes; the initiative, recycle 12,000 counterfeit shoes and donating them to children in developing countries. The KCS Inchon Office and Korea UNESCO hosted this program at the Inchon Customs Office People's Forest. This resulted in the reduction of counterfeit shoes disposal costs for achieving an economic effect of KRW500 million.

This is an example of utilizing creative organizational cultures by implementing

drastic regulation reforms using creativity, and reducing the burden of citizens and businesses.

f. Customer satisfied customs administration service

The various programs and initiatives have improved external customers' satisfaction toward customs administration. The KCS has received various domestic and international positive evaluations as well as awards.

8. NEXT STEPS

The agenda of the Korea Customs Service (KCS) is to realize the goal of the 'World's Best Customs Administration'. The broad plans consist of:

- 2020: Establishment of new 10-year knowledge management master plan
- Creative Development Model: Construction of organization, processes, and information infrastructure suitable for a knowledge management system.
- Achievement of a Global Customs Network: From domestic to international single-window

9. SUMMARY

Although the concept of knowledge management itself is a recent development, the KCS has adhered to a tradition of utilizing new technologies and management practices to continuously upgrade the efficiency and effectiveness of customs services.

Recently, in light of the need to address new challenges that emerge due to the shifting global trade environment, the KCS has continued to promote knowledge-based management by employing innovative strategies and techniques to facilitate safer and efficient trade, and to provide more effective customs services.

CHAPTER 4

TAPHANHIN CROWN PRINCE HOSPITAL¹², THAILAND

DR. BOONDEE BUNYAGIDJ

ORGANIZATIONAL PROFILE				
Organization	Taphanhin Crown Prince Hospital			
Location	Taphanhin District, Pichit Province (300 km north of Bangkok)			
Industry	Health Care			
Year Established	1978			
Vision	To be one of the community hospitals nationally recognized for service quality and loved by communities.			
Mission	To be the community hospital of choice for people from all walks of life, providing quality services for people's good health through community participation, good governance, and ethical and happy employees, toward learning organization and stakeholders' satisfaction.			
Number of Employees	288			

1. OVERVIEW

Taphanhin Crown Prince Hospital (TCPH) is located in Taphanhin District, Pichit Province, a small and peaceful province 300 km north of Bangkok, where most local people earn their living as farmers for generations. They are traditional Thai rural agriculture-based communities, close-knitted and family-oriented.

Since its establishment in 1964 as a small district health center, TCPH has gone through a series of expansions, including upgrading the center into 30-bed Crown Prince Community Hospital in 1976, all of which were supported by donations from local communities. The bond between hospital and communities is exceptional and unique as compared to other community hospitals.

In 2012, the hospital has grown into a 90-bed community hospital, serving 70,000 people with three major services as follows:

 Secondary health care services (out and inpatients, chronic diseases, dental clinic, rehabilitation, Thai traditional medicine, medical lab, intensive care unit (ICU), surgery, and maternity labor ward)

¹² The author wishes to acknowledge the invaluable support of Dr. Kittichote Tangkittithaworn, Director of the Taphanhin Crown Prince Hospital.M).

- Community health promotion
- Community prevention and control of diseases

Total outpatients and inpatients are respectively 150,000 and 8,000 per year. The average occupancy rate is 95%.

There are 288 employees classified into three categories, namely, civil servants who are mostly professionals, for e.g.: doctors, dentists, pharmacists, and nurses accounting for 52% of the employees, and the remaining 48% are permanent and temporary employees. The hospital operates 24-hours-7-day-week, and 70% of its employees work on eight-hour shifts.

Despite limited access to latest developments in modern health care and knowledge resources due to remote location, the hospital has always been ahead of most public hospitals in embracing modern management systems to continuously improve its performance. This is evident by some of the rewards and recognition the hospital received as follows¹³:

- National Award on Outstanding Community Hospital on Services (1995)
- Regional Award on Outstanding Frontline Services (1997)
- ISO 14000 certification (2000)
- Hospital accreditation (2006)
- Second public hospital in Thailand to attain Thailand Quality Class (2008)

2. KEY DRIVERS FOR KM

There has been a tremendous increase in the number of patients in most public hospitals since the government universal coverage health insurance scheme was in effect in 2000.

People under this scheme, accounting for 90% of the nation's population, have free access to standard medical services in public hospitals. The hardest hit by this scheme are the community hospitals due to their constraints in manpower and government budget. TCPH is no exception. Currently, the average workload of patients to doctor in OPD or outpatient department is 65:1 per day, excluding other responsibilities on emergency cases, inpatients as well as health promotion, and prevention responsibilities covering 91 villages in 12 subdistricts.

The influx of patients raised serious concerns by senior management on the provided quality of service despite the fact that good hospital management systems were in place.

¹³ See website of the Thailand Quality Award: http://www.tqa.or.th/

How could TCPH maintain and improve its services, and at the same time, minimize errors or mistakes that impact patients' safety to avoid risks of being sued as experienced by many hospitals?

To counter these pressing issues, TCPH strategized to strengthen employees' capabilities, particularly the less experienced staff at all levels to ensure patients' safety and satisfaction.

This was due to the fact that almost 30%-40% of professional staffs, permanent, and temporary employees (mostly supporting staff) had been working for the hospital for over 20 years (Figure 4.1). Even worse, approximately 10% of professional staff will be retiring within five years. Thus, there was a very high risk of knowledge loss if no effort was taken to counter the situation.

EMPLOYEE CLASSIFICATION	> 25 YEARS	20-25 YEARS	10-20 YEARS	5-10 YEARS	< 5 YEARS
MEDICAL PROFESSION(150)	25%	14%	44%	0 %	16%
PERMANENT AND TEMPORARY EMPLOYEES(138)	18% 8%		15%	13%	46%

Figure 4.1: Distribution of employees based on years of services

In addition to gaps in employees' experience, 70% of employees work three shifts, therefore, it was important that staff on duty during evening and night shifts (mostly junior staff) were trained as soon as possible so they are equipped with sufficient knowledge and skills to make the right decisions, particularly on issues related to patient safety.

It is understood that knowledge and skills of medical professions are very tacit in nature and grow with personal experiences. Those with experience can make a difference in service outcomes, particularly in difficult or emergency situations.

Obviously, there was an urgent need to systematically transfer knowledge and skills from older to younger generations, and retain it for long-term use to continuously improve performance, thus increasing patients' or stakeholders' satisfaction.

3. KM OBJECTIVES

Aware that their existing knowledge-sharing activities were ineffective and inefficient to cope with urgent needs, TCPH senior management decided to embrace and integrate KM into their management system to achieve the following objectives:

- Stimulate and encourage sharing of knowledge and skills throughout the hospital using various KM tools and techniques
- Transform individual knowledge, particularly senior staff, into organizational knowledge by sharing and codifying tacit knowledge, and collecting them in a knowledge repository for easy access to employees

Encourage the use of knowledge gained from sharing, or from knowledge repository to improve processes, and thus, enhance hospital performance

Expected outcomes are:

- Increase of knowledge sharing among employees through various KM tools
- Increase of codified organizational knowledge in knowledge repository
- Productivity improvement of key processes

4. EXISTING FOUNDATION PRIOR TO KM IMPLEMENTATION

The TCPH's achievement of receiving numerous awards and recognitions was the outcome of hard work and commitment from all levels of staff, particularly the hospital directors, past and present, all of whom were recognized as key drivers and supporters of improvement initiatives.

The improvement process, which is the essential mechanism of ISO 9000, ISO 14000, HA, and Thailand Quality Award (TQA) systems was sustained through enthusiastic and highly engaged employees.

Key enablers of success were organizational culture and core values, which had been built up over 15 years. Values are refined continuously through its annual review process with the participation of all employees.



Figure 4.2. A Core Value: Customer-focused

Values:

- Customer-focused
- Enthusiastic to learn and improve our work continuously
- Brotherhood teamwork
- Responsible for society and environment

5. KM IMPLEMENTATION

With these values, TCPH informally started KM in 2006 by implementing communities of practice (CoPs) and storytelling in some nursing units without good understanding about KM. Not achieving expected results, the Human Resource Development Committee overseeing KM then, reviewed what went wrong through desk studies and lessons learned from other organizations.

The assessment results based on TQA criteria, containing KM in one of its seven criteria¹⁴, gave them a holistic picture of KM. Based on the assessment findings, a formal three-year KM action plan (2008-2010) was set up using change management process (Figure 4.3).



Figure 4.3 : Change Management Process Reference : Bunyagidj 2004

5.1 Transition and Behavior Management

Senior management reviewed the mission statement and strategies, and set KM as one of the organization's strategies for enhancing the organization's and employees' capabilities (Organization and Learning Dimension in Balanced Scorecards). The KM objectives were aligned with the organizational direction and goals through KM strategy.

The KM committee was reorganized to consist of senior leaders from all functional units to oversee planning and implementation of KM throughout the hospital.

Considering that supportive culture was critical to KM success, therefore, senior leaders strengthened their core values through creating a supportive environment for openness by adopting the policy of "No Blame" to errors and failures, and setting up more improvement cross-functional teams from key and supportive functions. Every senior leader showed his or her commitment through personal and active participation in all key KM activities.

¹⁴ FTPI has developed the KM assessment methodology in-house. See "Organizational Health Check by KM Assessment" by Boondee Bunyagidj and Napatsawan Thaiyanun, Thailand Productivity Institute, Thailand 2012.

5.2 Communication

The hospital director and senior leaders used two-way communication to get buy-in through meetings with all employees three times a year. The key messages conveyed were on KM benefits to the employees `what's in it for me', ensuring the ease of implementation (not too complicated to implement), and how they could participate in KM. All employees were given the opportunity to ask and discuss about any issues until consensus was reached.

The campaign to create KM awareness and stimulate employees' participation was also carried out throughout 2009, under the theme "Sharing and Learning Year". Various communication channels were used, including senior management's visits to all departments, numerous informal meetings among staff, KM board, KM website, posters, brochures, and hospital newsletters.

5.3 Selection of Appropriate KM Tools

Appropriate KM tools were selected for use in various KM activities based on the type of knowledge (explicit or tacit knowledge) dealt with, and fitness to employees' behavior and learning capability. All selected tools were tested, evaluated, and simplified to fit with the learning capability of each employee group.

Examples of tools used included CoPs, After Action Review (AAR), storytelling, capturing of lessons learned, coaching, mentoring, job rotation, KM web, etc.

To ensure employees' accessibility to the KM web, all departments were equipped with sufficient number of computers, and wireless internet was set up throughout the hospital.

5.4 Training and Learning

Various training courses on KM concepts and the use of simplified tools were organized in line with training plans at organizational and departmental levels. In addition, KM was included in the Individual Development Program (IDP). E-learning on KM courses was also available to support those working in the afternoon or night shifts. Upon completion of training, the KM team followed-up and assisted employees on how to use the tools, whenever the need arises.

In addition to in-house training, employees also learned KM good practices through site visits to other organizations, and attending KM seminar and public training courses.

5.5 KM Measurement

To enable senior leaders to monitor the progress of KM implementation, and to provide employees with management's expectation on their KM participation, measures were set up at three levels:

- Organizational Level: Number of best practices (resulted from modification of existing knowledge) giving improved results
- Department Level: Percentage of employees meeting targets on learning hours (collected from employees' participation in various KM activities)
- Individual Level: Number of learning hours, number of stories told, number of work instructions written, number of teaching and coaching hours, number of OJT (one-the-job training) reports/employee

5.6 Rewards and Recognitions

Numerous rewards and recognition programs were set up including "Learning Champion" in which, employees could accumulate points based on their participation in any KM activities such as training as trainers or trainees, CoPs, AAR, OJT, book briefing, etc. Points were exchangeable for cash, in addition to it being part of their performance. Monetary rewards and recognitions were also given to employees' suggestions, lessons learned and captured, written work instructions, and best improvement projects.

5.7 Key KM Initiatives

In line with KM objectives and expected outcomes, various KM initiatives were implemented using appropriate knowledge-based tools. Two key initiatives are described below.

a. PDCA + KM process

To enhance the effectiveness of PDCA (Plan-Do-Check-Act) process, KM was integrated into various steps of PDCA process, starting with identification of improvement initiative in which, process owners identified knowledge gaps by asking a series of questions (Figure 4.4). Process owners then set up a KM plan to bridge the knowledge gaps, and merge with the improvement plan. New knowledge gained from improvement efforts was documented and shared through CoPs. The application of knowledge shared was monitored and evaluated by senior leaders or QMR¹⁵ (quality management representative). Once practices were proven to be practical and produced better results, standardized documents were prepared and stored in the KM web for use or for the next PDCA cycle.

The use of PDCA+KM process resulted in many significant improvements of patient care outcomes; for example, the admission rate of chronic obstructive pulmonary disease (COPD) patients and revisit rate of such patients at the Emergency Room decreased respectively two-fold and four-fold.

¹⁵ Quality management representative (QMR) is a senior manager, irrespective of his or her responsibilities, appointed by the top management, to oversee the quality management system in the organization.

b. Sharing of Lessons Learned

Sharing of lessons learned from errors and failures received full cooperation from employees. As in the TCPH culture, senior leaders never asked "who" but "why" when problems crop up. Employees were asked to write lessons learned with analysis of root cause and prevention measures, in addition to incident reports before sending them to Quality Promotion Center.

The Center then identified appropriate sharing methods depending on the seriousness of the incidents, for e.g.: distribution to all units, posting on the KM web, or sharing in CoPs, etc. Sharing of lessons learned resulted in drastic drop of repeated errors and customer complaints in the past three years.



Figure 4.4: PDCA+KM process

5.8 Challenges to KM Implementation

At the early stage of KM implementation, challenges were mainly with the senior team as KM was still quite abstract and context-specific. Thus successful KM practices observed in other organizations sometimes did not work as well in the hospital. Most KM initiatives in the early days were mainly on the use of KM tools such as CoPs and storytelling. The senior team, therefore, had to use "Learning by Doing" approach to accumulate understanding of KM, and made timely adjustments as KM systems were developed.

Most senior employees, or the older generation had limited IT (information technology) capability, and it was no surprise that only 50% of them used the KM Web. Thus, training courses on how to use the Internet and the KM web were provided. Many user-friendly e-learning courses were also introduced to familiarize and further train all employees with computer use.

Considering the focus of KM at the stage was to encourage knowledge sharing, the target was on quantity, not the quality of knowledge. Therefore, most of the knowledge captured needed further screening and validation for use. Knowledge content in the KM Web needed to be managed better for easy retrieval.

Although trends of process improvement were evident in many areas, all used KM measures were related to KM activities, and not on the use of knowledge and productivity improvement resulting from KM. The senior team is now in the process of reviewing and adjusting the KM measures as the maturity of the KM system developed.

Based on employees' feedback, timing of KM activities must be adjusted as some of those worked evening and night shifts found it inconvenient to participate in KM activities usually carried out during the day.

6. RESULTS

One of the important indicators that KM has been fully embedded into employees' mindsets is their behavioral change. Some of employees' behavioral changes observed by senior leaders were:

- Employees were more knowledge-oriented when doing their jobs, or when looking for opportunity for improvement, such as asking themselves the knowledge required to perform well in their jobs, or to make improvements, and where to seek knowledge, etc.
- Employees were more enthusiastic to voluntarily participate in KM activities
- Employees were more confident in what they were doing

From employees' perspectives, KM had the following impacts:

- KM has become part of their work
- KM helped them to fully use their knowledge, and also gain more knowledge and skills
- KM helped them work more efficiently
- Through KM activities, they had more interaction with other employees
- KM enhanced their self-esteem

All KM activities showed increasing trends since 2008 such as number of CoPs, number of formal knowledge sharing events, number of learning hours per employee, and number of best practices submitted.

More importantly, there was significant decrease of repeated mistakes due to the sharing of lessons learned on errors and failures. For example, the hospital's repeated risks on the same issues continuously dropped since 2008, and reached zero in 2011. Similarly, customer complaints on the same issues decreased three-fold between 2008 and 2010.

7. KEY LESSONS LEARNED

The strong commitment and team work of the senior management team contributed significantly to numerous achievements of the hospital. Senior leaders set direction, drove, and supported KM in every way they could. Alignment of KM with the hospital's strategies also helped in aligning employees to the same direction toward their strategic objectives. More importantly, the senior management team was the role model for KM through their personal involvement in KM activities. They also motivate and encourage employees' participation through various rewards and recognitions.

A solid foundation of core values on eagerness to learn, brotherhood, teamwork, and loyalty helped TCPH to create a culture of knowledge sharing with minimum resistance. Despite the embedded core values, senior leaders also consistently used two-way communication to all employees through appropriate channels to get buy-in, and keep employees abreast of KM directions and latest developments.

It was essential to simplify and customize KM approaches and its tools to fit employees who have varied learning capabilities and styles. This took continuous cycles of adjustments. Training and follow-up on the use of tools were also provided.

Having systematic management systems in place such as ISO 9000, ISO 1400, HA, and TQA ensured that key processes were streamlined, standardized, integrated, and measurable. Thus, tracking the impact of KM on process improvement could be carried out more effectively. In fact, with dynamic PDCA cycle in place, the impact of KM on productivity improvement would be remarkably increased.

8. CONCLUSION

This case is an example of a small rural community hospital that has successfully embraced KM to better utilize their knowledge for improving performance using simple and practical approaches. The approaches used are perhaps applicable to any public organization, regardless of size and complexity of operation. Even though the process may appear simple, it was the result of hard work from senior leaders and the KM team in simplifying the process through endless cycles of learning and improvement. Embedding KM into the PDCA process, which is an important improvement mechanism in any management system enhances the power of both KM and PDCA on productivity improvement.

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CHAPTER 5 AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH¹⁶, SINGAPORE

ORGANIZATIONAL PROFILE				
Organization	Agency for Science, Technology and Research (A*STAR)			
Headquarters	Singapore			
Mission	Fostering world-class scientific research and talent for a vibrant knowledge-based Singapore			
Vision	A prosperous and vibrant Singapore built upon a knowledge-based economy			
Year Established	1991			

1. OVERVIEW

The Agency for Science, Technology and Research (A*STAR) is the lead agency fostering world-class scientific research and talent for a vibrant knowledge-based and innovation-driven Singapore under the Ministry of Trade and Industry. A*STAR oversees fourteen biomedical sciences, physical sciences, and engineering research institutes, and six consortia and centers, located in Biopolis and Fusionopolis as well as in their immediate vicinities.

The A*STAR supports Singapore's key economic clusters by providing intellectual, human and industrial capital to its partners in industry. It also supports extramural research in the universities, hospitals, research centers, and with other local and international partners.

The A*STAR is a Research Hub of Excellence that attracts world-class researchers, corporations, universities, and any kind of research institutions which intensely seek innovation in science and technology. It has attracted many talented individuals from around the world – scientific leaders, researchers, post-doctoral and Ph.D. students from over sixty countries. As of June 2010, the total size of the A*STAR community was 4,085, comprising 223 at A*STAR headquarters, and 3,862 scientists, researchers, technical, and non-technical staff, including industry development and commercialization staff.

Fusionopolis focusing on physical science research and Biopolis focusing on biomedical science research are two key components of A*STAR that have attracted world-class research communities, and flourished as the cutting-edge research hubs.

¹⁶ The author wishes to acknowledge the generous assistance and cooperation from the A*STAR team.

Many international corporate laboratories and renowned research centers have joined the community and entered into research collaborations with the A*STAR research institutes. The co-location of public and private laboratories in these two research hubs has offered rich opportunities to create a vibrant environment, pushing the frontiers of science and driving technological innovations.

2. BACKGROUND

The A*STAR was established in 1991 as one of the driving forces of Singapore's national strategy that has strong commitment to R&D innovation to grow its knowledge capital. The growth of Gross Expenditure on R&D as percentage of GDP in Singapore clearly shows the nation's intensive efforts; it has risen sharply from 1.9% in 2000 to 3.0% in 2010, and the government is aiming at 3.5% by 2015 through increased private sector R&D expenditures.

Since the A*STAR is under the Ministry of Trade and Industry, it emphasizes not only research-oriented activities, but also commercializing the research results. The facilities are located in a 200 ha area called 'One-North' (latitude of one degree north) that includes industrial parks, science parks, government offices, condominiums, hotels, universities, parks, concert hall, etc., to provide not only cutting-edge research environment, but comfortable lifestyle for researchers. It is designed to foster collaborative opportunities among various research areas such as between biomedical and physical sciences to generate innovation.

3. KNOWLEDGE STRATEGY

As declared in its mission and vision, the A*STAR's focus is to realize a prosperous and vibrant Singapore built upon a knowledge-based economy through world-class scientific research and talent. It is crucial for Singapore's economy since the country has almost no natural resources and understands knowledge capital as the key for its future prosperity.

In other words, it aims to become Asia's innovation capital, where scientific innovation and commercialization are sustainably created in Singapore, and the country set its focus on biomedical sciences, physical sciences, and engineering as the strategic areas to pursue innovation.

To achieve its goal, it was crucial to attract world-class researchers and research institutions to Singapore. A*STAR has achieved it by providing state-of-the-art research facilities for biomedical, physical sciences, and engineering via Biopolis and Fusionopolis. Over 4,000 researchers from over 200 research institutions, corporations, and universities from all over the world have been attracted to the A*STAR.

They not only conduct research programs intensively, but often collaborated with other institutions in Biopolis and Fusionopolis. They are virtually the hubs of innovation in the fields, and the A*STAR also play the role of coordinator by connecting different players.



Figure 5.1: Biopolis

Biopolis is a complex with quality amenities designed for providing a world-class biomedical research environment. Phase 1 of Biopolis was completed in 2001 at a cost of SGD500 million. The seven-building complex, linked by sky bridges, offers a built-up area of 185,000 m2. When the Singapore government decided to launch Biopolis, biomedical and healthcare were not thriving industries in Singapore. It was the nation's strategic intention to boost the research activities in the biomedical areas, and Biopolis was built as the cornerstone of the strategy.

Biopolis provides shared facilities, such as scientific services and core services. These services offer glassware washing, and tissue and bacterial culture media preparation that help researchers save time, and manage scientific equipment and supplies. It also has an animal facility, facilities for scientific conferences, symposiums, seminars, and lectures in its effort to provide world-class research environment for biomedical researchers.

Phase 2 was completed in 2006. It offers 37,000 m2 for housing more biomedical research institutes and private research organizations. Phase 3 was completed in 2009 to yield another 41,500 m2 of space to support clinical and translational research.

Currently over 2,000 researchers from various organizations such as Novartis, GlaxoSmithKline, and Johnson and Johnson from the private sector as well as Waseda University conduct over 100 R&D projects at Biopolis, and many of them are collaborative research programs conducted by multiple organizations.

Since it opened, research programs at Biopolis produced hundreds of scientific achievements, some of which, turned into commercial successes. It is on its way of becoming an epicenter of biomedical innovation.

Fusionopolis was established to become an R&D innovation hub for information and communication technology, media, physical sciences, and engineering. Phase 1 of 119,000 m2 was completed in 2008. Phase 2A (104,000 m2) will be launched in 2014, while Phase 2B (50,000 m2) was completed in 2010.

Similar to Biopolis, Fusionopolis hosts various state-of-the-art shared research

research facilities such as Anechoic Chamber measuring 8 m in length, 3 m in width and 3 m in height, filled with absorber material to dampen the reflection of electromagnetic waves, Clean Rooms with a total floor area of 5,200 m2 spread over four floors (clean rooms will be completed in 2014 Phase 2A), R&D Foundry, and Visualisation Chamber that saves time and money for researchers.

More than 1,000 professionals in physical science and engineering R&D from various organizations such as Seiko Instruments, Baidu, and HP are conducting over 100 projects at Fusionopolis. It has also generated many research achievements, some of which have turned into commercial successes.

Fusionopolis is a self-contained development complex that includes serviced apartments, retail outlets, eateries, a supermarket, a fitness center, a theater, sky gardens and a Mass Rapid Transit station. Its unique self-sustaining environment also makes it an ideal test-bedding site of new technologies to accelerate their adoption into society. Already, the supermarket at Fusionopolis is testing Asia's first intelligent shopping cart, which incorporates radio frequency identification (RFID) technology to identify shoppers' locations and profiles, and delivers targeted advertisements via an LCD screen.



Figure 5.2: Fusionopolis

The Nature Magazine described this environment as:

"Part laboratory, part resort and part architectural gem, Fusionopolis is Singapore's newest mega-science facility ... Fusionopolis is the physical science sequel to Biopolis. Housing six institutes ... the buildings are meant to spur interdisciplinary research not only among its own institutes but also with Biopolis."

Nature Vol. 455, "Singapore surges upwards" 23 October 2008

4. COLLABORATION DYNAMICS

At Biopolis and Fusionopolis, the co-location of public and corporate organizations offers unprecedented opportunities for the integration of scientific capabilities. Not only does it foster close linkages by stimulating interdisciplinary research, it also acts as a catalyst in forging international links

with renowned scientific institutions through research and graduate training partnerships. To accelerate collaborative research programs with multiple players, the A*STAR staff plays the role of coordinator and facilitator to encourage such inter-organizational research activities. When the author visited Fusionopolis, a manager at the A*STAR said:

"It is often our side, A*STAR, not residing institutions who firstly propose new research topics. If needed, we also introduce potential research partners as we know much about strength of each residing research institution. If there is enough large benefit to collaborate, yes, they collaborate with even their competitors."

The inter-disciplinary research programs are not limited within Biopolis or Fusionopolis; there are many collaborative research projects between the two polis. They were built next to each other (just 600 m away) to foster the fusion of different knowledge. As a result of the close collaboration between the biomedical and physical sciences, private companies can also draw on the capabilities and expertise of the research community to grow their businesses.

State-of-art facilities, top-notch collaboration partners along with proactive and dedicated facilitators are the primary features that attract world class researchers and research institutions from all over the world. These factors also nurture economic clusters through impactful science in strategically focused areas such as biomedical sciences, electronics and info-communications, engineering and chemicals, and energy. For instance, in biomedical science areas, biologics, one of the fastest-growing segments that involve complex manufacturing processes to develop new technologies or products in areas such as cell therapy, vaccines, and antibodies, is targeted as one of the key economic clusters. Partnering with various pharmaceutical companies and research institutions in the industry has not only accelerated innovation in the biologics but enabled Singapore to have an edge in creating opportunities further down the value chain within the country.

The A*STAR's support covers the fostering of R&D activities and commercializing the R&D results. Exploit Technologies Pte Ltd (ETPL) is one of its subsidiaries. It supports the A*STAR in transforming the economy through commercializing and marketing R&D results. It also supports research projects at the A*STAR in the areas of intellectual property (IP) management, incubation, commercialization, and licensing of R&D results.

IP Management includes three stages:

- Technology disclosures
- IP filing
- IP maintenance

Commercialization (spin-off management) has four stages:

Start-up management (such as due diligence and hiring of management

- Fund raising (such as business plan development and negotiation with investors)
- Start-up formation (such as deal sizing and negotiation)
- Post spin-off management (such as portfolio management)

Staff at the ETPL serves as professional consultants and facilitators to transform technologies created at Biopolis and Fusionopolis into services, products, or business models that generate financial value.

5. KEY LESSONS LEARNED

As a result of collaborative and innovative research projects at Biopolis and Fusionopolis, many scientific achievements and commercial results have been developed. Obviously, the A*STAR has also successfully attracted world-class researchers from all over the world.

It is important for readers to understand that the A*STAR plays a supporting role for the research projects. They created a conducive environment for knowledge flows by attracting world-class researchers, providing cutting-edge physical research facilities, and playing a role of facilitator and coordinator.

The A*STAR has created a knowledge ecosystem consisting of biochemistry, physical science, and engineering, and it has been greatly supporting Singapore to become Asia's Innovation Capital. This case clearly shows that governmental institutions are potentially able to create hubs of innovation by focusing on knowledge ecosystem in which, new knowledge, new ways of looking at things, and new ways of doing things are sustainably created that eventually boost innovation.

6. REFERENCES

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CHAPTER 6 MALAYSIAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE¹⁷

DR. IDA YASIN

ORGANIZATIONAL PROFILE				
Organization	Malaysian Agricultural Research and Development Institute (MARDI)			
Headquarters	Selangor, Malaysia			
Mission	To be a world-renowned R&D organization in food, agriculture, and bio-based industries by 2015			
Vision	To create, innovate, transfer and apply knowledge, competencies and services to transform the national food, agriculture and bio-based industries toward increased commercialization and competitiveness			
Year Established	1969			
Number of employees	3,077 (as of April 2012)			

1. OVERVIEW

The Malaysian Agricultural Research and Development Institute (MARDI) was established in 1969. It is a statutory body under the Ministry of Agriculture and agro-based industry of Malaysia, which has been mandated to conduct research in agriculture, food, and agro-based industries. Among its objectives is to lead in agricultural technology and food processing toward the goal of increasing agricultural productivity.

MARDI headquarters is located at Serdang, Selangor. It has eight main research stations and 24 support stations in a land area of 7,065 ha. It consists of 3,077 staff, with 1,321 researchers and 1,756 non-researchers.

MARDI's mainstay is research and development (R&D), and it also provides technical services and entrepreneurship development in food, agriculture, and other fields related to the industry. The technical services include advisory, consultancy, technical trainings, analytical laboratory services and quality assurance, product development and processing as well as technology up-scaling.

¹⁷ The author acknowledges the generous assistance of MARDI Director General, Datuk Dr. Abd Shukor bin Abd. Rahman, and Wan Faridah Wan Jaafar.

MARDI's vision & mission is outlined as follows:

Vision

To be a world-renowned R&D organization in food, agriculture, and bio-based industries by 2015

Mission

To create, innovate, transfer and apply knowledge, competencies and services to transform the national food, agriculture, and bio-based industries toward increased commercialization and competitiveness

Business

- To carry out research to generate innovative technologies for the development of food and agriculture industries
- To provide consultancy and technical services to support the development of food and agriculture industries
- To offer joint ventures and licensing arrangements for the commercialization of research results

Focus of R&D Activities

- Technology development to enhance competitiveness in the food processing industry
- Technology development in the production of fruits, vegetables, flowers, cereals, and others related to the crop industry
- Technology development related to livestock industry
- Technology development in biotechnology, mechanization as well as resource and environment management
- Socio-economic studies and technology management for food and agriculture industries
- Transfer of technologies and commercialization to improve agriculture productivity and food quality as well as to create viable agri-businesses

2. KEY CHALLENGES

MARDI went through various phases of development since its establishment more than 40 years ago.

The key challenges at present can be divided into three perspectives: meeting stakeholder demand, human resources capability, and resource allocation.

MARDI is a public-sector funded and R&D driven institute. MARDI's R&D portfolios now mainly offer public goods, which is market-driven via R&D contracts. The stakeholders demand competitive products and services, higher level of R&D, and effective intellectual asset management.

Retirement of MARDI's staff and frequent transfer of knowledge workers across government departments also create challenges for the retention of knowledge, preservation of institutional memory, and training new staff. There is also competition for talent in various fields related to agriculture, science and engineering.

The expertise of MARDI researchers is listed in Table 6.1.

AREA OF EXPERTISE	NUMBER OF RESEARCHER		
Animal Science	29		
Biological Science	33		
Biotechnology	62		
Chemical Sciences	22		
Computer Sciences & ICT	9		
Crop Production	69		
Economic, Marketing & Technology Management	29		
Engineering	67		
Environmental Science	8		
Food Science & Technology	82		
Plant Breeding	28		
Plant Protection	25		
Plant Science	9		
Post-Harvest Technology	20		
Social Science/Technology Transfer	12		
Soil Science	21		
Technology Commercialization	5		
New Research Officers(to be defined)	54		
TOTAL	594		

Table 6.1 Distribution of Researcher by Area of Expertise

In a knowledge economy, government agencies are increasingly facing competition at national and international levels in terms of funding. At the international level, government agencies are in competition with foreign organizations delivering similar services. As such, research organizations compete to attract the best talent and funding.

MARDI is in R&D business; and it faces great challenges when it comes to transfer R&D findings to commercialization. Based on the data for the period of 2006-2010, technologies commercialized in MARDI are shown in Table 6.2.

MECHANISM	NUMBER					
Significant knowledge & technology generated	896					
Commercialized technology	87 (9.7%)					
Public good technology	42 (4.6%)					
Total technology commercialized	129 (14.3%)					

Table 6.2. Extent of Commercialization

3. KNOWLEDGE MANAGEMENT DEVELOPMENT IN MARDI

MARDI has embedded KM initiatives in the business process since its establishment. However, it was indirectly managed by departments or individuals. The concept of KM was first introduced in MARDI in late 1990s. Subsequently, the awareness programs began when MARDI invited speakers to talk about KM, which were attended by senior officers in 2005. MARDI also sent officers to attend training programs, and gradually embarked on KM initiatives. MARDI has its Strategic Plan 2006 – 2015 and the development of KM in the organization can be seen in the context of MARDI's development.

Beginning Era (1969–1983)

- To spur agricultural technology to increase productivity main focus were rice, palm oil, pineapple, meat, fresh water fish
- The MARDI began operations with 422 staffs and 71 researchers

Development Era (1984–1992)

- Develop research capacity and infrastructure to include fruits (banana, papaya, durian, star fruit, cocoa) and orchid
- To modernize agriculture-sector based on technology
- To assist small and medium scale enterprises in food processing
- Started international networking and agricultural projects with other countries

Transition Era (1993-2000)

- In 1995, integrated information system has been developed with fiber optic network to connect the headquarters in Serdang, Selangor with eight main research stations in Malaysia
- Emphasis on R&D in controlled environment agriculture, fertigation, mechanization, and automation
- Economic recession in 1998 has affected the manufacturing and services sector, thus, the agricultural sector is the best alternative to help boost the

the economy by increasing technology transfer and commercialization activities

Transformation Era (2001–2010)

- Emphasis on knowledge and innovation to develop competitive technology in agriculture biotechnology
- Exploitation of biology resources of herbs for pharmaceutical, nutraceutical, and cosmetic purposes
- Establish Malaysia Agro Exposition Park in Serdang (129 ha) for internationally-recognized Malaysian Agriculture, Horticulture and Agro-tourism Show

4. KNOWLEDGE MANAGEMENT SYSTEM IN MARDI

Establishment of infrastructure in MARDI is geared toward developing centers of excellence, accredited and specialized laboratories, facilities, and technology information center. MARDI migrated from manual operations to e-management for higher efficiency as well as applied knowledge management to enhance innovation processes.

Information, knowledge, scientific findings, and agricultural skills acquired from the R&D activities are channeled to the public via publications, exhibitions, conferences, and seminars at national and international levels. To ensure MARDI is ahead in food and agriculture technology evolution on the global platform, liaisons with national and international research institutions, universities, and group networking are continuously enhanced.

Knowledge management in MARDI has taken into consideration the needs of the public, entrepreneur, scientist, and its staff. The strategy is to manage as much as possible, both explicit and tacit knowledge. Furthermore, the MARDI's staffs are encouraged to write in various publication such as Journal of Tropical Agriculture and Science (JTAFS), Economic and Technology Management Review (ETMR), Corps Technology Bulletin, Food Technology Bulletin, Poultry Technology Bulletin, technology manuals, books, and monographs. In addition, MARDI offers various systems such as:

MyFruits

Myfruits.mardi.my is a one-stop-shop for information about tropical fruits. It offers over 1,000 information sheets on all aspects of tropical fruit production, processing, and marketing

- MePIS
 Provides information on tropical herbs R&D, e-gallery, and books
- AgrobIS
 An information system developed by MARDI to provide the public direct

access to data on all biological genetic resources conserved at MARDI. The system contains germplasm information of more than 40,000 accessions of Plant Genetic Resource for Food and Agriculture (PGRFA), which includes fruits, rice, vegetables, and medicinal plants. The system also consists of information on 2,500 isolates of microbial genetic resources and about 30,000 specimens of arthropods

iSMART

Provides information on more than 300 technologies developed by MARDI, commercialized, or in the up-scaling status

AnjungNet

An intranet for MARDI's staffs, which facilitate internal communication through e-forums and e-news



Figure 6.1. A sample page in i-SMART

NO.	ONLINE SERVICES	JAN	FEB	MAR	APR	MAY	JUN	TOTAL TRANSACTIONS
1	Job Application (no. of applicant)	43	101	88	96	208	112	648
	Job Application (no. of visitor)	11,369	6,227	6,344	5,210	5,920	5,290	45,241
2	e-Bookshop (no. of order)	10	21	9	17	12	33	105
	e-Bookshop (no. of visitor)	330	295	334	326	329	291	2,139
3	e-Learning (no. of applicant)	40	44	32	27	20	38	239
	e-Learning (no. of visitor)	1,427	1,022	1,256	1,266	1,083	1,468	8,738
4	Enquiry (no. of question)	3	83	97	71	8	5	267
5	myFruits (new registered user)	6	13	13	17	6	6	75
	myFruits (no of visitor)	187	133	132	135	45	48	731
6	Staff Directory (no. of visitor)	443	443	452	458	515	439	3,253
7	MePIS (no. of visitor)	174	196	289	387	323	422	2,321
8	MagriTech/i-SMART (no. of visitor)	169	134	142	157	110	105	916
9	Cameron Highlands Agro Technology Park (no. of visitor)	614	504	587	646	715	665	4,382
10	Langkawi Agro Technology Park (no. of visitor)	203	212	238	198	276	282	1,719
11	Ag-Food (no. of visitor)	73	53	65	58	36	28	335
12	National Information Sharing Mechanism – NISM (no. of visitor)	26	13	21	24	9	15	114
13	MARDI Library System (no. of visitor)	304	878	457	218	467	742	3,575
	TOTAL							74,798

Table 6.3 Number of MARDI Online Transactions

Tacit knowledge is essentially personal in nature, and is therefore difficult to extract. The transfer of tacit knowledge is best accomplished by the transfer of people as 'knowledge carriers'. Furthermore, learning in an organization occurs when individuals come together under environments that encourage them to share their ideas and to develop new insights together that lead to the creation of new knowledge. In MARDI, various platforms are created to encourage tapping into tacit knowledge such as:

- Brainstorming session: for policy and planning
- Coaching and mentoring: for human resource development
- Innovative and Creative Circle: for improvement in work process
- Forum: to exchange ideas and perspectives
- Public lecture: to share research findings
- Structured interview: to gauge knowledge in specific area
- Assignment analysis: to benchmark work process
5. RESULTS

MARDI research endeavors of more than 40 years have generated many new crop varieties and clones, animal breeds, and management practices. Cutting-edge technologies in food processing and post-harvest handling have also been developed for horticultural and livestock products. ICT technologies were exploited in farm management and operations such as 'precision farming' technology for rice estate, and yield estimation using imaging technology. New techniques are being developed in environmental management and optimum utilization of agricultural resources, particularly soil, water and genetic resources.

Eventually, the knowledge and technology that were created in MARDI should be applied by farmers and entrepreneurs in improving their productivity. Farmers and entrepreneurs who adopted MARDI technologies have contributed to the development of the national food, agriculture, and agro-based industries, making the agricultural sector a compelling contributor to the national economy. Since its establishment, MARDI has assisted hundreds of domestic 'agro-preneurs' or agricultural entrepreneurs in research and development and commercialization (R&D&C).

The assistance to agro-preneurs includes:

- Technology transfer: such as food processing technology and seeding technology
- Technical consultancy: such as standard operating procedures and waste management
- Skills training: such as factory management and estate management

Malaysian Angkasawan spaceflight program in 2007 featured MARDI's involvement in producing food specially prepared and packed for the first Malaysian astronaut cum orthopedic surgeon, Dr. Sheikh Muszaphar Shukor. All products were approved by the food testing laboratory in Russia to be consumed in space. The mission performed experiments on board the International Space Station relating to the characteristics and growth of liver cancer and leukemia cells, and the crystallization of various proteins and microbes in space. Sheikh Muszaphar celebrated Eid ul-Fitr aboard the station, and handed out satay, *rendang*, and Malaysian cookies to the crew on 13 October 2007 to mark the end of Ramadan.

As an organization doing research in science and technology as its core business, the MARDI provides a pool of experts in relevant fields, and contributes significantly to the global knowledge corpus. The knowledge processes, in accordance to the APO KM Framework, to identify, create, store, share, and apply are being implemented in various ways.

The MARDI has participated in various science and technology events nationally and internationally. In the national scene, from 2002 to 2009, the MARDI was

involved in the Malaysia Technology Expo, Intellectual Property Award, BioMalaysia, and National Innovation Award. The MARDI received 217 medals (40 gold, 87 silver, 90 bronze, and 10 special awards). In the international scene, the MARDI participated in the International Exhibition of Inventions (Geneva), British Invention Show (BIS London), Inventions & New Exposition (INPEX Pittsburg, U.S.A.), Seoul Invention & Innovation Fair (SIIF), World Exhibition of Innovation Research & New Technology (Eureka Brussels), and Ideas-Inventions-New Products (iENA NÜremberg). Between 2002-2009, the MARDI garnered 60 awards internationally (28 gold, 27 silver, 5 bronze, and 9 special awards).

In addition, the MARDI was also awarded numerous quality awards and research awards. It won nine awards, namely Project Management Quality Award, Malaysia Toray Scientific Foundation Science & Technology Award, Public Sector Innovation Award, and Public-Private Sector Innovation Award.

ANNEX A

BASIC CONCEPTS IN KNOWLEDGE MANAGEMENT

The most frequently asked questions for beginners on KM are:

- What is knowledge?
- What is knowledge management (KM)?
- How to get started?

WHAT IS KNOWLEDGE?

Although there is no one standard definition on knowledge, definitions by leading KM gurus share one common characteristic - knowledge increases capacity for effective action.

Examples of definitions by key leading KM gurus:

"Justified belief that increases an entity's capacity for effective action" – Ikujiro Nonaka¹⁸

"I define knowledge as a capacity to act" – Karl Erik Sveiby¹⁹

"Knowledge is information that changes something or somebody — either by becoming grounds for action, or by making an individual (or an institution) capable of different or more effective action" – Peter F. Drucker²⁰

"Knowledge is information in action" – Carla O'Dell, C. Jackson Grayson and Nilly O'Dell Essaides²¹

TYPES OF KNOWLEDGE

Knowledge can be broadly classified into two types: explicit and tacit knowledge²². Explicit knowledge can be expressed in words and numbers and easily communicated and shared. It comes in various forms such as documents, books, manuals, procedures, manuals, rules and regulations, images, patents, database, etc.

¹⁸ Nonaka I. A dynamic theory of organizational knowledge creation. Organization Science 1994; 5:1: 14-37.

¹⁹ Sveiby K.E., et al. The New Organizational Wealth: Managing & Measuring Knowledge-Based Assets. San Francisco: Berrett-Koehler Publishers; 1997.

²⁰ Drucker P.F., et al. The New Realities. Boston: Butterworth-Heinemann; 1989.

²¹ O'Dell C., Grayson C.J., Essaides N.O., et al. If Only We Knew What We Know. New York: Free Press; 1998.

²² Knowledge Management: Facilitators' Guide. Tokyo: Asian Productivity Organization; 2009.

Tacit knowledge, in contrast, is found in the minds of employees (such as skills, experience, expertise and thoughts, etc.), the experience of customers, or the memories of past vendors, etc. Tacit knowledge is difficult to document, communicate, and share with others. Therefore, in order to share or transfer tacit knowledge, it has to be made explicit in some form that can be easily communicated to others, generally through codification or social interaction, etc.

Documents	Explicit Knowledge
Procedures	
Manuals	
Policies/Rules	
Practices	
Systems	
Skills	•
Experience	
Mind of Individual	Tacit Knowledge

Figure A.1: Types of Knowledge

It is necessary, at this point, to understand the difference between 'knowledge' and 'information'.

When knowledge owners want to share or transfer their tacit knowledge to others, they do this by first making part of their tacit knowledge 'explicit' (via speech, book, e-mail, presentation, etc.), which can be easily communicated to others. Their explicit knowledge is just information to the recipients until they in turn; choose to internalize it as their own tacit knowledge. In short, explicit knowledge will merely be information if it is not internalized by the recipients through the learning process.

Therefore, the difference between the two: knowledge is internal to humans, whereas, information is external.

Although explicit knowledge is believed to only be the tip of the iceberg of the entire body of knowledge, both explicit and tacit knowledge are important and complement each other. In fact, conversion of these two types of knowledge happens constantly, and through this conversion process, tacit and explicit knowledge expand in quality and quantity.

To better understand the interaction between tacit and explicit knowledge, it is essential to understand different modes of knowledge conversion or knowledge transfer.

KNOWLEDGE CONVERSION PROCESS

Professor Nonaka²³ and Takeuchi²⁴ developed 'SECI Model' to explain how knowledge is created and amplified through the four modes of knowledge conversion:

²³Nonaka I., Takeuchi H., et al. The Knowledge Creating Company: How Japanese Companies Create The Dynamics Of Innovation. New York: Oxford University Press; 1995.

²⁴SECI is an acronym for the four modes of knowledge conversion: Socialization, Externalization, Combination, and Internalization.

- Socialization (tacit to tacit) is a direct transfer of tacit knowledge from person(s) to person(s) through social interaction and experience sharing, thereby creating new tacit knowledge (for e.g.: exchanging insights during talks by the water-cooler).
- Externalization (tacit to explicit) is a process of converting tacit knowledge to explicit knowledge (for e.g.: writing an article or giving a presentation using an individual's experience)
- Combination (explicit to explicit) is a process of bringing together different bodies of explicit knowledge to create new knowledge (for e.g.: formal training in schools, using information from various websites to draft a technical paper)
- Internalization (explicit to tacit) is a process of internalizing explicit knowledge of others into individual's tacit knowledge, which is actually the learning process or learning by doing (for e.g.: practicing storytelling technique after reading KM book, understanding how to run the machine after reading an instruction manual)



Figure A.2: SECI Model - Modes of Knowledge Conversion

In organizational context, KM is about managing the knowledge conversion or knowledge transfer process, which will lead to a continuous renewal and amplification of tacit and explicit knowledge. This may involve the creation of supportive organizational structures and workplace environment, collaborative teamwork, deployment of information technology (IT) for teamwork, and knowledge transfer.

KM involves the optimization of its tacit and explicit knowledge, which are now considered as key organization knowledge assets. Tacit knowledge is referred to as "human knowledge assets" as it resides in the minds of people, either as individuals, teams, networks, communities, or organizations.

Explicit knowledge, which may be codified in various forms such as documents, process description, policies, software, training programs, etc., can also be knowledge asset, referred to as "structural knowledge asset".

WHAT IS KM?

To answer the above question, it is better to understand some common elements found in numerous KM definitions proposed by KM gurus and practitioners all over the world. The key common elements include the following:

- KM is an organizational strategy, practice, and approach
- KM is an integrated and systematic approach
- KM is closely linked to knowledge processes, which involve the processes of identifying, creating, storing, sharing, and applying knowledge
- Knowledge is leveraged to improve organizational performance

The APO defined KM as follows:

"KM is an integrated approach of creating, sharing, and applying knowledge to enhance organizational productivity, profitability and growth."²⁵

The definition covers all key common elements mentioned earlier. Two points need to be emphasized:

- Integrated approach KM is a holistic approach that involves multi-disciplinary systems to make it work. For example; commitment and direction setting from leaders, involvement of employees (owners of knowledge) at all levels from key functional units, and support from the IT system to enhance knowledge transfer and accessibility, etc.
- Creating, sharing and applying knowledge These are key steps of the knowledge process, which help facilitate at least one mode of knowledge conversion (SECI Model). The knowledge process, by itself, has no context. Therefore, it has to be embedded into work processes or practices of the organization, ideally, at all levels. The details of the knowledge processes and their application are fully addressed in Annex B on the APO KM Framework.

If an organization can implement knowledge processes, which are embedded in all key work processes systematically and collectively, the productivity, profitability, and eventually growth of the organization will be dramatically improved. These are, in fact, the outcomes of KM, as clearly stated in the APO's KM definition.

HISTORICAL GENERATIONS OF KM

The APO KM definition is one among numerous definitions proposed by many KM

²⁵ Knowledge Management: Facilitators' Guide. Tokyo: Asian Productivity Organization; 2009.

experts and practitioners; it reflects the evolution of KM, which has gone through at least five generations since its emergence:

1st Generation

ICT/Web-based systems: Generation 1 appeared in the early decade of the 1990s, which focused mainly on collaborative technologies to support the transfer of mostly explicit knowledge. It is not sufficient for effective KM as it failed to address tacit knowledge, which is also a key asset of the organization.

2nd Generation

Collaborative Communities: Generation 2 was based on collaborative teamwork and collaborative community work and research. This generation started in the mid-1990s and began to provide some useful value. Generation 1 was technology-based, whereas Generation 2 was far more team- and people-based.

3rd Generation

KM-Enabled Processes: This generation emerged in the late 1990s and linked KM with learning process and learning organization. It addressed the embedding and enabling new knowledge processes.

4th Generation

Strategic Enterprise KM: This generation began in 2001 with the realization that knowledge, when used as a strategic asset, was highly effective, and could create very high value to organizations.

5th Generation

Inter-Organization KM: The latest KM development was the expansion of KM practices externally across multiple organizations, which can create more effective clusters, communities, and ultimately, more dynamic knowledge-driven and knowledge-based economies and societies.

The KM development is a never-ending process. The next KM generation is emerging sooner or later. The case studies described in the earlier sections represent different generations of KM development; in fact, some practices may lead to the future generation of KM.

HOW TO GET STARTED ON KM?

Understanding the KM definition and KM evolution is a good start for a KM journey, but inadequate to be successful in KM implementation. In this regard, APO has developed a wide range of publications on KM to guide and help organizations, regardless of size or sector, to successfully embark on a KM journey, choose practical KM tools and techniques for KM implementation, and learn from case studies of organizations with good KM practices from both the public and private sectors.

These APO publications on KM can be downloaded from its website:

- Practical Guide for SMEs Owners/ Managers (2010)
- Knowledge Management: Tools and Techniques Manual (2010)
- Knowledge Management: Facilitators' Guide (2009)
- Knowledge Management: Case Studies for Small and Medium Enterprises (2009)
- Knowledge Management in Asia: Experience and Lessons (2008)

ANNEX B

APO KNOWLEDGE MANAGEMENT FRAMEWORK



The APO KM Framework provides a common understanding of KM among member countries, and emphasizes its value for organizational success. The Framework is designed based on the practical experience of KM from several countries in Asia, including the best practices from America, Australia, and Europe. The APO KM Framework is simple and comprehensive. It addresses all relevant elements of a KM solution, and serves as a reference basis for all types of organizations; it aims to improve their performance through knowledge management.

The starting point is the understanding of the vision and mission of the organization, which provides the strategic direction of the organization. Understanding it helps identify core competencies required to achieve the business objectives providing insights for designing the KM programs, roadmap, and action plan for the organization.

There are three levels in the framework:

- Accelerators
- Knowledge Process
- Outcomes

The Accelerators comprise both drivers and enablers of KM. Leadership is the driver that propels KM initiative in the organization. Processes, people, and technology enable the organization to accelerate the KM initiative and implementation.

Five widely accepted core knowledge processing activities have been identified: identify, create, store, share, and apply knowledge.

They represent the second layer of the framework by forming an integrated process. The Knowledge Process starts with identifying what the organization 'needs to know and what it knows'. The knowledge gaps are then translated into knowledge assets through the process of creation, storage, sharing, and application.

The third layer highlights the outcomes of KM. The Knowledge Process enhances learning and innovation that build individual, team, and organizational capabilities resulting in increased societal capacity. These will lead to improvement in the quality of products and services, productivity, profitability and growth, thereby contributing to socio-economic development.

The APO KM Framework will help organizations, which are embarking toward their own KM journey by considering all the KM elements outlined to achieve an efficient and successful KM implementation. The framework assures that no important aspect of KM will be overlooked while reducing the variety and complexity of KM to manageable task.

DEFINITIONS OF TERMS

1. Vision and mission

Vision is an expressed statement made by an organization, which outlines a long-term desired state of the organization. Mission broadly states the basic purpose of the organization. Vision and mission, together, help in framing strategic directions of the organization. They help identify core competencies required to achieve the business objectives. They provide insight for designing KM programs, roadmap, and action plan for an organization.

2. Accelerators

Accelerators help to propel and speed up, or 'accelerate' the KM initiative in the organization. The four accelerators identified in the framework include:

- i. Leadership
- ii. Technology
- iii. People
- iv. Processes

Leadership

The leadership, which resides in the top management, is the driver of the KM initiative in the organization. The leadership ensures alignment of KM strategies and projects with the vision and mission of the organization. Leaders identify champions of KM who help in the successful implementation of KM projects. They demonstrate commitment and support by providing resources for the implementation of KM projects. They also institutionalize KM in the organization through the development and implementation of policies and structures to build a knowledge-enabled work environment, which encourages the acquisition, sharing, and application of knowledge.

Technology

Technology accelerates the knowledge process by providing various effective tools and techniques, which assist in the creation, storing, sharing, and application of knowledge. Technology helps in managing explicit knowledge through various tools, such as search engines, storage media, intranets, and extranets. In case of tacit knowledge, technology facilitates online and offline collaboration, leading to better communication and sharing at both formal and informal levels. Tools such as groupware and collaborative workspaces enable participation, across time and distance, in the process of knowledge creation. Technology provides a platform for retention of organizational knowledge.

People

People play an important role in key knowledge process, namely creation, sharing, and application. In an organization, staffs are users as well as generators of knowledge, and form an important knowledge asset by acting as a repository of tacit knowledge; even explicit knowledge till it is documented. They are part of human capital, and create and possess intellectual capital. For example, the material assets of a firm are of limited worth, unless it has people who know what to do with them. It is the value-added by people – context, experience, and interpretation – that transforms data and information into knowledge.

The success of the KM projects largely depends on employees' willingness to share knowledge. There must be a climate of mutual trust and benefit to encourage knowledge sharing amongst employees.

Processes

Processes refer to a flow of events that describe how things work in an organization. These are sequences of social and technological steps that enhance the contribution of knowledge in the organization. Systematic and effectively-designed processes can contribute to improving organizational productivity, profitability, quality, and growth. It is useful to periodically check known assumptions in design of processes, and incorporate learnings from best practices in redesigning them for better performance.

3. Knowledge processes

Knowledge processes refer to knowledge development and conversion processes. There are five stages in the knowledge processes identified in the framework:

- i. Identify
- ii. Create
- iii. Store
- iv. Share
- v. Apply

Identify

This is the initial crucial stage of the knowledge process, where critical knowledge needed to build the core competencies of the organization is identified. The knowledge gaps and the types of knowledge required in the various areas of the organization are defined.

Create

Creation is addressing the knowledge gaps through knowledge conversion and generation of new knowledge. There are many ways to create new knowledge. At the individual and team level by training, learning by doing, joint problem solving, or brainstorming activities. At the department or organizational level, new knowledge is created for products, services, internal processes, and procedures. Often, new solutions, great ideas are not recorded, either for learning or reuse. Hence, these remain solely as individual knowledge and lost by the organization.

Store

Knowledge storage involves collection and preservation of organizational knowledge. This preserved knowledge is organized so that it can be retrieved quickly and easily by the users. It is not easy to document individual experience and expertise (tacit knowledge), and therefore, it is important to know and retain those who have these expertise.

Share

Sharing occurs when there is regular and sustained exchange of knowledge among the members of the organization. The objective is to foster continuous learning to achieve business goals. Mutual trust and benefit help foster a culture of sharing. Technology can be used to enhance sharing. Coaching and mentoring are other means of sharing.

Apply

Application is the use and reuse of knowledge in the organization. It translates knowledge into action. A lot of knowledge remains underutilized. Knowledge adds value only when it is used to improve products and services.

4. Learning and innovation

The knowledge process enables learning and innovation at all levels and areas in the organization. Learning is the discovery of new insights, the affirmation of what is already known and the realization of the need to unlearn. New insights and unlearning can lead to innovation, which could encompass new products, services, processes, markets, technologies, and business models.

Learning and innovation arising out of the knowledge process helps to build individual and organizational capability which in turn leads to societal capacity.

5. Outcomes

The expected outcomes of KM initiatives are enhanced individual, team, and

organizational capability, and increased societal capacity. Together, these outcomes will spur overall productivity, improve quality of products and services, and contribute to profitability and growth.

Individual Capability

Learning and innovation arising out of the knowledge process increase knowledge and skills of individuals resulting in enhanced performance. Positive attitudes, strong moral, and ethical values are the foundations of individual capability development. Individual capabilities collectively contribute to team capabilities, organizational capability, and societal capacity.

Team Capability

Sharing of knowledge in a team enhances the team's capability. A team's capability is only as good as the individuals who make up the team. When individuals in a team are constantly learning and sharing knowledge with each other, team capability is enhanced.

Organizational Capability

Organization capability focuses on improving internal processes and systems, core competencies and designing innovative strategies to achieve sustainable growth and competitive advantage.

To do this, organizations need to leverage on individual and team capabilities, and collaborate with external stakeholders such as suppliers, customers, and partners.

Societal Capacity

Societal capacity refers to the collective knowledge of individuals, organizations, and institutions that can be harnessed for inclusive growth. As the world moves toward knowledge economy, society must be prepared for the transformation. Government and the private sector will have to work collectively in raising awareness, and provide impact on the importance of knowledge and technology. Networking and collaboration can stimulate creative potential of individuals and organizations to seize the enormous opportunities in the society for growth and development.

Productivity

Productivity focuses on efficient and effective use of resources to produce higher output. Higher productivity can be achieved through the collective capabilities of individuals and teams, technology, improved work processes and systems, enhanced collaboration, and better decision making. The outcomes include reduced wastage, better products and services, and increased profits.

Profitability

Improved productivity leads to profitability. Profitability means wealth for individuals, organizations, and society as a whole. Knowledge helps in value creation leading to increased profitability.

Quality

Quality means better products and services, which leads to higher customer satisfaction. Improvement in quality is the result of application of knowledge, learning, and innovation.

Growth

Higher productivity, increased profitability, and better quality product and services can yield higher gross domestic product. These and improved societal capacity can bring about inclusive growth and better quality of life for all. This is the ultimate objective of all productivity movements in the world. Using knowledge can enhance productivity, quality, profitability, and growth.

ABOUT THE AUTHORS AND THE VOLUME EDITOR



RON YOUNG Chief Expert and Team Leader

Ron Young is the founder and CEO for Knowledge Associates International, a management consulting firm based in Cambridge, U.K. He is acknowledged as a leading international expert and thought leader in Learning, Knowledge Management, and Innovation.

He advised and assisted the U.K. DTI Innovation Unit in 1999 in the production of the U.K. Government White Paper titled 'UK Competitiveness in the Knowledge Driven Economy'.

He regularly provides keynote presentations at leading KM and Innovation conferences around the world, and he has extensive experience in working with European, Asian, and U.S. organizations. He has chaired both the British Standards Institute (BSI) Knowledge Management Standards Committee for three years until 2003, and the European CEN Knowledge Management Standards Committee for two years until 2004.

Ron Young is the founder of the highly informative Open Knowledge website www.knowledge-management-online.com. He lives with his wife between Toulouse, SW France, and Cambridge, U.K.



DR. BOONDEE BUNYAGIDJ

Dr. Boondee Bunyagidj is the Advisor to the Executive Director of the Thailand Productivity Institute.

After completing her Ph.D. in microbiology at the Kansas State University in the United States, she obtained a Master of Management (M.M.) degree, majoring in business management from the Sasin Graduate Institute for Business Administration of Chulalongkorn University, Thailand.

Dr. Boondee has played a pioneering role in introducing benchmarking methodology in Thailand in 1999 and best practice case studies using the Malcolm Baldridge National Quality Award in 2001.

She helped initiate KM pilot projects at the Thailand Productivity Institute that helped develop a suitable KM model for Thai organizations, and the KM assessment methodology based on Thailand Quality Award framework.



DR. SHIN KIM

Dr. Shin Kim is a research fellow at the Korea Institute of Public Administration (KIPA), which is a Korean government think tank under the Prime Minister's Office. Before joining KIPA, he was a research professor at the SungKyunKwan University. Dr. Kim received his Master's degree and Ph.D. in public administration from the University of Akron, Ohio, U.S.A.

He has been extensively involved in the process of Korean government reform for more than a decade. He was a member of Government Innovation Consulting Committee under the Ministry of Government and Home Affairs, advisor to the National Assembly Budget Office, and evaluator of Policy Evaluation Committee under the Prime Minister's Office.

His research interests include administrative reform and policy analysis. He has published many books, articles, and chapters in books on government reform, performance management, and policy innovation. His recent research focus is on enhancing public-sector productivity, including knowledge management, performance evaluation, and organizational development.



PRABA NAIR

Praba Nair is Principal Consultant in Knowledge Management and Change Management at KDi Asia, an international consulting and training services organization based in Singapore. Prior to joining KDi Asia, he was the Director of the KM Competency Centre at NCS Pte Ltd, which is the largest IT service provider in Singapore. He has more than 20 years of varied professional and management experience in Knowledge Management, Learning Organization, Change Management, and Human Resource Management spanning the private-and public-sector organizations in Singapore and the region. His regional experience includes engagements in countries such as Bahrain, Bangladesh, Cambodia, Fiji, India, Japan, Republic of Korea, Malaysia, Indonesia, Myanmar, the Philippines, Thailand, Republic of China, U.K., U.S.A., and Vietnam. He is also an Adjunct Lecturer at Nanyang Technological University, and the Singapore Institute of Management.

He was a key architect in the development of the APO KM Framework. His articles and views have been published in various regional and international publications. He has also co-authored several APO publications such as `KM Facilitators' Guide', `Case studies for SMEs', and `KM Tools and Techniques'. He wrote a chapter, `Knowledge Management in the Public Sector', in the *Times* publication, `e-Government in Asia: Enabling Service Innovation in the 21st century', 2005.



NAOKI OGIWARA

Naoki Ogiwara had worked as KM consultant at KDI, Fuji Xerox in Japan for over a decade, actively supporting KM initiatives in more than 20 large corporations, and the public organizations in Asia, helping them create effective ways to create, share, and utilize knowledge. He is also a management benchmarking specialist, who led eight global benchmarking studies on KM, visiting and analyzing over 60 leading-edge organizations worldwide. He joined the World Bank in 2011, and is now a KM lead in Financial and Private Sector Development at the Bank.

Naoki has written, coauthored or edited many books and articles in the KM field. He cowrote books and articles on Knowledge Management: Case Studies for Small and Medium Enterprises (Asian Productivity Organization, 2009), Knowledge Management: Tools and Techniques (Asian Productivity Organization, 2010), and The Potential of a New Workplace (NASA Ask Magazine, 2011).

Naoki holds a BA in political science from Keio University, and an MBA, summa cum laude from Babson College.



DR. IDA YASIN

Dr. Ida Yasin has been working at various divisions of the Malaysia Productivity Corporation (MPC) for the past 19 years. She holds a Ph.D. in Quality and Productivity Improvement from the National University of Malaysia; her thesis is on Knowledge Management Capability of the Manufacturing Sector. She received her Master's degree in Economics.

Her research interest includes KM and productivity measurement. She contributed papers on KM and productivity measurement in various conferences, and coauthored a book which is published by the Asian Productivity Organization entitled "Knowledge Management in Asia: Experience and Lessons". She also contributed to the module development of "Knowledge Management: Facilitators' Guide." She has conducted training on knowledge management locally and internationally.

Dr. Ida is active in promoting knowledge management in Malaysia. She is among the key people in the Association of Knowledge Management Practitioners, Malaysia. Recently, she was appointed as the Industrial Advisor for the knowledge management program in the Multimedia University of Malaysia.



DR. SERAFIN TALISAYON Volume Editor

Dr. Serafin Talisayon is the Director for R&D of the Center for Conscious Living Foundation since 1999, a nonprofit organization providing advocacy, services, and tools in knowledge-based development, knowledge management, and organizational learning and change. He is the Vice Chair of the Knowledge Management Association of the Philippines.

Dr. Talisayon wrote a book on KM and was the senior author of two other KM books. He had edited four KM books for APO, including this book. He is a member of the Editorial Board of the Knowledge Management for Development Journal. He teaches KM at the Technology Management Center of the University of the Philippines, where he supervised workplace KM projects of over 230 graduate students. He spoke at many KM conferences in Hong Kong, Singapore, Thailand, India, Indonesia, Malaysia, and People's Republic of China.

He was also a KM consultant for the Asian Development Bank, World Bank, International Labour Organization, Asian Productivity Organization, Delegation of the European Commission, IBM, UNDP, UNISDR, World Health Organization, and SEAMEO, among others. He has provided KM services for over a decade to clients in India, Indonesia, Mongolia, Vietnam, Switzerland, Netherlands, Thailand, U.K., and the Philippines.