

Automation Of Knowledge Asset In Public Works Department (PWD) Of Malaysia

Yusmadi Yah Jusoh^a and Muhamad Rahimi Abdullah^b

^aInformation System Department, Faculty of Computer Science and Information Technology
University Putra Malaysia, Serdang, Selangor
Email: yusmadi@fsktm.upm.edu.my

^bInformation Technology Centre, Corporate Management Branch,
Public Department Of Malaysia, 50582 Kuala Lumpur
Email: mrahimi@jkr.gov.my

ABSTRACT

Finding the right information quickly and easily to make informed decisions is one of the biggest challenges faced by PWD today. To automate the management of the knowledge assets, PWD have to stand back and take a strategic approach – to understand why and where knowledge management (KM) will deliver the greatest benefits. Knowledge not so many years ago was based on paper filing, and PWD depended on knowledgeable workers who knew how it was filed, and had experience that enabled them to make ‘informed’ decisions. Today, this has all changed as information is held electronically and often needs to be shared with others beyond the traditional boundaries of the corporation. The objective is to make pilot study on the automation of the knowledge asset based on Knowledge Management in Project Monitoring System Unit, Information Technology Centre, Corporate Management Branches of PWD by leveraging on the existing Information Technology Infrastructure available. The outcome of the study will be presented to the Director of Corporate Management Branches of Public Works Department (PWD) as a pilot project.

Keywords

Knowledge Management, Knowledge Asset, Knowledge Capital, Knowledge Asset Framework, Knowledge Management Roadmap, Knowledge Asset Roadmap

1.0 INTRODUCTION

Before embarking on any project knowledge-based information, PWD need to audit how information is used, where it is stored and who needs access to it. Once the

organization understands what information it has, the next task is to work out who can make best use of it.

Staff at different locations can identify the type of information their colleagues are searching for – not only improving collaboration between groups with less duplication of effort, but also acting as a catalyst for new ideas.

Information is increasingly held electronically in various repositories – databases, office systems, image archives, and financial systems – and these impose extra barriers to locating and qualifying information. Because of the sheer volume of information, some of whose location is unknown. KM is an umbrella framework that allows staff to find the information they are looking for, regardless of its location.

2.0 PWD ORGANIZATION

2.1 Overview of the Organization

PWD or in Malay, Jabatan Kerja Raya (JKR) which has begun since the colonization time until today still maintain the main function of providing the infrastructure to the country. PWD which was set up since 1872 has progressed and became more excellent after gaining the independent in the year 1957. Planning and execution of projects were properly organized and implemented according to the government five-year planning of the country development and the First Malaysian Plan was launched in 1966. Since then, PWD is responsible for the development of the country which is becoming more challenging in this new millennium with the beginning of the Eight Malaysian Plan in year 2000.

PWD track record of excellence as an implementing agency and technical consultant to the government is constantly sensitive to the latest technologies and with the skilled and innovative professional work force, PWD is able to implement projects as desired and to the satisfaction of the clients. The expertise of PWD's

professional offer services wholly to the construction sectors which comprised of roads, water supply, buildings, airports, ports and jetties. These main sectors are fully supported and complement each other by certain functions of the mechanical engineering, electrical engineering as well as the contracts and quantity surveying teams.

PWD Malaysia has been awarded the Malaysian Public Services MS ISO 9000 Quality System Registration Certificate on 9 January 2000. The scope of registration for Quality System that is being implemented is based on MS ISO 9001:1994 for Technical Consultancy and Project Management Services. The activities comprised of planning, design, procurement, project management, contract administration and servicing. The registration involves

- PWD Malaysia Headquarters
- 10 PWD States – Perlis, Kedah, Pulau Pinang, Selangor, Negeri Sembilan, Melaka, Johor, Pahang, Terengganu and Kelantan
- Federal Territory Kuala Lumpur and Labuan

2.1 Current Business Process

PWD is one of the biggest government technical departments. One of the roles of PWD is to provide technical advice and consultancy to the government on project implementation. To realize this, there are three main core business of PWD, that is:

- Consultancy services
- Project Monitoring services
- Operation and Maintenance services

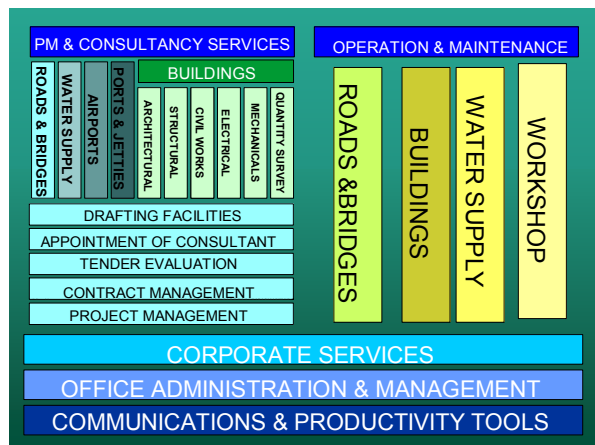


Figure 1 Core Business Of PWD Malaysia
2.2 Functions and Responsibilities of PWD

PWD is responsible in planning, designing and the construction of infrastructure projects in the country. Hence, PWD has set up the main sectors and supported by the specialist sectors to carry out the functions and responsibilities to the country. The sectors are as below:

- Roads and Bridges
- Buildings (Education, Health, Defense, Internal Security and General Building)

- Water Supplies
- Airports and Ports
- Electrical Engineering
- Mechanical Engineering
- Contract and Quantity Surveying

2.3 THE CURRENT ORGANIZATION STRUCTURE

Currently, PWD is headed by Director General, Dato’ Ir. Haji Zaini Bin Omar and is supported by two Deputy Director General, that is, Dato’ Prof. Ir. Dr. Wahid Bin Omar as Deputy Director General I and Dato’ Ir. Ng Chong Yuen, Deputy Director General II.

Thirteen State PWD are Perlis, Kedah, Pulau Pinang, Perak, Selangor, WP Kuala Lumpur, Negri Sembilan, Melaka, Johor, Pahang, Terengganu, Kelantan and WP labuan. The PWD Special Unit is PWD KESEDAR, PWD Federal Development Department in Sabah and Kelantan. The Technical Unit is PWD WP Putrajaya.

2.3.1 Human Resources

The established management of human resources will give satisfaction to the staff to work more dedicatedly and thus enhance the quality of work towards their career development. PWD workforce is divided into three groups, that is, professional group (14%, 1505), administrative groups (16%, 1555) and technical supporting group (70%, 1805). The total numbers of PWD workforce is 4685. The breakdowns of professional are Civil Engineers (37%, 864), Electrical Engineers (16%, 166), Mechanical Engineers (12%, 127), Architects (15%, 166) and Quantity Surveyors (19%, 193). Based on qualification, there is 88 with master degrees and 21 with PhD degrees.

2.3.2 Stakeholder

Stakeholders are the most important client because they decide the direction of the development policies of the country. PWD are the implementer of the government development project.

The stakeholders are those who have an interest in a particular decision, either as individuals or representatives of a group. This includes people who influence a decision, or *can* influence it, as well as those affected by it.

2.3.3 External Client

2.3.3.1 Government Agencies (Ministries/ Departments)

The Client Department/Ministry is the “originator” and final user of the projects which the PWD implements. The preparation of the development plans and outline briefs of the projects, and the bid for the necessary funds are undertaken by the Client Department/Ministry which also undertakes to identify suitable sites and to acquire the

land. Where land has to be acquired from private owners, the Client Department/Ministry is responsible for all matters related to its acquisition and payments of compensations.

2.3.3.2 General Public

General public is defined as the user of the government building, road and water supply user.

2.3.3.3 Contractor

Contractor means the person or persons; partnership, firm or organization that's tender for the Main Contract Works has been accepted by the Government to perform a specific task and includes the Contractor's heirs, executors, and administrators, permitted assigns, successors and duly appointed.

2.3.4 Internal Client

The internal clients are the staffs of PWD which consist of technical and administration/financial personnel.

2.3.5 Consultant

A consultant, which may be an individual or an organization, provides expert advice with recommendations to a department/agency as the basis for making a decision or taking a certain course of action.

3.0 INFORMATION TECHNOLOGY INFRASTRUCTURE OF PWD

Project Management requirement will continue to be the strategic business system of the organization. Continuous corporate effort will be spent to enhance the system and mould it into a working MIS model not only for Ministry Of Works/Public Works Department but for similar organization inside and outside the country. On plan will be the upgrade of major portions of the existing Contract Managements, retaining the same functions but with increased flexibility for future enhancement and expansion to meet current and possibly future changing business needs.

To manage the project, PWD introduced a project monitoring system known as SKALA in early 1980's. The objective of this system is to assist in the implementation and monitoring of the government development project which is handling by PWD using IT tools to assist in project monitoring processes. This is in line with the vision of the Electronic Government which call for the reinventing the government (using multimedia/information technology to improve productivity). A systematic implementation and monitoring system on all the development project is important to guarantee the implementation of the project run smoothly and didn't affect the current world economy.

The project implementations are divided into five phases:

- Planning

- Designing
- Procurement
- Construction
- Handing Over

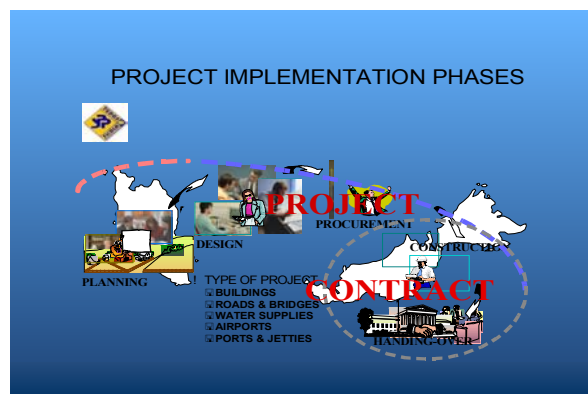


Figure 2 Project Implementation Phases

The usage of computers in PWD was started since 1983. In 1990, the first LAN was installed in PWD Computer Centre. This LAN was serving put up to replace the IBM Mainframe and to down size all the application from IBM to the Novell NetWare Application Server. In 1994, LAN was installed to all PWD building situated in Kuala Lumpur and connected together through WAN. In 2000, the LAN was installed to all PWD branches in State and District throughout Malaysia.

The latest version of Novell Netware Operating System used in PWD Headquarters was version 6.00 and at the state and district level, Microsoft NT Server Version 4.0 was used.

The IT infrastructure at the main office was connected via a 2MB leased line connection to JARING to give the users accessibility and usage of Internet. At the state and district level, the connection to headquarters level was done using dial-up facilities through Internet.

All the IT infrastructure and the main application such as SEPAKAT (Human Resources System), SKALA (Project Monitoring System), Sistem Fail (File Management System), AutoCADD application for design and drafting etc were managed by PWD IT Centre.

Communication between the PWD officers and staff and to the external entity was done electronically through a groupware application (e-mail, scheduling, appointment, telephone message) called Groupwise, a Novell product.

3.1 Public Work Department Information Technology Centre

The PWD IT Centre was setup in 1977 and was formally known as PWD Computer Centre. The computer that had been used by the centre were NOVA (1971) computer for engineering design, super micro LSI (1982) for office productivity, PRIME 750 (1984) mini computer used for

engineering design and information system, and IBM 4381 (1988) mainframe computer used for information system. With the advancement of technology, the above systems were replaced with newer system and the first local area network (LAN) was setup in 1990 by downsizing from mainframe to server using Novell Netware Network Operating System. Connection to outside world through internet was setup in 1995 using 64k connection through JARING and PWD Web Page was implemented in July 1995. The PWD intranet (RAKAN) was implemented in 1997. In monitoring the implementation of project by PWD throughout Malaysia, SKALA System was introduced in 1998. In 2000, The SKALA System were implemented as a distributed system by using dial-up to internet to send data from remote office to PWD headquarters in Kuala Lumpur. In early 2003, the SKALA System were implemented as centralized system using an open source system running on Linux RedHat Version 7.x server and Post-Gre SQL database.

3.2 Function of PWD ITC

The function of PWD ITC were:

- Acquiring system application that would help the PWD organization to achieved their objective through the process of buying, internal development or outsourcing.
- Acquiring the computer equipment and software to support the application system above and also the equipment and software for end user computing.
- To assist all PWD office and the Ministry Of Works to identify the process and procedure that could be computerized.
- To give technical support, advice and consultancy services to all PWD offices and the Ministry Of Works and also other government agencies in the process of using and acquiring computer and software.
- Administration and coordination of training in Computer-Aided-Design and Drafting System to PWD staff.
- Administration of computer facilities including work scheduling, prepare standard and procedure and develop security and safety procedure for computer and data.

3.3 Overview of Knowledge Management

Knowledge management, the harnessing and organization of information assets that reside in the database of an organization or in its employees' collective brain power, has become such a critical part of doing business in today's economy. Knowledge management is not only about managing knowledge assets but also managing the processes that act upon the assets. Knowledge management involves the identification and analysis of available and required knowledge assets and knowledge asset-related processes, and the subsequent planning and

control of actions for develop both the assets and the processes so as to fulfill organizational objectives.

3.3.1 Knowledge

According to Webster's Dictionary, knowledge is the fact or condition of knowing something with familiarity gained through experience or association. Knowledge may also be described as a set of models that describes various properties and behaviors within a domain. Knowledge may be recorded in an individual brain or stored in organizational processes, products, facilities, systems and documents.

In today's economy, knowledge is people, money, leverage, learning, flexibility, power, and competitive advantage. Knowledge is more relevant to sustained business than capital, labor or land. Nevertheless, it remains the most neglected asset.

Knowledge is a strategic asset and like any other asset it must be husbanded and kept secure. Given management's responsibility for productivity, the knowledge continuum cannot simply end with knowledge, but must be tied to improved individual and organizational performance. That is, to effectively manage and employ one of the greatest corporate assets: Intellectual Capital

Knowledge has value only as it contributes to Profit. Knowledge exists only in the mind of the person; everything else is information or data.

Generally, intellectual and knowledge-based assets fall into one of two categories: Explicit or Tacit. Explicit knowledge includes assets such as patents, trademarks, business plans, marketing research and customer lists. Often explicit knowledge consists of anything that can be documented, archived and codified.

Tacit knowledge pertains to the information each individual can contribute that may help in the growth of the organization. Most enterprises face inherent challenge in finding means to recognize, generate, share and tap these resources.

While technology in the form of e-mail, group ware, instant messaging and related technologies can help facilitate dissemination of tacit knowledge organizations often find difficulty in identifying them.

2.7.2 Management

Management is part of another hierarchy that includes **supervision, management and leadership.**

2.7.3 Knowledge Cycle

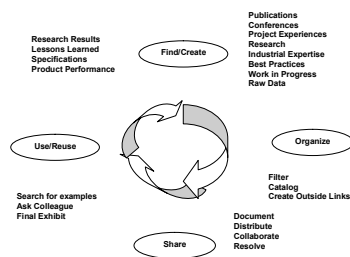


Figure 2.5 Cycle of Knowledge

In traditional organizations, knowledge tends to flow along organizational lines, from the top down. But that pattern seldom results in making knowledge available in a timely fashion and where it's needed the most. In organizations with managed knowledge, information can flow across organizational lines, reaching the people who can use it in ways that best promote the organization's goals and that enhance service to the customer at the same time.

How this happens can be understood by examining the four basic elements of the knowledge management cycle: find/create, organize, share, and use/reuse. Under "find/create," especially as it operates in a transportation organization, knowledge is gained through a variety of means, including publications, conferences and meetings, project experiences, research, and industry expertise. In the next step in the cycle, "organize," the knowledge is filtered and catalogued, and links to the outside are created. Then the information is shared for wide availability, making use of high-tech computer tools such as the Internet and other techniques such as conferences, journal articles, and the natural communication channels created in a collaborative work environment.

The final stage of the knowledge management cycle, "use/reuse," involves both informal contacts and access to reports, good practices, success stories, and other forms of communication, including exhibits, demonstrations, and training sessions. Much of this knowledge can be made available to a wide audience through the Internet. This is the step in which knowledge is applied and reapplied to solve real-world issues, such as building better bridges, operating roadways more efficiently, and improving highway safety. Of course, these results are then captured as part of the lessons learned for use as the knowledge cycle begins again.

3.3.2 Knowledge Use

Knowledge use—meaning the productive deployment of organizational knowledge in the production process—in fact is the purpose of knowledge management. The successful identification and distribution of critical knowledge does not ensure its daily use. And without

consistent use, there is a high probability that new knowledge systems will decay in quality, and the investment will be wasted. The potential user of knowledge has to see a real advantage in order to change his or her behavior and “adopt” the knowledge.

A more direct measure of many Knowledge Management projects is whether the information is being used in practice. As usage normally happens outside of the system, it must be reported by the staff. Provide simple mechanism for notifying when information is used, and implement a rewards mechanism to encourage timely reporting.

3.3.3 Knowledge Asset

Knowledge assets are the knowledge regarding markets, products, technologies and organizations, that a business owns or needs to own and which enable its business processes to generate profits. Unlike information, knowledge is less tangible and depends on human cognition and awareness. There are several types of knowledge - 'knowing' a fact is little different from 'information', but 'knowing' a skill, or 'knowing' that something might affect market conditions is something, that despite attempts of knowledge engineers to codify such knowledge, has an important human dimension. It is some combination of context sensing, personal memory and cognitive processes. Measuring the knowledge asset, therefore, means putting a value on people, both as individuals and more importantly on their collective capability, and other factors such as the embedded intelligence in an organization's computer systems.

There are three types of knowledge assets:

- Human knowledge assets are the capabilities of the individuals that are required to provide solutions to the customers of the organization. The staffs of the organization are the "owners" of human knowledge assets; they "rent" their knowledge assets to the organization.
- Structural knowledge assets are the organizational capabilities to meet market requirements. They comprise what's left when people go home and they provide the structure and continuity that people need to perform within the business environment.
- Market knowledge assets refer to knowledge about the market, the organization's clients, partners, competitors, etc, i.e. knowledge about the value created from the organization's relationships with the people and organizations with which business is conducted. Market knowledge assets gauge, evaluate and value the organization's products and services. They are the final outcome of investments in human and structural knowledge assets.



Knowledge Application Development Model

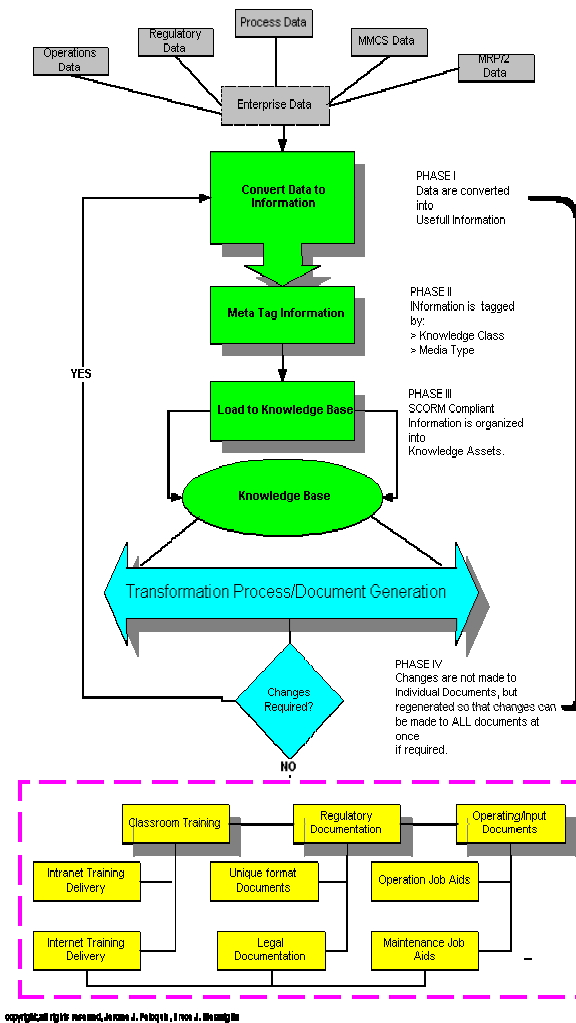


Figure 2.4 Knowledge Application Development Model

3.3.4 Calculating Knowledge Capital

The valuation of knowledge capital makes it possible to assess the worth of the people who possess the accumulated knowledge about an organization. They are the individuals who leave the workplace every night (and may never return), storing in their heads the know-how acquired while receiving full pay. Their brains are repositories of knowledge accumulated over untold hours of listening and talking while not delivering any goods or services to paying customers.

The employees' minds, and the files they manage, carry a share of the organization's knowledge capital. This makes every employee a custodian of the most important assets a firm owns, even though these assets never show up on any financial reports.

Knowledge Capital forms when employees think or talk about how they are delivering goods and services. That usually occurs when workers are engaged in overhead tasks, not when they're actually delivering goods or services.

If learning, training, talking, writing and communicating make for improved productivity, it will reveal itself as improved economic performance and will become measurable in dollars. That real money is the return on the newly created Knowledge Capital. It discloses the value of the knowledge that has been unleashed by informed actions.

By recognizing that Knowledge Capital is a measurable quantity, the executives in charge of information management should be able to shift from their preoccupation with short-run expense efficiency to a new perspective: how to create valuable knowledge assets. The right set of measures will help in explaining and justifying how to accomplish that objective.

4.0 KNOWLEDGE ASSETS IN PWD

Organizations are realizing how important it is "to know what they know" and be able to make maximum use of the knowledge they possess. Knowledge that supports an organization's processes and decision-making capability is an absolute vital resource, but it is a resource that usually suffers from under-management. To maintain competitive advantage, organizations must ask themselves two important questions:

- What are knowledge assets?
- How do these assets are managed and make use to get maximum return?

Knowledge may be recorded in an individual brain or stored in organizational processes, products, facilities, system and documents. It can live inside myriad databases or it often lies hidden and undervalued in the minds of individual employees and it may also dwell in the relationships our colleagues have with people at the other organizations. Hence, the full utilization of an organization's "knowledge base", coupled with the potential of individual skills, competencies, thoughts, innovations, and ideas will enable an organization to compete more effectively.

Intellectual assets can be divided into three categories:

1. **Human Capital** - that in the minds of individuals: knowledge, competences, experience, know-how etc.
2. **Structural Capital** - "that which is left after employees go home for the night": processes, information systems, databases etc.

3. **Customer Capital** - customer relationships, brands, trademarks etc.

The most common knowledge assets in PWD are

1. Brochures, printed documents & training materials which can easily be converted into regular Web (HTML) pages.
2. Photos, charts, maps, graphics and drawings can be converted to digital formats for effective communication.
3. Calendars: Display event information for easy access.
4. Links to other sites: offer a directory of online resources that makes the Web site a popular destination for researching issues Searchable online databases: build an online repository of information that can be searched on the Web.
5. Adobe Acrobat PDF: allows us to put up exact replicas of newsletters, reports and charts for viewing and printing on the Web.
6. Audio and video streaming: good for putting up short videos or audio samples such as Public Service Announcements (PSAs), media interviews, organizational videos, conference workshops and plenary.
7. Web discussion forums: Create an online space for discussions among people with similar interests.
8. Search engines: install a search engine to improve ease of access.

5.0 ROADMAP FOR IMPLEMENTING KNOWLEDGE MANAGEMENT

5.1 Knowledge Asset Framework

The Knowledge Assets Framework is a comprehensive model for leveraging knowledge for value creation, so that knowledge activities in an organization will have maximum impact. It is comprised of three pillars: knowledge architecture, technology infrastructure and culture.

1. *Knowledge Architecture* determines whether the initial emphasis will be on investing in activities related to "access" or "exchange"
2. *Technology Infrastructure* determines where priorities will be placed in developing the platform required for supporting knowledge initiatives
3. *Culture* addresses how a greater sense of trust and interdependence can be engendered across the organization in order to facilitate the exchange of knowledge

An integral part of the Knowledge Assets Framework is the articulation of a Knowledge Strategy. Successfully implementing a Knowledge Asset Framework requires a

strong knowledge and learning culture. The concept of a "make and sell" organization is no longer effective. Instead, the approach should be "sense & respond". This creates an "outside in" flow of knowledge and value.

5.1.2 Knowledge Management Roadmap

The Road Map is a living document regularly updated and serves as a framework for the monitoring of the knowledge management program. The document reflects the current state of the interrelationships between work in progress and proposed for the future and the overall milestones and aims of the program.

5.1.3 Knowledge Asset Roadmaps

Knowledge Asset Roadmaps are mechanisms enabling organizations to visualize their critical knowledge assets, the relationships between these and the skills, technologies and competencies required to meet future market demands. The goal of developing a Knowledge Asset Road Map is to increase an organization's competitiveness by:

- enabling all sections of an organization to appreciate the current and future critical knowledge assets and their linkages to business objectives;
- guiding strategic research, development, marketing and investment decisions.

This is achieved by:

- identifying current and future knowledge assets required to meet organizational objectives and placing them on a timeline;
- identifying critical actions and projects required to develop and maintain the assets in the context of the business objectives;
- specifying the relationship between the assets, actions, projects and business objectives of the organization and the roles that each asset is expected to have in achieving the objectives.

A Knowledge Asset Road Map provides a co-coordinated picture of the various parts of an organization's overall knowledge management programmed such that the diverse and dispersed efforts can be seen as part of the whole and can be justified as such.

Knowledge Asset Road Maps highlight the critical knowledge assets required by an organization to meet market needs five to ten years in the future. They are mechanisms enabling organizations to visualize their critical knowledge assets, the relationships between these and the skills, competencies and technologies required to meet future market demands. They allow:

- individual knowledge management actions to be defined and justified in terms of their contribution to the overall aims.
- effective communication of the work and progress on the program to the participants and observers.
- management aids for those involved in carrying out the program and measuring its progress.

- more effective communication between users, researchers, technicians, managers and directors involved in the various aspects of the program.
- sensible decisions to be taken on the opportunities for further exploiting the results of the program.
- the identification of knowledge gaps that need to be filled.

The Knowledge Assets Map provides a framework which helps to understand the structure of the organization's knowledge assets.

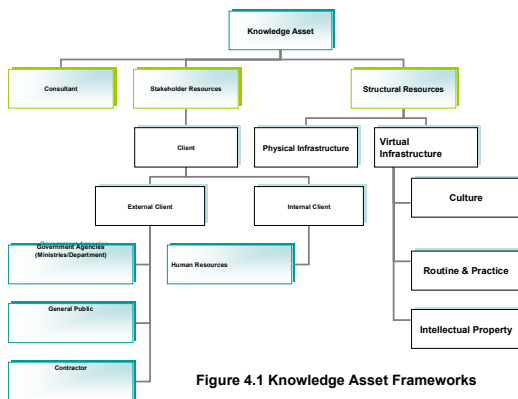


Figure 4.1 Knowledge Asset Frameworks

Figure 5 illustrates the hierarchy of knowledge assets with its sub-classifications. Stakeholder Resources are divided into External Client and Internal Client. The External Clients are other Government Agencies (Ministries/Department) and the Internal Client represents the human resources of PWD. Structural Resources are split into Physical and Virtual Infrastructure, which refers to their tangible and intangible nature respectively. Finally, the Virtual Infrastructure is further sub-divided into Culture, Routines & Practices and Intellectual Property. Another important category is the consultants which provide an expert advice to the department.

The categories of knowledge assets identified by the Knowledge Assets Map are defined in further detail below.

Stakeholder resources include all forms of relationships established by the organization with its stakeholders. These relationships could be licensing agreements, partnering agreements, financial relations, contracts and arrangements about distribution channels. The stakeholder relationships include also customer loyalty, organization names and brand image, which represent a fundamental link between the organization and its stakeholders.

Human Resource contains knowledge provided by employees in forms of competence, commitment, motivation and loyalty as well as in form of advice or tips. Some of the key components are know-how, technical expertise, and problem solving capability, creativity, education, attitude, and entrepreneurial spirit.

Physical infrastructure comprises all infrastructure assets, such as structural layout and information and communication technology like computers, servers and physical networks.

Culture embraces corporate culture and management philosophies. Some important components are the organizational values, the networking practices of employees as well as the set of mission goals. Culture is of fundamental importance for organizational effectiveness and efficiency since it provides organizational members with a framework in which to interpret events. Culture affects the corporate approach to deal with time competitiveness. In fact in a business world characterized by an increasing complexity the organizations have to be able to encourage individuals to be innovative with an entrepreneurial spirit in order to generate new ideas to react or pro-act to dynamic business environment changes. The culture provides organizations with a framework that encourages individuals to operate both as an autonomous entity and as a team in order to achieve the companies objectives.

Practices & Routines include internal practices, virtual networks and routines, i.e. tacit rules and procedures. Some key components are process manuals providing codified procedures and rules, databases, tacit rules of behaviour as well as management style. Practices and routines determine how processes are being handled and how workflow processes flow through the organisation.

Intellectual property is the sum of patents, copyrights, trademarks, brands, registered design, trade secrets and processes whose ownership is granted to the organization by law. It represents the tools and enablers that allow companies to perform its daily processes to produce results.

5.2 Four Phases, 10-Step Knowledge Management Planning Initiative Strategy (Adapted from Tiwana)

As a guide throughout the entire process of KM Planning Initiative strategy, the 10-step KM roadmap adapted from Tiwana, A: The Knowledge Management Toolkit. The 10-step is divided into four phases which comprise:

4.2.1 PHASE 1: INFRASTRUCTURE EVALUATION IN INFORMATION TECHNOLOGY CENTRE, PWD MALAYSIA

STEP 1: Analyze the existing infrastructure

STEP 2: Aligning knowledge management and business strategy for Information Technology Centre, PWD Malaysia

Create a clearly articulated link between knowledge management and organizational strategy

4.4.2 PHASE 2: KM SYSTEM ANALYSIS, DESIGN AND DEVELOPMENT

STEP 3: Design the knowledge management infrastructure

Analyze components of the “info-structure”, collaborative platform, knowledge sources, costs versus added value

STEP 4: Audit existing knowledge assets and system

Create a clearly articulated link between knowledge management and organizational strategy

STEP 5: Design the knowledge management team

Identify key stakeholders, critical points of failure, create a balanced team

STEP 6: Create the knowledge management blueprint

Plan for building and incrementally improving knowledge management system

STEP 7: Develop the knowledge management system

Putting together a working system

4.2.3 PHASE 3: DEVELOPMENT

STEP 8: Deploy, Using the results-driven incremental methodology

Understand need/scope of the system deployment, identify failure points, use Result-Driven Incremental methodology

STEP 9: Manage change, culture and reward structures

Encourage use, gain employee support, training

4.2.4 PHASE 4: EVALUATION

STEP 10: Evaluate performance, measure ROI, and incremental refine the KMS

Measure the impact of knowledge management on business.

6.0 CONCLUSION AND RECOMMENDATIONS

This independent study focus on Information Technology Centre of PWD as a pilot project before the system can be implemented to the whole of PWD organization. The planning initiative is intended to maintain and enhanced the knowledge asset of the department in order to meet the information needs of its officers and staff and also the top management. This proposed knowledge management initiatives intended to leverage on the existing IT infrastructure and facilities that can be used to diverse the content of the asset based on web technologies. The knowledge management technology will allow the professionals in PWD to control access to the knowledge asset.

BIBLIOGRAPHY

Cheryl, C. & Company (1994). *Reengineering Toolkit, 15 Tools and Technologies for Reengineering Your Organization*. Prima Publishing,

Jabatan Kerja Raya (2002) *Malaysia PWD Form DB/T, Standard Form Of Design & Build/Turnkey Contract*. JKR.

Jabatan Kerja Raya Malaysia (1988). *A guide on The Administration of Public Works Contract*. JKR.

Jabatan Kerja Raya Malaysia (1992). *Manual Kualiti Jabatan Kerja Raya Malaysia*. JKR.

Jabatan Kerja Raya Malaysia (1992). *Panduan Pentadbiran Kontrak Kerja Raya*. Edisi Kedua,.JKR.

Jawatankuasa JKR (1996). *Dokumen Anugerah Kualiti Perdana Sektor Awam*. JKR.

Pusat Komputer, Cawangan Pengurusan, Ibu Pejabat JKR, (Disember 1992). *Public Works Information Technology Architecture “On With IT Towards 2020”*. JKR.

Tiwana, A. (2002). *The Knowledge management toolkit: orchestrating IT, strategy, and knowledge platforms, 2nd Edition*. Pearson Education, Inc.

ONLINE REFERENCES

<http://www.som.cranfield.ac.uk/som/cbp/knowledgeassets.htm>

<http://www.skyrme.com/insights/11kasset.htm>

<http://www.km-forum.org/wiig.htm>

<http://www.kmmag.co.uk/CURDECJAN03/STRATdec3.HTM>

<http://www.cio.com/summaries/enterprise/knowledge/index.html>

<http://www.saint-ongetoolkit.com/default.htm>

http://www.infosys.com/knowledge_capital/thought-papers/KM_DeveloperIQ_KMFaces_final.pdf

<http://www.aiai.ed.ac.uk/~alm/kam.html>