Developing Knowledge Asset Valuation Model using Knowledge Experts

Wong Man Wai, Ammuthavali Ramasamy, and Marini bt Othman

Universiti Tenaga Nasional(UNITEN), Malaysia, calebmw@yahoo.com; {ammutha; marini}@uniten.edu.my

ABSTRACT

Knowledge assets which relate to an organization's core business can ensure its competitive edge in business competition by transforming knowledge into goods and services. However unlike physical asset, Knowledge Asset is intangible and there are inadequate techniques to measure the Knowledge Asset. The value of the Knowledge Assets varies, depending on human cognition and awareness which includes context sensing, personal memory and cognitive processes. The aim of this research is to interpret the value of the Knowledge Asset into a meaningful and tangible way. The objective is to develop a model that defines the value of Knowledge Assets. The research approach used is a qualitative single case research. The research has begun with a literature review, document study and interview for information gathering. The findings from the literature review reveals existing framework or model which applied to measure intangible asset. Whereas the document study reveals the factors that triggered event to create, review, update and dispose the Knowledge Asset. This information is used as a foundation to develop the conceptual model. Interviews were conducted and the model presented to the Knowledge Management manager and Knowledge Engineers to collect feedbacks about the conceptual model. As the result, the proposed model enables the Manager and Knowledge Engineers to use the identified factors to value the Knowledge Assets easily and interpret its value into more meaningful and tangible way.

Keywords: Knowledge asset, Value of Information, Valuation model, Knowledge management

I   INTRODUCTION

Organizations are transforming business model into knowledge based core competence because knowledge asset is essential in designing and performing business processes efficiently and effectively. It is vital to have knowledge asset for sustaining competitive advantage. But due to the nature of knowledge assets which are intangible and misconception that they are not important causing organizations to lose their valuable knowledge assets unintentionally. This may cause the organization to lose its productivity and creativity in business process which will lead to loss in competitive advantage.

Knowledge assets are important as physical and financial assets. It allows organization to design and perform business processes efficiently and effectively. Also increases the possibility to create new products and services to enable a business to create its value. Organizations are aware that it is difficult to determine the actual value of knowledge assets in tangible way. How to determine the loss of the organization if their experience knowledgeable workers leave the company? What is the cost to discover, capture new knowledge and transfer to the employees? A framework that is able to interpret the values of knowledge assets into monetary term will help the organization to understand the importance of their knowledge assets in a tangible way, allow them to determine the essential knowledge which requires to support organization business process from time to time and manage knowledge assets more effectively.
The paper is organised as follows. The Related work section defines Knowledge Assets in detail and several methods of measuring intangible assets are discussed. Methodology section describes data collection instruments and procedures. Analysis Section describes the result of analysis and interpretation of the collected information. Model Development Section proposed the model of this research based on result generated from Analysis Section. Conclusion contains concluding remarks.

II   RELATED WORK

InvestorWords.com defines "Asset" as "Any item of economic value owned by an individual or corporation, especially which could be converted into cash." This is including current assets (liquid cash), long-term assets (real estate, equipment), prepaid and deferred assets (insurance, interest), and intangible assets (trademarks, patents, copyrights, good will).

Knowledge is intangible and varies towards human cognition and awareness. It is a combination of context sensing, personal memory and cognitive processes. To measure the Knowledge Asset also means to put value on people, both as entities and their collective capability (Skyrme, 1999). Unlike physical asset which has time span, Knowledge Assets existence can last forever. One good example

is the knowledge of aerodynamics. Sir George Cayley discovered and identified four aerodynamic forces of flight – weight, lift, drag and thrust in 18 century and the knowledge has been utilized for three centuries. Another good example is the law of motion which is discovered by Newton that standardize of measuring in terms of mass length, and time which has been used for more than three hundred years (Boisot, 1998). From the examples above, we can say that knowledge itself is not perfect (and it will never be) but it will continue to evolve and grow by going through series of experiments, trial and errors bringing best solution at that moment of time.

Snowden has further elaborate 5 types of Knowledge as below (Snowden, 2000):

Table 1. Types of Knowledge

Types of Knowledge	Description
Artefacts	Result of knowledge captured and codified which includes documents, database and processes.
Skills	Combination of set of movements which follow in sequence to make a smooth, efficient feat in order to complete a task. It is acquires through series of training
Heuristic	Technique that has been mastered for problem solving, learning, and discovery which enable a person speed up a process. Maybe referred as "rule of thumb"
Experience	It is job dependence and exercised to perform a task, which many refer as "hands on experience"
Natural Talent	Unmanageable. The best method is to discover the talent and develop it whenever possible by providing chances to individuals to put their talents to best use

Measuring the value of intangible asset such as Knowledge Asset has never been an easy task (Kaplan, 2004). First of all, the value of the intangible assets are subjective, the worth of intangible assets varies in different people. In an oil company for an example, it is very important for a retail firm to get hold of retailers as it can ensure the oil company could sell out smoothly; but to the Customer Service Department in the same company, they give more value to the customer service quality and satisfaction more than retailer. Second, the intangible assets are almost no value by themselves;

they need to be combined with other assets in order to realize their full potential. A good example like investment in IT has little value unless it is complemented with HR training, the IT investment and HR training must be incorporated and associated with corporate strategy in order to realize their full potential. Third, the impact of the intangible assets to financial performance is not immediate. For an instance, providing training Total Quality Management and Six Sigma could improve the process quality and to improve customer satisfaction and loyalty. However the investment of the training will be paid off if only the company is able to transform customer satisfaction and loyalty into financial benefits from the sales.

Despite the challenges mentioned above, it is still very crucial to recognize intangible assets as the tangible assets. Thus different frameworks have been developed to attempt measuring intangible assets which is discussed briefly in the Table 2.

Table 2. Intangible assets measurements

Intangible assets measurements	Developed	Description
Intangible Assets Monitor	Karl-Erik Sveiby	It measures the intangible asset by using table that classified employee into three categories: Competence, Internal Structure and External Structure. Each category is measured with four perspectives: Growth (e.g. number of years in the profession.), Innovation (E.g. new concept or ideas development), Efficiency (E.g. value added per professional) and Stability (E.g. average of employees) of intangible assets.
Skandia Navigator	Edvinsson	Provides a holistic view based on performance and goal achievement. It is used to measure the Intellectual Capital and Knowledge Assets of the company.
Meritum Guidelines		Consists of three phases. The first phase is to guide company to identify the vision of the company; In the second phase, the

		company needs to identify the intangible resource which is aligned to their strategic objectives and the activities that could affect the intangible resources; Finally, a system of indicators will be used to assess how well the company is fulfilling its objectives.
Danish Guideline		Designed based on four elements: Knowledge Narrative, Management Challenges, Initiatives and Indicators which represents the analysis of the company's KM in the Intellectual Capital statement

These models have different approaches to measure the intangible assets but they share two common actions while defining the measurements:

1. Discover factors to be measured.
2. Define performance measures for the identified factors.

These actions are the foundation in measuring performance of the intangible assets. In general point of views, factors are related to objectives of the company where quality performance must be performed. Meanwhile to define performance measures to identify factors is to serve as benchmarking of the performance. Based on the purpose of the measurement; the result of the benchmarking could be used to control, motivate and guide the company. Figure 1 below is a common state of four models in managing factors into measurement.

Figure 1. Flow of Managing Factors into Performance Measurement

III METHODOLOGY

This research focused on studying the current practices to valuation of Knowledge Assets at Company A. It investigated the possibility of implementing new method to measure value of Knowledge Asset and developed a model that defines and reflects the value of the Knowledge Assets. The study started off with existing process that measures the Knowledge Asset at Company A and identified the factors which were initiated to create, maintain and dispose Knowledge Script. To accomplish these, an interview was conducted with Operation Support Office's (OSO) personnel and reviewed documents which are related for analysis. Also, identified the events which triggered to create, maintain and dispose the Knowledge Scripts which assisted in developing model to value the Knowledge Asset. The model practiced by Company A was compared to other models to identify the gap and opportunities which was used to implement new model.

For data gathering, an interview method was used through the development of a series of semi-structured interview questions related to the units-of-analysis. This method was chosen in order to have a better guide and produce a more informative interview session. This involved the use of multiple data collection methods such as data, methodological and interdisciplinary triangulation (Yin, 2009; Denzin, 2000).

In addition to the interviews, data was collected through several other sources such as archival documents, minutes of meetings and consultancy reports. Eisenhardt suggests that the usage of multiple data collection methods supports triangulation and provides a concrete and solid foundation of theory. Interviews shall be recorded and transcribed. A copy of the transcription shall be provided as soon as possible after each interview for further verification (Eisenhardt, 1989).

Concept model was developed based on understanding of the process and procedures which were undertaken in the managing knowledge scripts at the Company A. Development of the model was required to support evaluation of knowledge assets of the organization. A model was used to interpret the value of the knowledge assets in currency to provide significant ways to view the knowledge assets similar to the physical asset in an organization. The model should be able to generalize the cost of the knowledge including i) identified knowledge; ii) preserved knowledge; iii) foster the growth of knowledge and updated frequently iv) knowledge sharing. Later, the concept model will be reviewed by Knowledge Engineers (KE) and Subject Matter Experts (SME), their feedbacks and opinions of the concept model became the references on improving the model before it was proposed.

IV ANALYSIS

The single case study analysis technique is used to present and to analyze the information which is collected from Company A. This research has

selected Company A's Operation Support Office (OSO) as a case study for the process of managing Knowledge Scripts in order to develop a model that values the knowledge scripts.

Company A is a multinational Corporation which provides IT and business process outsourcing, professional services such as management and technology consulting. OSO is actively involved in activities within Knowledge Management (KM) such as to create, update, review and retire knowledge scripts. Their role is to ensure a completed, timely and accurate knowledge script which stored in the Knowledge Repository and to ensure the availability to those who requires knowledge to solve the IT related issue.

The current process has involved 7 participants. They are Knowledge User(KU), Knowledge Submitter(KS), Knowledge Owner(KO), Knowledge Administrator(KA), Knowledge Engineer(KE), Subject Matter Expert(SME), and Knowledge Publisher(KP). Table 3 provides the summary of roles and responsibilities for each participants.

Table 3 Roles and responsibilities for each participants

Responsibilities	Knowledge User	Knowledge Submitter	Knowledge Publisher	Knowledge Administrator	Knowledge Engineer	Subject Matter Expert (SME)	Knowledge Owner
Manage Knowledge							
Create knowledge	P	C					
Review Knowledge					P	C	
Retire knowledge		C	P				P
Approve knowledge		C	P	C			
Publish knowledge			C	P			
Update knowledge	P						
Query knowledge							
Authorise all interrogative users and systems				P			
Ensure knowledge base can be queried by systems				P			
Allow query by keyword searches				P			
Filter returned results to allow only records accessible to users				P			
Authorise reporting access				P			

Legends: Reviews - Approves, Contributes - Performs

The content of the Knowledge Scripts includes IT related issues, business process how-to, template or format of the document for the documentation purposes and many more. Each Knowledge Script is to display information such as: document ID, problem type, problem description/ scenario/ questions, solutions, and attachment. At the end of the script, users are able to rate the knowledge script, leave comments and mark as request to update the knowledge script.

Based on result of the interviews and documents study, it shows that the company does not value the Knowledge Script, the staffs hardly view the Knowledge Script as Knowledge Asset, the value of the knowledge scripts is not tangible to the staffs, the task to maintaining the Knowledge Repository has become a hassle and there is no plan in near future to adopt framework or model to evaluate knowledge script.

After comparing to Company A's current practice with the models reviewed in Literature Review Section, few gaps have been identified.
- Factors are not identified to evaluate the Knowledge Script.
- The value of Knowledge Script is not tangible and less visible.
- Company A does not own a measurement system to measure performance of the Knowledge Script.
- Knowledge Users play a major role to evaluate the performance of the Knowledge Script. The result is subjective and does not reflect the actual value of the Knowledge Script.

The findings from the above served as one of the underlying foundation to formulate the proposed model.

V MODEL DEVELOPMENT

The foundation of the conceptual model is derived from the literature review, document study and interview. The purpose of developing the model is to enable the OSO personal to use identified factors to value the Knowledge Assets with an easier way and to interpret its value into more meaningful and tangible way. There are three components in this model: People, the Measurement System and Process, as shown in Figure 2.
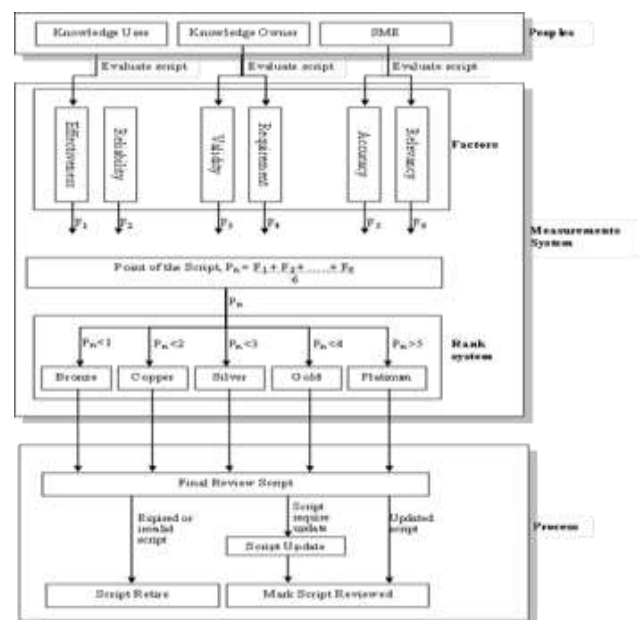

Figure 2 Components of the Knowledge Asset Valuation Model

A. People

Previously, Knowledge Users are the only major role which rates the Knowledge Script. In the new model, there are three participants who play the role to evaluate value of the Knowledge Script:

- Knowledge User – A person who uses the knowledge as part of their daily task.
- Knowledge Owner - The person who contributes and owns the knowledge script.
- Subject Matter Expert (SME) - The person who is an expert of a given Knowledge Script.

The Knowledge User, Knowledge Owner, and SME will evaluate the Knowledge Script according to specific indexes which are used in the value system.

The measurements of the value system are derived from the document study where it describes the event of trigger the Process of Knowledge Script Management. Each participant listed at previous subsection People has a different event which triggers the process.

Table 4 Events that trigger by each participants

Participants	Events
Knowledge User	User cannot find any knowledge script in the given area. Problems are not resolved by solutions given in the Knowledge Script.
Knowledge Owner	Identifies that Knowledge Script has expired. New knowledge or business process has been introduced.
Subject Matter Expert	Aware and able to identify the changes of new technology or knowledge. To identify knowledge script is outdated, inaccurate and irrelevant.

Each event listed above is interpreted into factors. These factors are used by participants as the indicator or performance measurement to value the Knowledge Script.

Table 5 Factors valued by participants

Participants	Factors
Knowledge User	Script Effectiveness. Script Reliability.
Knowledge Owner	Script Validity. Script Requirement.
Subject Matter Expert	Script Accuracy. Script Relevancy.

Each factor given has its definitions as listed below;

• Script Effectiveness

To measure the quality of the knowledge script; the solutions returned in the script guides the user on doing the right things to the achieve objectives and to solve problems.

• Script Reliability

To measure the consistency of the knowledge script; the ability of the knowledge script to perform its function or mission to the solutions which are delivered to users consistently without degradation or failure is concern.

• Script Validity

To measure the validity of the knowledge script in certain period of time; where the solutions of the script are effective and remained in force in the specific timeframe concerned.

• Script Requirement

To measure the necessities of the knowledge script; where the degree of the needs and demands of the script exists to support the business process is concerned.

• Script Accuracy

To measure the precision of the knowledge script; where the details of the script enables user to perform the task or to resolve issue with precision is concerned.

• Script Relevancy

To measure the degree of pertinent between the knowledge script and the problem; where the details of knowledge or solutions of the knowledge script is closely tied with current business process or known issues is concerned.

Each participant can rate the particular factors from scale 1 to 5, the higher value for the better performance. After the knowledge script is evaluated, the performance of the Knowledge Script will be tabulated into a chart shown as Figure 3.
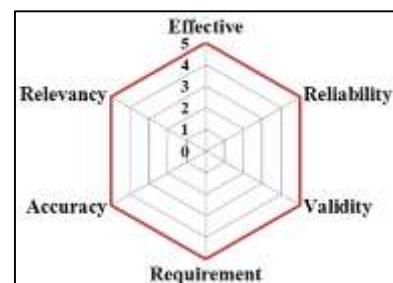

Figure 3 Example of the chart

Next, the total points accumulated from the factors will be averaged. The average points will fit in to the rank listed at Table 6 below.

Table 6 Table of ranking

Average Points	Rank
$0 \le X < 1$	Bronze
$1 \le X < 2$	Copper
$2 \le X < 3$	Silver

3 ≤ X < 4	Gold
4 ≤ X ≤ 5	Platinum

B. Process

This subsection will illustrate the process of the model. The idea behind of this process was suggested by Knowledge Management Manager and Knowledge Administrator. It is suggested to implement the model in the process where the knowledge script is documented, stored at Knowledge Repository and published to the Knowledge Users. The process is adjusted to fit in the "Evergreen Process". The process of the model is shown as Figure 4:
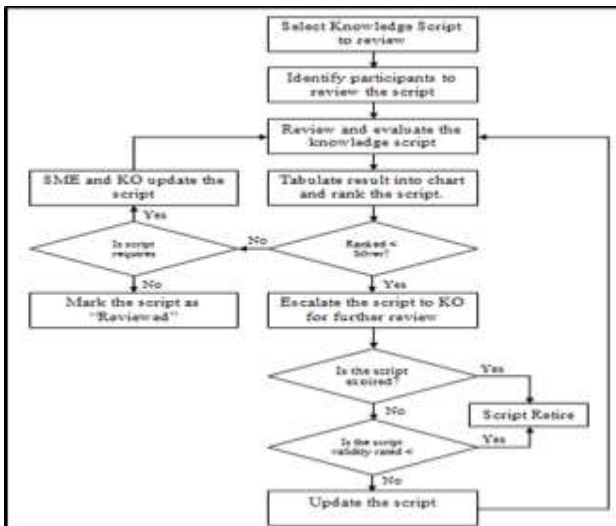

Figure 4. Flow of the process

VI CONCLUSION

Knowledge Assets is one of the valuable assets and crucial for the growth of the companies and enable them to sustain their competitive edge. By understanding the value of their knowledge assets will help the companies to manage and retain their precious knowledge. This research is attempted to provide solution where the knowledge assets can be tagged with value and be recognized by the people. Specifically, the proposed model has given an idea on how to identify the value according to the specific factors, and then magnify the value into charts and its rank. Allow users to view the value of the scripts in more tangible and meaningful way.

The studies have revealed the events which trigger the process to create, review, update, and retire the knowledge script and the roles and responsibilities of participants in each event and the methods used to rate the scripts. This information is analyzed and utilized to develop the model. The second contribution was the development of the model to value the knowledge scripts. The aim of the developed model is to utilize identified factors to evaluate the value of the knowledge script.

Finally this research recommends continuing a further study on this model to expose it to other possible improvement and potential of the model. In this research, it is only to focus on valuing the knowledge scripts. It would be good opportunity to have further research to value other knowledge assets such as skills, heuristic, experience and etc. Also, to conduct further case study with simulation to illustrate how to use the developed model in the working environment and with quantitative elements to increase validity of this research.

REFERENCES

Boisot, M. H. (1998). *Knowledge assets: Securing competitive advantage in the information economy*. OUP Oxford.

Danish Agency for Trade and Industry. (2000). A guideline for intellectual Capital Statements - Key to Knowledge Management. Copenhagen.

Denzin, N. K. and Lincoln, Y. S. (2005). *The Sage Handbook of Qualitative Research*. Sage Publications, Thousand Oaks

Edvinsson, L. and Malone, M. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brain-power*. HarperCollins, New York

Eisenhardt, K.M. (1989). Building Theories from Case Study Research. *Academy of Management Review*. 14(4), 532-550

Kaplan, R.S., and Norton, D.P. (2004). Measuring the Strategic Readiness of Intangible Assets. *Harvard Business Review*, 82(2), 52-63.

Meritum. (2001) Guidelines for managing and reporting on intangibles. Final Report of the MERITUM Project.

Skyrme, D. J. (1994). The Knowledge Asset. I3 INSIGHT No 11, David Skyrme Associates. Retrieved from http://www.skyrme.com/insights/11kasset.htm, 1999

Snowden, D. (2000). The ASHEN Model: an enabler of action in Knowledge Management. 3(7), 14-17

Sveivy, K. E. (2001). The Intangible Assets Monitor. Retrieved from http://www.sveiby.com/articles/CompanyMonitor.html

Yin, R. K. (2009). Case study research: Design and methods 4th ed. In *United States: Library of Congress Cataloguing-in-Publication Data*