The Capture and Analysis of Critical Knowledge in Consultancy Services Delivery: A Brainstorming Approach

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Abstract   In Universiti Tenaga Nasional (UNITEN), the Institute of Professional Advancement (INSPA) is established to be the platform for lecturers in offering their professional services. However, some aspects of the service delivery skills, knowledge and procedure are still unclear to the lecturers. From brainstorming sessions conducted with selected experts in UNITEN and a qualitative study of the ensuing results, we compile and capture the knowledge related to consultancy service delivery. In this paper, we discuss the process of knowledge capture using the brainstorming approach and present the results of the process.

Keywords   Consultancy, Knowledge Transfer and Sharing, Knowledge Capture, KM Framework

1. Introduction

As professionals in their area of expertise, lecturers are also required to offer consultancy service as a significant part of their responsibilities. In UNITEN, the Institute of Professional Advancement (INSPA) has been established to provide the platform for lecturers to offer their professional services. However, a study[1] conducted reveals that much more efforts are needed to improve the knowledge of these lecturers in conducting consultancy services and their visibility to external clients. Consequently, a sharing facility is required for lecturers to share their experience and knowledge in such services. In this paper, we propose and describe a technique for capturing the knowledge of consultancy services from a group of experts. Such knowledge could then be shared among the lecturers to close this knowledge gap.

The literature provides ample information on the techniques of knowledge capture. Amongst those that we found include Brainstorming[2-3],[11-12],[15-16], Nominal Group Technique (NGT)[3],[10],[14],[16], Delphi[3],[6],[7-8],[16], Interview[4-5],[15-18] and Knowledge Acquisition and Documentation Structuring (KADS)[9],[15],[17-19]. From the analysis of these techniques and the nature of the consultancy knowledge, we decided to choose the brainstorming technique as part of our work to capture the

knowledge of consultancy services delivery from a group of experts.

In this knowledge capture process we used a two-stage approach, in which knowledge-based documentation (Kb-Doc) forms[1] are used to record two consultancy processes that are normally performed by lecturers: (i) The process of securing a consultancy project, and (ii) Implement an effective consulting operation from start until delivery of results.

The paper is organized as follows: Section 2 discusses the related work of this research. In Section 3, we present in some details, the capture process of the knowledge of consultancy services delivery and the results of the capture process using the brainstorming approach. Section 4 concludes the paper.

2. Related Work

2.1. The Significant of Capturing Experts' Knowledge

Knowledge management recognizes and prioritizes the pre-requisite processes before proceeding to capture and map the required knowledge[23]. Knowledge capture is one of the components in knowledge management[24] that provides the benefits for company's long term success and targets many perspectives such as[22-24]:

• receive opinions and assurances from different experts related to the skills, procedure, routine's aim, etc.,

• recognize the weak points that exist in the routine for further improvement as well as enhancing intergroup synchronization and existing information,

• create job opportunity that is valuable for future

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training and recruitment through the creation of knowledge inventory that has been captured from the experts,

• visualize and recognize a process's environment that influences the experts such as the process of consulting, the relationship between experts as group leaders with their clients and group members,

• build a framework, diagram or flowchart to facilitate users in creating a temporary or long-term solution, how to perform the correct procedure, assist them on their actual/main target, recognize their risk's factor as well as reduce severity,

• help to recognize the compilation of knowledge and skills, and able to identify which type of knowledge that is valuable for staff in related domain or worthy of research investment, and

• facilitate staff in providing training in different skills/tasks.

2.2. Approaches in Capturing Experts' Knowledge

The knowledge capture process not only captures knowledge but also the solutions that help experts in applying their knowledge for solving some problems[20-21].

NGT is used to describe a conceptual framework, workflow of business routine, allocating the knowledge needed that is significant in decision making, helps the company to make alterations in their routines that can be easily understood and adapt and to ensure that each individual has equal right in making the group decisions[3],[10],[14],[16].

While in Delphi, once the problem is identified, questionnaires are distributed for feedback, results are shared with group members and the entire process is repeated with refinement until agreement is reached. This method is not conducted face to face[3],[6-8],[16].

Brainstorming is known for a method of making decisions. It is aggressively conducted to push each member to contribute as many ideas as possible, while, one member of the group is assigned to record all the ideas. It is a method of seeking opinions from multiple experts and assists in generating ideas[2-3],[11-12],[15-16].

KADS allows users to identify prospective and bottom-up method on how companies establish, share and use their knowledge resources. It is conducted by analysing specific routines with the integration of knowledge[9],[15],[17-19].

Interview is a process that is systematically performed via face to face. It is a common and popular method in capturing information from respondents as well as from experts/stakeholders[15-18].

2.3. Comparison of Knowledge Capture Approaches

There are several advantages and disadvantages that have been found regarding the five types of knowledge capture approaches. Table 1 compares the advantages and disadvantages.

Table 1. Comparison of Knowledge Capture Approaches

Approaches	Advantages	Disadvantages
NGT [3],[10],[14],[16]	• Each member can vote their favourite idea with no fear of recrimination. • Suitable for small group meeting.	• Difficult to know why those ideas were voted with the way they did. • Inappropriate for business process, or negotiation.
Delphi [3],[6-8],[16]	• No face to face meeting or boundary issues to collect for the solution.	• Unable to ask question between members. • Time consuming. • Costly. • Commitment deficiency due to uncertainty. • Systematic errors such as skewed data.
Brainstorming [2-3],[11-12],[15-16]	• Members are able to express their idea as many as possible in short period of time. • Available in e-brainstorming such as blackboarding and software e.g. MSN messenger.	• Time consuming for meeting arrangement with an experts.
KADS [9],[15],[17-19]	• Easy to interpret and understand the alternative/solution due to structuring method. • No need for modification and correction on the model because re-create and throw prototype for testing for inappropriate solution.	• A difficult task to attain knowledge from experts. • Expert unsure how to describe/elaborate their knowledge. • Hard to test and filter knowledge. • Hard to find relevant knowledge when data are unorganized.
Interview [15-18]	• Most suitable for survey and many interview. • Forms are used to document interviews.	• There is fixed and limited structure in term of response.

3. The Knowledge Capture Process in Consultancy Services via Brainstorming

One of the issues in knowledge capture is the determination of experts. In this paper, we shall not deliberate on this issue but suffice for us to state that in selecting the experts, we have considered the characteristics of the experts, e.g. their seniority and experience and the number of consultancy projects they have undertaken[2]. Consequently, for this project, we selected three subject matter experts (SMEs) from the College of Engineering

(CoE), who fulfil these criteria. The knowledge capture process consists of two stages as shown in Figure 1. It shows the procedure that we apply to implement the knowledge capture process from the subject matter experts using the brainstorming technique.
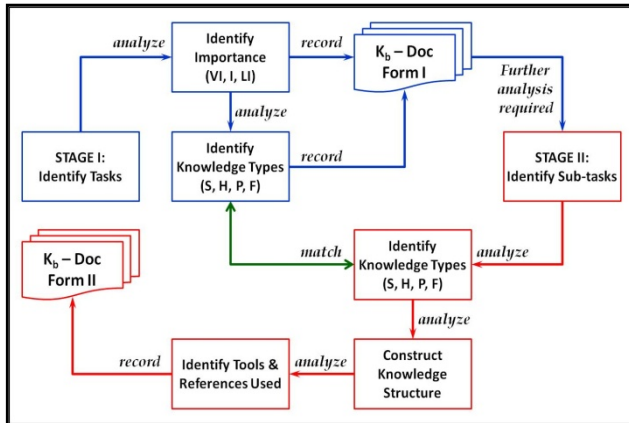

Figure 1. The Knowledge Capture Process Utilizing the Brainstorming Technique

3.1. Stage 1

In this stage the SMES are requested to provide inputs to the following[2]:

a) Identify each task of the consultancy process.

b) Identify the importance, i, of the task. This is scaled and given points as follows:

ⅰ. Very Important (VI) – indicates that the task is very important to analyze (3 points),

ⅱ. Important (I) - the task is important to analyze (2 points),

ⅲ. Less Important (LI) – the task is quite trivial (1 point).

c) Identify the knowledge types, k, each task entails. Four types of knowledge are identified:

ⅰ. Skills (S) – critical knowledge based on expertise (4 points),

ⅱ. Heuristics (H) – knowledge based on previous experience(3 points),

ⅲ. Procedural (P) – knowing the right steps to execute the task (2 points), and

ⅳ. Fundamental (F) – basic or pre-requisite knowledge that are required to understand the task (1 point).

All the above findings are documented in Form I (Task Descriptions) of the Kb-Doc. At the end of Stage 1, an analysis is performed to determine if, for each task, further breakdown to sub-tasks is necessary to elicit further details about the task.

To determine if the task needs further breakdown to sub-tasks, a simple formula is used as in equation (1):

$$ik = \sum[(i) \bullet \sum(k)] \geq 15 \qquad (1)$$

For example, if a task is VI (3 pts.) and it entails the knowledge types H (3 pts.), P (2 pts.), and F (1 pt.), then the result of the formula is 3 x (3 + 2 + 1) = 18, which is greater than 15, the threshold value. All such tasks, which we called

the *critical tasks*, are analyzed for further breakdown to sub-tasks in Stage 2.

3.2. Stage 2

In this stage, the SMEs are requested to perform the following[2]:

a) Identify the sub-tasks for each task. The SMEs are guided to determine the granularity of the sub-task to avoid describing extensive details of the sub-tasks.

b) Determine the knowledge types of each sub-task (S, H, P, or F), which should match the types identified in Stage 1. Otherwise the new knowledge types determined here are updated in Form 1. The knowledge description for each knowledge type is also determined. For example, if knowledge type identified is type F, then the knowledge is "Able to read the circuit diagram."

c) Identify the tools and references used to perform the sub-task.

All the findings in this stage are documented in Form II (Skills and Knowledge) of Kb-Doc. While documenting the details of (b), a detailed analysis is required to create the knowledge structure of the sub-task.

The knowledge structure of a task is the way in which the knowledge types (S, H, P, F) are built with which a set of actions is generated to perform the task. Figure 2 clearly describes a typical knowledge structure.
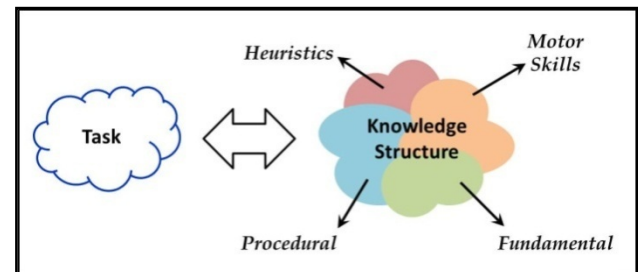

Figure 2. A Typical Knowledge Structure

3.3. Creating the Knowledge Structure of a Sub-task

The knowledge structure of a task is created by compiling the skills a task performer needs to have and the knowledge he needs to know in order to complete the task. For example, we show in Figure 3 below, a sample of a knowledge structure of a sub-task from the session:

Figure 3. A Sample of a Knowledge Structure (Form II)

The contents of KNOWLEDGE ELEMENTS and TYPE

represent the knowledge structure of SUB-TASKS/TASK ELEMENTS (Ref. No. 3.1). The resulting knowledge structure of Task 3.0, UTC (now known as INSPA) advertises training courses to list of clients, is the compilation of the knowledge structures of all its sub-tasks.

Abstracting the concept further, the knowledge structure of the task of Securing a Consultancy Project is the integration of all the knowledge structures of its tasks/sub-tasks. Figure 4 illustrates this concept.
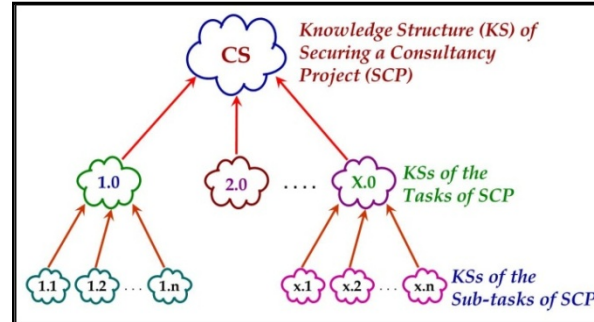

Figure 4. Abstractions of Knowledge Structures

MAIN JOB : THE PROCESS OF SECURING THE KNOWLEDGE/PROJECT

DEPARTMENT: COE/COIT
SME: DR. QISTI, ASSOC. PROF. ISMAIL SAID, TUAN RASHID

DATE: 18/1/ 2012 (WED)   TIME: 2:30:00 PM   PAGE 1 of 1
COMPLETED BY: NUR ATIQAH BT MOHAMED FARID

TASK REF. NO.	TASK DESCRIPTIONS	IMPORTANCE (i)			KNOWLEDGE TYPES (k)				SUM $\sum [(i)(x(k))] \geq 15$	ANALYSE ($\geq$15)
		VI	I	LI	S	H	P	F		
1.0	Power Engineering Centre (PEC), UNITEN R&D (Roles: Secure and find project for lecturers), UTC (business and consultancy): secure the project, and find lecturers to join the project.	3				3	2	1	18	YES
2.0	External Client: Approach UNITEN / TNB's staff.	3			4	3	2	1	30	YES
3.0	UTC advertises consultancy-training courses via list of clients.		2		4	3	2	1	20	YES
4.0	From conducting short courses external client come to know about expertise in UNITEN lecturers.	3				3	2	1	18	YES
5.0	TNB also recommend their clients to approach UNITEN's lecturers for consultancy project. (followed by task no. 1)			1	4	3		1	8	NO
6.0	Lecturers who published papers in journals and conferences coincidentally advertise their expertise.	3				3	2	1	18	YES
7.0	TNB policy of engaging UNITEN lecturer first before other external consultant (followed by task no. 2)			1	4	3	2	1	10	NO
8.0	Lecturers proactively approach the client with dean's permission to secure a project (similar to task 2.0)	3			4	3	2	1	30	YES
9.0	Lecturers expertise is recommended through contacts and networking to secure a project. (similar to task 2.0)	3			4	3	2	1	30	YES
10.0	New project are secured due to excellent performance of previous projects. (similar to task 2.0)	3			4	3	2	1	30	YES
	FREQUENCY	7	1	2	7	10	9	10	**TOTAL OF NO. THAT SHOULD BE ANALYSE**	**8**
	RELATIVE FREQUENCY (%)	28	4	8	8	12	11	12		

PROJECT TITLE: THE DEVELOPMENT & VALIDATION of KM FRAMEWORK   PROJECT REF. NO. : SESSION 1/ 2012

Figure 5. Kb-DocForm I: Main Task

SUB – TASK 2.0: EXTERNAL CLIENT: APPROACH UNITEN / TNB'S STAFF.

DEPARTMENT: Coe/Coit
SME: Dr. Qisti, Assoc. Prof. Ismail Said, Tuan Rashid   COMPLETED BY: Nur Atiqah Bt Mohamed Farid
MAIN JOB : The process of securing the knowledge/project

REF. NO.	SUB-TASKS/TASK ELEMENTS	KNOWLEDGE ELEMENTS	TYPE	Can Perform?	TOOLS / INSTRUMENTS	REFERENCES
2.1	Identify potential clients' problem, related to current interest and lecturers' expertise	• Knowledge of the client's processes, and issues (H) (F) • Knowledge of expertise (H)	H, F	YES	• Internet • Website • Personal contact • Meeting and discussion	• Company's brochure
2.2	Project team write the proposal	• A knowledge in subject matter of the project (S)(H) • Knowledge of proposal format (P)(F) • Costing of project (F)	S, H, P, F	YES	• Word Processor	• Company ISO Document
2.3	Submit proposal through UNITEN R&D	• The knowledge of submission procedure (P)	P	YES	• Email • Word processor	• UNITEN ISO Document
2.4	Present project proposal to client	• A knowledge in subject matter of the project (H) • Presentation skills (S)	S, H	YES	• Power Point	
2.5	Submit revised proposal (if necessary)	• A knowledge in subject matter of the project (S)(H) • Knowledge of proposal format (P)(F) • Costing of project (F)	S, H, P, F	YES	• Word Processor	• Company ISO Document

PROJECT TITLE: THE DEVELOPMENT & VALIDATION of KM FRAMEWORK   PROJECT REF. NO. : SESSION 1/ 2012

Figure 6. Kb-DocForm II: Sub-Task

We compiled the results of the brainstorming sessions, a sample of which is shown as the Appendix of this paper (see Figures 5 and 6). The results of the sessions were captured and analyzed using the MS-Excel (Version 2007) and the Brainstorming tool, XMind 2012 (Version 3.3.0).

4. Conclusions

The brainstorming sessions were conducted with three selected lecturers who are experts in their main area which is engineering as well as the consultancy work which they have secured over many years as lecturers of UNITEN as part of their other responsibilities.

The main objective of these sessions was to capture and identify the knowledge process, tools, references, level of importance, types of knowledge that are used by experts in delivering the consultancy services that might be useful for new or less experienced lecturers.

From the brainstorming sessions, we discovered that there are several knowledge processes which are critical for sharing. These were documented in two forms of Kb-Doc; the first captures the main task and the second documents the sub-tasks.

The complete results of the knowledge capture process are compiled into one complete Kb-Doc for reference and use of future generation of lecturers or consultants in UNITEN to deliver effective consultancy services to UNITEN's clients. Further work will proceed by refining and finalizing the KM Consultancy Framework of which the Kb-Doc is a part.

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