International Education Studies; Vol. 9, No. 3; 2016
ISSN 1913-9020 E-ISSN 1913-9039
Published by Canadian Center of Science and Education

The Effect of Implementing Knowledge Management System in Supplier Selection Content to Improve Learning Performance of Online Travel Agencies Staff

Pakinee Ariya[1], Nopasit Chakpitak[1,2] & Pradorn Sureepong[1]

[1] College of Arts, Media and Technology, Chiang Mai University, Chiang Mai, Thailand

[2] International School, Peking University, Chiang Mai University, Chiang Mai, Thailand

Correspondence: Pakinee Ariya, College of Arts, Media and Technology, Chiang Mai University, Chiang Mai, Thailand. Tel: 6-653-920-299 Ext 401. E-mail: pakinee.a@outlook.co.th

Received: August 14, 2015 Accepted: October 9, 2015 Online Published: February 25, 2016

doi:10.5539/ies.v9n3p148 URL: http://dx.doi.org/10.5539/ies.v9n3p148

Abstract

Supplier selection knowledge of OTAs businesses is one of the most valuable and significant knowledge since OTAs now operate businesses that gain their benefits from having many kinds of tourism products and services for customers to browse from in their own online booking systems. The better the suppliers, the more successful will OTAs be. The knowledge in supplier selection is, therefore, relayed through manuals, mentoring and coaching. After that there has been a creation of knowledge management systems to be used as a media to pass on the knowledge via online means. The knowledge contents presented are retention and transfer knowledge. To evaluate the efficiency of using Knowledge Management System (KMS), the research has provided a study in increased learning performances of related staff in supplier selection who have learned through the KMS system. The result found that the group that learned through KMS gained higher learning performances than the one who learned from documents. This reflects that the KMS system will suitable to be used as a tool in knowledge management and can be relayed to organizations in this present time.

Keywords: Knowledge Management System (KMS), learning performance, online travel agency, supplier selection

1. Introduction

Chiang Mai is one of the provinces of Thailand that gains most of its income from tourism and is one of the most popular destinations for foreign tourists. Moreover, the Internet has become a significant part to drive the growth of the Chiang Mai tourism industry forward by providing online booking facilities to serve tourists using information technology to explore destinations and cultures from their own home using personal computers. This technology also enables tourists to collect information on available choices before finalizing travel plans. And with its immense information resources, the Internet allows tourists to scrutinize hotels, check weather forecasts, look up for local food, and even share their travel experiences of chosen destinations with other tourists around the world (Duncan, 2009; Helmut et al., 2007; Buhalis, 1998). Travel agency businesses have therefore been established to serve these tourists who would like to reserve accommodations, buy airplane tickets, tourism packages, and other tourism products and services. Travel agency businesses act as intermediaries between customers and other businesses in the tourism industry (Buhalis & Licata, 2001; Harvey, 2001). In these processes, there are requirements to select suppliers, manage primary costs, and assess prices. The collected knowledge is then significant to the OTA businesses themselves, including all related businesses such as airlines, hotels, car rentals etc. It can be said that travel agencies are the knowledge conductors of the tourism industry.

The key to business success is the supplier selection because a good selection method can lead to success through beneficial product delivery (Tempelmeier, 2002; Vonderembse & Tracy, 1999). Moreover it creates advancement and satisfaction in business relationships which in turn can impact products, services, costs and the ability to adapt to changing market stimulus (Monczka et al., 2005). When considering their roles in learning organizations, learning processes do not only exist in general education systems and happen between teachers and students but at the workplace as well. As mentioned above, OTAs have to work together as a team to exchange their tacit and explicit knowledge from suppliers to develop their products and services that are sold

via their online reservation system. OTAs' supplier selection is also considered to be the core organizational value that requires staff to participate in learning and knowledge sharing to make these processes efficient. They do the supplier source planning based on the knowledge collected through documentation (Explicit knowledge). But techniques, experiences, knowledge, and expertise (Tacit knowledge) are not forwarded to the staff in the company.

Supplier selection staff learns the processes by studying from documents and inquiring from experienced persons, which processes create memories and understandings. However, the selection process requires skills and experiences. When senior staff resigns, their knowledge also leaves the company making it harder for junior staff to effectively operate their work. This can harass the supplier selection processes and increase selection time and costs. If the selected suppliers are not qualified to match the company's policies and to meet the customers' needs, that can dissatisfy customers and eventually can make them forsake the products and services of OTAs resulting in profit losses. Forming knowledge management in organizations is one of the topics that has currently been focused by OTAs and encouraged them to design several knowledge management methods to each organization's needs. The researcher had created a knowledge management system that would help organizations maintain crucial knowledge by a method known as Knowledge Management Systems (KMS), which is an IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other ways, enhances the KM process.

One knowledge management methods for example is to create a website for organizations to function as a tool to relay knowledge to the staff. This knowledge has to be able to be relayed through the learning styles that the staff in the organization tends to use when accessing the website or the database for example smart phones, tablets, personal computers etc. Supplier selection knowledge can be audited, identified and presented in the form of a knowledge model called CommonKADs and Knowledge Codification by identifying knowledge repositories and tacit knowledge and then create a knowledge mapping. Knowledge portals are also identified as means of knowledge sharing by using the website www.kmtourism.net to share the knowledge model and the relevant supplier selection case studies. The knowledge transferred through knowledge management systems in this study consists of 2 levels according to Bloom's taxonomy(1956); 1) knowledge retention; remembering working methods in the supplier selection and 2) knowledge transfer; understanding case studies or having critical thinking processes to solve problems in supplier selection on individual levels.

Even though there is a standardized knowledge management system according to the knowledge engineering principles, the main problem was to prove if this system would actually elevate learning performances of organization staff higher than the former ways of learning–from documents. This research aimed to measure the learning performances of staff who had learned supplier selection via knowledge management systems and applied the supplier selection knowledge management by self- studies. To measure the knowledge, pre-tests and post-tests were used to assess learning results and to see how the KMS system affects the learning performance. The following parts of this paper will present concepts, theories, and related researches, covering the topics of Learning, Learning style and Learning Organization, along with study results, and discussions.

2. Literature Review

2.1 Supplier Selection Knowledge of OTAs

Supplier selection is a set of competencies, tools and techniques that support the overall SRM process. Suppliers are selected and evaluated against several criteria such as price, timeliness, costs, product quality and service (Buhalis, 2003). There are limited issues in supplier selection. To assess the ability of suppliers in order to select the most appropriate ones is very important. Supplier selection is a challenging task for the management because it is a difficult and complex problem. Supplier selection has factors or criteria to be taken into consideration, for example, the quality of materials, or equipment, lead time, unit price, flexibility in delivery, frequency, and the lot size that can be delivered, cost of freight, consignments on time, ability to share information, ability to collaborate in the design, the import tax/exchange rate of the currency, and the stability of the business of the supplier.

OTAs select suppliers from the supplier list. If there are not enough suppliers to fulfill the requirements, new suppliers must be searched and listed. OTAs evaluate the potential suppliers. After they pass this process, they receive a quotation from the online travel agency.This quotation provides terms, conditions and pricing. Finally, negotiation and contract should be managed. OTAs identify business importance and determine the appropriate amount of time and the level of resource to be allocated in order to cope with suppliers.

Supplier selection is an important knowledge that requires knowledge management to create a learning process that is made out of a range of strategies and practices used in an organization to identify, create, represent,

distribute and enable adoption of insights and experiences. Such insights and experiences comprise knowledge, either embodied individually or organizationally as processes or practices. Since 1991 (Nonaka, 1991), KM has established disciplines that are taught in the fields of business administration, information systems, management, and library and information sciences (Alavi & Leidner, 1999). More recently, other fields also contribute to KM research; these include information and media, computer science, public health and public policy. Many large organizations have resources dedicated solely to internal KM efforts, often as a part of their business strategy, information technology or human resource management departments (Addicott et al., 2006). There are even several consulting firms that specialize in providing strategy and advice regarding KM. Knowledge can be divided into two major categories as follows:

Tacit Knowledge: knowledge gained from personal experiences, gifts, and instincts in each individual generated through the process of understanding the things around. Tacit knowledge cannot easily be interpreted into words or written notes. This type of knowledge can refer to, for example, knowledge in supplier selection, product and service distribution management, tourism package design, primary cost analysis, and pricing assessment.

Explicit Knowledge: knowledge that can be relayed using several methods, such as written notes, theories, or manuals. This type of knowledge is a concrete knowledge which has obvious management, focuses on accessing knowledge, and can be interpreted. When this type of knowledge is used and transformed into new knowledge, it can serve as a reference for the future or it can be published and shared with others. In this study, the knowledge that we focus on consists of documents and supplier databases that companies keep as references, including operation manuals.

These 2 types of knowledge will continue to transform, sometimes as tacit and sometimes as explicit knowledge, which is counted to be "epistemological". Dimension is the site of "social interaction" between tacit and explicit knowledge whereby knowledge is converted from one type to another, and new knowledge is created (Nonaka, 1994). A lot of literatures emphasize the SECI model as a unified dynamic knowledge creation and knowledge conversion model. However, under the learning organization theory (Senge, 1990), there is a fifth-discipline concept, especially systematic thinking as a tool to be used to transfer the knowledge and create a holistic view of supplier selection for OTAs. And it can codify the tacit knowledge of supplier selection allowing it to be transferred to explicit knowledge.

Typically, knowledge management in supplier selection focuses mainly on organizational objectives such as improved performance, competitive advantage, innovation, the sharing of lessons learned, integration and continuous improvement of the organization. Knowledge management in supplier selection and online publications enable organizational learning and is a more concrete mechanism than previously existing supplier selection methods applied in former organizational systems, e.g. storing knowledge in the form of manuals or teaching by using coaching systems etc.

2.2 Knowledge Portals for Sharing

According to Bhatt (2001), supervision and a predetermined channel of knowledge distribution minimizes the interaction and consequently resolves the issues of transferred knowledge validity. The interactions between organizational technologies, techniques and people can have a direct impact on knowledge distribution. This knowledge distribution has to pass knowledge management processes before it can be used as a teaching content. Teaching in an organization through knowledge management systems as technology components requires the extracts of tacit knowledge on the staff and manuals that contain explicit knowledge. The tools used in knowledge management can be divided into 2 groups; 1) Non-Technical Tools; Community of Practices (Bood & Coenders, 2004), Storytelling (Egan, 2011), Mentoring and Coaching (Volet, 1991), On the Job Trainings, and Reflective Conversations (Schon, 1992) and 2) Technical Tools; Intranet, Websites, E-mail (Atherton, 2005; Bouthillier & Shearer, 2002), Weblogs (Efimova, 2004) and CommonKADs (Sutton & Patkar, 2009).

This research focuses on CommonKADs, which is a knowledge engineering tool used to set rules and frameworks in the analysis of work details and knowledge management processes, rules for demonstrations, creations, and exchanges in knowledge models to solve problems in 3 levels: 1)Task Level: Knowledge on goals of each work. 2) Inference Level: knowledge in thinking processes. CommonKADs will create templates for thinking structures that require intensive knowledge to be applied in preparing agendas for interviews. Knowledge capturing helps in the analyses of semantic annotation to analyze and synthesize knowledge models. 3) Domain Level: Knowledge about certain thoughts on specific problems, rational principles, and results used for work, problem solving, and decision-making by using these 3 thinking method frames to capture, analyze and model knowledge and put it into practice, including the application of knowledge management creation processes.

2.3 Learning, Learning Style and Learning Organization

Knowledge is information that leads to actions. Knowledge consists of contents and information that contain facts, opinions, theories, principles, styles, set of ideas, or other relevant information. Knowledge is a frame of the combinations between experiences, values and attainments in the contexts of evaluation, and it also allows the combination of new experiences with new information (Bloom et al., 1965).

Knowledge relaying is a part of knowledge management that creates knowledge management. Learning processes occur throughout one's life. A definition of knowledge (Kimble & Bourdon, 2006; Hildreth & Kimble, 2002; Davenport & Prusak, 1998) defines learning as "a relatively permanent change in behavioral potentiality that occurs as a result of reinforced practice". Based on the mentioned definition, 5 criteria of knowledge can be defined, which are 1) learning is changing in behaviors, 2) the behavioral changes have to be permanent, 3) the said changes do not have to lead to processes immediately since these changes can be potentials of future performances, 4) changes in behaviors or potentials in learners are results only from experiences or trainings, and 5) experiences or trainings have to be reinforced. Learning, whether in education systems or in workplaces, will help learners to achieve efficacy or potentials in their works depending on learning styles, which refers to the physical conditions, thoughts, and feelings one stably uses to recognize, respond, and interact with the learning environment.

Learning styles of learners affect the success on learning. A learner achieves more and is able to memorize information longer when the teaching methods, teaching materials/media, and the learning environment are in harmony with the cognitive and learning styles of the learner (Caldwell & Ginthier, 1996; Dunn et al., 1995; Jonassen & Grabowski, 1993). For example learners who are able to think in pictures will achieve more when the instructors use media that contain illustrations, or those with independent thoughts will achieve more when participate in learning activities that allow them to do research by themselves, or those with a team learning mindset can achieve more from working in certain groups etc. Therefore, the constructivist concept and self-learning design concept are put into use since they stimulate the OTAs' staff learning motivation and they use knowledge from their performances to create lessons for generation-to-generation relaying through knowledge management systems (KMS). This research used Microsoft Sharepoint as a knowledge portal for OTA staff to be used throughout their self-knowledge management processes and knowledge sharing. Knowledge sharing and knowledge management systems are most commonly associated with IT-related projects because of their use of joint storage such as shared drives, the ability to exchange information via networking systems operating across thousands of machines, and the resulting mass circulation of information. This includes initiatives such as access to databases, the worldwide web and company intranets.

These above mentioned concepts of knowledge learning, learning styles, and knowledge portals for knowledge sharing can be applied on the domain of supplier selection to bring the learning processes in the organization to a higher level. In this era of knowledge-based society the significance of "human resource" factors is ever growing. In OTA businesses there are a lot of employees who have the following sort of capabilities; possessing factual and theoretical knowledge, finding and accessing information, ability to apply information, communication skills, motivation, and intellectual capabilities. They are obviously non-manual workers. OTA employees who use any form of recorded knowledge could be considered as knowledge workers (Creotec, 2006). Knowledge workers can be considered to be sources of human capital that organizations have to value and invest in in order to improve their staff's skills. It has been found that many organizations have been focusing on the knowledge of these people and searching for ways to help their staff better understands learning.

- Learning Organization (LO) (Porrini & Starbuck, 2015; Constance, 2003; Gherardi, 2000) starts from individual learning. However, individual learning can be expressed by behaviors, thoughts, and instilled and collective beliefs. The individual learning of a person will occur among these following conditions: Firstly, from relating current events to past events. The more a current event is similar to a past event, the more the staff will learn. Secondly, using the Law of Effect concept that focuses on the rules of results. If a result is satisfactory for the staff, it will sustain that behavior. For instance when a chief praises the staff's work, this positive feedback encourages the staff to keep up with the good performance and a better work will lead to more praises from the chief. Finally, by actions. The more the staff is repeatedly trained on repeatedly doing something related to assigned works, the more they learn. However, feedback is important in terms of training results. When the chief presents awards to the staff, the staff tends to continue to sustain the good performance.
- When a person understands individual learning processes in his or her work, team learning can happen by the exchange of ideas, discussions, and by sharing opinions of different persons. This process of team

learning is what leads to organizational learning and creates the ontological dimension illustrates the knowledge from individual via group, inter-organizational knowledge and organizational levels (Nonaka & Takeuchi, 1995). Through this process an individual's knowledge is 'amplified' and 'crystallized' as a part of the knowledge network of an learning organization".

- It can be concluded that 1) staff are the one who create organizational knowledge, 2) staff working together in groups tend to have better knowledge exchange which leads to new knowledge creation, and 3) the group will apply new knowledge received to the development of their works, which will affect the organization's benefits or goals. Therefore, in order to preserve knowledge within an organization, there must be knowledge management, knowledge repository creations, and dissemination through appropriate ways to create sustaining knowledge management systems. The staff will also show improvement in learning, which will result in the efficacy of actions that creates high-quality works and increases the organization's values.

2.4 Learning Performance

To measure the results of knowledge management in an organization, OTA staff is encouraged to learn from the KMS system, which is a learning technology that has been involved with the aim of fostering the learning performance of knowledge workers. This research evaluated the staff's learning results in supplier selection by using the six categories of original taxonomy; Remember, Understand, Apply, Analyze, Evaluate, and Create. The first two basic knowledge, which were Remember and Understand, also known as 'Knowledge Retention' and 'Knowledge Transfer', were selected to provide the pre-tests and the post-tests for staff who had learned from the KMS to create in-depth-dimension knowledge. 'The New Knowledge Dimension' concept (Anderson,et al.,2001) was used to revise taxonomy cut across subject matter lines, but however contains four main categories instead of three. Three of them include substances of subcategories of knowledge in the original framework, but were later reorganized to enable the terminology and to recognize the distinctions of cognitive psychology that have been developed since the original framework was devised. The new fourth category consists of:

A. Factual Knowledge - The basic elements that students must learn to be acquainted with disciplines and solve problems in them.

B. Conceptual Knowledge - The interrelationships among the basic elements within larger structures that enable them to function together.

C. Procedural Knowledge - How to do some things; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.

D. Metacognitive Knowledge - Knowledge of cognition in general as well as awareness and knowledge of one's own cognition.

Besides, measuring the learning performance of knowledge workers is a crucial part in our study since it can lead to better learning technology improvements. In our study, the knowledge test has been applied for measuring the learning performance of knowledge workers in OTAs. The knowledge test consisted of two sub-tasks, first being the Retention Test which measures the learners' related prior knowledge on the presented content. This test corresponds to the factual and conceptual knowledge remembering represented in Bloom's taxonomy. The second sub-task applied is the Transfer Test which measures the learners' understandings about the presented content corresponding to the concept of understanding and applying conceptual knowledge represented in Bloom's taxonomy (Anderson et al., 2001). From the knowledge tests, learning performance scores are calculated based on the formula shown in Formula 1.

$$The\ score\ of\ learning\ performance = \frac{The\ score\ of\ retention\ test + The\ score\ of\ transfer\ test}{2} \quad (1)$$

3. Methodology

3.1 Conceptual Framework

In order to carry out the analysis, this research focused on supplier selection in advance by defining the tacit and explicit types of knowledge on supplier selection by using such tools and knowledge management techniques as tacit knowledge exchanging techniques and knowledge capturing techniques. The knowledge management systems CommonKADs and Microsoft Sharepoint have been installed and published on the website www.kmtourism.net. The participating staff in the research has been separated into two groups. One of the groups used the above mentioned knowledge management systems for learning, and their learning performance has been then evaluated and compared with the other group using the traditional ways applied in OTAs which

means studying from conceptual framework documents as shown Figure 1.

3.2 Scope of Work

A preliminary study on supplier selection knowledge management had been conducted beforehand by using CommonKADs and had been published online before it was tested by using the information set in Appendix A. To be able to respond to the research objective, an evaluation was conducted to measure the learning performances of OTA staff. This study therefore had a scope of work to study the results of pre-KMS learning compared to post-KMS learning and the participants were divided into2 groups as follows: a control group not using KMS for learning and an experimental group using KMS. The in-depth analysis of the study results is to be discussed in the next steps.

3.3 Sample Data

The method of this study is based on the selection of a target group consisting of OTA businesses. There are 33 OTA companies in Chiang Mai which have registered to the Bureau of Tourism Business and Guide Registration, Department of Tourism. Seven of the companies were selected, so the rate of participation is 21.21%. The reasons why these companies were selected were: 1) OTAs have been conducted business for at least ten years since 2005; 2) OTAs are registered in the Bureau of Tourism Business and Guide Registration, Department of Tourism. They have been also qualified as 'Good standard' by the Bureau of Tourism Business and Guide Registration, and 3) OTAs are IATA members (International Air Transport Association: IATA).

According to the 7 representatives from companies, there were 36 employees that were responsible for supplier selection. The average age in the sample was 36 with 13 men and 23 women. Each of them had been working at their companies for an average of 2 years. These employees were divided into 2 groups; A being a group of 18 persons using manual documents on tablets to learn about supplier selection and B being a group of 18 persons participating in learning through KMS. Both groups had to complete a pre-test and a post-test consisting of Knowledge Retention and Knowledge Transfer contents.

The main reason to divide these persons into 2 groups was to prove the following hypotheses:

H1: Knowledge Retention score of the group that learned through the KMS system will be higher than that of the group that learned though manuals for learning.

H2: Knowledge Transfer score of the group that learned through the KMS system will be higher than that of the group that learned though manuals for learning.

H3: The group that learned through KMS system will achieve higher performances than the group that used manuals for learning.

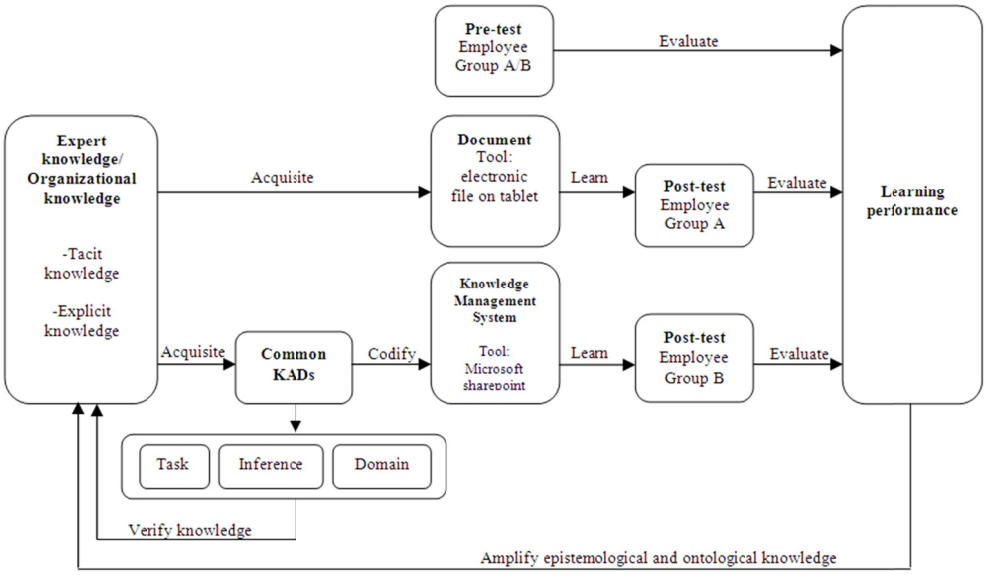

Figure1. Conceptual Framework

3.4 Research Methods

The research method can all be described in Figure 2 as follows:

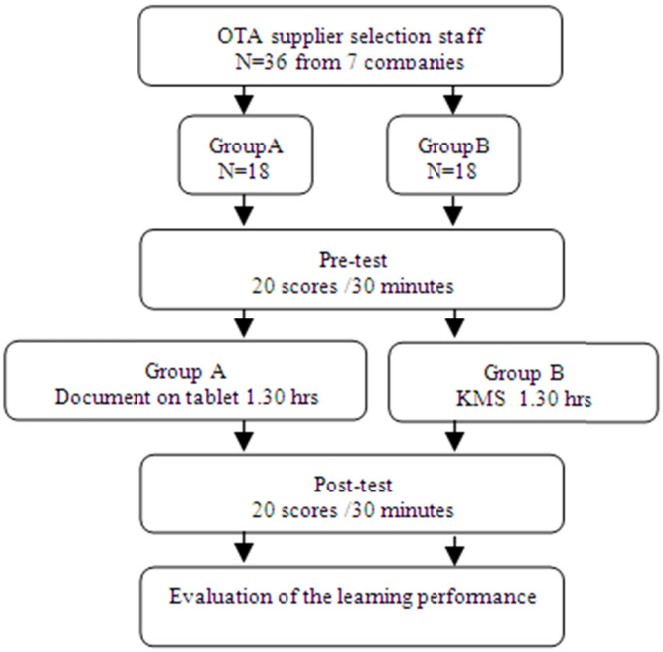

Figure 2. Research framework

The pre- and post-tests, which are of the same test sets, had the following creation methods:

The contents of knowledge management in the supplier selection were analyzed and multiple-choice tests have been created. The created tests were then tested and proved by 5 experts and then analyzed individually in 20 items. The tests were categorized to 1) knowledge retention; remembering working methods in supplier selection for 10 items which consist of 3 sections; 3 questions on Terminologies, 4 questions on operational methods, and 3 questions on concepts and 2) knowledge transfer; understanding study cases or having critical thinking processes to solve problems in supplier selection in individual levels for 10 items which is categorized into 3 sections; 3 questions on classification and categories, 4 questions on case study, and 3 questions on strategic knowledge. 20 Items of the test are also structured by using the knowledge dimension of the revised taxonomy (State of Minnesota, 1998) (Table1).

Table 1. Knowledge dimension

Knowledge Dimension	Knowledge retention		Knowledge transfer				Total items
	Terminologies	Operational methods	Concepts	Classification and categories	Case Studies	Strategic knowledge	
Factual Knowledge	3			3			6
Conceptual Knowledge			3		4		7
Procedural Knowledge		4					4
Metacognitive Knowledge						3	3

The analyses were done using the IOC (Index of Item-Objective Congruence) formula to find harmony between the objective and contents (Turner & Calrson, 2003) in the each test. The experts selected the tests that had IOC values between 0.50-1.00. If the values were under 0.50, the tests have been revised.

The scores were analyzed to find the difficulty values (P) and discrimination values (r) (Barker & Ebel, 1982) of each individual test for each test item. 1 point was given for every correct answer and 0 point was given to incorrect test items. The tests had difficulty values between 0.20 and 1.00. The other information analysis was done by giving pilot-tests to 30 participants.

The best test items with difficulty levels between 0.20–0.80 and with discrimination values at 0.20–1.00 were selected and analyzed to verify reliability by using the Kuder-Richardson's KR-20 method. The reliability was 0.95. The reliability was found by using one test with one participant in one time. The scoring system was the 0-1 method–1 for correct and 0 for incorrect answers.

The tests were divided into groups by their contents to be used as pre-tests and post-tests.

The tests were given to the sample group of 36 employees in charge of supplier selection who had never been trained on supplier selection before this examination. The test method was to invite all 36 persons to take the tests on a specific day in the same classroom. The participants were then divided into 2 groups by using a random method; A being a group of 18 persons to use manual documents on tablets to learn about supplier selection and B being a group of 18 persons to participate in learning by using tablets to access to KMS. Both groups had the same number of participants (18 persons). The groups were not given the tablets before the pre-tests to measure their prior knowledge. The pre-tests consisted of 20 points and 30 minutes were given to complete the tests. When the tests were done, group A studied about supplier selection presented on tablets while group B studied using the KMS system with instructions on how to use the system. Both groups were given 1.30 hours for a self-study and then they were asked to complete the post-tests which had the same contents as the pre-tests to get comparable results from learning with different methods.

The pre-test and post-test scores of each group were analyzed and compared to find the results from learning through the Knowledge Management System and to identify how this system fosters the learners' performances. 1 score point was given to any correct answers and 0 for the incorrect ones. The scores consisted of 10 Knowledge Retention related questions for 10 points and 10 Knowledge Transfer related questions for another 10 points. The Knowledge Retention (R) and Knowledge Transfer (T) scores of the sample group were calculated to find the average by the division of the overall score by the number of participants in each group. The Learning Performance (LP) score of each group was calculated by the formula (R+T)/2 and then post-test scores were compared to pre-test scores to find differences of 3 aspects; 1) Knowledge Retention, 2) Knowledge Transfer and 3) Learning Performance to be analyzed and interpreted by the hypothesis.

4. Results

4.1 Knowledge Input

The knowledge brought to be studied by the sample groups was the knowledge on supplier selection about business scenarios in high and low seasons, various information of airlines, hotels, rental cars, and etc. Additionally, there were situations related to customers both domestic and international, which have huge effects on supplier selection in order to meet customers' demands in tourism products and services. This Knowledge Input, as mentioned above, dwells in Knowledge Retention and Knowledge Transfer levels which consist of terminologies, work methods, rules, supplier selections concepts, and case studies.

4.2 Pre-Test and Post-Test Results

The test pattern of this test consists of 2 parts; Knowledge retention and Knowledge transfer measurement tests. The tests on Knowledge retention are to measure memory recalls from teaching and relating experiences of mentors from business rules of OTAs and manual documents on Supplier Selection. The 10 test objects are categorized in 3 sections as followings:

- 3 questions on terminologies; vocabularies, names, rules–"What does price parity policy mean?"
- 4 questions on operational methods; orders and patterns, sequences and steps and trends according to practice information, and categorizing–"After having a qualified supplier, what should be done next?"
- 3 questions on concepts; specific details and elements; including the ones that have been summarized–"Which supplier selection method is the most significant one?"

As for the tests on knowledge transfer, there are questions that were not prepared from textbooks or lectures but linked the contents taught to questions and then reformed the answers. In this test, there are 10 test objects in 3

categories:

- 3 questions on classification and categories; word, text and photo classification and categories, or using
- comparisons or metaphors; having a scenario to consider an annual report of a supplier before visiting the actual place–"Does analyzing annual reports affects supplier selection and how?"
- 4 questions on principle and generalization; interpretations of stories, case studies, facts–"What would you do if a hotel which was a former supplier of your company bargained on the commission referring to having the highest room sale?"
- 3 questions on strategic knowledge; adapting the model or theoretical structures to real situation and translating stories apart from provided information reasonably, which depends on the skills in translation and interpretation–"According to the traveling trend of Thailand in 2015, there is an inbound travelling trend that includes having Chinese tourists at number 1 on the chart. How does this phenomenon affect supplier selection?"

Knowledge retention part has 0-10 points. Knowledge Retention part has 0-10 points. Both parts have 0-20 points. The only correct answer should have been selected from the four choices in each question. Each correct answer was given one point, and the points for each question were added up to compute the total score, which was later used in the analyses. Table 2 and table3 present the Score of retention, transfer test for both pre-tests and post-tests of group A and group B, respectively. Table 4 and table 5 present the score from knowledge dimension of group A and group B. Table 6 presents the mean scores of both groups on the retention and transfer tests for both pre-tests and post-tests, including the total scores of learning performances and the overall progress.

Table 2. Score from pre-test and post-test of group A

No.	Retention test (R)								Transfer test (T)								Total	Total
	Pre-test				Post-test				Pre-test				Post-test				Pre-test	Post-test
	A[1]	B[2]	C[3]	total	A	B	C	total	D[4]	E[5]	F[6]	total	D	E	F	total	(R+T)	(R+T)
1	1	2	2	5	2	2	2	6	2	2	2	6	2	3	1	6	11	12
2	2	3	2	7	2	3	2	7	3	2	2	7	2	3	3	8	14	15
3	1	3	2	6	2	3	2	7	1	3	1	5	2	2	3	7	11	14
4	3	2	2	7	3	3	1	7	2	2	3	7	2	4	2	8	14	15
5	2	2	2	6	2	3	3	8	1	3	2	6	1	3	3	7	12	15
6	2	1	2	5	2	3	2	7	3	3	2	8	2	3	3	8	13	15
7	1	2	1	4	3	2	2	7	3	4	2	9	3	4	3	10	13	17
8	3	2	3	8	3	3	3	9	3	3	3	9	2	4	3	9	17	18
9	1	3	1	5	2	3	2	7	3	2	2	7	1	3	2	6	12	13
10	3	4	2	9	3	3	2	8	2	2	3	7	2	3	2	7	16	15
11	2	2	1	5	2	3	2	7	2	4	1	7	2	3	3	8	12	15
12	3	4	3	10	3	4	3	10	3	3	2	8	3	4	2	9	18	19
13	2	2	1	5	2	2	3	7	2	3	3	8	2	3	3	8	13	15
14	3	2	1	6	2	3	2	7	1	3	2	6	2	2	3	7	12	14
15	3	2	2	7	3	4	2	9	2	2	2	6	2	3	2	7	13	16
16	2	3	2	7	2	3	2	7	1	1	2	4	2	3	1	6	11	13
17	1	1	3	5	2	2	3	7	2	3	1	6	3	2	2	7	11	14
18	3	3	2	8	3	4	1	8	1	2	1	4	2	2	2	6	12	14
Mean	2.11	2.39	1.89	6.39	2.39	2.94	2.17	7.50	2.06	2.61	2.00	6.67	2.06	3.00	2.39	7.44	13.06	14.94
Learning Performance (R+T)/2																	6.53	7.47

[1] A stands for questions on terminologies.

[2] B stands for questions on operational method.

[3] C stands for questions on concepts.

[4] D stands for questions on classification and categories.

[5] E stands for questions on case studies.

[6] F stands for questions on strategic knowledge.

The participants in Group A had mean scores in knowledge retention tests in the 3 test objects of the pre-test part; questions on contents, operational methods and concepts–at 2.11, 2.39, and 1.89, which were summed up to 6.39. For the post-test, the scores were at 2.39, 2.94, and 2.17, which were summed up to 7.50. As for the mean scores in knowledge Transfer tests in the 3 test objects the pre-test part; questions on interpretations translations, and explanations–were at 2.06, 2.61, and 2.00, which were calculated as 6.67. For the post-tests, the score were 2.06, 3.06, and 2.39, which were calculated as 7.44. The scores could be summarized as the total pre-test score at 13.06 and the total post-test score at 14.97, or as a Learning Performance score by using the formula (R+T)/2.As for the pre-tests, the total test score was 6.53, while the total post-test score was at 7.47.

Table 3. Score from pre-test and post-test of group B

No.	Retention test (R)								Transfer test (T)								Total	Total
	Pre-test				Post-test				Pre-test				Post-test				Pre-test	Post-test
	A	B	C	total	A	B	C	total	D	E	F	total	D	E	F	total	(R+T)	(R+T)
1	1	3	1	5	2	3	2	7	2	3	1	6	2	3	3	8	11	15
2	2	3	2	7	3	3	2	8	3	2	1	6	2	4	3	9	13	17
3	1	3	2	6	2	3	2	7	1	2	2	5	2	3	3	8	11	15
4	3	3	2	8	3	3	2	8	2	2	2	6	3	3	2	8	14	16
5	1	2	2	5	2	2	3	7	3	2	1	6	2	3	3	8	11	15
6	1	2	1	4	2	3	1	6	3	2	2	7	2	4	3	9	11	15
7	2	3	3	8	3	2	3	8	3	2	2	7	3	4	2	9	15	17
8	3	2	3	8	3	4	2	9	3	2	3	8	3	4	3	10	16	19
9	2	2	1	5	1	3	2	6	3	2	2	7	2	3	2	7	12	13
10	3	3	1	7	3	2	3	8	2	1	3	6	2	3	2	7	13	15
11	2	2	2	6	2	3	2	7	1	4	2	7	3	3	3	9	13	16
12	3	4	2	9	3	3	3	9	3	2	2	7	3	4	2	9	16	18
13	2	2	2	6	3	2	3	8	2	3	3	8	3	4	3	10	14	18
14	3	2	1	6	3	3	2	8	1	3	2	6	2	4	3	9	12	17
15	3	3	1	7	3	4	2	9	3	2	3	8	3	3	3	9	15	18
16	1	3	2	6	3	3	2	8	2	3	2	7	2	4	3	9	13	17
17	1	1	3	5	2	2	2	6	2	3	3	8	3	2	3	8	13	14
18	2	2	2	6	2	3	2	7	2	3	1	6	2	4	2	8	12	15
Mean	2.00	2.50	1.83	6.33	2.50	2.83	2.22	7.56	2.28	2.39	2.06	6.72	2.44	3.44	2.67	8.56	13.06	16.10
Learning Performance (R+T)/2																	6.53	8.05

The participants in Group B had mean scores in knowledge retention tests in the 3 test objects of the pre-test part; questions on contents, operational methods and concepts - at 2.00, 2.50, and 1.83, which were summed up to 6.33. For the post-test, the scores were at 2.50, 2.83, and 2.22, which were summed up to 7.56. As for the mean scores in knowledge Transfer tests in the 3 test objects the pre-test part; questions on interpretations translations, and explanations were at 2.28, 2.39, and 2.06, which were calculated as 6.72. For the post-tests, the score were

2.44, 3.44, and 2.67, which were calculated as 8.56. The scores could be summarized as the total pre-test score at 13.06 and the total post-test score at 16.11, or as a Learning Performance score by using the formula (R+T)/2. As for the pre-tests, the total test score was 6.53, while the total post-test score was at 8.06.

Table 4. Score from knowledge dimension of group A

Knowledge dimension	Knowledge retention						Knowledge transfer						Total		Progress
	Terminologies		Operational methods		Concepts		Classification and categories		Case Studies		Strategic knowledge				
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	
Factual Knowledge	2.11	2.39					2.06	2.06					4.17	4.45	0.28
Conceptual Knowledge					1.89	2.17			2.61	3.00			4.50	5.17	0.67
Procedural Knowledge			2.39	2.94									2.39	2.94	0.55
Metacognitive Knowledge											2.00	2.39	2.00	2.39	0.39
Percentage	70.33	79.67	59.75	73.50	63.00	72.33	68.67	68.67	65.25	75.00	66.67	79.67			
Total													13.06	14.95	1.89
Learning performance (R+T)/2													6.53	7.47	0.94

From the tests, the scores were analyzed into the 4 knowledge dimensions and found that group A has higher post-test average scores in every aspect after learning supplier selection methods through the documents presented on the provided tablets than pre-test scores in factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge at 0.28, 0.67, 0.55, and 0.39, summarized as 1.89 or 0.94 in learning performance score. It was also found that the staff in group A scored best in the terminology pre-tests at 70.33 percent, which was factual Knowledge in knowledge retention. For the post-tests, the best score was 79.67 percent in terminologies, which is factual knowledge and strategic knowledge which are metacognitive knowledge.

Table 5. Score from knowledge dimension of group B

Knowledge dimension	Knowledge retention						Knowledge transfer						Total		Progress
	Terminologies		Operational methods		Concepts		Classification and categories		Case Studies		Strategic knowledge				
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	
Factual Knowledge	2.00	2.50					2.28	2.44					4.28	4.94	0.66
Conceptual Knowledge					1.83	2.22			2.39	3.44			4.22	5.66	1.44
Procedural Knowledge			2.50	2.83									2.50	2.83	0.33
Metacognitive Knowledge											2.06	2.67	2.06	2.67	0.61

Percentage	66.67	83.33	62.50	70.75	61.00	74.00	76.00	81.33	59.75	86.00	68.67	89.00		
Total													13.06	16.10	3.04
Learning performance (R+T)/2													6.53	8.05	1.52

From the tests, the scores were analyzed into the 4 Knowledge Dimensions and found that group B has higher post-test average scores in every aspect after learning supplier selection methods through the KMS than pre-test scores in factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge at 0.66, 1.44, 0.33, and 0.61, summarized as 3.04 or 1.52 in learning performance score. It was also found that the staff in group B scored best in the classification and categories pre-tests at 76.00 percent, which was factual knowledge in knowledge transfer. For the post-tests, the best score was 89.00 percent in strategic knowledge, which is metacognitive knowledge.

4.3 Learning Performance Progress

Table 6. Mean score of retention, transfer test

Sample	Retention test		Transfer test		Total (Learning performance)		Progress
	Pre	Post	Pre	Post	Pre	Post	
A	6.39	7.50	6.67	7.44	6.53	7.47	0.94
B	6.33	7.61	6.72	8.56	6.53	8.05	1.52

According to the mean scores from the pre-tests, the participants in group A and B reached the same score (Mean = 6.53). Thus, there were no significant differences in the overall scores among the groups. As far as the background of the participants was concerned, the prior knowledge seemed to be similar since all of them were working in the same position (supplier selection in marketing department). For the post-tests, the results indicate that the scores of the participants in group A (total score = 7.47) were significantly lower than the scores in group B (total score = 8.06). The comparison of the progress scores in the two groups shows that the learning performances of the participants in group B, who were provided learning support through KMS, show significant improvement than group A (progress score of group A = 0.94,while group B = 1.52).

5. Discussion and Conclusion

It can be concluded that learning through KMS online was suitable to staff's behaviors in using online media at this present time and encouraged higher learning performances than the former ways because the learners can now learn directly from tacit knowledge of many experienced experts. The empirical study is found that:

H1: The Knowledge retention score of the group that learned through KMS (Group B) were higher than the group that used manuals for learning (Group A). It was also found that group A and B had identical scores when compared with the Bloom's knowledge theatrical taxonomy which divides learning into 6 levels; knowledge from – retention - being at the lowest level -, comprehension or transfers, applications from analyses – being able to solve and detect problems, syntheses, and evaluation all 3 test objects were in relevant with knowledge dimensions, which are factual knowledge,procedural Knowledge, and conceptual knowledge, respectively. Form the score analyses, it was found that both Group A and Group B achieved the highest score of the pre-tests and post-tests in terminologies section, which indicates that the staff had great knowledge about supplier selection strategies all along. Group A achieved the second and third highest scores in operational method and concepts, respectively, while group B had concepts as the second and operational methods as the third highest scores. However, It is possible that the groups memorize the supplier selection processes which is an ability to categorize the experiences in their works and recall those experiences correctly and precisely. Therefore, the supplier selection methods could also be learned from documents and manuals within an organization with no need of KMS.

H2: The Knowledge transfer scores of the group that learned through the KMS system were higher than that of the other group in this type of knowledge, which is from understanding the knowledge. The group could interpret and summarize the main points of the knowledge. In case of urgent problems, they would use their tacit knowledge to solve the problems by using their work experiences. Because the knowledge presented through

KMS has been synthesized by experts into a task, inference,domain form by using CommonKADs, the learners were then able to create step-by-step thought processes and categorize the importance and steps of the supplier selection. It is a learning system that reduces time of understanding by imitating the work processes of the experts. This study, moreover, divided Knowledge Transfer into questions on classifications and categories, case studies, and strategic knowledge. The tests were in relevant with knowledge dimensions; factual knowledge, conceptual knowledge, and metacognitive knowledge, respectively. The score analysis showed that both group A and B achieved the highest post-test scores in Strategic Knowledge, which indicated that the staff had great knowledge about supplier selection strategies all along. The second and third highest scores of both group were from case studies and classification and categories, respectively. However, group B achieved higher scores in all 3 sections in knowledge transfer tests.

H3: The group that learned from KMS will achieve higher learning performances than the group that used manuals to learn. Our research found that group B had a higher score than A because group B had learned from KMS. The scores were from knowledge retention combined with knowledge transfer from H1. The scores were different in both groups, but there were differences in H2.

The results from the 3 hypotheses can be used to create a learning model for staff in online travel agency companies as shown in Figure 3.

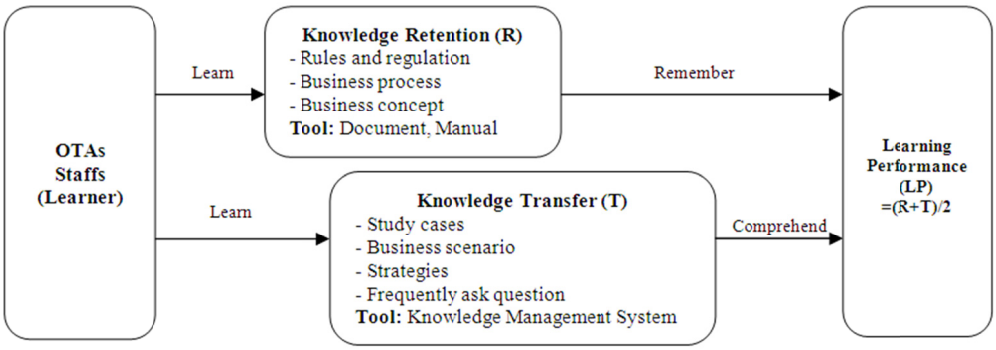

Figure 3. OTAs learning model

The study also found that the supplier selection knowledge–which can be categorized into 2 levels; knowledge retention and knowledge transfer–reveals a result that can be used in the following ways: 1) Knowledge Retention, e.g. rules and regulations, business processes, business concept and knowledge that has become memories that can be learned from documents; there is no need of analytical systems as shown in the result H1. Group A and B had nearly identical scores even though they had learned on different platforms (documents on tablets and KMS), which means that staff can also learn from documents and manuals. 2) Knowledge Transfer, e.g. study cases, business scenario, strategies, and frequently asked questions that can be learned through KMS; it creates a more effective learning process since the knowledge management by CommonKADs is synthesized from experts and then divided into task reference domains, which creates clearer pictures in the learner's minds and help him or her eventually come to better understandings. Learning from both learning models enhances learning performances of staff. If this learning process of this study was used constantly, it would eventually make an organization become a learning organization. Staff have knowledge in epistemological level–having a knowledge conversion from tacit to explicit knowledge, e.g. using knowledge from experts to create study cases and, when specialized, create explicit knowledge back to themselves as personal experiences or so called tacit knowledge, and in ontological level–staff have their own personal knowledge that can be exchanged, relayed to coworkers, and expanded to an organizational level. It can be concluded that learning performances in an organization will be higher if there is a proper knowledge management and also a systematical and proper publication in it through online media. KMS will effectively enhance Knowledge Transfer of the staff by using these systematic thinking processes and mind maps proficiently.

6. Limitations and Future Work

Due to the limitation to the study time, thus said, there were only 1.5 hours to learn from the learning situations and then test the knowledge results. In real working situations, it was found that learning could occur at any time. Therefore, the studies that should be conducted in the future will need to have a long period of learning process

and following-up with the sample group to observe changes.. Moreover, it will be greatly beneficial for the future research, if considering the cost difference between using the traditional learning method and learning from KMS. The comparison of both methods will influence OTAs executive to apply KMS in their organization.

Acknowledgements

The authors wish to thank the Graduate School, Chiang Mai University for providing funding and support for this study.

References

Addicot, R., McGivern, G., & Ferlie, E. (2006). Networks, Organizational Learning and Knowledge Management: NHS Cancer Networks. *Public Money & Management*, *26*(2), 87-94. http://dx.doi.org/10.1111/j.1467-9302.2006.00506.x

Alavi, M., & Leidner, D. (1999). Knowledge Management Systems: Issues, Challenges, and Benefits. *Communications of the Association for Information Systems*, *1*(7).

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., . . . Wittrock, M. C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives*. Longman, New York.

Atherton, J. S. (2005). *Learning and Teaching: SOLO taxonomy UK*. Retrieved from http://www.learningandteaching.info/ learning/ solo.htm

Barker, D., & Ebel, R. (1982). A comparison of difficulty and discrimination values of selected true-false item types. *Contemporary Educational Psychology*, *7*(1), 35-40. http://dx.doi.org/10.1116/0361-476x(82)90005-4

Bhatt, G. D. (2001). Organizing Knowledge in the Knowledge Development Cycle. *Journal of Knowledge Management*, *4*(1), 15-26. http://dx.doi.org/10.1108/13673270010315371

Bloom, B. (1956). *Taxonomy of Educational Objectives, the classification of educational goals–Handbook I: Cognitive Domain*. New York: McKay.

Bood, R., & Coenders, M. (2004). *Communities of practice: bronnen van inspiratie*. Utrecht: Lemma.

Bouthillier, F., & Shearer, K. (2002). Understanding Knowledge Management and Information Management: The need for an empirical perspective. *Information Research*, *8*(1). Retrieved from http://informationr.net/ir/8-1/paper141.html

Buhalis, D. (1998). Strategic use of information technologies in the tourism industry. *Tourism Management*, *19*(5), 409-421. http://dx.doi.org/10.1016/S0261-5177(98)00038-7

Buhalis, D., & Licata, M. C. (2001). *The future eTourism intermediaries*. *Tourism management*, *23*, 207-220. http://dx.doi.org/10.1016/S0261-5177(01)00085-1

Caldwell, G. P., & Gonthier, D. W. (1996). Differences in Learning Styles of Low Socioeconomic Status for Low and High Achievers. *Education*, *117*(1), 141-146.

Constance, R. J. (2003). Learning organizations. *Organizational Dynamics*, *32*(1), 46-61. http://dx.doi.org/10.1016/S0090-2616(02)00137-7

Creotec. (2006). *Knowledge, Creative and Passion*. Retrieved from http://www.creotec.com/index.php

Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Boston, MA: Business School Press. Boston.

Duncan, E. (2009). *The internet effects on tourism industry*. Retrieved from http://ssrn.com/abstract=1403087

Dunn, R., Griggs, S., Olson, J., Bassly, M., & Gorman, B. (1995). A meta-analytic validation of the Dunn and Dunn model of learning-style preferences. *Journal of Educational Research*, *88*(6), 353-362. http://dx.doi.org/10.1080/00220671.1995.9941181

Efimova, L. (2004). *Discovering the iceberg of knowledge work: A weblog case*. Telematica Institute, The Netherlands, OKLC. Retrieved from http://www.uibk.ac.at/congress/oklc 2004

Egan, K. (2011). *Teaching as Story Telling: An Alternative Approach to Teaching and Curriculum in the Elementary School Paperback*. Chicago: The university of Chicago press.

Gherardi, S. (2000). Practice-Based Theorizing on Learning and Knowing in Organizations. *Organization*, *7*, 211-223. http://dx.doi.org/10.1177/1350508400072001

Harvey, M. D. (2001). *E-business & E-commerce: How to Program*. Prentice Hall.

Helmut, B., Michael, D., Dieter, M., Anton, B., Simeon, S., & Carles, S. (2007). *Opening new dimensions for e-Tourism*. Retrieved from http://portal.acm.org/citation.cfm?id=1275662

Hildreth, P., & Kimble, C. (2002). The duality of knowledge. *Information Research*, *8*(1). Retrieved from http://InformationR.net/ir/8-1/paper142.html

Jonassen, D. H., & Grabowski, B. L. (1993). *Handbook of individual differences, learning, and instruction*. Hillsdale. New Jersey: Lawrence Erlbaum.

Kimble, C., Hildreth, P., & Bourdon, I. (2008). Communities of Practice: Creating Learning Environments for Educators. Information Age Publishing.

Monczka, R. M., Robert, B. Handfield, R. B., Giunipero, L. C., & Patterson, J. L. (2005). *Purchasing and Supply Chain Management*. South Western: Trent Thomson.

Nonaka, I. (1991). The knowledge creating company. *Harvard Business Review*, *69*(6), 96-104.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organ. Sci*., *5*(1), 14-37. http://dx.doi.org/10.1287/orsc.5.1.14

Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company. How Japanese Companies Create the Dynamic of Innovation*. Oxford: Oxford University Press.

Porrini, P., & Starbuck, W. H. (2015). *Information and knowledge, organizational*. International Encyclopedia of the Social & Behavioral Sciences (2nd ed.). Oxford: Elsevier Science.

Schön, D. A. (1992). Designing as reflective conversation with the materials of a design situation. *Knowledge-Based Systems*, *5*(1), 3-14. http://dx.doi.org/10.1016/0950-7051(92)90020-G

Senge, P. M. (1990). *The learning organization*. Retrieved from http://www.infed.org/thinkers/senge.htm

Simone, E. V. (1991). Modeling and coaching of relevant metacognitive strategies for enhancing university students' learning. *Learning and Instruction*, *1*(4), 319-336 http://dx.doi.org/10.1016/0959-4752(91)90012-W

State of Minnesota. (1998). *State educational standards coupled to lesson plans and resources: Language Arts, High standards: Grade 12: Writing Unit: Description, Academic*. Retrieved from http://www.statestandard.com/showstate.asp?st=mn

Sutton, D., & Patkar, V. (2009). CommonKADs analysis and description of a knowledge based system for the assessment of breast cancer. *Expert Systems with Applications*, *36*(2, Part 1), 2411-2423. http://dx.doi.org/10.1016/j.eswa.2007.12.060

Tempelmeier, H. (2002). A simple heuristic for dynamic order sizing and supplier selection with time-varying data. *Production and Operations Management*, *1*(11), 499-515. http://dx.doi.org/10.1111/j.1937-5956.2002.tb00474.x

Turner, R. C., & Carlson, L. (2003). Indices of item-objective congruence for multidimensional items. *International Journal of Testing, 3*(2), 163-171. http://dx.doi.org/10.1207/S15327574IJT0302_5

Vonderembse, M., & Tracey, M. (1999). The impact of supplier selection criteria and supplier involvement on manufacturing Performance. *The Journal of Supply Chain Management: A Global Review of Purchasing and Supply*, *35*, 33-39. http://dx.doi.org/10.1111/j.1745-493X.1999.tb00060.x

Appendix A

Before evaluating learning performances of the sample group, this research had provided knowledge contents by interpreting supplier selection knowledge of Online Travel Agency businesses, which knowledge is valuable to business working processes. The contents in this part consist of 1) Supplier Selection Knowledge Identification, 2) Knowledge Review Results, 3) Knowledge Mapping-created using true knowledge of an organization in supplier selection knowledge, and 4) Knowledge Portal for Sharing.

1) Supplier Selection knowledge Identification

The results of the knowledge audit were provided by the information collected by the specialists of OTAs. The specialists precisely explained the characteristics of supplier selection and the scope of selection contents in 4 main knowledge domains; 1) Supplier sourcing, 2) Selection criteria, 3) Tourism service standard, and 4)

Evaluation results. Each knowledge category contains minor knowledge subcategories. The in-depth knowledge audit with specialists resulted in 4 main knowledge types that the staff responsible for supplier selection should know, understand and apply. Results of the knowledge audits have been compiled by the researcher for an analysis and knowledge capturing processes in order to allow knowledge engineering and interpretation through CommonKADs techniques. The results from the audit step was brought into the capturing step to analyze the knowledge of the specialists and to transfer it into explicit knowledge by depending on engineering knowledge interpretation theories and CommonKADs tool techniques. The analyzed knowledge has been divided into 3 task levels; task level, inference level, and domain level, by assigning theatrical symbols for CommonKADs to identify the knowledge group divisions and to separate the thought processes of each group.

The method of assigning symbols for each task in CommonKADs is about to use symbols that can be communicated in each task level to lead them to the same direction with the aim of creating the same understanding by assigning from Task, Inference, and Domain to separate the knowledge in the next level. In the knowledge capturing step to the specialized knowledge is interpreted in an individual way and transferred to explicit knowledge. The mentioned symbols have the following details:

- Task Level: assigned as T - T1 Supplier selection.
- Inference Level: assigned as I - I1 Supplier sourcing, I2 Selection criteria, I3 Tourism service standards, and I4 Evaluation results.
- Domain Level: assigned as D and if it is in Inference level, it could have sub-domains which are assigned as SD. The results from the domain study showed 20 domains and 2 sub-domains as shown in table A.1.

2) Knowledge Mapping

The results from knowledge capturing and the specialist analysis were separated into groups to divide thought processes and reasons in each level that show relations between the levels of knowledge. The mentioned knowledge diagram was mapped using the CommonKADs theories. From the results of knowledge mapping diagram 1 could be created, which is a supplier selection knowledge diagram as shown in Figure A.1. Creating a mind map can also help review the knowledge since knowledge mapping helps in grouping thought processes and sorting reasons and results more easily.

3) Knowledge Review Results

The aim of knowledge reviewing is to test the processed knowledge against accuracy and the OTAs' principles. The results from knowledge reviews with specialists found that the gained supplier selection methods, according to the knowledge interpretation of specialists using knowledge engineering, were suitable to OTA action standards. After the review was finished, the knowledge became correct, efficient, and could be seen as something adequate from an academic point of view to be stored in a central storage of supplier selection knowledge to allow the staff responsible for supplier selection to have an equal level of understanding.

Table A1. Knowledge Engineering of Supplier Selection

Knowledge Engineering of Supplier Selection		
Task	T-1 Supplier selection	
Goal and Value	Goal: to provide correct supplier selection methods that are suitable for an organization. Value: to gain knowledge in supplier selection that covers strategies, management policies, and real application to make suppliers meet customers' and OTAs' needs.	
Inference	Domain	Sub-Domain
I-1 Supplier sourcing	D-101 Supplier database	D-101-1 Business profile and transaction
	D-102 New potential supplier	D-102-1 Business profile
	D-103 Plant visit	D-103-1 Location
		D-103-2 Facility
I-2 Selection Criteria	D-201Performance history and current performance	D-201-1 Annual report
		D-201-2 Business size
		D-201-3 Company 's financial statement

	D-202 Service capacity and facility	D-202-1 Normal capacity and Idea capacity
		D-202-2 Property management policy
	D-203 Reputation and position in industry	D-203-1 Industry ranking
		D-203-2 Market segmentation
	D-204 Price positioning compare to standard cost	D-204-1Parity pricing policy
	D-205 Financial position	D-205-1 Annual report
		D-205-2 Credit rating
	D-206 Financial stability on the long term	D-206-1 Profitability
		D-206-2 Liquidity
		D-206-3 Debt
		D-206-4 Capital budgeting
	D-207 Commission rate	D-207-1 Commission policy
	D-208 Amount of past business	
	D-209 Type of customer	D-208-1 Target customer
	D-2010 Commercial relationship policy	
	D-2011 Geographical location	
I-3 Tourism service standard	D-301 Hotel business standard	D-301-1 Service quality certified by well-known institution in hotel association
	D-302 Airline business standard	D-302-1 Service quality certified by well-known institution in airline association
	D-303 Car rent business standard	D-303-1 Service quality certified by well-known institution in Car rent association
	D-301 Other standard related to tourism business supplier	
I-4 Evaluation result	D-401 Qualified supplier	D-401-1 Negotiation
		D-401-2 Contract management
	D-402 Unqualified supplier	D-402-1 Supplier termination

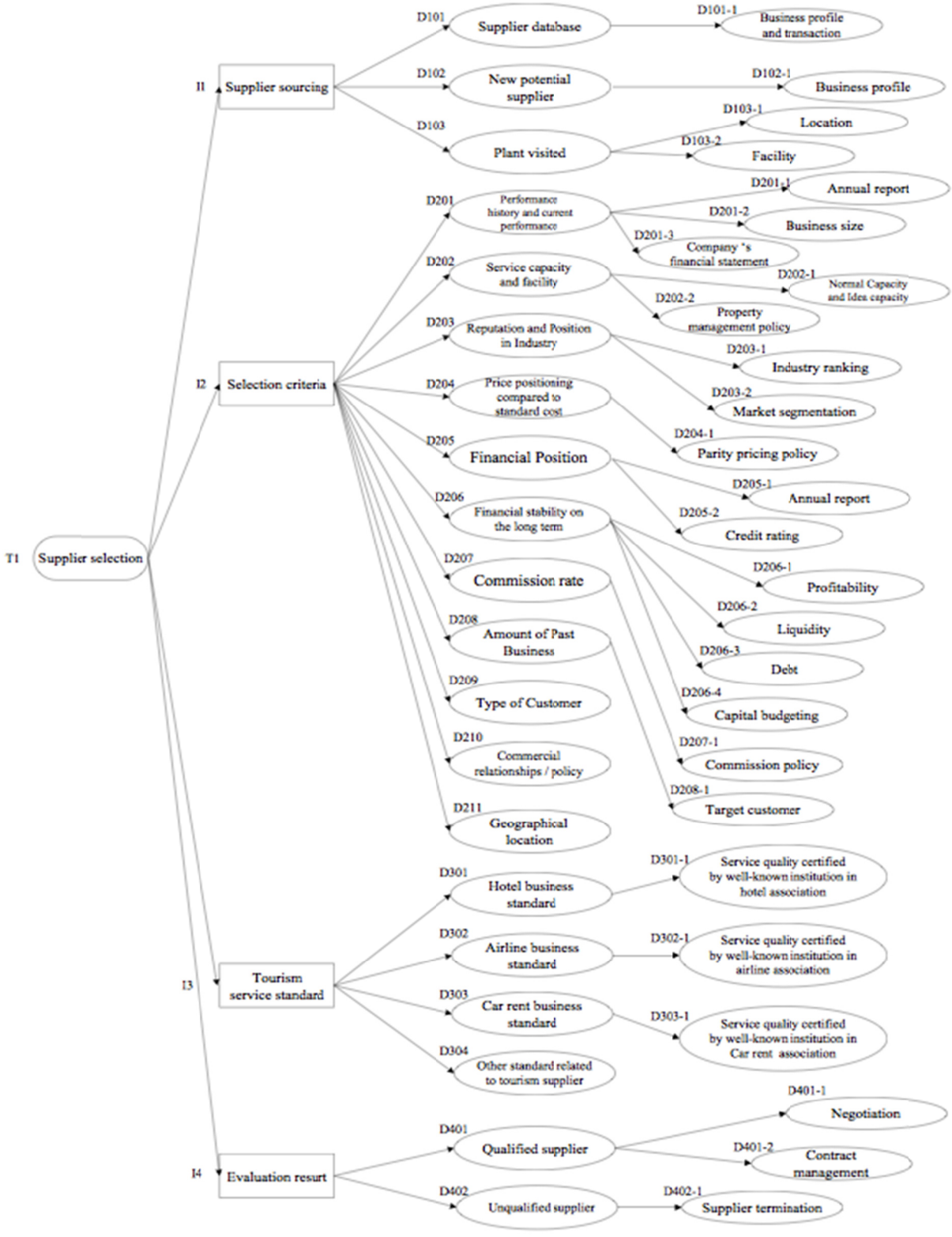

Figure A1. Knowledge Map of Supplier Selection

4) Knowledge Portal for Sharing

When knowledge mapping is created successfully, the chart is proved by 3 experts to inspect the knowledge corrections. When the knowledge passes the inspections and is edited, it is presented on www.kmtourism.net.

Figure A2 shows a sample presentation of Inference 1 – supplier sourcing that includes related domains and sub-domains in sourcing processes.

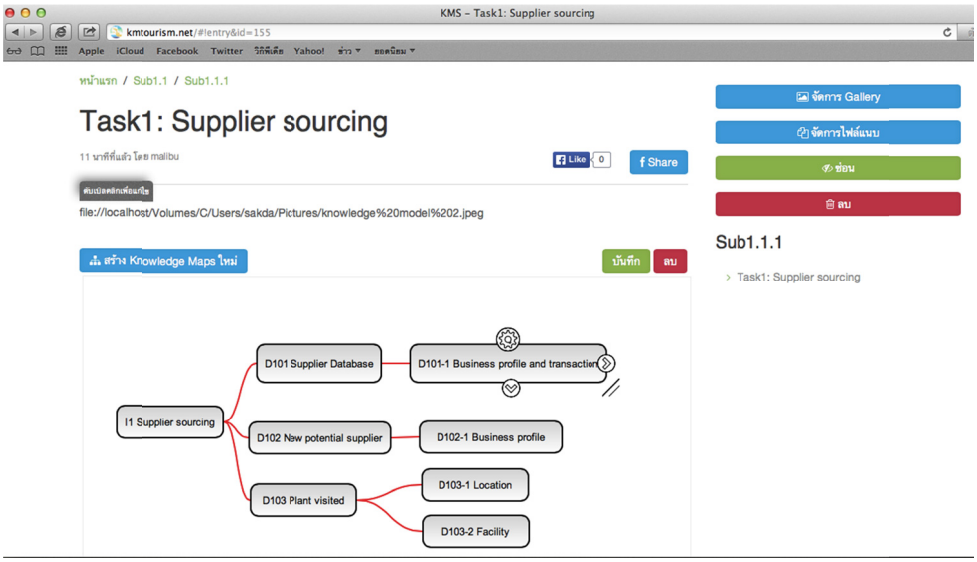

Figure A2. Knowledge Map of Supplier Selection on KMS

The result from creating all knowledge engineering and publishing it on a website will be used to prove learning processes of staff in the next step. The study result is mentioned in Results section (section 4) in this paper.