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Original Paper

Appropriate Technology in Knowledge Management for Public University Lecturers

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Abstract

In this research objective was to studies appropriate technology for knowledge management in the case of public university lecturers. Using the Delphi technique, the researcher conducted interviews with twenty experts involved in education administration, academic affairs, and knowledge management at institutes, faculties, offices, and educational institutions. Data were collected from the experts three times. The first round involved structured interviews. The second and third rounds involved the use of a five-rating scale questionnaire. Computing the median for the data collected from the experts. Thence the median was determined for the lower and upper quartiles. The values for the criteria used by the researcher were a median at the high level upwards greater than 3.50 (Md>3.50) with a concomitant interquartile range of less than 1.50 (>1.50). Findings show that appropriate technology in knowledge management for public university lecturers as agreed by experts consists of five aspects: (1) knowledge acquisition; (2) knowledge creation; (3) knowledge storage and access; (4) knowledge sharing; (5) learning. Of the 37 items appropriate technology found at the highest level pertains to 15 items. At a high level 22 items are found. The median ranged from 3.72 to 4.95 and the interquartile range was from 0.25 to 1.19.

Keywords

technology, knowledge management, public university lecturers, Delphi technique

1. Introduction

At present, public and private universities are expanding educational opportunities by developing a large number of curriculums in order to fully respond to the needs of students. This results in an increase in the quantity of new lecturers each year. New lecturers' knowledge and capabilities are at a certain level. Therefore, the lecturers must be supported and encouraged by universities to the end of

enhancing their knowledge such that they will have the capabilities required for efficiently carrying out their duties. Changes in Thai society and political policies have involved paying heed to the creation of innovation in work performance requiring technology for making changes in work performance (The Ministry of Education, 2017). Therefore, it is necessary to develop the capabilities of lecturers in performing work in respect to instruction, research, and providing academic services to society (Cruthaka & Pinngern, 2016). In this connection, one method is to use a concept of knowledge management as an instrument for developing formal and informal knowledge on the part of university lecturers. This goes to ensure knowledge sharing apropos both tacit (implicit) and explicit (manifest) knowledge which can in turn be used to create new bodies of knowledge through study, research and analysis and synthesis involving research and providing academic services to society and the community (Cruthaka, 2019).

Knowledge management in various forms should be carried out such that knowledge is stored and affords opportunities for easily and quickly accessing knowledge in a thorough manner. Technology can be used as a tool in knowledge management to foster knowledge storage, knowledge accessibility, and knowledge usability. Technology can be used in knowledge sharing and knowledge transfer. A system can be constructed to retrieve knowledge. A network can be created to transfer knowledge. Agencies should support and assist in transferring knowledge. Knowledge management should also be able to develop knowledge continuously (Cruthaka, 2017).

Awad and Ghaziri (2004) explain the life cycle of knowledge management applied to organizations as follows: (1) Capture: Knowledge is searched for and absorbed using e-mail, audio files and digital files in which appropriate sources of knowledge are engaged. (2) Organizing: Knowledge is organized and filtered for easy use by means of the methods of indexing, cataloging, coding, thereby providing easy and quick access to knowledge. (3) Refining: Knowledge is systematized and extracted as explicit (manifest) knowledge, viz., in the forms of concepts, performance, projects, all of which are stored in an organizational knowledge trove. and (4) Transfer: Organizations must organize activities so that personnel in the organization can exchange knowledge in an efficient manner by making work flow charts, through knowledge sharing, and pushing by means of promoting knowledge for their personnel.

These ideas can be developed through retrieving knowledge from knowledge troves in order to use the knowledge and to develop new knowledge. This leads to decision making and planning for the development of work performance engaging the work capabilities of lecturers as providing a source of intra-organizational knowledge. Most important is the fostering of trust and good relations which will result in willingness to share and exchange knowledge among themselves. An Information Technology (IT) system will lend convenient and quick support to the management of knowledge while keeping pace with the need to use knowledge. The role of IT is to serve as a source of knowledge that stores knowledge systematically, is easy to access, and has the capabilities required in knowledge exchange in

order to search for knowledge thoroughly and widely on the part of the members of a community employing knowledge networking (Cruthaka, 2017).

The researcher is therefore interested in using technology in knowledge management for university lecturers in order to facilitate knowledge acquisition, knowledge creation, knowledge storing and retrieving, knowledge sharing, and learning from utilizing knowledge. The researcher studies and pays heed to technology in various forms appropriate to the roles of public university lecturers in Thailand in order to design a knowledge management system for university lecturers in the future.

2. Method

2.1 Study Group Experts

In this descriptive research inquiry, the researcher studied technology appropriate for knowledge management by public university lecturers. The Delphi method was used to collect coherent opinions expressed by experts. The research population consisted of experts in education administration, academic affairs, and knowledge management at institutes, faculties, offices, and educational institutions. The members of the sample population were selected in accordance with research objectives. The sample population consisted of those having qualifications as based on the following criteria:

Group 1: In this context, experience in the field of education determines those who are qualified by virtue of being or having been administrators of institutes, faculties, offices, and educational institutions. Educational qualifications are at least a master's degree or higher with work experience in education administration of not less than two years.

Group 2: Lecturers holding a position as a specialist in a technical area at institutes, faculties, offices, and educational institutions. Educational qualifications are at least a master's degree or higher with work experience in academic affairs at faculties or universities of not less than two years.

Group 3: Lecturers responsible for knowledge management at institutes, faculties, offices, and educational institutes. Educational qualifications are at least a master's degree or higher with experience in knowledge management of not less than two years.

2.2 Instruments and Delphi Technique

The research instrument used to collect data were questionnaires constructed by the researcher. The data were collected by means of the Delphi method for three rounds.

The first-round questionnaire was a structured interview form consisting of six items presented as interview questions. Three experts tested the instrument for clarity, accuracy, and appropriateness prior to the interviews.

The second round questionnaire was constructed on the basis of analyses of the contents of answers collected through the questionnaire employed in the first round. The contents were constructed in the form of a five-rating scale questionnaire pertaining to technology appropriate to knowledge management for public university lecturers in five aspects composed of 40 items. Experts next

expressed opinions apropos the levels of technology appropriate to knowledge management pursued by public university lecturers on the basis of the contents of the interviews conducted with experts. Opinions were solicited as well as recommendations for adjusting expressions and the language used. Next, the instrument was analyzed in terms of Median (*Mdn*) and Interquartile Range (IQR). The language and contents were then adjusted once more as based on recommendations made by the experts.

The third-round questionnaire was then used with the same information as contained in the second round with information having been adjusted for certain items so as to be clearer in meaning than the original. The *Mdn* and the IQR were accordingly increased on the basis of the analysis of the answers by all nineteen experts. This confirmed the answers taken from the opinions given as answers to repeated questions. Experts could then consider their own responses through multiple rounds. The validity of the opinions of experts was then established. The third-round questionnaire concerned appropriate technology for knowledge management by public university lecturers in five aspects with 37 items. The results from the third round questionnaire were analyzed so as to establish the *Mdn* and the IQR. The considerations concerning the technology appropriate for knowledge management showed that the experts expressed concurrent opinions whose *Mdn* was not less than 3.50 and whose IQR was not more than 1.50. The results were summarized in which the summary detailed the establishing of the technology which would be appropriate for knowledge management at public universities (Sisathitnarakun, 2008).

Statistical techniques utilized in data analysis were *Mdn*, Quartile Deviation (QD) and IQR.

3. Result

3.1 The Technology Appropriate for Knowledge Acquisition

The technology appropriate for knowledge management by public university lecturers in the aspect of knowledge acquisition were nine items whose *Mdns* ranged from 3.72 to 4.67 and whose IQR ranged from 0.25 to 1.19. The experts exhibited concurrent opinions vis-à-vis six items as being appropriate at the highest level. The three items at a high level. As shown in the Table 1.

Table 1. Median and Interquartile Range of the Opinion Regarding the Level of Technology Appropriate for Knowledge Management by Public University Lecturers in the Aspect of Knowledge Acquisition

knowledge acquisition	Mdn	IQR	Opinion level
1. Seeking tools for retrieving a worldwide database	4.67	0.25	highest
2. Technology used in retrieving information, *viz*., computers and the Internet network or 3G and 4G mobile technology	4.67	1.19	highest
3. Internet tools, such as Google Scholar, e-data derived from websites	4.62	0.25	highest
4. Papers found through employing the Internet, e-books media	4.54	0.30	highest
5. Social network online	4.50	0.25	highest
6. Electronic online media	4.50	0.25	highest
7. Faculty and university websites	4.49	0.25	high
8. Free ware Open Courseware	4.00	0.65	high
9. Wikipedia resources	3.72	0.61	high

3.2 The Technology Appropriate for Knowledge Creation

The technology appropriate for knowledge management by public university lecturers in the aspect of knowledge creation involved four items exhibiting a *Mdn* ranging from 4.00 to 4.95 and an IQR ranging from 0.26 to 1.08. One item for which the experts exhibited concurrent opinions was deemed appropriate at the highest level. Three items were taken to be appropriate at a high level. As shown in the Table 2.

Table 2. Median and Interquartile Range of the Opinion Regarding the Level of Technology Appropriate for Knowledge Management by Public University Lecturers in the Aspect of Knowledge Creation

knowledge creation	Mdn	IQR	Opinion level
1. Technology used in the creation of work such as document typing and making presentation slides	4.95	0.26	highest
2. YouTube	4.35	1.08	high
3. Word; the use of excellent atlas programs	4.09	0.89	high
4. Infographic clip video	4.00	0.75	high

3.3 The Technology Appropriate for Knowledge Storage and Access

The technology appropriate for knowledge management by public university lecturers in the aspect of knowledge storage and access pertained to ten items with *Mdns* ranging from 3.78 to 4.65 and IQRs ranging from 0.25 to 0.81. The experts evinced concurrent opinions for four items as being appropriate at the highest level. Six items were appropriate at a high level. As shown in the Table 3.

Table 3. Median and Interquartile Range of the Opinion Regarding the Level of Technology Appropriate for Knowledge Management by Public University Lecturers in the Aspect of Knowledge Storage and Access

knowledge storage and access	Mdn	IQR	Opinion level
1. Technology used for collecting and storing knowledge in a systematic manner; easy and rapid retrieval employing computers; Internet networking or mobile technology	4.65	0.25	highest
2. Cloud computing	4.62	0.25	highest
3. Database multimedia	4.57	0.25	highest
4. Website databases	4.54	0.30	highest
5. Electronic media	4.49	0.42	high
6. Drop box	4.40	0.65	high
7. Blog gotoknow	4.09	0.81	high
8. Electronic files or template	4.08	0.75	high
9. Google application	3.96	0.69	high
10. Outlook	3.78	0.61	high

3.4 The Technology Appropriate for Knowledge Sharing

The technology appropriate for knowledge management by public university lecturers in the aspect of knowledge sharing with ten items displayed *Mdns* ranging from 3.80 to 4.95 and IQRs ranging from 0.25 to 0.75. Experts showed concurrent opinions for three items as being appropriate at the highest level. Seven items found to be appropriate at a high level. As shown in the Table 4.

Table 4. Median and Interquartile Range of the Opinion Regarding the Level of Technology Appropriate for Knowledge Management by Public University Lecturers in the Aspect of Knowledge Sharing

knowledge sharing	Mdn	IQR	Opinion level
1. email	4.95	0.26	highest
2. technology as a resource for knowledge dissemination; tools for exchanging results and responses; inquiring; discussions and summarizing of knowledge	4.62	0.25	highest
3. Facebook	4.50	0.25	highest
4. Group Line official	4.08	0.75	high
5. Management Learning Systems involving networks	3.96	0.69	high
6. Community of practice (CoP); Professional Learning Community (PLC)	3.96	0.69	high
7. chat room	3.93	0.65	high
8. YouTube	3.92	0.74	high
9. Weblog	3.85	0.75	high
10. Could computing conference	3.80	0.65	high

3.5 The Technology Appropriate for Learning

The technology appropriate for knowledge management by public university lecturers in the aspect of learning encompassed four items with *Mdn*s ranging from 4.00 to 4.62 and IQRs ranging from 0.25 to 0.81. Experts concurred in respect to one item as being appropriate at a high level. Three items considered appropriate at a high level. As shown in the Table 5.

Table 5. Median and Interquartile Range of the Opinion Regarding the Level of Technology Appropriate for Knowledge Management by Public University Lecturers in the Aspect of Learning

learning	Mdn	IQR	Opinion level
1. technology assisting in the dissemination and utilization of knowledge in the forms of distributed documents, websites, books, textbooks, sheets, lecture slides, academic articles, and research papers	4.62	0.25	highest
2. Youtube	4.11	0.70	high
3. Open courseware	4.09	0.81	high
4. Digital device knowledge	4.00	0.65	high

4. Discussion

The technology appropriate for knowledge management by public university lecturers for which the experts showed concurrent opinions were five aspects with 37 items governing necessary competencies at the highest level with 15 items. Necessary competencies at a high level were 22 items. The researcher explains each aspect as follows:

1) The aspect of knowledge acquisition. Findings showed that the technology appropriate for knowledge management by public university lecturers in the aspect of knowledge acquisition with nine items showed concurrence by the experts in respect to six items deemed appropriate at the highest level. The experts concurred in finding three items to be appropriate at a high level, *viz*, seeking tools for retrieving worldwide databases; technology used in retrieving data such as computers and the Internet networks or 3G and 4G mobile technology; and the Internet tools of Google Scholar and e-data base websites.

At present, university lecturers use technological capacities as a tool for knowledge management involving applications and Internet networking with notebooks, desktop computers, and advanced mobile technology with high speed Internet signals. Those can be used for retrieving a body of knowledge systematically stored in databases from various worldwide resources. This finding is in accordance with the ideas of Earmsiriwong (2014) who said that applications on the Internet favored at a high level were search engines that helped users to access and search for knowledge given on webpages. This finding was also in consonance with Namprasertchai (2015) who asserted that technology was a tool for supporting knowledge management at both the personal and the organizational level. Communication technology helped personnel to access various fields of knowledge in an easier and more convenient manner. Communication can be conducted with experts in various fields. Information and knowledge needs can be searched on the Internet and Internet networks. This finding also accords with the research investigated by Nisong and Dajmanee (2015) entitled Communication and the Use of Information Technology in Knowledge Management at Rajavithi Hospital. Findings showed that personnel used information technology in the type of websites. Concerning opinions toward the use of IT, it was found that personnel used it for additional study for themselves at the highest level.

2) The aspect of knowledge creation. Findings showed that the technology appropriate for knowledge management by public university lecturers in the aspect of knowledge creation involved four items with one item exhibiting concurrent opinions as being appropriate at the highest level. Three items which were deemed appropriate at a high level in descending order were technology used in creating work such as typing documents and making presentation slides with YouTube and Word; the use of excellent atlas programs; and Infographic VDO clips. University lecturers applied Word processing, Microsoft Office Excel, database programs, presentation programs, graphics, and multimedia programs in order to collect a body of knowledge which was then analyzed and synthesized. The body of knowledge can be summarized in terms of various forms of presentation: textbooks, books,

documents accompanying knowledge presentations, and electronics media. These can also be uploaded on YouTube. This is in accordance with the ideas of Namprasertchai (2015), who said that technology conducive to knowledge management was epitomized by YouTube, a center for various kinds of video clips. They have good content and are entertaining. The contents contain both deep knowledge and simple knowledge. This is in accordance with the research investigation conducted by Onkaeo and Kotong (2012) entitled "The Design and Development of Information Systems for Knowledge Management by Public Organizations." Findings showed that the information system model for knowledge management for public organizations consisted of the following systems: articles; activity pictures/activity calendar; Link; Weblog; downloading; video; document management; frequently asked questions (FAQs), social media; and webboard. This accords with the research investigation of Cruthaka (2019) entitled "The Development of Appropriate Knowledge Management Models for Public University Lecturers." Findings showed that the components of the knowledge management model appropriate for public university lecturers in the aspect of knowledge creation were synthesizing the knowledge collected and the integration of knowledge and experience which may be in the form of Infographics to make it easy to understand.

3) Regarding the aspect of knowledge storage and access, it was found that the technology appropriate for knowledge management by public university lecturers in the aspect of knowledge storage and access constituted ten items with the experts expressing concurrent opinions as being appropriate at the highest level for four items. Six items were considered appropriate at a high level. The first three items were technology used in the systematic collection and storing of knowledge; speedy and easy retrieval using computers; and Internet networking or mobile technology, cloud computing, and database multimedia. University lecturers conduct studies and research to enhance their academic position, for academic development, and for professional reasons. They need technology to collect information and knowledge. At present, computer networks and mobile technology are designed to accommodate the system of cloud computing so as to store a great deal of knowledge. Knowledge can be accessed everywhere and at any time. This is in accordance with Earmsiriwong (2014), who said that germane software programs had to be installed in computers and software programs worked on the web as well. Many companies have prepared online applications such as Google Docs and Office Web Apps from Microsoft that help access and share work and documents on browsers so that documents can be accessed anywhere through computers or other mobile equipment with the ability to connect with the Internet. Knowledge can be collected on clouds such as through Microsoft Onedrive with space containing information on clouds so that said information can be accessed everywhere in the world. This is in accordance with the research investigation conducted by Tunjaw (2012) on The Information Technology Model and Communication in Knowledge Management at Higher Education Institutions in Thailand. He found that research findings, theses and dissertations can be collected in automated systems. Documents pertaining to subjects and instructional media can be produced in the form of digital courseware. Tacit knowledge and explicit knowledge can be recorded in KM websites.

This is in accordance with the research conducted by Cruthaka (2019) on The Development of a Knowledge Management Model Appropriate for Public University Lecturers. Findings showed that the components of an appropriate knowledge management model for public university lecturers in the aspect of knowledge storage and access were the making of files; knowledge databases being inspected and indexed for system access via Dropbox, Google Drive, cloud computing, and Outlook Express for Windows. Knowledge can be stored as pertaining to research, instruction and study, and references.

4) The aspect of knowledge sharing found that an appropriate technology for knowledge management by public university lecturers consisted of ten items with three items deemed appropriate at the highest level by experts exhibiting concurrent opinions. Seven items were considered appropriate at a high level. The first three items with which the experts were concerned showing concurrent opinions were e-mail; technology used to disseminate knowledge and tools for knowledge exchange, responses, discussions, and summaries of knowledge; Facebook and Line. Lecturers use email, Line, and Facebook in their daily life to communicate and to exchange information and knowledge. This is in accordance with the ideas of Namprasertchai (2015) concerning technology used in knowledge management, especially Facebook which is a social network system with the highest number of members. This is a channel for disseminating interesting knowledge. Qualifying for Facebook enables users to access and obtain knowledge easily. This is in accordance with the research investigation conducted by Cruthaka (2019) entitled The Development of an Appropriate Knowledge Management Model for Public University Lecturers. Findings showed that the components of an appropriate knowledge management model for public university lecturers in the aspect of knowledge sharing were sharing work on websites, by means of social media, Line and Microsoft Office for Windows, and web board questions and answers (Q & A).

5) Concerning the aspect of learning, it was found that the technology appropriate for knowledge management for pubic university lecturers broached in four items show one item which the experts concurred in the opinion that it was appropriate at the highest level with the other three items being appropriate at a high level. In descending order the items were that technology would help disseminate knowledge obtained and utilized in the form of website documents, books, textbooks, sheets, lecture slides, academic articles, and research investigations; YouTube and Open Courseware; and digital device knowledge. University lecturers use technology as a resource for learning. The knowledge obtained is used in writing articles, textbooks, and research investigations so as to further knowledge in various forms. A new body of knowledge came into view in consonance with the research investigation conducted by Junwong et al. (2013) entitled An Application of Quality Information Technology for Knowledge Management Using Webblog. Findings showed that the model of an application of quality information technology for knowledge management using weblogs is conducive to implementing knowledge ensuring in turn that users find it convenient to use the knowledge thereby collected. The goal is for users to have the tools for retrieval, printing, or sharing on social network. They can check the statistics governing the implementation of knowledge on weblogs. The tools used include the

installation of tools for typing email and sharing on social networks; the installation of tools to send articles by e-mail; the tools to check URLs introduced on weblogs; the tools to inspect websites introduced on weblogs; the tools use in inspecting keywords for the sake of retrievals; tools for examining broken links; the quantity of social network shares; and the quantity of weblog followers. This finding is in consonance with Tunjaw (2012), who conducted research under the title of The Information Technology Model and Communication on Knowledge Management at Higher Education Institutions in Thailand. It was found that the characteristics of Information and Communication Technology (ICT) in knowledge management at higher education institutions in Thailand consisted of a system of e-books used to provide access to textbooks. Subject documents and instructional media can be made into digital lessons in the form of courseware.

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