Evaluation criteria of experts for knowledge management system of a business school

G.Serzhan, G.Tulemissova, S.Iskakova, E.Ramazanov
International Academy Business, Almaty, Kazakhstan
g.serzhan@iab.kz
gtulemissova@gmail.com
isvetlana_@mail.ru
ramazanov@iab.kz

Abstract: The paper summarizes the performance of evaluation criteria developed by experts and IT faculty members in order to encourage them to form a knowledge management system in a business school of Kazakhstan. Interesting quality components are also possible to estimate with linear programming approach such as balanced benchmarking. In result, it was received specific quantitative indicators of criteria for evaluation.

Keywords: knowledge management, criteria, DEA, balanced benchmarking

1 Introduction

The main value of educational institutions is the presence of a large amount of data bank of knowledge. Traditionally, we always take for granted that in the quest for knowledge one supposed to visit a university, attend lectures and do workshops, and so on. Books, collections of tasks and assignments have been paid considerable attention as sources for education.

However, the modern world has brought us its current problems, including education. Huge flow of information flooded those, who desire to study and forces them to seek for selection criteria among the many sources of information. Natural selection has become such a source, which pragmatically teaches to address a particular problem. In addition, we may assume, the more one gains benefits from a source, the faster she sticks to the source and hardly needs other alternative sources. Then the other sources might have been lost in the sea of information. Therefore, the value of the information-received becomes more important than tools and methods of education. As a result, students become much more independent.

Now the user is interested in mechanisms of transformation of information into knowledge. Importance of mental activity algorithm constructed by an author of a course becomes essential. In fact, while teachers face reluctance to study with full-time on-campus students, it is no case in online education. For example, anyone can have access to training materials of Massachusetts Institute of Technology. MIT is going to put all courses online in 5 years in a scope of a project Open Course Ware (MIT OCW). Moreover, they guarantee to give a complete self-training success (Worlock & Ricci, 2013).

Logics leads us to a decision that the main efforts of the modern type of training is necessary to carry on the online training and use knowledge management (KM) in it. This is the demand of time and there is a trend to global universities around the world to provide remote access to educational resources. As many of business schools in the world, International Academy of Business faces a huge competition at an international level. As a matter of fact, we are introducing entrepreneurial approach for teaching with help of improving our strategy and tactics of growth. Introducing KM system is considered as one of our tactics.

2 Knowledge management system for a business school

We have admitted that the main mechanism of buoyancy of a business school in the sea of competition is the introduction of KM in business education. In addition, KM should be implemented in distance education. The system itself implies a kind of KM strategy, which binds specifically to the organization. At the same time, a good KM system has all of the materials that are semantically structured, categorized, indexed and linked for students search.

Moreover, collective success depends on commitment to success of expert teachers. An expert teacher transmits to the analyst the knowledge, which is one of the most expensive products in the

world, including tacit knowledge. Then the analyst depending on the conditions of development should seek a variety of incentives for experts and specialists to obtain knowledge, because few experts would share knowledge freely and willingly reveal their trade secrets.

The paper provides the performance of evaluation criteria developed by experts and Information Technology faculty members (ITFM) in order to encourage experts and specialists to form a KM system in a business school of Kazakhstan.

In fact, 17 faculty members and administrative staff from International Academy of Business in Kazakhstan had a unique teaching assessment and excellence program in business education at Haas School of Business of UC Berkeley in 2013. The government of the country sponsored the program. This was for the first time that the local government sponsored a small private business school. We may indicate that our work as a positive effect of such an experiment. The experiment allowed the expert teachers and analysts such as ITFM interact to form a team.

3 A set of criteria

3.1 Defining scheme

As the problem is bulky, the solution is divided into several stages. In this stage, which is discussed in this article, we attempted to estimate a set of criteria. These criteria serve as mechanisms for controlling the overall operation of knowledge management in the school.

In order to specify an object to discuss we took a closer look to nature of providing courses for students. The courses to study provided by so-called an educational *complex* for each subject in the school. A *complex* is a set of agents (mediums) which stores or/and convey knowledge. At the same time, a complex is created as a result of generating, collecting or sharing of knowledge. Therefore these complexes are abstracted objects to investigate. As it was mentioned above, the first step was to define and estimate a set of criteria. The set of criteria would determine characteristics such complexes.

A team of Information Technology faculty teamed up to develop such criteria. The analysis of questionnaire data used to obtain a true picture of the problems of writing teaching materials. We examined questionnaires 50 expert teachers out of 150 teachers of the business school.

The team followed by Soliman scheme, using the questions at every stage of the formation of a system of knowledge that examines the following questions:

1) What is created (captured, organized, accessed, used)?
2) How to create (capture, organize, access, use)?
3) Who creates (captures, organizes, accesses, uses)?
4) When to create (capture, organize, access, use)?
5) Why create (capture, organize, access, use)? (Soliman & Spooner, 2000)

Hence, criteria formed by both qualitatively and quantitatively. Evaluation of experts' labor is very important. Another important factor is the relevance of their labor. In result of discussing, we provided to estimate 7 criteria: costliness, relevance, mobility, performance, adaptability, technical potential, manageability.

3.2 Data

The list of criteria is the following:

- *Costliness* is to determine expensiveness the development of an educational complex for one course of study in terms of efforts and time.
- *Relevance* criterion consists of questions on use of a complex by others.
- *Mobility* is for define use of information technology for a complex.
- *Performance* defines the personal contribution to develop the course.
- *Adaptability* has questions on easiness to adopt the content of a complex to current situations.
- *Technical potential* refers to technical tools such as computers, mobile devices, interactive blackboards, etc.
- *Manageability* is for determine flexibility of using the contents of a complex.

Each criterion consists of a specific structure (Table 1).

Table 1: Average assessments of criteria by experts

1	*Costliness*			4.3 Conference materials	19.77%
	1.1 The average new additions to an existing complex before use	33.54%		4.4 Research results (doctoral dissertations)	20.00%
	1.2 The percentage of complexes used to the author	75.27%	5	*Adaptability*	
	1.3 The average duration of development of a complex (months)	7.96		5.1 Change of the basic structure	18.33%
	1.4 What percentage of the time it takes to correct errors and typos	15.70%		5.2 Partial changes	21.55%
2	*Relevance* [use of a complex]			5.3 Updates for specific majors	18.77%
	2.1 Other faculty members of the same department	51.16%		5.4 Using practical cases	30.88%
	2.2 Faculty members of other business schools	27.89%	6	*Technical Potential*	
	2.3 Any other institutions in the country	6.22%		6.1 Using the computers, mobile devices, etc.	74.55%
	2.4 Any other institutions worldwide	2.00%		6.2 Electronic blackboards, etc.	23.66%
3	*Mobility*			6.3 Using other media (video, sound, etc.)	31.00%
	3.1 Electronic copy in the school library	59.61%		6.4 Other presentation tools and applications	63.58%
	3.2 On Internet web resources	14.7%	7	*Manageability*	
	3.3 Using on web-conferences	3.27%		7.1 Extended access for users	74.00%
	3.4 Using in distance education	36.11%		7.2 Copyright of a complex	76.00%
4	*Performance*			7.3 References to a complex	63.11%
	4.1 Articles and Reviews	24.67%		7.4 Permissions to use cases of a complex	53.11%
	4.2 Textbooks	45.55%			

3.3 DEA Models

Data Envelopment Analysis (DEA) is widely applied in performance evaluation and benchmarking of service operations (Talluri, 2000). We try to assess the management of knowledge criteria with balanced benchmarking approach (Sherman & Zhu, 2013).

The DEA model (Charnes et al. 1978) is considered in order to increase quality of relevance, mobility, adaptability and manageability subject to costliness, performance and technical potential. Each department of the school is considered as a decision making unit (DMU). Each criterion consists of four defining parts in both input and output. Agents of each DMU(i) assessed knowledge management criteria.

DMUs are indicated by *i* from 1 to *n*. Efficiency of each DMU(i) is to be evaluated.

For given n units, index $i = 1,\ldots, n$, $y_k(i)$ is output amount of k used by DMU(i)

$$max \sum w_k \cdot y_k(i),\ k = 1, \ldots, s;$$

$$\text{s.t. } \sum u_j \cdot x_j(i) = 1,\ j = 1, \ldots, m; \qquad (1)$$

$$\sum w_k \cdot y_k(i) - \sum u_j \cdot x_j(i) \le 0$$

$$w_k, u_j \ge 0 \text{ for } k = 1, \ldots, s;\ j = 1, \ldots, m;$$

w_k, u_j weights of output and input correspondingly.

We suggest that improving the efficiency of each DMU is reduced to finding the optimal weights (w and u) for the problem (1).

Table 2 shows combinations of numbers we can vary to get models. As the value combinations are many, we have to use computer to solve the problem. Therefore, the next stage of the research is going to be calculating and analyzing of results received from the calculation.

Table 2: Combinations of numbers of models

Numbers	Value combinations	Details
n	6	DMU
m	$\sum(j\ r)^T = 2^{12} - 1 = 4095$ $j = 12$ $r = 1, \ldots, 12$	3 input criteria 3x4 criterion parts
s	$\sum(k\ r)^T = 2^{16} - 1 = 65535$ $k = 16$ $r = 1, \ldots, 16$	4 output criteria 4x4 criterion parts

There are 3 criteria at input: costliness, performance and technical potential. Each criterion consists of 4 parts as it is defined in Table 1. Therefore, we can have any combination of 12 inputs. Combinations of r out of j inputs are indicated as $(j\ r)^T$. The sum of such combinations is equal to 4095. The same approach gives us sum of combinations for 4 output criteria.

Conclusion

Integration to the processes at an international level makes educational institutions develop its knowledge management. Assessing knowledge management criteria in a business school through so-called educational complexes problem divided into several stages.

The paper defined a set of criteria at the prior stage. The set consists of seven criteria which are to be used in effectively assessing quality and quantity of knowledge sharing through complexes. Each criterion has four defining parts.

At the next step data was collected from different branches of the school which provide knowledge as a service. The branches are decision making units of the data envelopment analysis models. Three criteria are inputs to the models and four of them are outputs. Changing combination of criteria parts it can be selected optimal set of weights. The next stage of research is going to be defining the consistent models.

References

Aier, S., Riege, C., Winter, R. (2008) *Classification of Enterprise Architecture Scenarios - An Exploratory Analysis*. Enterprise Model Information System Architure. 3 (1), pp. 14-23.

Aler, S., Riege, C., Winter, R. (2008) *Enterprise architecture - Literature overview and current practices*. [Unternehmensarchitektur - Literaturüberblick und Stand der Praxis]

Wirtschaftsinformatik, 50 (4), pp. 292-304.

Anantatmula, V. & Kanungo, S. (2005). *Establishing and Structuring Criteria for Measuring Knowledge Management Efforts*. 38th Hawaii International Conference on System Sciences, 1-11.

Bacharach, S.B. (1989) *Organizational theories: Some criteria for evaluation Academy of Management Review*, 14 (4), pp. 496-515.

Baskerville, R., Wood-Harper, A.T. (1998) *Diversity in information systems action research methods*. European Journal of Information Systems, 7 (2), pp. 90-107.

Becerra-Fernandez, I., Sabherwal, R. (2001) *Organizational knowledge management: A contingency perspective*. Journal of Management Information Systems, 18 (1), pp. 23-55.

Becker, J., Niehaves, B. (2007) Epistemological perspectives on IS research: A framework for analysing and systematizing epistemological assumptions. Information Systems Journal, 17 (2), pp. 197-214.

Boh, W.F., Yellin, D. (2006) Using enterprise architecture standards in managing information technology. Journal of Management Information Systems, 23 (3), pp. 163-207.

Booth, M.E., Philip, G. (2005) Information systems management: Role of planning, alignment and leadership. Behaviour and Information Technology, 24 (5), pp. 391-404.

Davenport, T.H., Prusak, L. (1998) *Working Knowledge: How Organizations Manage What They Know.*

Delen, D., Dalal, N.P., Benjamin, P.C. (2005) Integrated modeling: The key to holistic understanding of the enterprise. Communications of the ACM, 48 (4), pp. 107-112.

Charnes, A., Cooper W. and Rhodes E. (1978). *Measuring Efficiency of decision making units*. European Journal of Research, 2, 1978, 429-444.

Giarratano, J., Riley, G. (1998) *Expert Systems: Principles and Programming*.

Gordon, J.L. (2000) *Creating knowledge structure maps to support explicit knowledge management.* ES 2000 Conference - Applications Stream, pp. 34-48.

Gómez, A., Moreno, A., Pazos, J., Sierra-Alonso, A. (2000) *Knowledge maps: An essential technique for conceptualization.* Data and Knowledge Engineering, 33 (2), pp. 169-190.

Hevner, A.R., March, S.T., Park, J., Ram, S. (2004) Design science in information systems research MIS Quarterly: Management Information Systems, 28 (1), pp. 75-105.

King, W.R. (2005) *Communications and information processing as a critical success factor in the effective knowledge organization*. International Journal of Business Information Systems, 1 (1-2), pp. 31-52.

Kuechler, B., Vaishnavi, V. (2008) On theory development in design science research: Anatomy of a research project. European Journal of Information Systems, 17 (5), pp. 489-504.

Menon, T., Pfeffer, J. (2003) *Valuing internal vs. external knowledge: Explaining the preference for outsiders*. Management Science, 49 (4), pp. 497-513.

Melão, N., Pidd, M. (2000) A conceptual framework for understanding business processes and business process modeling. Information Systems Journal, 10 (2), pp. 105-129.

Minsky, M. (1975) *A framework for representing knowledge*. The Psychology of Computer Vision, pp. 211-277.

Morganwalp, J.M., Sage, A.P. (2004) Enterprise architecture measures of effectiveness International Journal of Technology, Policy and Management, 4 (1), pp. 81-94.

Pettigrew, A.M., Woodman, R.W., Cameron, K.S. (2001) Studying organizational change and development: Challenges for future research. Academy of Management Journal, 44 (4), pp. 697-713.

Sherman D. & Zhu J. (2013). *Analyzing Performance in Service Organizations*. MIT Sloan Management Review. 54. No.4.

Soliman, F. & Spooner, K. (2000). *Strategies for Implementing Knowledge Management: Role of Human Resources Management*, in: Journal of Knowledge Management, 4(4), 2000,

337-345.

Talluri S (2000). *Data Envelopment Analysis: Models and Extensions.* Decision Line 31(3): 8-11.

Worlock, K. & Ricci, L. (2013) *MOOCs: Cutting Through the Hype*. Outsell Report, 2013.

Wu, S.Y. & Li, W.B. (2014). *Research on knowledge service oriented expert management system.* Applied Mechanics and Materials, 2014, 519-520, pp. 1566-1569.