The CONCEPTUAL MODEL of KNOWLEDGE ACQUISITION SYSTEM in ACCOUNTING and LEGAL FIRMS

Eric Y. Cheng, SUNY-Canton, 315-379-3904, cheng@canton.edu
James Fok, Hong Kong Polytechnic University, (852) 2766-7370

ABSTRACT

Knowledge acquisition is recognized as a critical knowledge management process for developing knowledge management systems. For accounting and legal industries, to transform tacit knowledge from the professional experts to explicit knowledge could be problematic as human judgment could vary substantially among the experts. In addition, maintenance of the systems could require regular interaction between the system engineers and the experts which could be time consuming and costly. This paper addresses the motivators and barriers of knowledge acquisition during the development of knowledge based systems. A conceptual model for integrated knowledge based system is introduced to resolve certain barriers during knowledge acquisition. This analysis could also be used to help accounting and legal industries to understand how to better manage existing invaluable knowledge assets.

Keywords: knowledge management, tacit knowledge, knowledge acquisition, accounting

INTRODUCTION

Though the focus on computer applications in accounting remains in how to use advanced decision support systems to support auditing [8], there is still needs to develop a knowledge management system that can acquire tacit knowledge effectively and efficiently. Extensive researches and studies have been conducted by many scholars to resolve the deficiencies during knowledge acquisition process. J.W. Moody et. al. [11] investigated the applicability of cognitive interview in the knowledge elicitation phase of expert system development. P.H. Hendriks [14] studied the organizational impact of knowledge based systems. N.F. Matsatsinis et. al. [13] proposed a methodology which combines interviews with experts and known literatures for eliciting expertise. W. P. Wagner et. al. [21] presented a mapping between the body of knowledge acquisition empirical studies and the different problem domains within accounting and finance as a guide for choosing knowledge acquisition techniques.

The architecture of an integrated knowledge system is also explored. H.C. Tu and J. Hsiang [4] introduced an architecture of intelligent information retrieval agents
to support group knowledge retrieval. E. Davenport [2] addressed the issues of knowledge management under communities of practice infrastructure. H.R. Nemati et. al. [5] proposed the adoption of knowledge warehouse, which integrates knowledge management, decision support, artificial intelligence and data warehousing. H.C.W. Lau et. al. [3] proposed an integrated knowledge system model which contains data warehouse, OLAP system and case base reasoning component to resolve the concern about shortage of knowledge workers.

LITERATURE REVIEW

Knowledge management in accounting industry

Tom C. Davis [19] addressed the importance of knowledge management to public accounting firm and that better use of practice’s knowledge to improve firm’s efficiencies is vital. The global big four accounting firms are well aware of the importance and the firms invested considerable resources in developing knowledge based infrastructure. Knowledge based systems are widely adopted in large accounting firms. V. Karen et. al. [20] assessed the suitability of judgmental auditing tasks for expert systems development. They noticed that the Big 6 accounting firms (some of which have merged and consolidated to be the Big 4) have developed auditing expert systems to support their auditing business.

On the other hand, the small accounting firms could also adopt commercially available expert system development tools in building their knowledge based systems. The commercial packages contain basic components of expert system, which include, knowledge base, inference engine, user interface and explanation facility. In principle, the small accounting firms can directly develop their knowledge base systems by using the packages without any support from knowledge engineers.

The development of knowledge based system for accounting profession also received attention from scholars. J.K. Lee and M.W. Jeong [10] developed a prototype IAPS (Intelligent Audit Planning System) to support the auditor assignment process for audit engagements. S. Lee and I Han [16] introduced EDIRDB, a prototype audit support system to support EDI auditors. I. Comyn-Wattiau and J. Akoka [6] presented the application of INFAUDITOR, an audit expert system, to logistics information systems auditing. In view of the difficulties during knowledge acquisition process in developing expert system, M. Anandarajan and M. Anandarajan [12] proposed to adopt machine learning techniques for auditors’ going concern reporting. System to be built under neural network model was examined.

Knowledge management in legal firms

presented INCAS, a legal expert system for contract terms in electronic commerce. T.A. O’Callaghan et. al. [18] introduced SHYSTER-MYCIN, a legal expert system which combines case-based legal expert system (SHYSTER) with a rule-based expert system (MYCIN).

Dan Hunter [1] advocated the idea of commercializing Legal Neural Networks and argued that the time is ripe for practitioners to adopt neural network technology for legal inference. He illustrated the usage by referring to an example of a court in granting bail to an offender. The input layer captures factors such as habitual criminal, sex crime etc. and signals (yes =1 or no = 0) will be assigned. The signals will be multiplied by allocated weightings in the hidden layer to determine whether the value will exceed the threshold value. If the value exceeds the threshold value, the neurone will pass a signal to the output layer to suggest the nature of the bail granted. Dan Hunter [1] admitted that the neural network, as their intelligence rests with the weightings on links between neurodes, could be “quintessential black box” and unable to provide reasons for generating the outputs (conclusions). It’s considered that legal neural network can be applied as a quick predictive tool.

**Motivators and Barriers for Knowledge Management**

This section examines the difficulties of knowledge acquisition of knowledge based system. There are typical and well researched barriers including: difficulties of knowledge acquisition, communication between domain expert and system engineer, Technical support and social background, psychological concern, and financial constraint. Based on the review of related research studies and reports on knowledge management, 18 motivators and 18 barriers are identified as relevant to the knowledge acquisition of knowledge base systems for accounting and legal firms.

The motivators and barriers are summarized in the following table 5.

Table 5. Motivators and Barriers of Knowledge Management
Conceptual model of integrated system for accounting and legal firms

This conceptual model takes into account of recent developments in addressing the specific requirements in accounting and legal industries. Intelligent agent and organization impact will also be incorporated into the system. As IT strategies to align with business strategies is essential for all organization, strategic knowledge will be stored in the integrated system to facilitate alignment. The Nonaka’s knowledge spiral model [7] was adopted for the illustration of the system framework.

The conceptual framework is depicted in figure 3 below.

<table>
<thead>
<tr>
<th>Motivators</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Committed management support</td>
<td>1. High cost of development</td>
</tr>
<tr>
<td>2. Perceived ease of use</td>
<td>2. Poor relationship between knowledge engineer and experts</td>
</tr>
<tr>
<td>3. Establish knowledge sharing culture</td>
<td>3. Lack of commitment from senior management</td>
</tr>
<tr>
<td>4. Incentive schemes for knowledge sharing</td>
<td>4. System too complicated</td>
</tr>
<tr>
<td>5. User innovativeness reward</td>
<td>5. Lack of proper information infrastructure</td>
</tr>
<tr>
<td>6. Infrastructure of knowledge network</td>
<td>6. Absence of knowledge policy</td>
</tr>
<tr>
<td>7. Relative advantage against competitors</td>
<td>7. Inadequate time to support knowledge acquisition</td>
</tr>
<tr>
<td>8. Link with business objectives</td>
<td>8. Inadequate technical support</td>
</tr>
<tr>
<td>10. Improve skills of domain experts</td>
<td>10. Personal benefits not perceived</td>
</tr>
<tr>
<td>11. Better decision making</td>
<td>11. Chinese culture not support knowledge transfer</td>
</tr>
<tr>
<td>12. Better customer handling</td>
<td>12. Difficult to integrate with daily work</td>
</tr>
<tr>
<td>14. New ways of working</td>
<td>14. Unable to measure the financial benefits derived</td>
</tr>
<tr>
<td>15. Staff attraction</td>
<td>15. Not an industry norm</td>
</tr>
<tr>
<td>16. Compatible system</td>
<td>16. Inadequate channels for knowledge flow</td>
</tr>
<tr>
<td>17. Create new business opportunities</td>
<td>17. Poor communication among employees</td>
</tr>
<tr>
<td>18. Increase market value and profit</td>
<td>18. Organization structure does not support knowledge sharing</td>
</tr>
</tbody>
</table>

Table 7: Motivators and barriers of knowledge acquisition
Both machine learning and human expert knowledge transfer are incorporated in the integrated system. On line knowledge support from professional bodies such as Hong Kong Law Society and Hong Kong Society of Accountants will be linked to the integrated system. Knowledge mining software will be installed for knowledge discovery. Tacit knowledge stored in knowledge repositories will be converted to explicit knowledge. The domain experts, inspired by new knowledge discovered, will assist the domain experts in developing new knowledge. The new knowledge can be elicited into the system. As most of the experts in accounting and legal firms are accustomed to computerized environment, it is appropriate to adopt expert system shells for the domain experts to communicate directly with the system.

Case-based reasoning is useful for both tax specialists and lawyers. The knowledge-based neural network will provide quick solution for decision support. Neural network integrated with case-based reasoning mechanism will provide proposed solution which is useful for referencing. Intelligent information retrieval agents as proposed H.C. Tu and J. Hsiang [4], will assist the organization to obtain information and knowledge through the internet. The agent could assist in document classification and will be beneficial for categorizing the new knowledge acquired.

Adaptive user interface will allow customization to meet the different user background. As the domain experts are both knowledge provider and knowledge receiver, adaptive system environment will ease the acceptance to the system. The organizational impact should not be overlooked. Knowledge sharing culture has to be developed through training, incentive scheme, profit sharing and other reward systems.
in order to ensure the system could be operated effectively. The knowledge intranet will serve as a channel for communicating strategic knowledge.

The conceptual model overcomes certain difficulties in knowledge acquisition, such as communication problem, interpersonal relationship as well as certain psychological concern. For further enhancement of the proposed model, it is useful to identify the main motivators and barriers of knowledge acquisition.

**DISCUSSION**

The studies are relevant to knowledge acquisition as domain experts are also the users of the knowledge base system. Supportive social environment is crucial for knowledge transfer, in particular, the consultants in accounting firms. Perceived ease of use as already covered in TAM, which is an important factor in developing knowledge base system. Perceived consequence could be a motivator for knowledge acquisition if the experts can perceived benefit derived from the system. It is easier for the domain experts to accept the system if the role of system is inclined for decision support instead of decision making. The experts could be afraid of being replaced by the system.

P. Poon and C. Wagner [15] studied the critical success factors for the development of information systems. They defined five evaluation criteria for system success.

The five criteria are:-
1. The system is made available for access by users.
2. The system is used by intended users.
3. Users are satisfied with the system.
4. The system has positive impact on senior management and the organization
5. The system tends to spread across the organization.

The drivers for system success are named as critical success factors and they adopted J.F. Rockart and D.W. DeLong [9] together with other researchers’ studies for examining the impact of ten critical success factors to implementation of information system.

The ten critical success factors are:-
1. Committed and informed executive sponsor
2. Operating sponsor
3. Appropriate IS staff
4. Appropriate technology
5. Management of data
6. Clear link to business objectives
7. Management of organizational resistance
h. Management of system evolution and spread
i. Evolutionary development methodology
j. Carefully defined information and system requirement

The result of their research confirmed J.F. Rockart and D.W. Delong’s [9] study as well as the two additional critical success factors.

The identified critical success factors could be relevant to knowledge acquisition in knowledge base system. Committed management could drive the experts in devoting their time and effort for the development of the knowledge base system. Quality of the IS support is important. In the absence of knowledge engineers, the organization may require to appoint external IT consultancy firm to provide IT support to the domain experts for using the expert system shells or resolving any technical problems which may arise. The critical success factors include organizational factors. Link to business objective could also be crucial. Alignment with business strategies will support the stability of IT infrastructure which is essential for sustained knowledge acquisition. Operating sponsor is important as the position will manage the details of implementation from user’s side. Representative of the domain experts could be useful for clarifying the intended use of the knowledge based system which could reduce friction between the domain experts and the management during knowledge acquisition process. Management of organization resistance could relate to organization culture. Knowledge sharing culture may encounter resistance and education and incentive schemes could help the management to reduce conflicts. Management of data refers to the access of data, externally and internally. Knowledge network and knowledge repositories will provide adequate access to required knowledge by users. Evolution of the system is inevitable and the domain experts should be motivated for modification and enhancement of the system.

REFERENCES


