

E-Knowledge Management for Public Management*

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Abstract

The meaning of knowledge management and the requirements of public management on knowledge management are first presented, based on which the solution consideration to integrate E-knowledge management into public management is proposed. The key issues on implementing E-knowledge management in public management concentrate on the process of knowledge, which refer to knowledge representation, knowledge repository, knowledge reasoning, knowledge personalization and knowledge transferring. Based on the analysis on the key requirements on E-knowledge management in public management, we present an E-knowledge management system for public management, which is founded on knowledge ontology and information integration technology.

1. Introduction

Recent advancement in public management shows that public management is developing towards information [1, 2]. The e-Governments have two main properties [3]. First, they utilize information technologies to break the barrier between governments and let people able to obtain information and services from government through different ways. According to the traditional styles, people have to deliver written applications to apply certain services from governments. Second, governments can communicate and process businesses through many electronic ways, such as network, E-mail, etc. They are able to offer different choices of services according to peoples' different requirements such as time and place. Generally speaking, in E-age all functions of governments can be performed through the network except for some special cases.

There have been a lot of achievements in public management [4-9]. However, with the explosive increment of information, public

management has faced the problem of knowledge management. The following is a simple example. In E-government systems, the government usually needs to refer to the similar situations when dealing with a specific case. Previous decision information is very helpful for current similar cases. But nowadays the information management in public management is limited to static websites and offices automation, and is lack of effective approaches for knowledge management. In such situation, decision makers have to store their experiences in their own memory. It is difficult for them to share decision information each other. With the increment of information, it could be more difficult to organize and utilize previous decision knowledge. The objective of knowledge management is to make decision makers be able to access knowledge quickly and conveniently, and to offer right knowledge to right managers in right time in order to make best decision.

The knowledge management in public management was developed on the basis of information technology. There has been widely accepted that in 1970s the public management was based on data management, and in 1980s it was based on information management. To suit the requirements of knowledge economy, it is necessary to realize knowledge management in public management. So far there have been a lot of analyses on the requirements on knowledge management in public management, as well as on how to achieve knowledge superiority in public management [4-9]. Based on the study on the characteristics of knowledge management in public management, the differences between knowledge management in public management and knowledge management in enterprises were clarified [6]. The relationships between

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knowledge management and public management were discussed in [7] and it was emphasized that to suit the development of social economy public manager should pay more attention to knowledge management. In [8] a framework for the knowledge management in administration management was presented and the influences of knowledge management on organization management, administration behaviors and personnel management were deeply analyzed, which in the authors' opinion would result in the reformation of administration management system.

The Information-and-Communication-Technologies-based (ICT-based) framework for knowledge management was proposed in [9] and especially the requirements of policies development when realizing knowledge management in public management were discussed in detail.

However, previous research on knowledge management in public management concentrated on the analyses of the necessity to introduce knowledge management into public management and was short of the study on how to solve the implemental issues in knowledge management in public management. The key issue is how to build an effective approach to knowledge management in order to satisfy the impendent requirements in public management. This paper aims at exploring the knowledge management approaches in public management and a framework for E-knowledge management is presented. The approach presented this paper is based on the analysis on the specific knowledge and requirements in public management area. And the framework of knowledge management is founded on the novel knowledge-ontology-based integration technology. According to the developing process of public management, the data management and the information management have been totally implemented through the computer technologies, so we can believe E-knowledge management will be the trend in public management. Only in this way, it is feasible for public management to be integrated with E-government seamlessly.

The remainder of this paper is structured as follows: Section 2 focuses on the types of knowledge in public management and the requirements of knowledge management in public management. Section 3 presents a framework for

E-knowledge management in public management. And conclusions are discussed in Section 4.

2. Requirements of E-Knowledge Management in Public Management

The knowledge management is usually defined as "to convey appropriate knowledge and information to appropriate people in appropriate time so that people can efficiently utilize knowledge and information to take actions and make benefits" [10, 11]. So the objective of knowledge management is to convey the best knowledge to the most appropriate people in best time for a best decision.

Knowledge management differs from data management and information management. Data is original unprocessed facts and information is the data processed in a specific environment, while knowledge is the combination of information and experiences. The information management concentrates on the collection and analyses of information, but knowledge management concerns not only the management of information but also the management of the experiences on information processing.

Nowadays knowledge management has been a hot issue in the research on public management. But the knowledge management in public management is different from the traditional knowledge management in enterprise management. These differences can be depicted as follows: (1) The knowledge structure in public management is more complex; (2) The processing flow of knowledge in public management is different from that in enterprise management; (3) Generally, the knowledge management in public management must suit the multi-level administration; (4) There are many agencies in public management, which makes the knowledge management more complex.

So the traditional strategies of knowledge management in enterprise scope are not suitable for the knowledge management in public management. To develop effective approaches to knowledge management in public management, we need analyze the knowledge meaning in public management, as well as the specific requirements of knowledge management in public management.

2.1 The Knowledge in Public management

The public management is a knowledge work, and the officials are knowledge workers. In real world, the management work in some department is usually looked on as expert work and must utilize the specific knowledge in the department. Max Weber, who was the pioneer of administration management, defined this type of knowledge as *Dienstwissen*, which means *domain knowledge* or *service knowledge* [6]. In fact, the knowledge in public management is a mixture of some other knowledge, which contains:

- (1) Knowledge about previous policies;
- (2) Knowledge about previous work;
- (3) Knowledge about laws, prescriptions, constraints, standards and other political regulations;
- (4) Knowledge about abilities of knowledge workers themselves.

2.2 The Requirements of Knowledge Management in Public management

In knowledge management, there are five key issues, which are (1) the identification and representation of knowledge, (2) knowledge storage, (3) knowledge reasoning, (4) knowledge customization, and (5) knowledge transferring. To achieve knowledge management in Public management, we also need consider these issues.

2.2.1 The Identification and Representation of Knowledge

The requirements of knowledge identification include:

(1) to identify what is *conceptual knowledge*, e.g. the scope and regulations of government management (*fact knowledge*), why to establish policies (*reasoning knowledge*) and whom can be asked if problems occur during the management processes (*personnel knowledge*);

(2) to identify what is *procedural knowledge*, which means knowledge about processes of administration decisions, administration actions and administration executions, e.g. the decision process when officials receive a request on subvention.

Each type of knowledge should be represented in knowledge management. The conceptual knowledge can be represented by the structured data, but the procedural knowledge needs some new approaches. One of the most difficult issues

in knowledge management is how to represent the inferential rules among procedural knowledge. These rules are usually called *tacit knowledge*, which are hidden in existing declarative knowledge.

2.2.2 Knowledge Storage

In the past, officials were able to find information through files, databases and Internet. However, there were no efficient ways to transform the information into useful knowledge for officials. Thus though they could have a large amount of information, they still lacked useful information for the decision. To realize knowledge management, we first need to store the domain knowledge and information into the knowledge base in a standard format. Then useful knowledge can be delivered to the requesting person either in a passive way or in an initiative way. For instance, the experiences on administration management can be exported into a knowledge base, and then the officials are able to find the solutions to the problems met.

2.2.3 Knowledge Reasoning

Compared with the computer, the advantage of mankind's knowledge management is that man can obtain new results from existing knowledge. To utilize knowledge effectively, the ability of knowledge reasoning is necessary for knowledge management, which is to retrieve reasonable conclusions from facts. Knowledge reasoning has close relationship with knowledge representation.

2.2.4 Knowledge Customization

Knowledge customization is a key factor to improve the efficiency of knowledge management. Different knowledge workers need different knowledge, since they usually face different tasks and decision requirements. Only when the most appropriate knowledge are delivered to the most appropriate knowledge workers can knowledge make senses.

2.2.5 Knowledge Transferring

Knowledge transferring is the necessary condition to realize knowledge sharing and cooperation. With the fast development of network technology, it is convenient to connect the government with enterprises and universities. Thus through the interactions on the network, knowledge is produced, transferred and applied. Knowledge management makes the government

easy to obtain required knowledge and communicate with the public without the limitation of time and space. With the aggregation and update of knowledge, it becomes more important to develop more efficient ways to transfer knowledge to knowledge workers.

3. Solutions on E-knowledge Management in Public management

The core of knowledge management is to fasten the transferring and application of knowledge and bring more economic values. In order to utilize knowledge effectively, we must build a specific knowledge management system (KMS) for public management.

According to the definitions in [12], knowledge can be defined as the following

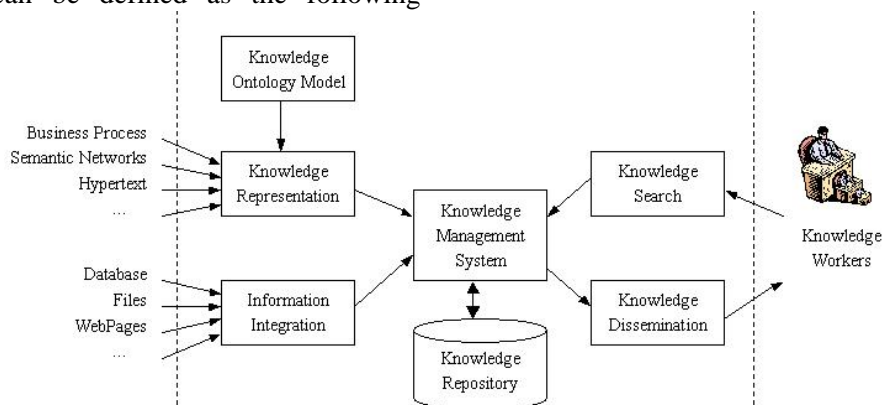


Figure 1. The knowledge management system based on knowledge ontology and information integration

3.1 Knowledge Ontology Model

Ontology is a formal explicit conceptualized specification of shared concepts [13]. The terminology “conceptualized” refers to the abstraction of real world, while “explicit” means the concepts and the constraints on the use of the concepts should be explicitly defined. And finally, ontology should be with formal definition in order to be processed in computer.

The knowledge ontology model provides the unified representation of the domain knowledge in public management. All the knowledge in public management is organized as knowledge ontology, which represents different kinds of knowledge in public management. The knowledge in public management may be the

equation:

$K = (I + M) ^ S$, where K represents knowledge, I represents information, M represents man and S is the sharing level.

So the efficiency of knowledge lies in the sharing of knowledge. To realize knowledge management, the expert knowledge of public administrative departments must be shared through some ways. However, the information and knowledge in different departments usually are with different formats and semantics, and also the same knowledge may be represented differently by different experts. Thus knowledge integration is a key process to realize knowledge management.

In this paper, we present a framework for knowledge management system in public management, which is based on ontology and information integration, as shown in Figure 1.

procedural description on a business process, or a semantic network about several concepts, or the relationship among different knowledge.

The knowledge ontology is composed with three elements (as shown in Figure 2), which are (1) a set of concepts or procedures, (2) a set of the relationships among concepts and procedures and (3) a set of inferential rules.

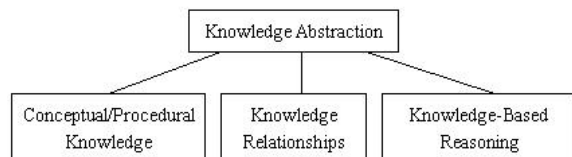


Figure 2. The knowledge abstraction of knowledge ontology

3.2 Knowledge Representation

Knowledge representation module is the most important component of the knowledge management system. It represents the knowledge abstracted by the knowledge ontology using some formal methods and transfers knowledge to the central knowledge management system. The difficulty of knowledge representation is the representation of semantics. The declarative knowledge can be represented by the structured technology, such as the relational database technology, while the representation of the semantics of knowledge needs new approaches. For this reason, some formal methods based on the knowledge ontology should be presented. So far several methods of knowledge representation are proposed, e.g. the Conceptual Graph [14], the logic-based method [15] and the conceptual reasoning method [14]. The XML/RDF approach is useful to represent declarative knowledge, but it does not support the representation of inferential knowledge. Currently the most appropriate approach may be the logic language. According to the abstract structure of knowledge ontology, the procedure-based logical language and the inference-based logic language can both be used to represent knowledge.

3.3 Information Integration

The information integration module provides unified information view for knowledge workers. In the early public management, information is stored as files. With the development of information technologies, information storage styles are changed into databases and web pages. The main problem in public management is that different departments have used different styles to store information. To realize the knowledge management in public management, it is necessary to integrate the information of different departments into a universal view. The information integration module integrates various information from different departments using the middleware technology, and provides global information access for public management.

3.4 Knowledge Repository

The knowledge repository is the platform storing different types of knowledge of the knowledge management system. This knowledge includes determined declarative knowledge and

inferential tacit knowledge. The approaches to implementing the knowledge repository can be classified in to four categories: (1) relational database technology, (2) XML technology, (3) object-relational database technology, and (4) object-oriented database technology. The relational database technology has been widely adopted in current public management. The XML technology is useful for information integration and has been a commercial standard. The object-oriented database technology provides much more semantics than the relational database technology, but it lacks efficient implemental techniques. The object-relational database is called “the third generation database”, which combines the advantages of relational database and object-orient database. So when implementing the knowledge repository the object-relational database technology should be the most attractive choice.

3.5 Knowledge Management System

The knowledge management system is the core of the whole system. It accepts the input request of knowledge and stores them into the knowledge repository. It also accepts the knowledge requests from knowledge workers and provides useful knowledge for them. In real public management, the knowledge management system needs to validate the inputted knowledge to assure the correctness of knowledge. Meanwhile, it must develop security mechanism to ensure the security of knowledge. And finally, it should have the ability to communicate with other knowledge management system for the sharing of knowledge. For this purpose, the knowledge management system must build some distributed cooperation techniques.

3.6 Knowledge Search

The knowledge search module provides graphic personalized search tools for knowledge. The knowledge search is driven by the knowledge workers, and the results are delivered by the knowledge management system. With the development of the Internet, it is a trend to develop Web-based knowledge search tool. It is not enough for the knowledge search tool to find only the explicit declarative knowledge, but also to find the implicit inferential knowledge.

3.7 Knowledge Dissemination

The knowledge dissemination is different from the knowledge search. The knowledge dissemination is an active process which pushes customized knowledge to appropriate knowledge workers, while the knowledge search refers to the process that knowledge workers pull wanted knowledge from the knowledge management system. The knowledge dissemination is very important in knowledge management, since it realized the main objective of knowledge management that is to transfer the most appropriate knowledge to the most appropriate persons [10]. To implement a knowledge dissemination module, the workflow technology and the ECA (Event-Condition-Action) rules can be used as candidate techniques. This technique can be described as follows. First, knowledge workers customize the wanted knowledge, as well as the time limit and other conditions. This information is managed by the knowledge dissemination module, and when certain conditions are satisfied the knowledge management system will call the knowledge dissemination module to transfer the specific knowledge to corresponding knowledge workers.

4. Conclusions

In the economic era, it is a trend to introduce the E-knowledge management into public management. Only when we have utilized information and knowledge with a high level can the public management become more efficient and effective. In this paper, we present a framework for the E-knowledge management in public management based on the analysis on the requirements of knowledge management in public management. The government should develop the E-knowledge management system to utilize the advantages of knowledge management in public management, and further to enable the E-government to suit the requirements of knowledge economy.

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