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Healthcare Administration Using Distributed Knowledge

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Abstract: This study pertains to an application of electronic commerce in the field of healthcare administration and is based on Distributed Knowledge Management (DKM). The DKM is a concept that originated as an abstraction of a business model prepared for the mechanical and agricultural industry. This study suggests a new business model based on DKM for more general use, in the context of healthcare administration.

Key words: Knowledge management, distributed knowledge management, specificity, decision support

INTRODUCTION

The abstract model for knowledge management is to take care of the following:

- Comprehensive documentation and effective means to manage data information and knowledge.
- Problem is to be solved from a micro perspective with bilateral communication and also from a macro perspective with structured multilateral business relations.
- Quality care with low costs and minimum effort.

The model is based on information and communication technologies, which in the forms of networks extend the reach and range of firm's business opportunities (Keen, 1986). The information separability from business processes enables us to move from business process redesign to business network redesign. (Sampler, 1998; Hammer and Champy, 1993; Venkatraman, 1994; Hammer, 1996; Hax and Wilde, 1999). Knowledge management moves beyond the boundaries of the firm into the extended enterprise and elevates the virtual organizing of business into knowledge based strategy for a dynamic portfolio of relationships to assemble and co-ordinate the required assets for delivering value to the customers resulting in business to business networks.

The model presented caters for the following:

- Knowledge relations (Exchange of asymmetric specific knowledge)
- Specific nature of network relations
- Decision support

The model proposed yields a superior performance (Sridhar, 1998).

Centralized vs decentralized knowledge management: This article emphasizes the inter-organization perspectives on knowledge management. Information technologies use symbols to serve human purposes to manage extended economic organization (Konsynski, 1993: Pedersen, 1996). So knowledge management relies on information technology including networks, technologies of processing and storage (i.e.) first represented in the acquisition of knowledge (knowledge repository) and later represented in network models.

Centralized knowledge management is based on the idea of making knowledge available to the whole organization. The challenge is how to update the knowledge dynamically. This model proposes a conversion from individual knowledge specificity into organizational collective knowledge made available to all where each individual user on an adhoc basis converts the global knowledge into local decision support.

The distributed knowledge management contemplates issues found in network theory exploring co-specialization assets, joint control and collective purpose (Alstyne, 1997). So DKM is for the exchange of specific knowledge between network actors in a mutual value-adding network. Each actor appropriates information and submits enhanced information that in return becomes enhanced by other network actors. Finally the originator gets much enhanced information than what was originally sent out. DKM is dynamic in nature. Knowledge creation in terms of knowledge specificity

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encompasses both tacit and explicit knowledge. Only specific knowledge items are passed on to the network, taking care of organizational boundaries. So we have a network of interdependent decision-makers all acting on information specificity and time specificity (i.e.) knowledge management should be tempered by the decision support system.

Distributed knowledge management: The network of distributed knowledge management is based on actor network concept. Here the actors have both autonomy and interdependence. The network is constructed for the specific knowledge taking account of each actor's specific role in the network. In business, the division of labor is based on the task allocation for each actor, which requires specific and global knowledge. According to resource based view, the actor who succeeds others holds unique resources, (i.e.) the actor gets more rents and quasi-rents from the resources (Wernerfelt, 1984; Milgrom and Roberts, 1992; Paul, 1997). From this, we move on to asset specificity related to Information associated to resource The asset specificity also refers to transaction cost economics (Williamson, 1985, 1986, 1994). In simple terms, we require specific information to manage our assets. This is termed as Information specificity. It has two forms:

- Time specificity
- Knowledge specificity

Time specificity: The right information to the right people at the right place in the right time prevails over all other information. If we divide further, we have time specificity in use and time specificity in acquisition. The time specificity in use means information if not used in time loses the value. The time specificity in acquisition refers to collection of information at the time of occurrence.

Since competition is fierce, the time pressure requires information in time. If not, the information is irrelevant. The time specificity of information assets results in greater achievements than that of a particular product or service characteristics. This requires management responses from the point of view of customers in time. To management, it means frequent changes in product varieties.

Knowledge specificity: This refers to scientific or technical knowledge or knowledge of context or knowledge of particular circumstances of time and place. If acquiring the information presupposes special training, insights etc., the information is high in knowledge specificity in acquisition (Teece, 1987; Chesbrough and Teece, 1996). Intra organizational knowledge specificity refers to the knowledge specificity (i.e., specific knowledge) in different people or units in an organization. Inter organizational knowledge specific in a network refers to the knowledge that is specific to each single organization in the network reflecting that the division of labor follows from high degree of specialization. Knowledge specificity is important for considering strategic technology collaboration. This is important in terms of transaction cost economics of relational contracting due to asset specificity or beneficial knowledge co-operation. Further this leads to knowledge management issues of identification, storage and use.

Distributed knowledge management model: Here distributed means reference to interdependent organizations performing each of their value added activities. Here a repository is created and updated continuously, usually when a certain threshold is reached that elicits signals calling for attention. The more the threshold information enters into daily routines, the more decision support is derived. We can have a system holding distributed knowledge repositories at the same time as showing decisions support qualities due to information timeliness and relevance to network actors.

The system works as follows, a actor receives time specific knowledge of the partners and processes along with actors own specific knowledge, which results in new specific knowledge. This new specific knowledge or an item of it is passed on to another actor in the network. The other actor merges this specific knowledge with knowledge possessed and processes further resulting in new specific knowledge. These are passed on to other actors (Fig. 1).

This process continues and eventually closing the circle as new specific knowledge arrives at the first mentioned actor. Actors are benefited from the knowledge for making decisions locally.

An example-product state model: Here we consider a manufacturing company, dealer and end user as actors (Table 1). Let us make a matrix regarding product maintenance and replacement, disregarding standard

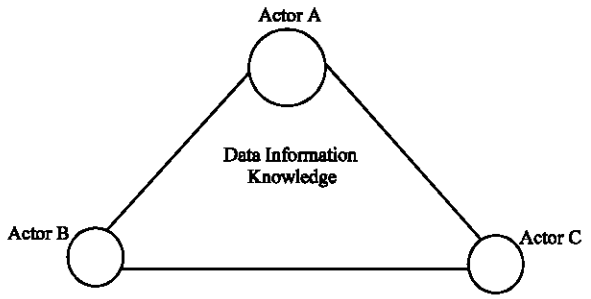

Fig. 1: Distributed knowledge network model (Source: Pedersen, 1999)

Table 1: Knowledge exchange matrix

From / To	Producer	Dealer	End user
Producer	Internal knowledge handling	Product service knowledge, stock mix	Self service manuals online service end user community
Dealer	State of stock mix, crisis management spare parts stock	Internal knowledge handling	Allocated (reserved) spare parts in stock maintenance services
End user	Hours of product use-FAQ-usage problems, time critical services	Maintenance support replacement support product support	Internal knowledge handling

Table 2: The knowledge exchange matrix for arkansas health care

From / To	Arkansas DMS	Doctors	Patients
Arkansas DMS	Internal knowledge handling	Confirmation of patient payment. display medical provider information	Assign primary healthcare physicians
Doctors	Verify patient eligibility and benefit use	Internal knowledge handling	Care, treatment and advice
Patients	Request for payment status information	Patient medical history and treatment (patient card)	Internal knowledge handling

business information like prices, payments etc. In this example, the business exchange does not call upon decision support model.

All the actors hold privileged knowledge that is offered as a continuous data to the other actors, resulting in a new specific knowledge. Each actor can thus take suitable decisions. So this network takes care of customer relationships and business partners relationship.

In USA, arkansas division of medical services functions as follows: Arkansas DMS administrator Medicaid program people older than 64, blind or disabled adults and children gives aid to families with dependent children or aged, blind disabled persons in nursing homes. Others may qualify for Medicaid through the 'medically need' program depending on their incomes, resources and medical needs. This covers 12 federal services and several optional services also.

The electronic business system Automated Eligibility Verification and Claims Submissions (AEVCS) was developed by Electronic data systems. The AEVCS supports the processing of:

- Eligibility verification
- Claims transaction

Using a network of point of sale devices, the transactions are processed in real time and response is submitted to submitter noting whether the transaction is accepted or not and informing errors, if any. The patient is provided with an ID card, with magnetic strip. So the eligibility of the patient can be determined in any of the provider locations with the devices. They are given an authorization number delivered to the provider guaranteeing payment. This system accepts most claim types such as inpatient and outpatient, early and periodic screening, vision, dental and long term claims. The AEVCS can be accessed through point of sale devices, vendor systems, PC's and both the Intranet and Internet web sites.

The flow of data, information, knowledge between the actors (Arkansas DMS, Doctors, Patients) is shown in Table 2.

The Arkansas DMS pays for the health services. Doctors get medical history of patients and other related information. Doctors treat the patients and update the information. Doctors get their payment electronically. Patients choose their physicians, get treatment, advice, medicines easily (without any time lag).

The technical specifications:

- AVECS has a real time SQL with an online transaction database to support.
- Processes 17-1 million transactions per year.
- Medicaid management information system processes paper claims and performs all back end claims. It resides on an IBM platform and processes 2470 million instructions per second.

Advantages of AEVCS are as follows:

- Paper work is eliminated.
- Emergency room use by patients dropped from 60 to 10%.
- Claim processing time reduced from the average of 15 to 3.5 days.
- Collection expense of the medical service providers reduced to zero.
- Savings of $30 million in Medicaid costs due to early diagnosis and treatment.
- Paper work errors are reduced to zero. So accuracy has increased.
- Denial claim fallen from 33 to 4 %.
- Postal expenses of US $60000/-saved every month.

DISCUSSION

The AEKCS serves the purpose of containing pertinent data about patients, providers and claims. This Arkansas DMS gets information and saves money (reduced costs), patients get adequate effective healthcare, providers get patients information and serve them in a better way. The satisfaction of patients reflects the success of this system.

Distributed knowledge management of multiple organization approach achieves this. The knowledge is shared by the actors, improved upon it and passed to the next actor without crossing organizational boundaries.

The DKM model merges specific knowledge with knowledge from other actors into a decision support specific for each actor in the network in recognition of actor role differences. The information acquisition is structured for use in real times. The knowledge is updated continuously. The system pushes forward relevant information knowledge to decision makers on a recurrent basis, resulting in better resource management.

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