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Organizational Memory Effects on Productivity

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I. Research Proposition

Strassman (1990) indicates that adding value to the organization or its customers improves the productivity of the organization. Value is added when the organization's performance is improved. Rubin (1994) proposes the Balanced Business Scorecard Framework, developed by Norton and Kaplan using the above definition, as a means of measuring the value of information systems (IS) to the organization. This model looks at four areas where value can be added. One of these areas is organizational learning. The organizational memory component of organizational learning is the construct of interest for this dissertation. This dissertation will examine how organizational memory (OM) is incorporated and used by a knowledge worker organization to improve its effectiveness. The proposition being investigated is:

Information Systems for knowledge workers are more likely to improve productivity if they integrate OM support functions into the organizational information system.

Additionally, there are two key assumptions:

1. Knowledge workers' productivity is improved by increasing the speed and/or quality of their decision making.

2. Speed and/or quality of knowledge worker decision making is improved by increasing knowledge worker access and use of organizational memory.

II. Significant Prior Research

A. Organizational Memory

OM is defined by Stein and Zwass (1995, p.89) as "the means by which knowledge from the past is brought to bear on present activities, thus resulting in higher or lower levels of organizational effectiveness." Walsh and Ungson (1991) define OM in its most basic sense as stored information from an organization's history that can be brought to bear on present decisions. Organizational Memory can include:

1. the record of an organization that is embodied in a set of documents and artifacts,

2. everything that is contained in an organization that is somehow retrievable, and

3. a collection of shared and stored understandings and beliefs and forms the basis for organizational sense-making and social construction of reality.

OM has two principle goals: to integrate information across organizational boundaries and to control current activities and thus avoid past mistakes. Basic functions of OM are perception, acquisition, abstraction, recording, storage, retrieval, interpretation, and transmission of organizational knowledge (Stein and Zwass 1995). Walsh and Ungson (1991) propose that organizational memory consists of five retention facilities: individuals, culture, transformations, structures, and ecology.

Stein and Zwass (1995) extend Walsh and Ungson's (1991) definition by proposing that there is an information systems component that serves to augment the interactions between knowledge seekers and human experts. They define an Organizational Memory Information System, OMIS, as a system that functions to provide a means by which knowledge from the past is brought to bear on present activities, thus resulting in increased levels of effectiveness for the organization. Four subsystems can be defined for the OMIS:

1. Document based OMISs are based on paper documents. These documents tend to be universal to the organization and can be found in central repositories.

2. Computer based OMISs are based on databases and application programs. They may be limited to a single user on a single computer or extended via networks to the entire enterprise.

3. Self memory based OMISs are based on a person's memory. They consist of whatever system one chooses to utilize to keep that memory. Typical components include the files, notebooks, recollections, and archives maintained by that person. These components may or may not have an official basis and format requirement. Also, items selected for inclusion in the memory are those items you feel important. They may or may not be the items others would think are important.

4. Others' self memory based OMISs are based on co-workers' memories. These systems are similar to a self memory system but are organized and maintained per the desires or requirements of the co-workers who own them. As with self memory, others' self memories contain what the owners of the memories feel is important.

It is expected that these are not discrete subsystems, but rather, overlapping systems with each subsystem containing elements from the others. This will be especially true for IT components of organizational memory due to process automation and reengineering replacing many documents and processes with IT substitutes. Figure 1 illustrates the relationships between the four subsytems.

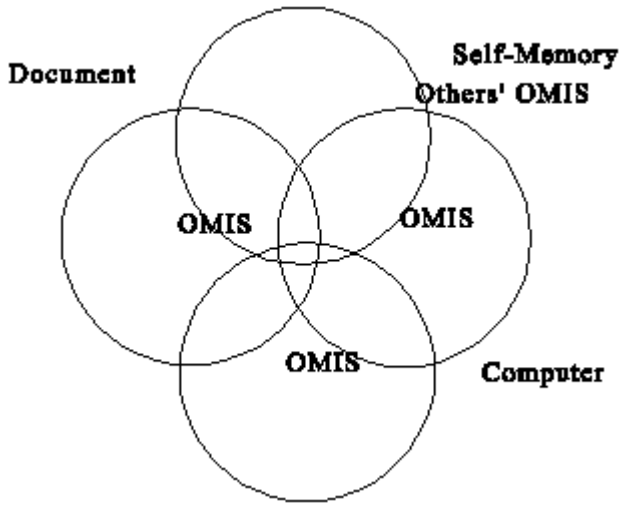

Figure 1

IT possibilities for organizational memory can be structured using an OMIS model proposed by Auramaki and Kovalainen (1995). The SHAMAN (SHAring and MANaging) model is a general model consisting of five building blocks:

1. Actors who are the users and generators of OM.

2. Actions which are the acts that utilize or create OM.

3. OM consisting of short, medium, and long term memories.

4. Learning via on the job experience.

5. Communication of issues into the OM.

Stein and Zwass (1995) propose that organizational effectiveness can be described using the competing values model proposed by Quinn and Rohrbaugh (1983). An implicit assumption of this model is that organizational effectiveness is related to OM. This model uses four of Campbell's organizational effectiveness criteria that have been found to be consistent with Parsons' effectiveness functions for systems of action. Memory has been found to be directly relevant to the four functional clusters of effectiveness of:

1. integration of the OMIS across space and time

2. adaptation of the OMIS to obtaining and disseminating the appropriate knowledge to the appropriate actor

3. goal attainment of using past performance information to manage current performance

4. pattern maintenance for maintaining the human and organizational culture memory.

Use of these models suggests that OMIS users with more computer experience and more positive computer attitudes will have better outcomes than OMIS users with less experience and poorer attitudes. Also, OMIS users will have higher precision and recall rates than those who use only their own memories and paper documents.

Sandoe and Olfman (1992) argue that the increasing transience of organizational workers will lead to a shift of the location of OM. They state that organizations will have to capture memory and store it in more concrete forms than they do today. They also suggest that an OMIS should capture not only the traditional organizational file data found in information systems, but also the context, processes, knowledge, and experiences associated with this data. Morrison and Weiser (1996) discuss systems being designed to combine these various OM component systems into a single environment. Ackerman (1994) studied organizations which had implemented Answer Garden and found one successful implementation. Answer Garden is a system that can "grow" memory when users can not get an answer from the existing memory. These findings suggest that a study of an organization's memory should include a review of the nature of the organization's work force. This will allow for a determination of what forms of memory can best serve the particular organization.

B. End User Computing

Research in the evaluation of MIS and in predicting end user system usage provides a theoretical base upon which to construct a link between organizational memory and productivity. As well, this literature provides several validated survey instruments which can be adapted to this research. Coliter and Dixon (1995) described MIS evaluation instruments based on MIS success factors or information systems attributes. Thompson, Higgins, and Howell conducted a study of workers' attitudes and behaviors with respect to optional computer usage. This work was based on Triandis' theory that perceptions on future consequences predicts future actions. The implication was that the utilization of a PC by a knowledge worker in an optional use environment would be influenced by the individual's feelings, habits, and expected consequences of using PCs; and the social norms and environment governing PC use. They developed an instrument that will be adapted to measure the relationships between social factors concerning OM use and the utilization of OM; perceived complexity of OM and the utilization of OM; perceived job fit and the utilization of OM; and perceived long-term consequences of use and the utilization of OM.

III. Research Method

The research method to be used for this dissertation is a field study of a technical support group at a nuclear generating station. It will utilize interviews, surveys, and document research as the means for data collection. It is expected that these various approaches to collecting data will provide a means of reducing threats to validity generated by analyzing a single organization in depth.

The technical support organization was selected because it is staffed almost exclusively by knowledge workers and its willingness to allow the research to be conducted. The organization consists of 65 engineers and 17 supervising engineers performing knowledge functions within the disciplines of mechanical, electrical, computer, and controls engineering. Additional staff of 16 support engineers and 7 supervising engineers provide specialized support in the areas of vibration, acoustic and thermal analyses, and code and regulation interpretation, for a total population of 105 engineers.

Semi-structured interviews will be used to collect data relating to the components of the organization's memory, the effectiveness of the OMIS, the degree to which components of the memory are temporally and spatially integrated, and how the organization measures productivity. Surveys will be used to determine the job fit and utilization of OM, factors affecting OM usage, and on the experience level of the organization's personnel. Survey data will be analyzed to distinguish between the outcomes across the three job categories of engineer, support engineer, and supervisor. Interview subjects will be purposefully selected for their knowledge level. All members of the organization will be surveyed.

IV. Expected Outcomes

It is expected that the subject organization has a mix of manual (including individual memories) and automated OMIS components. It is anticipated that the knowledge workers will consider automated OM a part of their job function and that the degree to which the OMIS is computer based will be perceived to affect their work effectiveness. It is also expected that productivity levels (as assessed by supervisors) will be related to the use of OMIS components. To the extent that these expectations are met, then conclusions can be drawn about the relationship between forms of OM and the productivity of the organization. If outcomes are not as expected, information about the forms of memory and their usage will be analyzed to determine to what extent these forms can eventually lead to increased productivity.

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