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AMCIS 1996 Proceedings

Americas Conference on Information Systems (AMCIS)

8-16-1996

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Introduction

How do organizations learn to improve their ***information quality (IQ)***? The dramatically increasing reliance on information as a critical resource in organizations raises the question of how organizations manage this resource and improve its quality. The prevailing perspective subscribes to the notion that organizations control and "safeguard" the information. The control perspective ignores the learning process that members of an organization engage in for "discovering" and "solving" problems with the information they use.

High IQ means information that is fit for use by information consumers. This involves providing the appropriate amount of relevant and timely information at an appropriate level of aggregation for the changing tasks at hand. Information users will encounter previously unknown and complex IQ problems for which solutions are not obvious. Improving IQ, therefore, demands innovative problem-finding and problem-solving knowledge beyond routine control of information.

Research Model

To achieve high IQ, organizational members use IQ-related knowledge for problem-solving. Furthermore, since IQ is a multi-dimensional construct (Wang and Strong 1996), different aspects of knowledge may produce high or low IQ along different IQ dimensions.

Information Quality

IQ is the outcome or dependent variable in this research. IQ is defined as *information that is fit for use by information consumers*. This definition, which follows from the quality literature, means that the tasks for which information is being used become relevant to assessing the quality of information.

Four aspects of IQ have been identified: Intrinsic IQ, Contextual IQ, Representational IQ, and Accessibility IQ (Wang and Strong 1996). Intrinsic IQ denotes that information has quality in its own right. Contextual IQ highlights the requirement that IQ must be considered within the context of the task at hand. Representational IQ and accessibility IQ emphasize the importance of the role of systems. Each of these IQ aspects has several underlying IQ dimensions, for a total of 16 IQ dimensions. These four different aspects of IQ may be differentially affected by different aspects of knowledge.

Information Manufacturing Systems

Production and storage of information have been conceptualized as a ***information manufacturing system***. We identify three roles within information manufacturing systems (Lee, Strong, and Wang, forthcoming): ***information producers*** (people, groups, or other sources who generate information); ***information custodians*** (people who provide and manage computing resources for storing and processing information); and ***information consumers*** (people or groups who use information). Each role is associated with a process or task: (1) information producers are associated with ***information-production processes***; (2) information custodians with ***information storage, maintenance, and security***; and (3) information consumers with ***information-utilization processes***, which may involve additional information aggregation and integration.

IQ-related Knowledge

Knowledge in an organization is a prerequisite for and a product of organizational learning (Argyris 1993; Cohen 1991; Weiss 1980). Knowledge is applied to, gained from, and accumulated through organizational experiences. IQ-related knowledge is the independent variable in this research.

Different aspects of knowledge pertinent for shaping organizational capabilities have been identified. We use the differentiation of knowledge into "what", "how", and "why" knowledge. This perspective explicitly includes aspects of knowledge that question underlying reasons and axiomatic assumptions behind the work practice in organizations. ***IQ-related "know-what" knowledge*** is defined as the accumulated understanding of the activities and procedures involved in producing, storing, and utilizing information. ***IQ-related "know-how" knowledge*** is defined as the accumulated skills for applying routine procedures to known IQ problems. ***IQ-related "know-why" knowledge*** is defined as the ability to analyze and discover previously unknown IQ problems or solutions, which is gained from experience and understanding of the objectives and cause-effect relationships underlying the activities involved in collecting, storing, and utilizing information.

These three types of knowledge apply to each of the three information manufacturing processes: information production, storage, and use. Thus, there are nine aspects of knowledge measured in this research.

Hypotheses

Improving different aspects of IQ demands different aspects of knowledge. Analyzing these different aspects of knowledge used, provides a deeper understanding about the relationships between knowledge input and IQ improvement. Specifically, we expect the different types of knowledge to be related to the different dimensions of IQ as noted in the following hypotheses.

H1: Utilizing **"know-what" knowledge** is crucial for achieving high intrinsic IQ, especially the accuracy and believability dimensions.

"Know-what" knowledge focuses on the goals and resultant activities of IQ. Utilizing "know-what" knowledge enables information consumers to distinguish what is expected from what is presented. This distinction leads to improving intrinsic IQ dimensions such as accuracy and believability.

H2: Utilizing **"know-how" knowledge** is crucial for achieving high intrinsic, accessibility and contextual IQ along routinely recognizable IQ dimensions, such as access security, timeliness and completeness.

"Know-how" knowledge denotes practiced skills for responding to routine problems. "Know-how" knowledge by itself is sufficient for recognizing and solving routine problems that information consumers face regularly. This improves well-defined IQ dimensions within all aspects of IQ. "Know-how" knowledge, however, is likely to be localized in one information manufacturing process, e.g., information storage.

H3: Utilizing **"know-why" knowledge** is crucial for achieving high contextual IQ, especially the relevancy and value-added IQ dimensions.

Because "know-why" knowledge entails discovering and analyzing underlying reasons for IQ problems, information consumer's task-specific contextual dimensions are likely to be discovered and addressed. For example, information custodians working in information storage process need to acquire "know-why" knowledge relevant to information consumers for an organization to achieve high contextual IQ.

Research Method

Our primary research method for testing our hypotheses is a field questionnaire. This field questionnaire will be supplemented with interviews and observations to provide a richer understanding of how organizations use their IQ-related knowledge to improve IQ. In this paper, we focus on the questionnaire.

The unit of analysis is an information manufacturing system. For each such system, questionnaires are filled out by information producers, information custodians, information consumers, and managers. Two employees from each of these four roles fill out questionnaires, resulting in eight questionnaires per information manufacturing system. These eight employees are serving as key informants for one of the four roles.

The first step in developing the questionnaire was to generate items for each construct, that is, questions for the nine IQ-related knowledge constructs and the sixteen IQ dimensions. For each construct, we generated 12 to 30 items, which were reviewed by experts to check the appropriateness of individual items as well as construct coverage. As a result, some items were eliminated leaving 8 to 16 items per construct. We retained fewer items for the IQ dimensions which have been empirically tested in previous research (Wang and Strong 1996) than for the knowledge constructs which are new.

These items were randomly sequenced into two physical questionnaires, the dependent variable questionnaire contains the items for measuring the IQ dimensions and the independent variable questionnaire contains the items measuring IQ-related knowledge and some organizational and individual demographics. At the pilot stage, we are using two separate questionnaires to ensure that answering a questionnaire does not take longer than 20 minutes. For the full test of our hypotheses, we expect to reduce the number of items so that there is a single questionnaire. These two questionnaires were pre-tested with information consumers.

An example question from the dependent variable questionnaire is "This information is sufficiently complete for our needs" measured on a scale from 0 (not at all) to 10 (completely). An example from the independent variable questionnaire is "I know which group collects this information" measured on a scale of 1 (very small extent) to 10 (very large extent).

Currently, we are doing a full pilot test with 15 information manufacturing systems. With 8 respondents per system, this yields 120 responses. Analysis will be done initially at the individual response level. Results of this pilot will be reported at the conference.

Conclusion

Organizational learning is increasingly prescribed as a crucial mechanism for achieving organizational effectiveness in most management areas. Improving IQ is an area in which organizational members need to engage in organizational learning by inventing, discovering, developing, and institutionalizing solutions for IQ problems. For any meaningful organizational learning to occur, however, knowledge must be used.

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