Advanced Information Systems: Impact on Organizational Reality

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I. INTRODUCTION

Assumptions regarding the nature of organizations have undergone constant change and re-evaluation since the beginning of the century. Well known early theories of organization, such as Taylor’s Scientific Management Theory, Fayol’s Administrative Theory, and Weber’s Theory of Bureaucracy, all had strong underlying assumptions about the behavioral rationality of the organization. Goal specificity and formalization were the primary forces which directed the behavior of the organization (Scott, 1987). Little consideration was given the “human” factor in organizations. People were merely “parts” of a larger machine, a machine subject to deliberate inspection and rational manipulation (Gouldner, 1959).

The assumptions of the rational organization eventually gave way to more open and interactive theories of organizations. Here organizations were seen, not primarily as self-contained, rational machines, but more as collectivities marked by both non-rational aspects of the social behavior of their members and by a more systemic relationship with the environment (Blau, 1956; Scot, 1987). The assumption of control over organizational processes, so vital to a rational perspective, was significantly compromised under the systemic, behavioral theories of organizations. Gone also was the idea of organizational information processing capabilities adequate for the “optimal” selection of overall goals, group goals, and individual goals.

Research in the cognitive processes lead to an understanding of the limitations in the ability of individuals and groups to accurately and adequately process information. These limitations include such things as; cognitive overload, limited attention, mental schemas and scripts. These along with the informal social aspects long deemed significant in organizations, maintained the assumptions of non-rational behavior that have been attributed to organizations in general since Roethlisberger and Dickson (1939).
Today, with the proliferation of increasingly advanced information technologies in organizations, a significant challenge can be made to the traditional assumptions regarding the non-rationality of organizational behavior. It is the purpose of this paper to consider the effects of advanced information technologies on the spatial, structural, social, and informational processes of the organization and to suggest how this could, in fact, signal a return to the “rational” organization. This paper will consider the issue of organizational rationality in a normative manner with several propositions offered.

II. ORGANIZATIONAL RATIONALITY

Though organizational rationality has often been defined in terms somewhat different from that of the classical definition of rationality, it is necessary to first consider the classical definition before we can discuss the more restricted assumptions that underlies organization-specific rationality. Harold Brown (1988), in describing the classical model of rationality, identified the following components: (1) Universality: All rational thought will consistently lead to the same conclusion for each specific situation given the same information set. (2) Necessity: The rationally derived conclusion must follow with necessity from the information given. (3) Rules: The rationality of a conclusion is determined by whether it conforms to the appropriate set of decision rules. (4) Algorithms: Decision rules which, when applied to a problem, provide a solution in a series of steps. (5) Induction: Means versus the ends. (6) Justification: The rational justification of the means. (7) Value: Rational processes have value due to the reliability of the results.

Organizational rationality has been stated by organizational theorists to be based on information, efficiency optimization, implementation and design (Scott, 1987). This in turn can be reduced to two primary components: that of goal specificity - providing the criteria by which goals are developed and supported (Simon, 1957); and that of formalization - the design of organizational structures and work flows to facilitate the achievement of the organization’s goals (Scott, 1987).

Current open systems approach considers the significant political aspects found in most organizations. Individual and organizational level interactions allow and even foster a considerable role for power, bargaining, negotiation, and compromise with the organization (Dow, 1988; Lachman, 1989; Levitt and Nass, 1989). It is the interaction of individuals and groups, each with limited cognitive capabilities, competing goals, and varying levels of informal power that provides the foundation of organizational non-rationality. It is the potential of advance information systems to alter, in a meaningful way, this foundation of non-rationality and, in fact, promote a return to an organization more rational in its processes and behavior.
III. ADVANCED INFORMATION SYSTEMS

Advanced information systems are noted for their ability to store, process, manipulate, and accurately communicate vast amounts of data (Culnar and Markus, 1987; Hoplin, 1994; Horn, 1999). New structural forms are emerging as the physical presence of an organization’s members is no longer mandatory (Applegate, Cash, and Mills, 1988; Hardin, 1998). Electronic messaging, bulletin boards, fax, decision, expert, group and cooperative work systems, and computer networking allow rapid, yet spatially distant transference of information and interaction of the organization’s members. It is these characteristics of advanced information systems that can reduce, or moderate, the forces that have supported the assumptions of organizational non-rationality and that lead to an organization that can be both more effective and more rational in its internal processes. Specific propositions will be offered that provide a framework for the consideration of advanced information systems and the classical rationality model as they relate to organizational behavior and processes.

IV. PROPOSITIONS

Essential to all models of rationality is the requirement for complete, or at least sufficient, information to make an optimal decision. As different individuals and groups act on information within their organization, the information cannot be subject to constant redefinition and interpretation if utilization that can be deemed “rational” is to occur.

Finholt and Sproull (1980), indicate that typical group processes, such as interaction and influence, have the ability to distort and reshape information as it is utilized within the organization. Advanced information systems allow the asynchronous processing of information that can significantly restrict the ability of social processes to distort information within an organization (Hardin, 1998). Bounded rationality rests on the limited ability of humans to receive, store, process, and transfer information (Nisbett and Ross, 1980; Simon, 1957). Here information is utilized via mental scripts, schemas, and heuristics, rather than the more purely rational processes identified by Brown (1988), earlier in this paper.

Hofstadter (1983) indicates that all rational thinkers must arrive at the same conclusion given the same information. A failure to do so is the result of either incomplete information or varying information available to the respective parties, or because one or more of the actors do not act rationally. The ability of advanced information systems to alleviate, to a significant degree, many of the generally accepted causes of bounded rationality poses real opportunities for more rationality-
based information processing within an organization. Kenney and Wallace (1994), indicate that information technology allows firms to both generate and capture more and more data and to analyze and control that data in ways that have never before been possible. The ability of advanced information systems to greatly enlarge the scope and scale of information being processed by an organization leads to our first proposition of advanced information systems and organizational rationality: Universality and consistency of information.

1. PROPOSITION 1

Advanced information systems create a greatly expanded organizational information base and can provide for the consistency of the information being acted upon by the organization.

Decision making under rationality assumes that an optimal decision will result from the decision-making process. A common and optimal decision must, of necessity, be able to be reached from the same information regardless of the variety of perspectives from which it may have been approached. The purely classical approach would have one, and only one, optimal decision resulting from the same set of information. However, more current thinking extends the idea of an optimal decision to include that which conforms to a set of criteria within a domain-specific context (Brown, 1988; Kant, 1960). Given the same information, all individuals and groups will arrive at the same conclusion as directed by the criteria.

Locke (1984), concurs when he suggests that most of our behavior is based on experience and past history, and not on rationally developed understanding. For a process, or decision to be rational, it must have a set of criteria by which cause, and effect relationships are understood. It will be this set of criteria that will provide, with necessity, the same conclusion to be reached from the same information. Expert systems, decision support systems, and various types of management information systems assist an organization in the operation of rational processes by providing stable criteria and consistent underlying causal models, patterns, links, and organizational history (Applegate, Cash, and Mills, 1988; Horn, 1999). These processes then become the basis of the second proposition of organizational rationality: Necessity.

2. PROPOSITION 2

Advanced information systems can provide the criteria and casual linkages required for the conclusions that must of necessity be obtained from the same information.
The rationality of any conclusion, or process, is determined by whether or not it conforms to a set of rules. When we proceed from a starting point and arrive at a conclusion via a specific set of rules, we can avoid the arbitrariness that is characteristic of non-rational processes (Brown, 1989). Non-rational processes are developed from human interaction, i.e., power, influence, scripts, schemas, and limited and varying information. Rule-driven conclusions are reliable. Rules are, therefore, the link between the information and conclusions that must, of necessity, be derived from the information.

Huber (1990:50), in discussing the properties of advanced information systems and their ability to enhance the individual and organization, indicated their ability to: “…more rapidly and accurately combine and reconfigure information so as to create new information, as in the development of forecasting models or financial analysis, and to more compactly store and quickly use the judgment and decision models developed in the minds of experts, or in the minds of the decision maker or decision models.”

“What if” scenarios allow the organization to consider alternative courses of action via an established set of “rules” existing in the various MIS, DSS, GDSS, and expert systems, and to arrive at a conclusion that will be rule driven. This leads us to the third proposition of organizational rationality: Rules.

3. PROPOSITION 3

Rule driven advanced information systems can lead to the necessity of a directed conclusion being derived from an information set.

To extend the role of rules and how they lead to rational, directed conclusions or results, we must look at the types of rules that are necessary for the requirements of rationality. Brown (1988) indicates that rules must, in a finite number of steps, lead to the conclusion. That these types of steps, which we call algorithms, are found in most computer programs is well known (Applegate, Cash, and Mills, 1988; Horn, 1999).

Expert and decision support systems are frequently set up to give the user information in a series of steps. At the conclusion of this process, all users, individual or group, will have been led to a similar conclusion based on the information and rule or algorithm applied to it. Conclusions arrived at via a human interaction model may seldom have consensus. For, in this case, the decision making “rule” will often have been applied in a haphazard and interpretive manner subject to considerable variability, resulting in non-rationality-based processes (Scott, 1987). It is the use of...
algorithms and the finite set of steps involved with information processes that helps advanced information systems fulfill the fourth proposition of rationality: Algorithms.

4. PROPOSITION 4

Advanced information systems can operate according to algorithms that will lead all users, in a series of steps, to an identical conclusion or result, based on the same information.

An issue that frequently emerges when a discussion of rationality is undertaken is the process of induction versus deduction. Can rational processes lead to irrational consequences and still leave the organization a “rational” one? It is the position of classical rationality theorists that inductive processes are sufficient to meet the requirements of rationality because the “ends” of a process are a separate issue from the “means” (Goodman, 1965; Hume, 1975). In other words, while the premises by which the organization, group or individual base a decision may be deemed rational, resulting consequences can still prove to be less than optimal. Brown (1988) indicates that this issue is resolved by the use of a “rule” of simplicity. When it is impossible to predetermine a proper “end”, it is rational to utilize the simplest means to the expected end. If an “end” is understood to have several means to it, it is again rational to utilize the simplest means.

Organizations that utilize rational information processes, as defined in this paper, and develop rules that can be non-ambiguously applied in all relevant situations, may be deemed rational though the ultimate consequence may prove to be unexpected or even sub-optimal. This fulfills the fifth proposition of rationality: Induction.

5. PROPOSITION 5

With the utilization of rules, parameters, and constraints, advanced information systems allow the organization to fulfill the requirements of inductive rationality. Karl Popper (1968), indicated that the means by which a concept or theory is developed is not the issue when discussing rationality. Rather, it is the means by which it is justified. Ideas may be generated intuitively, or by any other non-rational process. The organization may decide to go ahead with this new idea and yet not violate organizational rationality, though a “rational” process did not create the idea originally, if the idea or concept undergoes a rational justification process (Rudner, 1966). A rational justification process is considered to be a process which is driven by a set of rules, or algorithms, by which an idea or concept may be analyzed, evaluated and thereby justified. The result of this justification process can be that outcomes that are predetermined and optimized.
Expert systems, decision support systems, as well as the great variety of MIS will have rules or algorithms embodied within their operating programs by which such rational analysis may be undertaken and outcomes predetermined, evaluated, and justified (Hardin, 1998). Further, comparisons to standards, productivity measures, ROI, etc., are all additional examples of “rules” that can allow for rational justifications as required by the sixth proposition of rationality: Justification.

6. PROPOSITION 6

Advanced information systems can aid in the rational analysis and justification of new ideas, concepts, and/or behaviors proposed for the organization.

The final component derived by classical rationality theorists that needs to be considered when looking at advanced information systems and organizational rationality is that of value. Is there value to be gained from functioning as a more rational organization and what is that value? That value results from the reliability of organizational results that occur when rational processes are in operation. Value occurs when organizations can arrive at non-arbitrary conclusions to their questions and provide consistent direction for member behavior. Rational processes provide value by providing criteria necessary to support or reject organizational endeavors in a consistent and non-arbitrary manner. Potentially dysfunctional issues of power, influence, authority, and interpersonal relationships can be moderated by rationality-based information and decision-making processes. Of all the propositions that have been developed as pertaining to a model of classical rationality, probably none receive wider current consensus than that of the seventh proposition: Value.

7. PROPOSITION 7

Advanced information systems can create value for the organization and its members.

V. IMPLICATIONS

Advanced information systems have the ability to significantly alter organizational behavior from being that of politically driven and rationally bounded, to behaviors more consistent with the propositions of rationality as developed by classical rationality theorists. This is not to indicate that all organizations, or even a majority, will necessarily become rational as defined. Hoplin (1994), suggests that the ability to interface with the limitations of an organization’s human resources will continue to be of great concern to many organizations as they introduce and increase their use of advanced information systems.
On the ability of advanced information systems to affect organizations, Applegate, Cash, and Mills (1988) discuss a dozen ways that such systems can change, rationalize, and benefit organizations. These include; simultaneously capturing the benefits of small, de-centralized and large-scale, centralized operations, more flexible and dynamic structures, instantaneous information sharing, captured organizational knowledge, skills, and learning processes, better tracking and use of organizational capabilities, and decision-making by information technology-based systems. Further, Wetmacott (1999), suggests that by the year 2025 most of our experiences will be virtual with time and space having little meaning to organizational processes and membership. Labor will be further desegregated in its performance with work becoming more and more temporary and project based. Wages and price competition will become under great downward pressures as all potential customers will have access to information regarding all relevant competitors throughout the world. Finally, what is of interest to the organizational theorist is the possibility that after decades of political, human behavioral and bounded rationality models, rationality, as organizational concept, may again be of legitimate interest to the organizational theorists and researchers.

REFERENCES


