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December 2007

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BUILDING ON LEAVITT'S DIAMOND MODEL OF ORGANIZATIONS:
THE IMPACT OF INFORMATION TECHNOLOGY ON STRUCTURE, PEOPLE, AND TASKS

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Abstract

This empirical study focuses on the impact of an information technology (IT), specifically electronic mail (e-mail), on three basic organization components: structure, people, and tasks. An Organizational Interaction Diamond (OID) model is developed illustrating how each component enables changes in other components interacting with the organization's internal and external environments. The organizational setting is the administrative structure of a large, public university. The sample population consists of 390 administrators and professional and clerical support staff. Data were collected via a paper questionnaire with a 54 % return rate.

E-mail is used to bridge hierarchical boundaries at the middle and departmental levels, but not at the senior level nor across functional boundaries. E-mail usage enables spanning geographical distances and to coordinate people from dispersed organization units. These new network paths co-exist within the traditional hierarchical structure. Senior level administrators reported using e-mail more often per day than lower level administrators, and used it more for horizontal than for vertical communication. E-mail usage increases for uncertain, simple and routine tasks and decreases for ambiguous, complex and non-routine tasks. The interaction among IT use, job categories, and tasks reveals that the media channel selection varies by job category and task types. The perceived importance of using e-mail is highly associated with the frequency of use of e-mail to provide access to various job categories at different organization levels and for different task types. The importance of this research study and the development of the OID model are to demonstrate that IT efforts are opportunities to capitalize on creating new ways of working by redesigning the tasks, changing the roles of individuals, and spanning organizational boundaries.

Keywords: Information Technology; Organizational Interaction Diamond Model; Organizational Structure, Tasks, People; E-mail;

Role of information technology in organizations

Numerous information technologies (IT) (such as group support systems, custom Intranets, workflow systems, ERP systems) play a central role in today's organizations. Their combined use may be seen as analogous to the body's central nervous system. Collectively they enable numerous desirable tasks such as retrieving, linking, tracking, data entering and providing feedback (e.g., user/customer responses). E-mail is one of those IT used widely in both private and public sector organizations. E-mail purportedly increases organizational effectiveness and efficiency, facilitates greater communication among organization members, creates new forms of organization structure, alters the roles of individuals, provides new means to accomplish tasks, and is a critical messaging infrastructure for organizations. Increased IT usage and its impact on organization factors has become a key management issue. IT must be adapted to fit with the organization components of

structure, people, tasks, management processes, strategies, and technology (Benjamin & Scott Morton, 1992; Malone, 2004). If an organization is to reap the full benefits of IT investments, it must design and adjust its structure, tasks, people, culture, and management processes to achieve the desired results from the technology.

The diverse research on e-mail has produced conflicting results making it difficult to paint a coherent picture of the role of an IT, here specifically e-mail, in modern organizations. Since e-mail is used in an organizational context, various organizational factors such as structure, roles of individuals, and tasks have been studied and are believed to influence and be influenced by this IT (Benjamin & Scott Morton, 1992; Keen, 1991; Kiechel, 1993; Malone & Rockart, 1991; Mehlich, 2002; Picot et al, 2003; Rice & Case, 1983; Rice & Shook, 1990; Schmitz & Fulk, 1991; Sproull & Kiesler, 1991; Steinfield, 1985). These studies and others follow multiple paradigms and theoretical approaches to explain the relationship between IT and various organization factors. There is no one best theory to guide the research in this area.

Conceptual and research background

Two sets of theories directed this research: organization and information processing. A multifaceted approach is required to gain an understanding of the relationships among information, organization structure, individuals, tasks, technology and strategies. The first set of theories, organization theories, dissects organizations into their basic building blocks and provides a solid foundation on which to pursue the study of how to organize. The second set focuses on the role of information and information processing as well as the attributes of the media, media richness, social presence, and social influence.

Early empirical research on the relationship between IT and organization structure reveals divergent results that range from creating a more centralized structure (Leavitt & Whisler, 1958), to a more decentralized structure (Anshen, 1960; Burlingame, 1961), to having no impact at all on organization structure (Robey, 1981), or reinforcing the existing structure (Ciborra, 1993; Robey, 1977). Later studies found that greater access to individuals across hierarchical, functional, and geographical boundaries enabled by IT engenders the formation of new communication paths that may be reflected in new organization forms (Baker, 1992; Barley, 1986; Child, 1972; Drucker, 1993; Keen, 1991; Malone, 2004; Picot et al., 2003). Changes in structural forms may occur as a result of new social interactions and new means to accomplish tasks enabled by IT. Whether new communication paths and new ways of working are created depends upon how the components of structure, roles of people, and tasks are designed to tap the potential offered by IT.

Empirical research on the impact of e-mail on roles of individuals at different organizational levels also reflects a diverse range of results. Some research examines the type of tasks and media attributes to determine whether individuals at different organization levels will use e-mail differently. Upper-level managerial job categories are concerned more with reducing equivocality (Barley, 1990; Daft & Lengel, 1984; Daft & Weick, 1984; Hannaway, 1985; Mintzberg, 1973; Picot et al., 2003), and will select media with higher levels of information richness and social presence, (e.g., face-to-face meetings or telephone). Lower level positions are concerned more with routine operational and technical tasks and reducing uncertainty (Steinfield, 1983), and will select less rich media. Rice and Shook (1990) found in a review of 40 studies that usage of different media was significantly different for managers from other job categories, and that media usage was correlated highly with organizational level.

Media richness (Daft et al., 1987), social presence (Short et al., 1976) and social influence (Fulk et al., 1990; Schmitz & Fulk, 1991) move the focus of the research to the attributes of media (e.g., to facilitate feedback, communicate multiple cues, to convey nuances, subtleties, and to convey physical presence and non-verbal and social cues of the participants). This line of research indicates that users at different levels of the organization assess the media to fit the task and his/her communication style within the constraints of the organization. In this scenario the users know what to communicate to whom at which organizational level and through which media channel.

Empirical research on the relationship between tasks and an IT focuses either on task characteristics, (e.g., task complexity, uncertainty, ambiguity, programmability, predictability, repetitiveness, variety, routineness, and analyzability) or it emphasizes the attributes of the technology (i.e., the degree of social presence conveyed by the medium, its asynchronous, textual, and permanent nature, as well as the speed for feedback). The types of tasks, such as programmed and non-programmed tasks, have been used to distinguish between different types of organization structures (i.e., hierarchical or flexible), and can vary by organization level (March & Simon, 1958; Picot et al, 2003). Similarly task and cognitive complexity can vary by organization level and managerial roles and determine the number of levels within a hierarchy (Jaques, 1990). Some of the early research on the uses of IT (Hiltz & Turoff, 1978; Markus, 1988; Rice & Case, 1983; Rice & Shook, 1990; Steinfield, 1985) found that usage is affected by task characteristics, personality traits, organizational status, attributes of the media, and media styles. The importance of the research based on task characteristics and media selection is the recognition that organizations contain a mix of information processing requirements, various task characteristics, and a variety of media channels to meet these needs. The key to the puzzle is to find the right and best fit between the medium, the user, and the task.

Research model

A multi disciplinary theoretical framework suggests the model developed for this study, the Organizational Interaction Diamond (OID) model (see Figure 1), which is based upon the works of Chandler (1962), Leavitt and Bahrami (1988), and the MIT90's project, Samuel & Scott Morton (1989). The underlying theme of these historical paradigms is to describe how an organization redesigns itself by focusing on management processes, structure, strategies, people, and tasks, to meet the demands of such external forces as technology and changing markets. The OID model depicts the relationships among the four basic organization components, as well as the interaction of these components with organizational factors and external forces. The contribution and added value of this model is the interactivity depicted by the flow of information (enabled by an IT) among the basic components as well as the impact of strategy, goals, mission and culture. The goal of the model is to demonstrate that to reap the full benefits of an IT rests upon a detailed understanding of the interactions among these components of the organization.
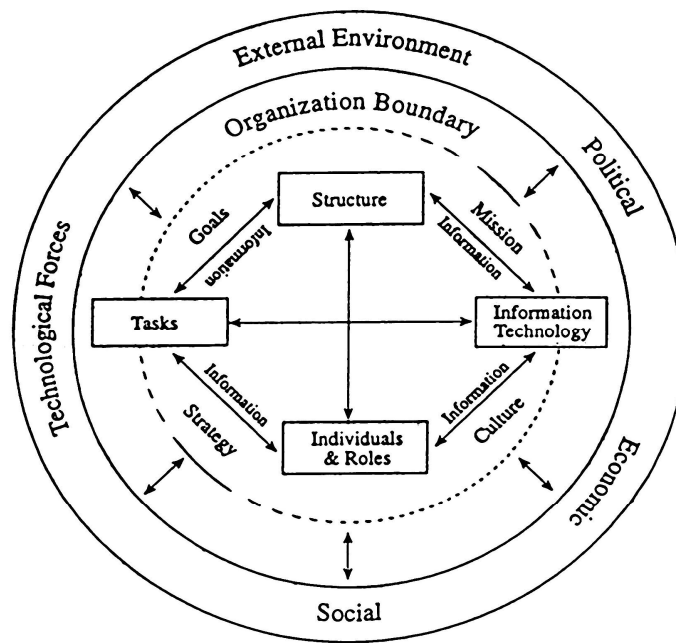

Figure 1. The organizational interaction diamond model

Research hypotheses

Based on the research and literature review, the essential variables were identified and constituted the basis upon which hypotheses were derived. Since the model depicts the interrelationships between the technology, the task to be accomplished, the role of the individual, the structure of the organization as well as organizational and multiple external environmental factors, three sets of hypotheses are designed to examine these relationships to ascertain if the use of an IT impacts these organizational components as based on the research (Drucker, 1993; Keen, 1991; Orlikowski, 1992; Picot et al., 2003; Sproull & Kiesler, 1993). The first set of hypotheses is designed to examine if employees will use an IT, e.g., e-mail, to span or bypass traditional, hierarchical boundaries. The organization was divided into three levels of management: Senior, middle and departmental. Within each management level, there were three levels of employees: Administrative, professional support, and clerical. The relationship between structure and the IT is measured by the frequency of e-mail use to access various groups of individuals at different levels of the organization, as well as the perceived importance of using e-mail to access these same people. The frequency of use of this IT to access different categories of employees at different levels of the organization depicts the actual use of e-mail for communication. The measure of perceived importance examines whether it is possible to span formal organizational boundaries.

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The first set of hypotheses examines the frequency of use of e-mail:

1a. E-mail will be used more frequently <u>to *access*</u> administrators within and at different organization levels than to access professional and clerical staff.

1b. *Perceived importance* of using e-mail to access different job categories at different organizational levels and in different functional areas is greater than the reported use of e-mail to access these same groups at the same levels and functional areas.

The second set of hypotheses focuses on the relationship between the IT and the roles of the individuals in different categories at different organizational levels. The research on the relationship among managerial roles, organization levels, and the use of an IT is varied (Bikson & Eveland, 1990; 1989; Rice & Shook, 1990). Research on media selection by different individuals at various levels of the organization revealed upper level managers will rely heavily on face-to-face and telephone communication to reduce equivocality and to carry out their various roles, interpersonal, informational, and decisional roles. Lower level managers may use less rich media to carry out their roles and to reduce uncertainty. This set of hypotheses examines the relationship among the frequency of use of e-mail, job categories, organization level, and the direction of the communication, horizontal or vertical.

2a. Senior level administrators will report using e-mail more frequently than middle and lower level administrators.

2b. Senior level administrators will report using e-mail more frequently for horizontal communication than for vertical communication.

Finally, tasks comprise the third major component of the model. The relationship between e-mail and tasks is depicted in this third set of hypotheses. Many studies have examined the matches between type of task and media choice, (i.e., the perceived appropriateness of a medium to accomplish a particular task (Daft & Lengel, 1984, 1986; Daft et al., 1987; Picot et al., 2003; Rice et al., 1990; Rice & Shook, 1990; Steinfield, 1986). Some findings suggest that e-mail can be used for complex communication tasks and that e-mail is used for inconsequential and important communication (Lea, 1991; Rice et al., 1990; Rice & Shook, 1990), while others indicate e-mail is inappropriate for confidential and complex tasks (Daft et al., 1987). This set of hypotheses explores the relationship among task characteristics, types of tasks, and the frequency of e-mail use.

3a. The use of electronic mail increases as the ambiguity, complexity, and non-routineness of the task decreases.

3b. The frequency of use of e-mail for specific tasks will be positively associated with the perceived importance of e-mail for each task.

3c. When selections are made among different media for the same types of tasks, the frequency of use of e-mail will be higher for uncertain, simple, routine, broadcasting and coordination tasks than for ambiguous, complex, and non-routine tasks.

3d. The length of time an individual has used e-mail within the organization is associated highly with the types of tasks for which it is used.

Exploring the frequency of use of e-mail for different types and characteristics of tasks depicts the relationship between the IT and task component of the model. Finally, the model recognizes that these basic components do not exist in a vacuum and are constantly impacted by environmental factors that might influence the relationship among these components.

Methods

The setting is a large, metropolitan, public sector, higher education organization with a student population exceeding 43,000 and employing approximately 4,600 full time employees. This university setting was selected because an established e-mail system with over 10,000 users, thus constituting a critical mass of e-mail users. Institutions of higher education are important to research because they are information intensive, if not information-based, organizations, with relatively rigid, hierarchical structures, traditional roles and tasks, and offer an excellent opportunity to study the impact of IT use upon the organization. A mail survey was selected to collect the data because it was cost effective and the appropriate medium for a complex questionnaire. The guidelines suggested by Dillman (1978, 1991) in the development, design and testing of the questionnaire were followed. The questionnaire was designed in part by using factor analyses to develop scales. Survey data were analyzed using multiple regression and correlations (MRC) analysis techniques (Pedhauzer & Schmelkin, 1991). The questionnaire was pre-tested with three groups: researchers, people with substantive knowledge of the survey topic, and end users. In terms of reliability of the questionnaire items, on average all items were well above the recommended .70 reliability coefficient (Cronbach's alpha). The first mailing of the questionnaires yielded a 51% return rate and a follow-up questionnaire yielded an additional 3% for a total return rate of 54 %.

Research design

A modified, stratified design was used to derive the sample population. The administration of this organization consisted of six functional areas: President's Office, Academic Affairs, Administrative Services, Research and Creative Activities, Student Affairs, and University Relations. Each of these functional areas was divided into three levels of administration: Senior (i.e., the offices of the president, provost, and four vice presidents), middle (i.e., college deans and directors of independent units), and the departmental level (i.e., academic departments reporting to a dean, and non-academic departments reporting to a director). Each of these administrative levels within each of the functional areas was divided into three types of positions: line administrators (e.g., president, provost, vice presidents, deans, and directors), managerial and professional support staff (e.g., assistant vice presidents, assistant deans, and other managerial assistants), and clerical staff. This modified, stratified sampling approach was preferred to a completely random approach of the entire population so as to ensure that the sample population reflected the different functional areas, administrative levels, and primary role categories. The sample population was N=390.

Results

Respondens' profile: The average respondent was between 40-49 years of age, worked in the organization an average of 11.4 years, worked in his/her current organization unit for 8.2 years, and in the current position for 4.8 years, was more likely to be female (62.2 %) than male (37.8 %), unless the respondent was an administrator in which case there were 68.4 % males and 31.6 % females. The professional and clerical support staff groups were predominantly female. As with any hierarchical structure, there were fewer people in the administrative category (27.6 %) than in the professional and clerical support categories (45.7 and 26.7 %, respectively). Similarly, there were fewer respondents working at the senior level (16.7 %) than at the middle or departmental levels of the organization (40.5 and 42.9 %, respectively). The organization was divided into six functional areas, with 63 % of the respondents from the largest area, Academic Affairs.

E-mail usage profile: 98.6 % of the respondents had access to e-mail and 58.5 % reported using e-mail several times each day and sent an average 14.26 messages daily, and used e-mail for 15.93 % of their total daily tasks. Over 89 % reported that e-mail helped them to do their jobs better. The average number of years for using e-mail was 5.8 years, and 5.6 years within the organization. Ease of use of the e-mail system was reported by 73.4 %.

Respondents rated how often they used e-mail to access specific job categories, located at different organization levels, in the <u>same</u> and in <u>different</u> functional areas. Each respondent also rated the importance of e-mail to access each job category. The key results of this set of hypotheses are presented below. All hypotheses found positive support.

*Access variables***:**

1a. E-mail is used more frequently to access administrators at the departmental and middle levels, but not at the senior level, and to access professionals and clerical staff at the senior level. E-mail is used more frequently within a functional area than across functional boundaries. These findings are supported by the descriptive statistics and a correlation analysis among the access variables at different organization levels both in the same and different functional areas.

Importance of using e-mail:

1b. The descriptive statistics for the importance of using e-mail to access different job categories across hierarchical and functional boundaries suggest that the respondents valued e-mail more for access to certain groups of individuals within their same functional area than its importance for access in different functional areas. An analysis of variance compared the means within and across organizational levels, between same and different functional areas, and were found to be significant at the .001 level. A comparison of the descriptive statistics between use to access and importance of e-mail reveals that the perception of the importance of the technology was higher than the use of the medium to access these job categories. The usage of e-mail to access specific groups of individuals at different organizational and functional levels is not creating new formal communication networks or altering the existing organization structure.

While the first set of hypotheses examined whether or not new paths were being created in the organization forest by providing greater access to people, the second set of hypotheses explores the relationships among the frequency of use of e-mail, job categories, and directionality of communication (i.e., horizontal or vertical). The key results are:

2a. Senior-level administrators report using e-mail more frequently than middle or departmental administrators.

2b. Administrators at all levels prefer to use e-mail to communicate horizontally rather than vertically. However, when the data are examined for vertical communication alone, then senior level administrators will use e-mail more frequently for vertical communication than either middle or departmental administrators.

The third set of hypotheses examines the relationship between tasks characteristics (i.e., ambiguity, uncertainty, complexity, simplicity, and routineness), types of tasks (e.g., information gathering, distribution, coordination, negotiation, and document preparation), and the frequency of e-mail use for tasks. Media selection, perceived importance of e-mail for specific types of tasks, and length of time of use of e-mail are examined also. For all of these variables descriptive statistics and correlations including levels of significance were computed. The key results of the variables used in these hypotheses are as follow:

> *3a. Tasks characteristics***:** As the ambiguity, complexity and non-routineness of a task increases the frequency of use of electronic mail decreases. An analysis of variance procedure yielded significant differences between the different types of tasks
>
> *3b. Importance of e-mail:* The frequency of e-mail use is associated positively with the perceived importance of e-mail for each task . Bivariate correlations between the frequency of use of electronic mail between uncertain, simple, and routine tasks and the perceived importance of electronic mail for each task were strong (i.e., ranging from .70 to .83, significant at the .001 level. The bivariate correlations between frequency of e-mail use for ambiguous, complex, and non-routine tasks and the importance of e-mail for each task were also strong and ranged from .67 to .87.
>
> *3c. Media selection***:** E-mail is selected more frequently for uncertain, simple, and routine tasks than for ambiguous, complex or non-routine tasks (3.c.), and e-mail is preferred for broadcasting tasks, but not for coordination tasks.
>
> *3d. Length of time:* Only a weak association exists between the length of time someone uses e-mail and the type of task for which it is used.

Conclusions

This study explored the use of an IT, specifically e-mail, from a management and organizational perspective, and focused on the basic organization components of structure, people, and tasks. This research demonstrates that the widespread use of this IT has not drastically altered the organization structure. Ciborra (1993) explains this apparent lack of structural change by the co-existence of primarily unnoticed and informal modes of communication with more traditional, hierarchical routines. Similarly, Malone (2004) grapples with the "loosening of the hierarchy" (pp. 41 ff.), the struggle between centralization and decentralization as well as that "communication costs can play a pivotal role in determining how decision-making power is distributed in organizations (p. 187). While some new communication paths are being carved in the organization forest, e-mail appears to be reinforcing the existing hierarchical structure.

The use of e-mail to access varying job categories at different organization levels demonstrates how e-mail is being used to span hierarchical and geographical, but not functional barriers. Hierarchical barriers are being bridged at the middle and departmental levels, but not at the senior level. E-mail usage to access people increases to span geographical distances and to coordinate people from dispersed organization units. At the senior level, the access via e-mail is greater for professional and clerical staff than for administrators. At the middle and departmental levels it is used more to access administrators than professional and clerical support staff. The lower use of e-mail to access senior level administrators reflects constraints imposed by the existing structural design, reporting relationships, control and coordination systems that may inhibit communication flow. The perceived importance of using e-mail to access different job categories at different organization levels is highly associated with the actual usage of it, indicating users understand the importance of this medium to achieve access to specific job categories when needed. Schmitz and Fulk (1991) found that perceived e-mail richness predicted individuals' e-mail assessment and usage. Users' perceived importance of e-mail to access specific job categories may be linked to their assessment of the medium's richness to access them. Only rich media which can convey more social presence may be deemed appropriate for senior administrators, while less rich media can be used with lower level administrators, professional and clerical support staff. While users may be aware of the impact of media attributes, social influence, and organization constraints on the use of e-mail, users also are aware that e-mail provides them with a potential tool to span hierarchical boundaries when necessary. This may explain why the perceived importance of e-mail is greater than the actual usage to access different job categories.

The frequency of use of e-mail varies across organization levels, but not across job categories. Senior level administrators report using e-mail more often on a daily basis than lower level administrators and use it more for horizontal than for vertical communication. Middle and lower level administrators also report using e-mail more for horizontal than vertical communication. While electronic communication may enable the flow of vertical communication, it is not being used to increase the flow of information from lower to higher levels.

Several studies support this higher frequency of use of e-mail by upper level administrators (Daft et al., 1987; Lea, 1991; Markus, 1988; Picot et al., 2003; Rice & Shook, 1990; Rice et al., 1990; Steinfield & Fulk, 1986). Senior level administrators have a higher level of overall communication than lower level administrators and use e-mail not as a substitute

for face-to-face and the telephone, but as a booster to these traditional media (Bikson & Eveland, 1990), and may use it to overcome geographical and coordination constraints more efficiently.

The usage of e-mail increases as the uncertainty, simplicity, and routineness of the task increases, suggesting respondents can match the type of task with the appropriate medium depending upon the amount of social presence required (Short et al., 1976), and the amount of uncertainty and equivocality embedded in the task (Daft et al., 1987). The high degree of association between perceived importance of e-mail and the usage of the medium for specific tasks suggests the user is selective in the use of the medium, and can match e-mail with appropriate tasks. This study found weak but significant associations between the length of time a respondent used e-mail and such tasks as negotiation, conflict resolution, and making a decision in a crisis situation, and suggests that a prolonged interaction with e-mail may increase the range of tasks for which the medium is used (Bikson & Eveland,1990).

Consequently, changes in structural forms may occur as a result of new social interactions and new means to accomplish tasks enabled by IT. The importance of this research study and the development of the OID model is to demonstrate that IT efforts are opportunities to capitalize on creating new ways of working by redesigning the tasks, changing the roles of individuals, spanning organizational boundaries, creating new communication paths and social interactions, and focusing on the interactivity of these basic components. The key lessons learned about the role of IT and the impact of IT on new tasks and people are also supported in a recent study conducted across 61 industries (McAfee & Brynjolfsson, 2007).

REFERENCES

Anshen, M. "The manager and the black box". Harvard Business Review (38), 1960, pp. 41-48.

Benjamin, R., & Scott Morton, M. "Reflections on effective application of information technology in organizations from the perspectives of the management in the 90's program". In F. H. Vogt (ed.), Personal Computers and Intelligent Systems, Information Processing. Amsterdam: Elsevier Science, 1992, pp. 131-142. .

Barley, S. "Technology as an occasion for structuring: Evidence from observation of CT scanners and the social order of radiology departments". Administrative Science Quarterly (31), 1986, pp. 78-108.

Barley, S. "The alignment of technology and structure through roles and networks". Administrative Science Quarterly, (35), 1990, pp. 61-103.

Bikson, T. K., & Eveland, J. D. "The interplay of work group structures and computer support". In J. Galegher, R. Kraut, & C. Egido (Eds.), Intellectual Teamwork: Social and Technological Foundations of Cooperative Work. Hillsdale, NJ: Lawrence Erlbaum, 1990, pp. 245-289.

Burlingame, J. F. "Information technology and decentralization". Harvard Business Review, (38), 1961, pp. 121-126.

Chandler, A. D. Strategy and structure: Chapters in the history of the American industrial enterprise. Cambridge, Massachusetts: MIT Press, 1962.

Child, J. "Organization structure, environment and performance: The role of strategic choice". Sociology, (6), 1972, pp. 1-22.

Ciborra, C. Teams, Markets and Systems: Business Innovation and Information Technology. Cambridge, UK: Cambridge University Press, 1993.

Daft, R. L. & Lengel, R. H. "Information richness: A new approach to managerial behavior and organization design". Research in Organizational Behavior (6), 1984, pp. 191-233.

Daft, R. & Lengel, R. (1986). "Organizational information requirements, media richness, and structural design". Management Science (32), 1986, pp. 554-571.

Daft, R., Lengel, R., & Trevino, L. "Message equivocality, media selection, and manager performance: Implications for information systems." MIS Quarterly, (11), 1987, pp. 355-366.

Daft, R. L., & Weick, K. "Toward a model of organizations as interpretation systems". Academy of Management Review, (9:2), 1984, pp. 284-295.

Dillman, D. A. Mail and Telephone Surveys: The Total Design Method. New York: John Wiley & Sons, 1978.

Dillman, D. The design and administration of mail surveys. Annual Review of Sociology (17), 1991, pp. 225-249.

Drucker, P. F. Post-capitalist society. New York: Harper Business, 1993.

Fulk, J., Schmitz, J. A., & Steinfield, C. W. (1990). "A social influence model of technology use". In J. Fulk & C Steinfield (Eds.), Organizations and communication technology. Newbury Park, CA: Sage, 1990, pp. 117-140.

Hannaway, J. "Managerial behavior, uncertainty and hierarchy: a prelude to synthesis". Human Relations (38:11), 1985, pp. 85-100.

Hiltz, S. R. & Turoff, M. Network nation: Human communication via computer. Menlo Park, CA: Addison-Wesley, 1978.

Jaques, E. "In praise of hierarchy". Harvard Business Review, (Jan-Feb), 1990, pp. 127-133.

Keen, P. G. W. Shaping the future. Boston: Harvard Business School Press, 1991.

Kiechel, W. "How we will work in the year 2,000: Six trends that are changing companies and careers—now". Fortune, (1993, May 17). pp. 37-52.

Lea, M. "Rationalist assumptions in cross-media comparisons of computer mediated communication. Behavior and Information Technology (10), 1991, pp. 153-172.

Leavitt, H. J., & Bahrami, H. Managerial psychology: Managing behavior in organization (5th Ed.). Chicago: University of Chicago Press, 1988.

Leavitt, H. J. & Whisler, T. L. "Management in the 1980's". Harvard Business Review (36) 1958, pp. 41-48.

McAfee, A. & Brynjolfsson, E. "Dog Eat Dog." The Wall Street Journal. Saturday/Sunday, April 28, 2007, pp. R10.

Malone, T. W. The Future of Work. Boston, MA: Harvard Business School Press, 2004.

Malone, T. W., & Rockart, J. F. "Computers, networks, and the corporation". Scientific American, (265:3), 1991, pp. 128-137.

March, J. G., & Simon, H. A. Organizations. New York: Wiley, 1958.

March, J. G., & Sproull, L. S. "Technology, management, and competitive advantage". In P. S. Goodman & L. S. Sproull and Associates (Eds.), Technology in Organizations. San Francisco: Jossey-Bass,1990, pp. 144-173.

Markus, M. L. "Information richness theory, managers, and electronic mail". Paper presented at the annual meeting of the Academy of Management, Anaheim, CA, 1988.

Mehlich, H. Electronic Government. Wiesbaden, Germany: Gabler, 2002.

Mintzberg, H. The nature of managerial work. New York: Harper & Row, 1973.

Orlikowski, W. J. "The duality of technology: Rethinking the concept of technology in organizations". Organization Science, (3:3), 1992, pp. 398-427.

Pedhauzer, E., & Schmelkin, L. Measurement, Design and Analysis. Hillsdale, NJ: Lawrence Erlbaum Associates, 1991.

Picot, A., Reichwald, R. & Wigand, R. T. Die grenzenlose Unternehmung: Information, Organisation und Management (Fifth Edition). Wiesbaden, Germany: Gabler, 2003.

Rice, R. E. & Case, D. "Electronic messaging systems in the university: A description of use and utility". Journal of Communication, (33:1), 1983, pp. 131-52.

Rice, R. E., Grant, A. E., Schmitz, J, & Torobin, J.   "Individual and network influences on the adoption and perceived outcomes of electronic messaging". Social Networks, (12) 1990, pp. 27-55.

Rice, R. E. & Shook, D. E.   "Access to usage of, and outcomes from electronic messaging." ACM Transactions on Office Information Systems, (6: 3), 1988, pp. 255-76.

Rice, R. E. & Shook, D. E.   "Relationships of job categories and organizational levels to use of communication channels, including electronic mail: A meta-analysis and extension". Journal of Management Studies, (27:2), 1990, pp. 195-229.

Robey, D. "Computers and management structure: Some empirical findings re-examined." Human Relations, (30), 1977, pp. 963-976.

Robey, D.   "Computer information systems and organization structure". Communications of the ACM, (24:10), 1981, pp. 679-687.

Samuel, R. A., & Scott Morton, M. S. "Information technology and major organizational change: Results from the management in the 1990s program". MIT Management, 1989, pp. 2-9.

Schmitz, J. A., & Fulk, J.   "Organizational colleagues, information richness, and electronic mail: A test of the social influence model of technology use". Communication Research, (18), 1991, pp. 487-523.

Scott Morton, M. S. (Ed.).   The corporation of the 1990s: Information technology and organizational transformation. New York: Oxford University Press, 1991.

Short, J., Williams, E., & Christie, B.   The social psychology of telecommunications. London: Wiley, 1976.

Sproull, L. & Kiesler, S. Making connections: Computers can enhance employee commitment--at a cost. Employment Relations Today, Spring, 1991, pp. 53-70.

Sproull, L. & Kiesler, S.   Connections: New ways of working in the networked organization (3rd ed.). Cambridge, MA: MIT Press, 1993.

Steinfield, C. W.   Communicating via electronic mail: Patterns and predictors of use in organizations. Unpublished doctoral dissertation, University of Southern California, Los Angeles. 1983.

Steinfield, C. W.   Dimensions of electronic mail use in organizations. In J. Pearce & R. Robinson (Eds.), Proceedings of the annual meeting of the Academy of Management. Mississippi State University, MS: Academy of Management, 1985, pp. 239-245.

Steinfield, C. W. "Computer-mediated communication in an organizational setting: Explaining task-related and socio-emotional uses". In M. McLaughlin (Ed.), Communication Yearbook, (9). Beverly Hills, CA: Sage, 1986, pp. 777-804.

Steinfield, C. W., & Fulk, J. "Tasks demands and managers use of communication media: An information processing view". Paper presented at the annual meeting of the Academy of Management, Chicago, 1986