THE IMPACT OF ELECTRONIC MAIL ON MANAGERIAL AND ORGANIZATIONAL COMMUNICATIONS

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The primary objectives of this study were to determine how an electronic mail system was being used by managers and professionals in a business setting and to describe its cognitive, affective and behavioral impacts. The organizational impacts reported by the respondents were compared with research-based evidence reported by experts in an earlier study by Kerr and Hiltz. The results showed that electronic mail was used extensively to displace phone calls and memos particularly for "organizing" activities, such as scheduling events, asking questions, and providing feedback. The experiences of the users showed that electronic mail reduced lag times in distributing information, created more flexible working hours, and provided lateral linkages throughout the organization. More pervasive social impacts of electronic mail, such as changes in social structure, expansion in group size, and increase in span of control, were not experienced to a marked degree.

BACKGROUND FOR THE STUDY

The introduction of new information technology into organizations has created a variety of organizational impacts. Reviews of research on the impacts of computer-based communications systems have shown that these systems affect existing media use, structural relationships, communications effectiveness, and work efficiency and quality (Rice and Torobin, 1986). These impacts must be recognized, understood, and managed so that the benefits of new communications systems can be enjoyed. Prior research about the benefits of electronic mail, its limitations, and its impacts on different types of users provide a useful background for this study.

The Benefits of Electronic Mail

In recent years, electronic mail systems have been used increasingly to improve the timeliness, control, and effectiveness of communications in organizations. One of the costly aspects of communications is having to be in the office to maintain face-to-face contact. Using electronic mail, people can work at home or travel while maintaining needed contact with their peers, superiors, and subordinates (Conrath and Bair, 1974). Superiors can keep better informed about issues and problems via internal electronic messages which complement traditional communications media.

Electronic mail can be substituted for more time-consuming types of communications such as telephone calls, memos, and letters. Although the number of letters and memos sent and received by electronic mail users may decrease, the volume of information which can be handled may actually increase (Rice and Case, 1983).

The use of electronic mail also has impacts on interpersonal and interdepartmental relationships. Communications between departments and groups sharing common interests are eased (Rice and Bair, 1984). Communities of interest connecting people in different geographic locations are founded using electronic networks (Kerr and Hiltz, 1982). Users also experience widening social connections and an increase in horizontal and vertical communications within an organization (Conrath and Bair, 1974).

The Limitations of Electronic Mail

Access to electronic mail systems may lead to information overload, particularly at the top of the organization, because upward flowing messages make it possible for subordinates to bridge authority links (Kerr and Hiltz, 1982). The increased volume of incoming messages may be difficult to assimilate, and reports of "garbage electronic mail" are prevalent, particularly in early months of system use. Lack of trust is another factor preventing the efficient use of electronic mail. If users do not trust the system or if they are not sure recipients will retrieve their incoming messages, they may backup their electronic mail messages with memos or phone calls, thereby undermining the economic justification for its use.

Perhaps the most common argument against electronic mail is that it eliminates interpersonal contact which is important in building relationships, resolving conflicts, and building morale. Many managers prefer phone or face-to-face contact to exchange ideas with their peers and to give direction to their subordinates. However, as experience with computer communications systems grows, users' attitudes about what types of communications are appropriate on these networks change. In one study, experienced computer personnel felt that an electronic messaging system could be used effectively for generating ideas, resolving disagreements, and negotiating (Rice

and Case, 1983). Experienced computer conferencing users studied by Hiltz and Turoff also felt that social reinforcement could be supported with the use of an electronic mail system (Hiltz and Turoff, 1981).

OBJECTIVES OF THE STUDY

The primary objective of this study was to determine the experiences of of electronic mail system users in a business setting. Specifically, the study was designed to address the following objectives:

1. To learn how an electronic mail system was being used.
2. To determine to what extent the electronic mail system was displacing traditional forms of communications.
3. To identify communications preferences and patterns.
4. To describe how various managerial functions, including planning, organizing, controlling, and problem-solving, were supported by electronic mail.
5. To determine the cognitive, affective, and behavioral impacts of electronic mail on individuals and on groups.

The study does not attempt to test a specific hypothesis. Rather, it is designed to explore the impacts of electronic mail on managerial and organizational communications as a basis for developing further in-depth empirical research.

PROCEDURES FOR THE STUDY

An organization with considerable experience with electronic mail was selected for this study. This organization had installed PROFS, the Professional Office System, for use by managers and technical professionals in 1981. System use had expanded substantially during the five-year period between 1981 and 1986, with over 16,000 users on the system by September, 1986.

Study Participants

Three groups were chosen for participation in this study. Interviews were conducted to determine each group's position in the overall corporate information services organization, its task characteristics, and communications and interaction with persons across departmental boundaries.

The first group consisted of managers responsible for information resource management and planning for the organization. This function involved organizing and controlling automation projects throughout the corporation. They were constantly dealing with urgent matters, diverse tasks, and non-standardized work. About 90 percent of their communications occurred across departmental lines.

The second group was composed of technical professionals responsible for systems software services and maintenance within an operating company. This group consisted of approximately fifty professionals organized into four departments. The members of the group consisted of technical and supervisory personnel with middle-level organizational status. Although many of their tasks were systematic in nature and governed by standard operating procedures, these technical professionals had to deal with some crisis situations and unexpected events. With regard to communications, the members of the second group had access to approximately 515 PROFS users within their operating company, and to 12,000 PROFS users throughout the corporation. PROFS was used for both intradepartmental and interdepartmental communications, making it possible to coordinate work among themselves and to keep informed of users' technical support needs.

The third group consisted of technical professionals responsible for providing systems programming and support services within another operating company. The members of this group, like the second group, consisted of technical and supervisory personnel with middle-level organizational status. The third group was the only department in their operating company with access to PROFS. Since the PROFS system they used was on a different machine than the PROFS systems supporting other operating units of the corporation, PROFS was used strictly for internal departmental communications. The users in this group, consisting of 60 systems programmers, were relatively self-contained.

Within each of these groups, a contact person helped to identify a random group of twelve electronic mail users with several years' experience using PROFS. Experienced users were selected because previous research suggests that novice users have different usage patterns and attitudes toward electronic mail impacts. Some of the initial effects of system use diminish as users become more experienced and integrate electronic mail into

their day-to-day activities (Plain, 1984).

Development of the Questionnaire

Questions regarding user characteristics, patterns of system use, substitution, and communications tasks were designed after a review of previous research. The analysis of message types supporting managerial functions was based upon categories established by prior researchers and the suggestions of experienced electronic mail users (Plain, 1982).

Questions on the organizational impacts of electronic mail were developed from the work of Kerr and Hiltz (1982), who derived a list of the impacts of computer-mediated communications from prior research and from the collective experiences of expert users. Categories characterizing electronic mail impacts both by level of impact (e.g. individual or group) and by type of impact (e.g. cognitive, affective, or behavioral) were developed. After the list was refined, the experts convened by Kerr and Hiltz voted on the category into which each impact best fit.

After these impact statements were organized into categories, the experts surveyed by Kerr and Hiltz reported the extent to which their research evidence and experience either supported or refuted each of these impacts. The following sample issue and scale illustrate the method used to quantify the research evidence bearing on each impact statement.

Sample Question: Electronic mail increases the possibility of information overload because the volume of information can be overwhelming.

Scale:
++	strong supportive evidence
+	weak supportive evidence
0	evidence neither supportive or refutive
-	weak refuting evidence
--	strong refuting evidence

The list of organizational impacts derived by the experts in the Kerr and Hiltz study was the basis for constructing the final section of the questionnaire. Respondents to this study were asked to indicate the extent to which they had experienced each of these organizational impacts using the electronic mail system. They were asked to respond based upon their experience, not upon their opinions of what the impacts of the electronic mail system should be. The scale used was exactly the same as the one used in the Kerr and Hiltz study in order to make it possible to compare the experiences of the experts with the experiences of electronic mail users in the corporation in this study.

Once the questionnaire was developed, three experts were asked to complete the questionnaire and to recommend any modifications they felt would clarify the questions. One of these referees was an experienced electronic mail (e.g. PROFS) user at the organization in the study. The second was an academic professional and experienced PROFS user. The third was a sociologist who was knowledgeable in research related to this study and in research design methods. All three of these experts had input into the questionnaire. Modifications were made before the final questionnaire was distributed to the survey participants.

FINDINGS OF THE STUDY

The findings will be reported in sections dealing with user characteristics, characteristics of system use, communications preferences, and managerial communications supported by electronic mail. The final section, dealing with the organizational impacts of electronic mail, describes its cognitive, affective, and behavioral impacts.

User Characteristics

Within each of the groups studied, the respondents reported that their average number of years experience with the firm was thirteen years, and that the average number of years in their present positions was two and a half years. A summary of user characteristics is given in Table 1.

Table 1: User Characteristics

Years at the firm:	13.1
Years in current position:	2.7
Years using electronic mail:	3.5

Characteristics of System Use

Prior research indicates that electronic mail tends to increase the volume of information being transmitted and received (Kerr and Hiltz, 1982). Most of the respondents noted that they transmitted and received more messages now that they had access to electronic mail. The average number of messages transmitted per day was 11.8, and the average number of messages received per day was 15.8, as shown in Table 2.

Table 2: Message Volume

Average messages transmitted/day	11.8
Average messages received/day	15.8

When asked whether most of the messages sent and received were the types of messages that replaced phone calls, memos, or documents, over two-thirds of the respondents noted that most of the electronic mail sent and received was intended to replace phone calls. Since many phone calls involve one-way transmissions of information, electronic mail provides an efficient subsitute. Another problem, telephone tag, is avoided through the use of electronic mail. Every time a user is unsuccessful reaching someone over the phone, time is wasted. Electronic mail is an effective means of communicating with the right person at the right time and avoids time-consuming shadow functions.

One of the benefits attributed to the use of an electronic mail system is the expansion in the number of persons with whom electronic mail users interact on a regular basis (Rice and Bair, 1984). When asked to estimate the number of persons regularly interacted with on the network, the respondents reported that they were able to interact with between 30 and 40 persons on a regular basis. In all three cases, users thought that they were able to communicate with more persons regularly than they were able to prior to the implementation of electronic mail. Without pre-electronic mail data, however, it was impossible to determine if personal networks had actually been expanded.

Communications Preferences

One of the purposes of this research was to discover if electronic mail displaced phone calls, face-to-face communications, and memo-writing. The productivity impact of electronic mail relates in part to the reduction in shadow functions which other communications methods entail.

This study showed that electronic mail affected communications preferences. When asked to rank the types of communications they used before electronic mail in order of frequency, the majority of respondents in all three groups ranked phone calls first, followed by face-to-face communications, memos, and reports. With electronic mail, the average rank order changed. Electronic mail was a clear first, with face-to-face communications second in order of frequency. Phone calls fell to third place, followed by memos and written reports. Although it was not possible to validate these frequency assumptions, these findings illustrated that the users perceived themselves to be extensive electronic mail users.

Electronic mail was also displacing traditional methods of communication, with its greatest impact on cutting back phone calls and memos, as shown in Table 3. This is consistent with a previous finding that the majority of electronic mail messages were categorized as "messages which replace phone calls."

Table 3: Percentage Displacement of Traditional Communications by Electronic Mail

Communication Type	Percent Displacement
Phone calls:	42%
Memos:	44%
Face-to-face:	25%
Written reports:	28%

Another issue addressed in this study was whether users distinguish between communications methods which are appropriate for various tasks after several years of electronic mail system use. While it is felt that electronic messaging depersonalizes human interaction, the social presence model of media use suggests that different media transmit different perceptions of the presence of users on the medium. The sociability of a particular medium may be perceived differently by different users, depending upon their attitudes, familiarity, and preferences (Rice, 1984). For example, experienced computer personnel using an electronic messaging system felt that the system was appropriate for generating ideas, making decisions, and resolving disagreements (Rice and Case, 1983).

The task context of communications also affects the choice of communications media. Tasks that are technical and formal may require different media than tasks which are social and emotional. In a study by Johansen (1977), electronic messaging was considered appropriate for exchanging information, asking questions, staying in touch, and exchanging opinions by over 80 percent of the managers studied. However, this medium was considered less suitable for such tasks as exchanging confidential information, resolving disagreements, and bargaining.

Given a choice among making a face-to-face visit, sending a memo, making a telephone call, holding a meeting, and using electronic mail, most of the respondents in this study indicated that they preferred to use electronic mail for providing routine information, for checking on progress, for scheduling activities, and for asking and answering questions.

Table 4: Communications Preferences for Electronic Mail

Communications Tasks	Electr. mail	Face-to face	Phone	Memo	Meeting
Providing routine information	88%	8%	0%	4%	0%
Checking on progress	71%	21%	8%	0%	0%
Scheduling activities	70%	13%	4%	9%	4%
Answering questions	58%	37%	4%	0%	0%
Asking questions	42%	50%	8%	0%	0%

In contrast, some communications tasks, respondents felt, required face-to-face interaction. The results in Table 5 show that experienced users preferred to use face-to-face visits to resolve disagreements, to provide criticism, and to give positive feedback.

Table 5: Communications Preferences for Face-to-Face Interaction

Communications tasks	Face-to face	Electr. mail	Phone	Memo	Meeting
Resolving disagreements	92%	0%	0%	0%	8%
Providing criticism	89%	11%	0%	0%	0%
Discussing alternatives	61%	4%	0%	0%	35%
Providing positive feedback	63%	32%	5%	0%	0%
Building consensus	48%	17%	0%	0%	35%

Meetings were a preferred method of discussing alternatives and building consensus. Telephone calls were not as frequently cited a communications method as other methods, indicating that electronic mail was being used as a substitute for the phone.

Managerial Communications Supported by Electronic Mail

The functions of management, according to O'Reilly and Pondy, are planning, organizing, staffing, directing, and controlling (O'Reilly and Pondy, 1979). Barnard, who suggested that the primary function of the executive was communications, broke managerial communications down into two categories, problem-solving and organizing (1938). In their framework describing communications supporting organizational functions, Gorry and Scott Morton (1970) included the communication of operational control information, much of which is processed via DP systems, and the communication of managerial messages, most of which are transmitted via face-to-face meetings, telephone calls, and memos.

To be effective, a communications method must support different types of managerial functions. In their attempts to study how electronic mail supports these functions, researchers have developed categories of message content which take into account both operational and managerial level messages. A category system developed by Plain included both the operational and managerial functions served by electronic communications. Messages supporting operational communication, he suggested, included all routine reports sent on a regular basis in a standardized format (Plain, 1983). Managerial communications were split into Organizing and Problem-Solving messages covering a whole range of sub-types, including requests for information, complaints, opinions, and notifications of decisions.

The categories developed by Plain were adapted for this study. Several other category systems were pilot tested, but managers found Plain's framework most relevant and easy to use. The first category, Operational messages, included all routine information sent or received on a regular basis. Organizing messages, consisting of requests for information, notifications of decisions, and replies to requests, were the second category. The third category was Controlling messages, referring to project status reports and other information used to monitor progress. Problem-solving messages, the fourth category, included complaints, opinions, and discussions of alternatives. The last category was Personal messages and referred to any personal information being transmitted via electronic mail.

Respondents were asked to estimate the percentage of messages they sent and received on a regular basis into these categories. In order to do this, they were asked to take a sample of 20 messages they sent and received, to categorize each of them, and to calculate the percentages falling into each category. Although actual work sampling would have provided more valid results, the estimates the managers provided were indicative of how well they felt the system supported messages with different functions.

The results indicated that most of the messages transmitted and received fell into the Organizing category. As many messages fit into the Problem-solving category as into the Operational category, indicating that experienced users were as comfortable using the system to solicit opinions and as they were to transmit routine information. The high percentage of "Organizing" type messages was consistent with the preference for using electronic mail for messages providing feedback on projects and activities. Table 6 shows these results.

Table 6: Managerial Functions Supported by Electronic Mail

	Messages Sent by:	Messages Received by:
Operational	20%	30%
Organizing	41%	33%
Controlling	15%	15%
Problem-solving	15%	12%
Personal	7%	5%
Other	2%	5%

The distribution of message types was consistent with the breakdown of operational, control, and planning functions reported by managers.

Organizational Impacts of Electronic Mail

The framework used to evaluate the organizational impacts of the electronic mail system was developed by Kerr and Hiltz based upon research literature and the collective experiences of experts. The users in this study were asked to assess each of these impacts according to their experience. Their responses were compared with the responses of the experts in Kerr and Hiltz' research. A-t test to determine if the differences between the means of the responses of the experts and the users were statistically significant at the .05 level was made for each impact statement.

The mean scores for each of the three groups of users, the overall mean for the managers, and the mean scores for the experts surveyed by Kerr and Hiltz were calculated using the following scale and values:

Scale	Value	
++	+2	strong supportive evidence
+	+1	weak supportive evidence
0	0	evidence neither supportive nor refutive
-	-1	weak refuting evidence
—	-2	strong refuting evidence

Cognitive impacts on individuals. Cognitive impacts refer to values, opinions, and attitudes about a system (Kerr and Hiltz, 1982). One of the commonly reported impacts of electronic mail is its ability to increase effective scope, an effect which occurs largely because of the availability of timely, accurate transcripts of office information which can be searched and retrieved as needed. Electronic mail also increases the variety of ideas, because people can learn about events of interest to them more quickly.

According to prior research, the volume of electronic information can become overwhelming, thus creating information overload. However, access to electronic mail can create new perceived needs for information, because geographic distance is no longer a barrier to dialog. Finally, since electronic mail is grounded in writing and reading skills, its use may favor the literate.

As shown in Table 7, the experts surveyed by Kerr and Hiltz agreed with many statements about the cognitive impacts of electronic mail on individuals.

Table 7: Cognitive Impacts on Individuals

Impact	Users' Mean	Experts' Mean	t
Expands effective scope	1.04	2.00	5.82*
Discriminates in favor of the literate	-.21	.90	4.24*
Creates new information needs	1.00	.88	-0.27
Increases variety of ideas	1.00	.88	-0.37
Creates information overload	.75	.00	-1.69
Can handle more information	1.21	.25	-1.80

*statistically significant at the .05 level

However, there were some areas of disagreement between the experts and the users. Although the users felt that electronic mail made it possible to handle large amounts of information more effectively, the experts were not so positive in their support for this impact. The experts did feel more strongly than the users that the system increased effective scope and an awareness of the global situation. The difference between the means of the experts and users on this issue was statistically significant at the .05 level. The information overload effect was felt by some users because of the amount of broadcast mail on the system.

The main disagreement between the experts and the users, however, was on the issue of whether electronic mail discriminated in favor of the literate. The users overwhelmingly disagreed with this contention, and the difference between the means of their responses compared with the experts' views was statistically significant. On another cognitive impact, the creation of new perceived information needs, the users and the experts were largely in agreement.

Affective Impacts on Individuals. Affective impacts are defined by Kerr and Hiltz as feelings, e.g. feelings of liking or disliking others, and emotions, e.g. a sense of well-being (Kerr and Hiltz, 1982). An affective impact of electronic mail which was agreed upon by the experts in Kerr and Hiltz' research included an increase in the sense of personal interaction with others. Another affective impact, the experts suggested, was that electronic mail users demonstrate more candor in expressing their opinions. Users alone at their terminals, they believed, may feel freer to express their ideas. Anonymity, they found, reduced inhibition and permitted frank discussions of personal and professional issues.

Another affective impact suggested by the experts was that access to an electronic mail system may increase the status of its users relative to those without access to the technology. Users linked together via an electronic mail network may become addicted to its use because it enables them to share common interests, rapid feedback, and timely information with others.

Electronic mail use may have less positive impacts on the affective side, though these problems produced less agreement among the experts surveyed by Kerr and Hiltz. One less positive impact is that users may be frustrated by the lack of immediate feedback from electronic mail requests and may prefer face-to-face discussions in situations where immediate reinforcement is needed. Electronic mail may also introduce new sources of social stress as traditional lines of communication are expanded, priorities change, and newly created networks connect people in new ways.

The opinions of the experts and of the users are compared in Table 8.

Table 8: Affective Impacts on Individuals

Affective Impacts	Users' Mean	Experts' Mean	t
Increases affective ties	.92	2.00	4.82*
Increases status	.33	.88	1.51
Enhances candor of opinions	.54	.75	0.56
Has the potential for addiction	.66	.81	2.40*
Lack of feedback frustrating	.25	.78	1.30
Creates new sources of stress	.00	.60	1.41

*statistically significant at the .05 level

Although the experts had strong supportive evidence that electronic mail made it possbile to increase affective ties and the sense of personal interaction with others, the users in this study were not as strongly convinced of this effect. Other differences of opinion regarded the possible negative impacts of electronic mail. The users in this study did not find the lack of feedback frustrating nor did they experience new sources of stress. Rather than feeling frustrated by lack of feedback, many of the users responded that electronic mail actually increased social reinforcement.

Behavioral impacts on individuals. The behavioral impacts cited in Kerr and Hiltz' study related to changes in individual communications styles and patterns. One of the impacts agreed upon by the experts was that electronic mail increased the flexibility of working hours, making it possible to accomplish a good deal of work outside of normal hours. The ability to join groups more freely, without regard to sex, race, and physical appearance, was also cited as a positive effect of electronic mail by the experts. Another agreed-upon impact was that electronic mail increased connectedness, by widening social circles and expanding the scope of social relationships.

The experts had less evidence supporting the idea that electronic mail use increased the quality of work by increasing contact with the work of others (e.g. databases, research in progress, published works, minutes of meetings, opinions of colleagues). They did not seem to have research-based evidence substantiating that electronic mail users could provide better responses to technical questions either.

In addition, they were not convinced that electronic mail increased the explicitness of communications because of the availability of more precise text. They did not report evidence that filing methods were changed because of on-line search and retrieval of past information and documents via an electronic mail system.

The responses of the experts and users on behavioral impacts are summarized in Table 9.

Table 9: Behavioral Impacts on Individuals

Behavioral Impacts	Users' Mean	Experts' Mean	t
Creates flexible work hours	1.00	1.38	1.32
Able to join groups more freely	.96	1.17	0.77
Increases social connectedness	.75	1.11	1.95

	Users' Mean	Experts' Mean	t
Improves the quality of work	1.08	.75	0.07
Provides better responses to technical questions	1.00	.75	-1.14
Increases explicitness of communications	.79	.43	-0.95
Changes filing methods	1.58	0.00	-2.66*

*statistically significant at the .05 level

One of the interesting aspects of this analysis was that both the experts and the users in this study felt very positive behavioral impacts resulting from electronic mail use. The major source of disagreement between the experts and the users was on the issue of the change in filing methods. The users consistently reported that electronic mail reduced the need for paper files and provided easier on-line searches for information, an effect the experts surveyed by Kerr and Hiltz did not find. The difference between the means of the experts' and the users' responses was statistically significant at the .05 level on the issue of changes in filing methods.

The other positive impacts experienced by the users were that electronic mail created opportunities for flexibility in working hours, improved the quality of work because of increased contact with the work of others, and provided more deliberate, documented responses to technical questions. The users also agreed that electronic mail made it possible to join groups more freely without regard to physical appearance and credentials.

Cognitive impacts on groups. Group cognitive impacts deal with the impact of electronic mail on group ideas, purposes, and goals, according to Kerr and Hiltz' definition. Based upon their research evidence, the experts polled by Kerr and Hiltz agreed that communities of interest were created and maintained through the use of electronic mail. Lesser credence was given to the contention that the quality of group decisions was improved because electronic mail provided mechanisms for sharing ideas, voting, identifying divergent views, collecting feedback, and reaching consensus.

Another view for which the experts had limited evidence was that electronic mail increased the understanding and appreciation of knowledge-based authority rather than hierarchical authority because users tended to be more oriented toward the content of the communication, not the organizational position of the speaker. This contention supports the view that electronic mail may create opportunities for managers at all levels to make their ideas known, ultimately leading to a flattening of organizational structures. The last behavioral impact addressed in Kerr and Hiltz' study was an increase in the awareness of the global situation resulting from electronic mail use. However, this impact was not substantiated by the research evidence of the experts surveyed by Kerr and Hiltz.

The responses of the users in this study were similar to those of the experts, revealing that some of these group cognitive impacts were evidenced. Two definite positive impacts of electronic mail cited by the respondents were improved awareness of the global situation and increased opportunities to develop communities of interest other than those based upon geography and discipline. There was stronger agreement among the experts on the communities of interest impact, as indicated by the fact that the difference between the means of the experts' and the users' responses on this issue was statistically significant at the .05 level. These findings are summarized in Table 10.

Table 10: Cognitive Impacts on Groups

Cognitive Impacts	Users' Mean	Experts' Mean	t
Develops communities of interest	.71	2.00	7.85*
Increases knowledge-based authority	.46	.66	0.57

	Users' Mean	Experts' Mean	t
Improves group decisions	.33	.40	0.33
Increases awareness of the global situation	1.00	.50	-0.95

*statistically significant at the .05 level

One of the interesting aspects of this analysis was that no definite evidence of electronic mail's impact on improving the quality of group decision-making existed, possibly because electronic mail was not considered an effective vehicle for decision-making. The increase in knowledge-based authority was not positively cited either, indicating that traditional hierarchical communications patterns were being maintained. Since much of the electronic mail volume was among peers for the users studied, experience with people circumventing traditional channels was limited if not non-existent. Since these users were quite experienced, earlier effects from users breeching proper communications channels would have already diminished.

Affective impacts on groups. Affective impacts on groups deal with affective feelings of liking or disliking others. One of the issues in this area related to confidentiality. Users may be concerned about communicating sensitive issues using an electronic mail system because other users may allow subordinates to log in, to retrieve messages, and to enter responses. The experts polled by Kerr and Hiltz did not find evidence of this effect, but the users in the three groups surveyed indicated some supportive evidence that the system was not always trusted. The difference between the means of the responses of the experts and the users on this issue was statistically significant at the .05 level.

The other affective impact stems from the lack of nonverbal cues in electronic communications. Without these cues, the research suggests, more attention is paid to supportive, encouraging, or negative statements. As a result, positive or negative feedback via the network may have definite impact. Both the experts in Kerr and Hiltz' study and the users had some evidence that electronic mail made supportive interaction possible, as shown in Table 11.

Table 11: Affective Impacts on Groups

Affective Impacts	Users' Mean	Experts' Mean	t
Inhibits trust	1.04	0.00	-2.57*
Facilitates supportive interaction	.75	1.00	1.54

*statistically significant at the .05 level

Several supervisors pointed out that supportive feedback was intentionally transmitted via the network.

Behavioral impacts on groups. The final area in which electronic mail impacts were studied related to its impact on relationships with other groups, on the effectiveness of communications processes, and on organizational structure. In this area, there were a number of agreements among the experts Kerr and Hiltz polled in their study. An increased span of control was possible, the experts felt, because electronic mail facilitated interaction with and control over geographically dispersed persons. The effective limits on the size of working groups could easily be expanded, making it possible for as many as 50 people to work together on a project. Because everyone had access to everyone else via an electronic mail system, a change from a hierarchical to more democratic organizational structures was possible. Lateral linkages among peers with common interests across departmental lines were facilitated, making coordination more realistic.

Some of the more pronounced impacts of electronic mail on organizational communications and structure, the experts felt, were not substantiated by their research-based evidence. One of these impacts is a shift to fluid teams and task-oriented work groups resulting from a greater equality of participation. Equality of participation is possible, social scientists argue, because an electronic mail system submerges status distinctions and lessens the impact of non-verbal cues. Because everyone can make their opinions known,

leadership based upon position power may be less likely to occur. Because it is difficult for a leader to emerge in computer conferencing groups, reaching consensus may also be less likely.

Although these ideas are intriguing, the experts polled by Kerr and Hiltz did not report having evidence supporting them. A comparison of their responses and the responses of users in this study is given in Table 12.

Table 12: Behavioral Impacts on Groups

Behavioral Impacts	Users' Mean	Experts' Mean	t
Increases span of control	.50	1.33	2.17*
Changes social structure	.46	1.25	2.52*
Expands group size	.04	1.14	5.25*
Increases lateral linkages	1.20	1.12	-0.31
Reduces lag times	1.58	1.09	-2.44
Creates shift to fluid teams	.92	.83	-0.35
Increases equality of participation	.58	.43	-0.34
Makes consensus less likely	-.13	.20	1.40

*statistically significant at the .05 level

Ideas which were supported by prior research, such as the impact of electronic mail on increasing span of control, changing social structure, and expanding group size, were not supported by the experience of users in this study. The users in this study did not support the contention that electronic mail brought about changes in social structure, e.g. from hierarchical to network-shaped structures, expanded group size, increased span of control, and increased equity of participation by submerging status distinctions and lessening non-verbal cues.

On the issues of increased span of control, change in social structure, and expansion of group size, the differences between the means of the experts' and users' responses were statistically significant at the .05 level, indicating that the experts found stronger evidence of these impacts. The lack of evidence of increased span of control and working group size cited by the users may have occurred because two groups in this study consisted of technical professionals who interacted primarily with their peers on technical matters and did not have any reason to extend their span of contacts outside their respective working groups.

The major areas of agreement by the user groups in this study were that electronic mail increased lateral linkages within the organization and reduced lag times by making it possible for people to obtain information on a timely basis. The reduction in lag time affecting information transfer was one of the most noticeable effects of electronic mail, and the difference in means between the experts and users on this point was statistically significant.

The respondents did not agree that consensus was less likely because of the number of views which could be aired via electronic networks. This effect was probably related to the fact that the electronic mail network was not viewed as a vehicle for raising issues and voicing opinions but rather as a vehicle for transmitting information on a timely basis.

SUMMARY AND CONCLUSIONS

One of the most interesting outcomes of this study was that managers and professionals were integrating electronic mail use into their day-to-day communications, with the greatest perceived impact being the displacement of phone calls. Electronic mail was particularly useful to support "organizing" activities, such as scheduling events, asking and responding to questions, and providing feedback to subordinates and peers. The

users surveyed actually preferred electronic mail over traditional forms of communications for many of their activities.

When the experiences of the managers and professionals in this study were compared with the research-based findings of experts polled by Kerr and Hiltz (1982), many similarities appeared. The experiences of both groups showed that electronic mail reduced lag times in distributing information, created more flexible working hours, and provided lateral linkages throughout the organization.

Respondents in this study reported more positive impacts in some areas than earlier research. Electronic mail, they noted, changed traditional filing methods by making on-line searches for information possible. This may have been because PROFS supports on-line information retrieval. Much larger volumes of information could be handled. Rapid communications reduced lag times, making it possible for people to learn of events of interest to them more quickly. Although the users agreed that electronic mail helped them expand their effective scope and to increase affective ties, they reported weak evidence supporting these impacts compared to the experts, who had strong evidence of these effects.

Some of the impacts reported by the experts were not substantiated by the experiences of users in this study, however. Although the experts felt that electronic mail interaction tended to discriminate in favor of the literate, the users did not agree. The more pervasive social impacts of electronic mail, such as changes in social structure, expansion in group size, and increase in span of control, were not experienced by the users. In the users' view, electronic mail did not significantly improve decision-making quality or consensus building. This was probably because they felt that other methods of communication, such as meetings and face-to-face contact, were more effective in building consensus.

The significant impacts of electronic mail, reported in earlier research and substantiated by the experiences of managers and professionals in this study, appeared to be an increase in affective ties, an increase in the flexibility of work hours, an increasing in lateral links, and an improvement in supportive feedback. Impacts on social structure were not evidenced, possibly because organizational structures were fairly well-defined and work roles were established in these business units.

RECOMMENDATIONS FOR FURTHER RESEARCH

Very few studies have addressed the impacts of electronic mail in business organizations where managers and professionals are the users. This research revealed some very positive benefits of electronic mail use resulting from changes in communications activities and work behavior.

In the future, variables affecting electronic mail impacts can be further identified and studied. It would be useful to learn what variables discriminate between successful and less successful users. The professionals in this study were well-experienced and appreciated the benefits of electronic mail. The experiences of less proficient managers with less commitment and training might be quite different.

Studies like these will be needed to understand organizational experience with new technology and its benefits. Systems professionals who introduce new technology must continue to be keenly aware of its organizational impacts, including its potential for changing individual work habits and group interaction. Understanding and managing technological change will increasingly become a challenge organizations will need to address in the years ahead.

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