Measuring Employee Reactions to Computer Operations*

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One of the greatest problems accompanying the computer boom of the last decade was that of acceptance of the computer by those persons in a business firm who were affected by it but not directly responsible for its operation. Professor Lucas has attempted to measure the attitudes of those employees toward computer operations. His analysis reveals several methods which often can contribute to a more favorable acceptance of computer information systems and suggests different ways of implementing those methods. A manager confronted with hostile employee reactions to a computer system could well benefit from Professor Lucas's study. *Ed.*

Introduction

During the past decade a large number of computer-based information systems have been designed and implemented in widely differing organizations and many employees in departments scattered throughout these organizations have been affected by the systems. As computer users these employees may prepare input for a computer system or they may receive output from a system; in many organizations employees other than those on the computer staff participate in the design or operation of information systems. The jobs of an increasing number of employees, either directly or indirectly, involve data processing activities of some type. Consequently, understanding attitudes and reactions to computer operations is important for managers, particularly those whose subordinates have contact with data processing activities.

There are several past studies which have been primarily concerned with the impact of computers on the organization. This research has been directed toward questions on the impact of computers on centralization and decentralization, changes in skill levels from computerization, manpower reductions because of automation, and changes in managerial jobs, especially for the middle manager.[1] Some studies were conducted in the early days of computer systems on employee satisfaction and office employee reactions to computer systems.[2] One British study by Mumford and Banks included employee attitudes explicitly in examining the implementation of a computer system in a bank.[3] Another recent study demonstrated how a conscious consideration of

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1 See Whisler [18], and Whisler and Meyer [19].

2 See Hardin [5].

3 See Mumford and Banks [12].

user attitudes could be instrumental in the design of a computer system for a minority organization.[4]

This paper presents a study of user attitudes toward the operation of computer-based information systems after industry and government organizations have experienced at least ten years of systems development activities. The first goal of the study is to determine the key factors associated with favorable user attitudes toward computer operations. There have been a number of approaches to the management of computer installations including internal departments, service bureaus, and facilities management contractors. The second goal of this study is to determine whether there are any differences in user attitudes toward computer operations under different types of computer management. Two cases are considered: an internal computer department which is controlled by company employees and facilities management in which a consultant contracts with the company to operate and design all computer systems. (In the companies in this study, client data processing personnel were offered positions on the staff of the facilities management company.)

Research Design

Field research was conducted in six companies to explore user reactions to computer operations; three companies were under facilities management and three had conventional or "internal" data processing management. The sample in each company was drawn from employees having some contact with the computer operation in positions ranging from clerk to vice-president. The companies were matched on industry affiliation (style merchandise manufacturing, food processing, and mail order sales) and the extent of their data processing efforts. The sales of the companies involved range from 50 million dollars to 1 billion dollars.

A questionnaire was devised to measure user attitudes toward and perceptions of computer operations. All attitude and most perception items consisted of a statement of the following type:

My general impression of the data processing staff is that they

Are not too competent technically.	1	2	3	4	5	6	7	Are highly competent technically.

The scales were formed by averaging the items to be included in each scale, and the results are coded so that higher numerical results represent more favorable attitudes or perceptions.

Measures of User Reactions to Computer Operations

Two factors were used to measure user reactions to computer operations, Perceived Computer Potential and Attitudes Toward the EDP Staff. The first

[4] See Lucas and Plimpton [10].

	Computer Potential†	Attitudes Toward EDP Staff†
Perceived Quality of EDP Service	.50	.40
Perceived Management Support	.29	.34
Involvement in Designing Systems	.22	NS††
Week's Contact with EDP	NS††	NS††
Computer Potential	1.0	.42

* Based on completed questionnaires from 683 noncomputer employees.
† Pearson Correlation significant at the .01 level.
†† Not significant.

Table 1 Correlations Between Key Variables*

goal of the study is to determine what user perceptions are associated with these two indicators.

Factors Influencing User Reactions to Computer Operations

This section will describe in detail the various organizational characteristics which affect the way employees perceive the benefits (or lack of them) of computer operations.

Service Quality

If the quality of computer service is satisfactory, then users should have more favorable attitudes toward the electronic data processing (EDP) staff and higher ratings of computer potential. Good service means fewer ambiguities between computer staff and the user and implies that errors and communications problems are at a minimum and systems are operating smoothly. Therefore, it was predicted that the quality of data processing service perceived by the user would be associated with ratings of Computer Potential and Attitudes Toward the EDP Staff. Table 1 shows the positive relationship between the Perceived Quality of EDP Service and Perceived Computer Potential and Attitudes Toward the EDP Staff for 683 users across all of the companies in the survey. High quality service is associated with favorable user attitudes as predicted.

Management Support

Likert and others have stressed the importance of management leadership and support in general.[5] Management support of computer operations should help both users and the EDP staff and should motivate greater empathy. Organizational literature also stresses the leadership role of management. In one study by Peltz, highly rated supervisors also were rated as being influential with their own superiors.[6] If management is clearly committed to an operation in the

[5] See Likert [8].
[6] See Likert [8], p. 91.

organization, there should be more favorable attitudes and greater cooperation. Table 1 shows a significant positive relationship between Perceived Management Support and Perceived Computer Potential and Attitudes Toward the EDP Staff.

In general, higher level management had more favorable attitudes toward the computer staff and rated the computer as having more potential than did nonmanagement personnel. This finding might be expected since most managers have not been affected directly by computer systems. The manager is able to evaluate the overall contribution of systems to the organization while nonmanagement users are confronted with day-to-day operating problems and frustrations with computer systems. If managers assume that others in the organization share their favorable attitudes toward computers, there may be serious problems. For example, managers may underestimate the problems of implementing a new system and fail to devote sufficient resources to preparing users for the change. A continued commitment by management is necessary to encourage successful computer applications.

Involvement

Much user criticism of data processing personnel is directed to assumptions made by computer staff about user operations; these assumptions often are made without bothering to consult users who actually have to work with a system. Organizational literature discusses the need for employee involvement in general. From the initial experiments by Coch and French to more recent work by Marrow *et al.*, Lawler, and Scheflen, the principle of involvement has been stressed.[7] The general findings are that participation or involvement helps to create acceptance of changes. First, goals are made more explicit within the group, and second, there is an intrinsic satisfaction of higher order needs from contributing to the change process.[8] For these reasons, it was predicted that user Involvement in computer system design would be associated with favorable ratings of Computer Potential and positive Attitudes Toward the EDP Staff.

The results in Table 1 show that Involvement was only related significantly to Perceived Computer Potential, not to Attitudes Toward the EDP Staff. It is possible that involvement leads to dissatisfaction with present systems because the users are shown new technology and made more aware of the capabilities of the computer. Since present systems are likely to be less sophisticated than planned ones, there may be some disappointment with current operations. It is also possible that some involvement is not sincere. That is, user ideas are not incorporated into the system which would tend to increase communications obstacles and the amount of friction between the computer staff and users.

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[7] See Coch and French [1], Marrow *et al.* [11], Lawler [6], and Scheflen [14].
[8] See Galbraith [4].

Contact

Some of the early work of Homans and more recent studies by others, including Walton, have suggested that contact between parties leads to better relationships.[9] It was predicted that the amount of Contact with the computer department would be positively associated with Perceived Computer Potential and Attitudes Toward the EDP Staff. As shown in Table 1, the relationships are not significant. However, further statistical analysis suggested that the more contact, the less favorable the attitudes and potential.*

This unexpected finding may be explained by the differences between types of contact. In the cases where contact is voluntary or social, it can be expected to lead to more favorable attitudes. However, forced contact may have the opposite effect. When a problem arises in operations such as incorrect input or output, or a missed schedule, the conditions of extreme interdependency between users and the computer department aggravate an already stressful situation and lead to conflict.

EDP Management

Half of the companies in the study had conventional management for their computer departments; these departments were managed by employees of the company ("internal" management). The other half of the companies operated under facilities management contracts. Under these conditions, an external consulting firm assumes the complete operation of the computer department, including the execution of production systems and the design of new information systems. Under facilities management, the consultant argues that he has higher professional standards and can perform a better technical job than client personnel. He maintains that computer operations are so specialized that they require the same type of contractual arrangements that many companies follow with accountants or legal advisors. Unfortunately, facilities management contracts do require the employee of the client firm to deal with employees of another organization on a routine basis. Problems may be exacerbated when client employees are confronted with consultant personnel instead of co-workers. Therefore, it was predicted that there would be less favorable employee attitudes toward computer potential and the EDP staff under facilities management than under internal computer management.

Because of the detailed negotiations required to develop a facilities management contract, top management is forced to examine the computer operation which should lead to a better understanding of the capabilities and problems of computer systems. It was predicted that top management will have more favorable attitudes toward computer potential and the EDP staff

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[9] See Walton *et al.* [17].

* This analysis used an approximation to a two-way analysis of variance. The complete results of the analysis are available from the author upon request.

under facilities management contracts than under internal computer department management. The facilities management firm also argues that it provides a clear career path for employees who now work for a computer company rather than the client firm. The association with more professional EDP personnel who work for the facilities management contractor should raise expectations about what computers can offer. These arguments lead to the final prediction that the computer staff will have more favorable self-ratings and ratings of computer potential under facilities management than under internal management.

The results for facilities management also were analyzed. Under facilities management agreements, top management rated Computer Potential higher than under in-house management. (There were no significant findings for attitudes Toward the EDP Staff.) Since the development of a facilities management contract is a time consuming process which includes extensive negotiations, this finding is understandable. If the prediction is correct that only firms with an unsatisfactory background of data processing undertake facilities management contracts, then one also would expect managers to report higher expectations for the computer since they probably feel that improvements can be made or they would not have entered into the contract. The results for all users are less clear. For Computer Potential, more differences were observed among industries than between types of management. For attitudes Toward the EDP Staff, both industry and type of management appear to make a difference.

This analysis also shows that the prediction of more favorable self-attitudes on the part of programmers and staff under facilities management is not supported. In fact, the opposite conclusion can be drawn from the data. Under facilities management the data processing staff does see more potential for the computer, but rates itself much lower than do the in-house computer staffs. It is possible that the association with professionals under facilities management reduces a staff member's estimate of the quality of his past work. Most computer departments tend to be extremely isolated; association with outside professionals may increase the severity of the standards under which the staff member judges himself. The feelings of higher potential under facilities management but less satisfaction with one's own performance would be consistent with this explanation.

Implications

Three important factors associated with ratings of Computer Potential and Attitudes Toward the EDP Staff have been identified in this article. It is likely that a cyclic relationship exists among all of the different factors. For example, more Management Support leads to increases in perceptions of Computer Potential which in turn results in more favorable Attitudes Toward the EDP Staff. These attitudes encourage the user to become more involved in the

design of systems which tends to increase the potential he perceives for the use of the computer. Cycles such as these have been found in the past by Farris.[10] As long as the cycle is a favorable one, so that forces create more favorable attitudes, greater potential, etc., then conflict should be reduced between users and the computer department. However, if the cycle is a negative one then it is important for management, users, and computer professionals to develop a strategy which changes the direction of the forces.

The factors which have been hypothesized as affecting user reactions to computer operations were selected because they have the most leverage for improving those reactions. The computer department most closely controls the Quality of Data Processing Service. While the computer department is dependent upon users to provide input, the major responsibility for the quality of systems and operations must lie with the data processing group. The willingness of the user to undertake new systems is based upon the quality of old systems.

There has been a tendency for data processing departments to undertake the challenging activity of developing new systems while ignoring existing ones. Management should recognize that quality service is a prerequisite to the successful implementation and user acceptance of new systems. Existing applications should perform at an acceptable level according to users before resources are devoted to the development of new systems. This advice is particularly important for firms involved in a facilities management agreement if dissatisfaction with present computer operations was the primary stimulus for entering a facilities management contract.

Management Support is under the control of management. For a manager to demonstrate support, he must reward and encourage the activities of the computer group leading to the development and operation of successful systems. For example, raises and promotions in the data processing department could be based partially on user reactions to systems. Users might be rewarded in part for their contribution to the design and operation of systems. The manager must show by both his actions and own commitment of time to computer activities that he supports further use of the computer in the organization. This commitment includes active participation in setting priorities for computer projects and participation in review meetings to discuss design alternatives and plans for implementation.

Involvement is a joint responsibility of users and the computer department. The computer staff must initiate the requests for involvement and make the effort to assure that it is meaningful. Users must be willing to spend time designing a new system. Management support is intertwined with involvement since users will be unwilling to provide the necessary time unless management is clearly behind a project. Management also must provide resources so that users can be free to participate in the design of a system. Usually a new

[10] See Farris [2].

application is undertaken because of an existing overload in information processing. Additional manpower may have to be provided or overtime authorized so that busy users will be able to participate in the design of a new system.

One mechanism for showing Management Support and gaining user Involvement is a steering committee. In one of the companies involved in the study, a data processing steering committee was used to allocate scarce computing resources. The committee of top managers and the manager of the data processing department assigned priorities and directed the activities of the computer facility. The members of this committee had significantly more favorable attitudes toward the computer and higher ratings of computer potential than did others in the organization.

If such a committee is formed, it must be organized and managed carefully. The purpose of the committee should be clear; decisions affecting all departments should be discussed, such as the priority for new systems development efforts. If the committee is allowed to degenerate into a design board for a single system, managers unaffected by the particular system may stop attending and the committee will probably dissolve.

The study has indicated that for the facilities management contractor, there may be some immediate problems with EDP staff morale. The association with computer professionals and higher standards may prove discouraging to data processing employees hired from the client organization. The facilities management contractor may need to provide special educational opportunities for these employees or work with them to develop goals and a career path within the facilities management firm.

There are no clear findings for user reactions to facilities management agreements except for the significantly more favorable attitudes of top management under a facilities management contract. The facilities management firm should exploit these favorable attitudes toward computer operations. For example, it would probably be relatively easy to form a steering committee of top management. Agreement might be reached to develop no new systems until specified existing systems are working satisfactorily. Favorable attitudes also mean that top management should be amenable to providing tangible support for computer activities as discussed above. The facilities management firm should take advantage of its situation to enlist top management assistance in reducing the problems created by the introduction of an external organization to manage computer activities.

Further Research

The exploratory study reported here has indicated some of the key factors associated with user reactions to computer systems. There is a need to develop more objective measures against which self-report responses can be compared. Future research should examine variables such as the method of charging

for services, procedures used in systems development, and the use of special liaison representatives by the computer department. It is hoped that these results and others will provide data on how to better manage computer operations within the organization.

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