

**THE MANAGEMENT OF INFORMATION SYSTEMS OCCUPATIONS:
A RESEARCH AGENDA**

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ABSTRACT

It is accepted, generally, that Information Systems (IS) personnel have specific needs and present a unique set of problems for management. This position is challenged. It is our contention that IS personnel exhibit relatively few differences when compared with other, similar, occupational groupings. This does not imply, however, that the unique aspects of IS work are unimportant, or that attention need not be focused on understanding the determinants of particular behavioral outcomes. Rather, it suggests, that the effective management of the IS human resource may well rest more on general management practices than is commonly believed.

This paper identifies managerial complaints about IS personnel and provides a summary of research findings. A model, based on accepted principles of worker behavior, intended to integrate much of the previous work, is presented. The IS staff is classified into categories and propositions about each are developed. Specific research questions are formulated which, when answered, will provide more insight into the unique aspects of IS work and will identify managerial strategies for improving employee performance and well being.

1. INTRODUCTION

One of the most pressing problems facing Information Systems (IS) management today is the improvement of systems development productivity [Dickson et al., 1984]. Despite great increases in the cost-performance of computers over the last decade it is generally acknowledged that approximately the same time and effort is required now to build a application system as it did ten years ago [Ewers and Vessey 1981]. The backlog in applications is well documented and it appears to be growing rather than decreasing.

Strategies for productivity enhancement consist usually of two parts: a technological and a human relations component. The major alternatives are to replace functions performed by labor with machines (or making existing machines more efficient) through the investment of capital, or, getting workers to produce greater output. The latter involves enhancing worker skills (by training), increasing their motivation to do a job, altering task procedures to decrease effort or time needed (closely tied to the mechanization of work), or selecting better or more appropriate workers.

The search for greater development productivity has focused primarily on mechanical solutions, including: software engineering such as structured programming [Yourdon and Constantine, 1979] and structured analysis [DeMarco, 1978]; more powerful computer languages, such as NOMAD and FOCUS [Focus, 1978]; and automated generation of systems, for example, PSL/PSA [Tiechrow and Hershey,

1977] or PECOS [Barstow, 1979]. Relatively little attention has been paid to improving the management of human resources involved in systems development (exceptions are the work of Baker, 1972; Weinberg, 1971; and Semprevivo, 1980).

While some small gains in productivity have been made in the construction of computer application systems (largely through the reduction of maintenance costs that have resulted from the use of software engineering techniques) or the improved productivity provided by fourth generation languages, relatively little has been learned about the practitioners themselves; describing them in their work settings, understanding their needs and how these differ from those of other workers, and how they respond to various management practices. Consequently, gains in productivity that might result from more efficient and effective use of these human resources remain largely unexplored. As Bartol and Martin [1982] observe, no large body of relevant research has emerged to help IS management, or for that matter general management, in coping with the difficulties of supervising IS personnel. If we are serious about improving the performance of the IS function, then, clearly, one of the likely areas for study is the management practices being used.

With increases in the relative size of Information Systems (IS) staffs, higher labor costs and a scarcity of qualified personnel, human resource issues are taking on greater significance for senior management. Complicating this situation is the multitude of workers performing IS tasks that has been spurred by the need to support the influx of micro computers and the trend towards end user computing (EUC) [Rockart and Flannery, 1983; Hammond, 1982]. The diversity of

the IS staff makes it difficult for a firm to establish a consistent set of management practices for these workers. If organizations are to effectively use IS technology in achieving corporate goals considerable improvement in the performance of the human resources portion of this function will be needed [Lucas and Turner, 1982].

We see the issues being raised here as part of a larger question concerning the management of service occupations. Our economy is becoming increasingly dominated by information and service industries. While some productivity gains may be possible by providing better tools this can have only limited impact. Unlike production workers, service employees use technology as an adjunct to their main activity. Major gains in their productivity will require content and structural changes to the way a service is provided rather than changes in the efficiency of its delivery. As service occupations become a greater proportion of the labor force it becomes all the more important that these managerial techniques be developed.

This paper identifies some of the current human relations problems involved in the management of IS personnel and then provides a summary of the relevant research findings. Our main goal is to understand how aspects of IS work and management practices contribute to undesirable outcomes, to minimize these and to evolve strategies for the improvement of employee performance and well being. A variety of research questions are formulated that highlight many of the key issues on which management policies are based. Especially, we desire to know how IS work differs from other, similar, occupations and to provide a method for the evaluation of different management policies and practices.

2. HUMAN RELATIONS ISSUES FOR IS PERSONNEL

Our objective in this section is to identify problems practicing managers have experienced when supervising IS personnel especially those concerned with human relations.

2.1 THE PROBLEMS

A variety of complaints have been made about IS personnel which suggests they are difficult to manage. These observations were obtained from discussions with top and middle level IS managers in a number of New York firms. These conversations were carried out as part of a focus meeting in a university/industry affiliate program and during interviews with five other IS managers. Questions were unstructured; interviewees were asked what problems they had, if any, in managing their IS groups.

While some of this material may be folklore we must presume that a portion is based on evidence and that it represents the real concerns of practicing management. These complaints are identified in the following section. The trade press is then examined for confirmation or denial of these observations.

2.1.1 TURNOVER

Management perceptions are that information systems staff have excessive turnover. The managers attributed this to three factors: 1) high demand for experienced staff and the premium paid to them for switching jobs, 2) pressure of the job, and 3) cultural rejection by the remainder of the firm. Of course, high turnover rates may also be

symptomatic of a number of other job related factors including the content of work, the quality of supervision, compensation, or career opportunities.

2.1.2. BURNOUT(footnote 1)

It was often mentioned that good programmers or application designers have one large system in them, after which they no longer have the motivation, discipline or interest needed to make the commitment and sacrifice called for in a major development effort. Implementing is considered to be difficult, risky and stressful work, involving a high degree of interpersonal and intra group conflict.

2.1.3. CAREER PATH

While opportunities for entry and middle level positions abound, there are relatively few senior positions in the field. Many organizations prefer generalists with knowledge of the industry or the particular firm for the top IS position. Furthermore, it is not clear what experience or skills are needed to attain these positions. In certain organizations, for example, in the military, an IS specialization can be considered a career detriment (c.f., McRae et al., 1985).

Part of the problem is a tendency on the part of IS personnel to become over specialized and consequently, not qualified for general management positions. The large amount of detailed knowledge needed in an IS job tends to force out more general knowledge about the business or people. The situation is complicated by rapidly changing

technology which creates a need as well as the opportunity to acquire new detailed knowledge.

2.1.4. COMMITMENT

The IS staff is often perceived by IS management as having little commitment to the firm. Some of this may be because they are considered to be different from other occupational groups; using a different language which makes them difficult to understand, or having a different set of interests. Or it may be that they look and dress differently from the other staff. Frequently, they are reluctant to learn the details of the business or to go through an apprentice process, which in other professions serves to both socialize new employees and initiate them into the organizational culture.

2.1.5. SUPERVISION

The IS staff is often considered hard to supervise. They don't seem to take direction well and they frequently question authority. In many cases they may even have unrealistic expectations about the need for supervision at all.

2.1.6. COMPENSATION

It is presumed that the IS staff is compensated at a higher average rate than other comparable occupational groups, largely because of the demand and limited availability of qualified personnel. This is a potential source of conflict with other professional groups within a firm.

2.2. TRADE PRESS

If the above opinions are generally held we would expect to hear these thoughts echoed in the practitioner press. A number of the observations are indeed confirmed in the trade press. For example, a recent University of Maryland survey reported in *Datamation* states that turnover of personnel on some IS projects is running as high as 30 percent [Arnold, 1984]. In addition to being expensive, turnover is disruptive and creates many difficulties for the IS department. For example, turnover compounds the difficulty of meeting project schedule and cost commitments, and it adds to the intra-group communication load.

Another *Datamation* report states that burnout is running rampant among IS professionals and is problematic for both the company and the individual [Cherlin, 1981]. Burnout greatly reduces an individual's productivity and can have serious negative personal consequences as well. A *Computerworld* article reports that stress is an increasing problem for the IS department as demands are placed on staff to develop systems which will provide the company with a competitive edge [Greenfield and Raskin, 1984a+b].

Warrick et al. [1985] report there are a large number of potential stressors present in the DP department. These include: constant and often unrealistic deadlines, growing work backlogs, frequent job changes, and long irregular work hours. They state further that stress can reduce productivity and worker morale while increasing turnover, absenteeism and reports of ill-health. In another *Datamation* article it is noted that there are special demands

in DP which can create stress and reduce employee performance and job satisfaction [Marks, 1985]. DP personnel are characterized as often creating their own stress because they like it, "workaholism" is seen as a badge of honor in the DP department. Marks notes, additionally, that career issues are often sources of great stress for DP personnel as they walk a tightrope between technician and management roles.

While just a few years ago the trade press would lead one to believe that IS would become a path to the executive suite this has not occurred. In fact, functional managers from other departments of the company are now moving in to assume the top role in IS, bypassing senior IS staff [Crane, 1982]. Many IS professionals either don't know how or don't want to be linked to the rest of the business, preferring to hide behind the details of technology [Crane, 1982]. This results in the isolation of the IS function and also leads to dead end careers.

Because the IS function is made up of a number of different specialties and do to the rapidly changing nature of technology it is more difficult to manage than other departments in the organization [Kimmerly, 1984].

2.3. SUMMARY of ISSUES

From reading the trade press and our discussions with top level IS management a number of issues have emerged with which a useful model of human behavior in an IS work setting will have to contend. These issues include turnover, burnout, career paths, commitment of staff, supervision and compensation. For insight into these areas we turn to prior IS personnel research.

3.0. RESEARCH REVIEW

When examining the IS research literature, there is, in general, a lack of attention paid to personnel related issues. It is only recently that researchers have begun examining IS staffs and their management problems. Bartol and Martin [1982] provide an excellent review of the IS personnel research literature and its implications for management. Over fifty studies are reviewed and the authors reach a number of conclusions regarding the management of IS staffs. We begin with some of their observations.

3.1. IS LITERATURE

Bartol and Martin [1982] report that IS personnel placed high value on jobs which offered them growth opportunities, interesting work and achievement. They placed less emphasis on money and other extrinsic rewards. Bartol and Martin observe, further, that IS personnel who face work overloads and unrealistic deadlines, a common problem in many situations, are likely to become more frustrated with their job than are workers without these stressors. Finally, they note that while many positions offer good growth potential and strong motivation, there are trends in the field toward increasing specialization and routinization of work content. These trends would most likely reduce the opportunities for growth and motivation currently offered by the content of work and would be particularly debilitating to the needs of those workers now occupying these positions.

Couger and Zawacki [1978] observed that job dissatisfaction and worker alienation was a problem in other occupations and that signs of job dissatisfaction were emerging in the IS field. They examined the job characteristics of applications development, technical management and operations staffs using the Hackman and Oldham [1975] job diagnostic survey (JDS)(footnote 2).

Couger and Zawacki report that analysts and programmer/analysts rated their jobs higher on the dimensions of the JDS than do other professional occupations, but that programmers rated their jobs as slightly lower than other professionals. Additionally, they report that IS personnel experience the same level of meaningfulness from their jobs as other professionals, but had lower perceptions of their degree of responsibility and knowledge of results of their work. Couger and Zawacki conclude IS supervisors are not doing as good a job as their peers in other fields. To bolster this conclusion, they found that while IS personnel are more satisfied with their jobs in general, they are less satisfied with their supervision when compared to other professionals. Weiss [1983] found that IS management exhibit lower social support than similar professional groups. This is consistent with Couger and Zawacki's conclusion that IS supervision may be problematic. In general it appears that improvements in the supervision of IS personnel may be required.

While Couger and Zawacki have found that many IS jobs are rich in motivating characteristics, Kraft [1977] offers some very different observations. Kraft argues that current trends toward structured programming, the use of code generators, chief programmer teams and other new programming techniques are merely a way of deskilling the

job of the programmer. He sees this as a move toward assembly line programming which would remove much of its creative element. By routinizing and standardizing programming, the motivating potential of these positions would be diminished. If Kraft is correct in his observations, then 1) efforts to enrich these positions may become necessary, and 2) there are implications in the applications of software engineering techniques that have not previously been recognized. A recent study by Baroudi and Ginzberg [1984] however, challenges Kraft's observations. They found no relationship between use of structured programming and design tools and IS personnel job satisfaction or commitment. Use of fourth generation languages did, however, correlate positively with job satisfaction. Baroudi and Ginzberg found further, as expected, that the percent of time spent in maintenance work was negatively related to job satisfaction while percent of time spent in development was positively correlated with job satisfaction.

Goldstein and Rockart [1984] examined the job characteristics of IS professionals and found results very similar to those reported by Couger and Zawacki. Goldstein and Rockart [1984], however, also investigated the importance of role perceptions (role conflict and role ambiguity) and leadership variables, in addition to those captured by the JDS. In general, they found that role perceptions correlated strongly with the satisfaction variables. Job characteristics were found to account for 40% of the variance in job satisfaction, while role perceptions and leadership variables accounted for 33% and 25% respectively. Goldstein and Rockart argue that when evaluating IS jobs, the job characteristics model (i.e., JDS

) should be expanded to include role perceptions and leadership variables as they provide important additional information.

Baroudi [1985] also examined IS personnel role perceptions and observed that several studies (e.g., [Abdel-Halim, 1981], [Woodruff, 1980], [Morris and Snyder, 1979], and [Kahn et al., 1964]) provide evidence that IS personnel with their complex, high scope jobs (as characterized by high scores on the JDS) and their personality profiles (a high need for achievement, autonomy, cognition and low need for change) are susceptible to the adverse effects of role ambiguity and role conflict. He examined some of the outcomes of role perceptions and found them to be negatively and significantly related to job satisfaction, organizational commitment, and positively related to turnover intentions. In particular, IS personnel were found to be intolerant of role ambiguity. These results, when coupled with those of the Goldstein and Rockart study, provide strong evidence for the need to examine the role perceptions of IS personnel.

Ivancevich et al. [1983] propose a model of organizational stress which relates a number of job, role, career, and organizational variables to stress and its various attitudinal, behavioral and health outcomes. They examined work overload, time pressures, role ambiguity, organizational rewards, organizational change, and organizational communication as well as a number of outcome variables. The study, however, was merely descriptive and did not attempt to empirically test the links between the various stressor and outcome variables. In general, Ivancevich et al. report that the mean stressor scores for IS personnel were below those obtained for other occupations. Of the stressors explored, they report that the most

stressful job characteristic was organizational communication. This variable included factors, such as, not being kept informed by ones supervisor and not getting the necessary information to do ones job. This finding seems to support further the conclusions of Couger and Zawacki who found that IS management did not provide adequate feedback, and to bolster Goldstein and Rockart's call for attention to IS supervision issues.

The second most stressful characteristic reported by Ivancevich's subjects was the inequity of the organizational rewards. Subjects perceived that individuals were being promoted and given raises for reasons other than performance. Time pressures and work overload were rated as the third highest stressor and, in light of the findings noted by Bartol and Martin that IS personnel who face work overloads and unrealistic deadlines are likely to become frustrated with their jobs, could provide a source of future difficulties.

Work relationship patterns, role ambiguity, change in day to day activities and technological change were rated the fourth, fifth and sixth stressors respectively. Interestingly, the least stressful job characteristic was career development. Ivancevich et al. report that IS personnel are reasonably satisfied with their jobs and neutral with respect to organizational commitment. They conclude that while IS personnel seem to have relatively low levels of job stressors when compared to other occupations, this should not be considered as an acceptable or desired state. They argue that improvements can be made in a number of areas reported in their study. Additionally, there is some indication that the job satisfaction of programmers and analysts is lower than that of accountants and engineers [Woodruff, 1980].

An unpublished case study [Kaplan, 1984] of the stressors within an IS department used the Ivancevich et al. stress questionnaire to identify important issues for management attention. While Kaplan also found generally low levels of job stressors, he also found some very different results with regards to their ordering. For example, among junior IS personnel he found career development to be the number one stressor. Shore [1984] also examined the career development issue within a large organization and found that over several years it was necessary to offer alternative career paths (technical versus management ladders) to meet the career growth demands of the staff and to maintain morale.

While a number of studies have demonstrated that job satisfaction and commitment of staff reduces turnover, Bartol [1983] attempted to explore antecedents of job satisfaction, organization commitment, and turnover. She chose to examine the impacts of professionalism and organizational reward criteria. Bartol cites studies which show that professional attitudes on the part of staff were associated with lower turnover and that professionals are more likely to feel committed to an organization and remain with an organization when they believe that the reward system gives significant weight to professional behavior. She reports that professionalism and rewards leads to job satisfaction and organizational commitment which in turn reduces turnover.

Welke and Kumar [1984] have found that IS practitioners tend to have values that are different than those of their clients. This suggests that one of the reasons IS personnel have difficulty being accepted and assimilated in firms may be the different value sets and orientation they have. This may also contribute to some of the

previously mentioned communication difficulties.

3.2. SUMMARY

While IS work appears to be high in satisfaction and desirable content, there are inconsistencies and unanswered questions in the research findings. Consistent reports of high turnover and low commitment are troublesome; it is not clear what their cause might be. The importance of creativity to IS personnel raises questions about the consequences of wide scale adoption of software engineering techniques. The conclusion reached by a number of researchers that supervision may be weaker than in other occupations bares further investigation and may well be a mitigating factor in some of the other findings.

A major limitation of this line of research is that it has focused mostly on application development, technical management or senior management. These categories probably account for well under 50% of the people working in IS. The remainder of the staff categories have not been considered. This issue is considered in section 5.0. Furthermore, limited research has been conducted on how outcomes might vary depending upon job assignment (e.g., maintenance programming vs. new development), or the tool or methods used in performing the job. Only a few of the factors likely to influence outcomes have been considered in prior research leaving the effects of many potentially important antecedent variables to be explored (for example, supervisor relations, performance-reward and individual difference variables). The following section will develop a more complete model of IS worker behavior and performance.

4.0. THE MODEL

The tendency in past research has been to make use of an instrument (for example, the JDS) whether or not it applied in a particular situation. While an argument can be made for obtaining comparative data using the same instrument, as a result, a number of aspects of work, likely to influence dependent variables were not considered. More recently, researchers have begun, building on theory, to include other dimensions of potential interest. For example, social support [Weiss, 1983]; commitment [Baroudi, 1985]; career development needs [Kaplan, 1984; Shore, 1984]; organizational communications, rewards and technological change [Ivancevich et al., 1983]; role ambiguity and role conflict [Baroudi, 1985; Ivancevich et al., 1983; Goldstein and Rockart, 1984]; supervision [Bartol and Martin, 1982]; and professionalism [Bartol, 1983] have all been shown to be related to important outcomes. This material needs to be tied together in a broad framework.

In constructing the model, extensive use has been made of previous work in organizational behavior and information systems. The dependent, or outcome variables selected, reflect the concern of IS management and prior IS research. However, care has been taken to select variables that apply to other, similar service occupational groupings. Consequently, we regard the model as being general.

4.1. DEPENDENT VARIABLES

Two classes of dependent variables are used to describe the IS practitioner: one focusing on the output and performance of the worker, the other concentrating on the worker's well being.

4.1.1 PRODUCTIVITY

Productivity and product quality are important because working for compensation implies purposeful economic activity and the products or services produced must be represented in any useful model of behavior.

4.1.2 WELL BEING

Working life quality is also important, both because a worker's well being influences his performance in producing a product, and because management (and society) has an obligation to provide a decent working environment.

Most of the research concerning IS personnel has used job satisfaction as the primary outcome variable. Recently, turnover and absenteeism have also been used as indicators of employee well being. Emotional exhaustion has been suggested as an important outcome measure of worker condition that is strongly associated with satisfaction and absenteeism, but captures another aspect of the work environment (i.e., related to a different cluster of independent variables). Because of the service nature of IS work, depersonalization of clients and feelings about personal accomplishment(footnote 3) will also be included. Baroudi [1985] has

suggested that commitment to the organization may be a useful unifying outcome dimension. Finally, Shepard [1971] has observed that people working with computer technology may show high degrees of alienation.

4.2. INDEPENDENT VARIABLES

There are six categories of independent variables to be included in the model: work environment, supervisor relations, performance reward, technology, individual difference and control.

4.2.1. WORK ENVIRONMENT

Role ambiguity and role conflict have been mentioned as important descriptors of the work environment of IS personnel that have been linked to selected outcome variables, as are both work load and discretion. Specialization and repetition have been suggested as important descriptors of the content of IS work; challenge and responsibility capture its creative nature. Abstraction represents the cognitive aspects of IS work. Social support and interdependence capture important aspects of the interplay among workers. The JDS core job dimensions of skill variety, task identity, significance and feedback will be retained (autonomy is similar to discretion) for the purposes of comparison with previous studies. Also captured will be the content of the job, task activities (i.e., programming, analysis, etc.), job title, and job category (see section 5.0).

4.2.2. SUPERVISOR RELATIONS

Supervision is composed of two components: technical supervision of the work performed and methods for dealing with human relations issues, such as participation in decision making and trust. Closeness of supervision captures the control dimension of supervision.

4.2.3. REWARD and CAREER FACTORS

The basis upon which rewards are given out (performance-reward relationship) can be a strong motivator of behavior, as can the actual level of compensation or status. Career achievement and perceptions of career opportunities must also be captured.

4.2.4. TECHNOLOGY

The technological tools used in the job (equipment and languages), the processes used (traditional life cycle, prototyping, software engineering techniques, development methodologies), the form of project organization and project control (locus of control) and the type of assignment (new system development, modification) are likely to effect outcomes.

4.2.5. INDIVIDUAL DIFFERENCES

Age, sex, educational level, prior experience, participation in professional activities, perceptions of professionalism and value orientation will be captured.

4.2.6. CONTROLS

Controls include industry, firm, organizational culture, group, group culture, grade and title.

4.3. COMPLETE MODEL

Figure 1 shows the complete model.

-----Insert Fig. 1 Complete Model here-----

The purpose of constructing the model is to capture many of the variables that, in any situation involving IS practitioners, are likely to explain a reasonable proportion of the variation in outcomes. If such a model were used consistently by researchers, in many situations, a data base would be established for comparative studies.

5.0. IS STAFF COMPOSITION

Much of the literature treats the IS profession as if it was composed of a homogeneous job (for example, applications programming). Presumably, the notion has been that the common aspect of working with a computer has a stronger effect on workers than the specifics of the job being performed. We disagree. It is our belief that there is wide variation in the content of IS work and that job content will turn out to be a major factor in determining outcomes. The following

ten job categories provide useful groupings by which to classify the numerous IS department positions.

1. Applications Development consisting of programmers and analysts performing maintenance and developing new application systems.
2. Liaison and other boundary spanning and coordination roles, such as Data Base Administration, Network Administrator, Data Administrator, and End User Coordinator.
3. Systems Programming involving operating system maintenance, configuration and modification as well as the installation and maintenance of package software.
4. Technical Consultants including documentation, manual procedure, training other specialists whose expertise is necessary for the development of applications systems.
5. Administrative Staff consisting of accounting (general ledger and accounting for usage), purchasing, budgeting, office management, clerical work and other similar activities.
6. Technical Management including first line supervisors and middle management (e.g., project leaders, department heads) with a combination of technical, administrative and boundary spanning activities.
7. Operations Staff including console operators and peripheral equipment servicing (i.e., those that operate equipment directly).
8. Operations Support consisting of maintaining tape and disk libraries, user information services, and submitting of production jobs.
9. Operations Management including first line supervisors and middle management (i.e., shift supervisors).
10. Senior Management consisting of the Chief Information Systems Officer and his immediate staff.

It is possible to use the staff groupings to formulate a number of important questions. For example, within the IS profession the argument could be made that because Application Development personnel have great control over the outcomes of their projects, they will exhibit relatively less strain than other groupings. Operations, because of its service nature, may be under relatively greater stress

than Application Development or other occupations. Conversely, the argument could also be made that because of the boundary spanning nature of Applications Development and Liaison roles and because of the problematic nature of bringing about organizational change, workers in these positions would be under greater stress than Operations personnel.

These groupings can also be used to determine to what extent IS personnel differ from each other and from other referent occupations on the various dependent and independent variables.

5.1 OBSERVATIONS ABOUT IS STAFF COMPOSITION

As an aid to formulating questions for investigation, the following conjectures about the composition of the IS staff are made:

1. Applications Development, Systems Programming, Technical Consultants and Technical Management are likely to have similar tasks, skill requirements, experience, attitudes, reactions and needs. This cluster of jobs will be referred to as Applications Development.
2. New, emerging jobs related to End User computing (EUC), such as Functional Support Personnel and End User Computing Support Personnel [Rockart and Flannery, 1983] are similar to the Applications Development cluster.
3. Operations Staff, Operations Support and Operations Management are likely to have similar tasks, skill requirements, etc. This cluster of jobs will be referred to as Operations.
4. Applications Development (1 above) and Operations (3 above) will have tasks, skill requirements, etc. that are different from each other. The implication of this is that different management issues will predominate.
5. Senior Management and the Administrative Staff will have tasks, skill requirements, etc. that are different from each other and are also different from Applications Development and Operations.

6. The Applications Development cluster will have characteristics similar to those of Engineers or Research and Development staffs.
7. The Operations cluster will have characteristics that are similar to Production Workers in a factory.
8. Workers in Applications Development and Liason roles will have the most stressful jobs.

One of the goals of future research should be to subject these conjectures to empirical testing.

6.0 RESEARCH QUESTIONS

One of the most important and difficult aspects of research is posing "good" questions. In formulating these research questions we have taken into account what we believe to be some of the key issues facing IS managers: the extent to which the staff is composed of different job categories and thus may require different management strategies; appropriate referent groups; the effect of tools and assignments; the quality and effect of supervision; the role of stress and burnout; and proper career opportunities.

The following specific research questions need to be investigated:

1. In what ways do the various categories of IS jobs differ? Are they really two basic clusters: applications development and operations support? Are the new specialists in EUC and ICs similar to applications development staffs, or do they have their own distinct characteristics and needs?
2. In what ways does the content of IS work differ from that of other professional office occupations?(footnote 4) What are the proper referent groups? IS personnel have been compared with engineers and accountants. On what basis were these occupations selected and are they the best choices?

3. Do IS personnel have any greater turnover, poorer job satisfaction, greater emotional exhaustion, poorer job content, more supervisory difficulties than do workers in similar professions? If there are differences, it is important to identify them. Even if no differences are found, it may be possible to reduce turnover and improve productivity if one understands the antecedent causes of these outcomes.
4. If the use of software engineering techniques do result in routinizing and standardizing programming (de-skilling), then, given the high emphasis placed on creativity, interesting work and achievement by IS practitioners, some negative affects can be expected. It might be argued, however, that programming is a relatively small part of the average practitioner's job and, consequently, the effect will be minimal.
5. If the quality of first line supervision is, indeed, poorer than that of other professions, then, this suggests the need for better selection and training procedures. Weak first level supervision may be one of the factors contributing to an inability to improve IS staff productivity. Furthermore, the move to EUC can only complicate the supervision issue since user management may not have the requisite skills to provide the needed technical supervision.
6. The mixed findings concerning the importance of career development and growth opportunities suggests that segments of the population may be effected quite differently. For example, arguments could be made that these concerns would be most important at the beginning of a career, where there are the greatest number of choices to be made and the consequences of these choices unclear, or, near the end of a career, where a person is most constrained by previous choices. It is likely that the content of work (the role being played, for example, maintenance programming, or, the languages used) also influence perceptions of career opportunities.
7. With the exception of Weiss' study of IS managers (footnote 5) and Ivancevich's untested model, the issue of worker stress has not been addressed. This represents a major gap in the literature. Turner[1984] has shown that strain (emotional exhaustion) is an important outcome measure in assessing computer work with a separate set of antecedent factors. Given the nature of the job, that of boundary spanning activities involved, IS work should be relatively stressful. Are IS personnel more burned out than other professional groups? High stress might manifest itself by symptoms of emotional exhaustion, or, depersonalization of clients, reports of both are mentioned frequently in the popular press. If this proves to be the case, it would suggest a variety of coping strategies that are not currently in the repertoire of IS management.

7.0 CONCLUSIONS

If a better understanding of the behavior of IS personnel useful for human resources management is to emerge, four major tasks need to be accomplished. First, a comprehensive model that captures those aspects of the work setting likely to be important to service occupations and the interactions among these aspects must be constructed. The great advantage of a general model is that it will permit comparative studies to be made among many occupations without altering the basic model (footnote 6). Section four describes such a model.

Second, the model needs to be tested in a variety of settings across a range of IS occupations, not just in application development. Third, the model should be tested with appropriate referent service occupations (non IS personnel), both to demonstrate its generality and to provide comparative data. Fourth, the evaluations should be repeated at several intervals to determine the stability of the factors being measured.

While previous research concerning IS personnel has shown a number of factors to be important in influencing outcomes, only a relatively few variables have been considered. We propose a program of research that will not only capture a larger proportion of relevant variables with the goal of explaining more variation in outcome measures than before, but will also provide referent data for other similar occupations. It is our objective to understand better the relations between outcomes that effect worker performance and well being and their antecedent factors.

We have argued that mechanistic approaches to productivity improvements in the development of information systems will, by themselves, be insufficient without corresponding attention to human relations factors. Previous research on IS personnel have been guided more by the availability of plausible instruments than by sound theory. Only recently have researchers begun to investigate those factors which have been shown, in other situations, to be strongly related to outcomes. Furthermore, the research that has been performed has been directed at a narrow segment of the IS population, leaving important classifications unexplored. Finally, this research has not been tied to problems faced by practicing managers.

A model integrating many important factors is proposed along with a series of conjectures and questions, which when answered, should provide insight into improved human relations management.

In order to improve the productivity of IS personnel, managers need a much clearer idea of what policies and practices lead to high performance. Firm success in the next decade may well be determined by how well information technology is applied to corporate goals. Key to achieving this aim will be the performance of IS personnel.

FOOTNOTES

(1) Burnout is a syndrome of emotional exhaustion and negative feelings about clients and self that occurs frequently among individuals who deal extensively with other people [Maslach and Jackson, 1981].

(2) The JDS measures the skill variety, task identity, task significance, autonomy and feedback of a position.

(3) It could be argued that the interpersonal conflict involved in bringing about planned change and the large demand for service as evidenced by the backlog of applications make the Applications Development cluster of jobs candidates for burnout.

(4) It might be argued that the rapidly changing nature of technology which creates pressures to continually learn new material, the conflict laden nature of the work in bringing about organizational change and the short supply of skilled practitioners does differentiate IS from other fields. Is IS work really different? Probably not.

(5) Weiss is primarily concerned with the relation of a variety of stressors to an overall index of strain, controlling for various exogenous variables. She did not make use of a control group, so it is not possible to tell whether the strain experienced by IS managers, or, for that matter whether the stressors, are greater than those for other managers, or, whether the stress mechanisms appear to be different.

(6) It is expected that there would be some customizing of the model; mainly in the measures used and to a limited extent, in the selection of variables.

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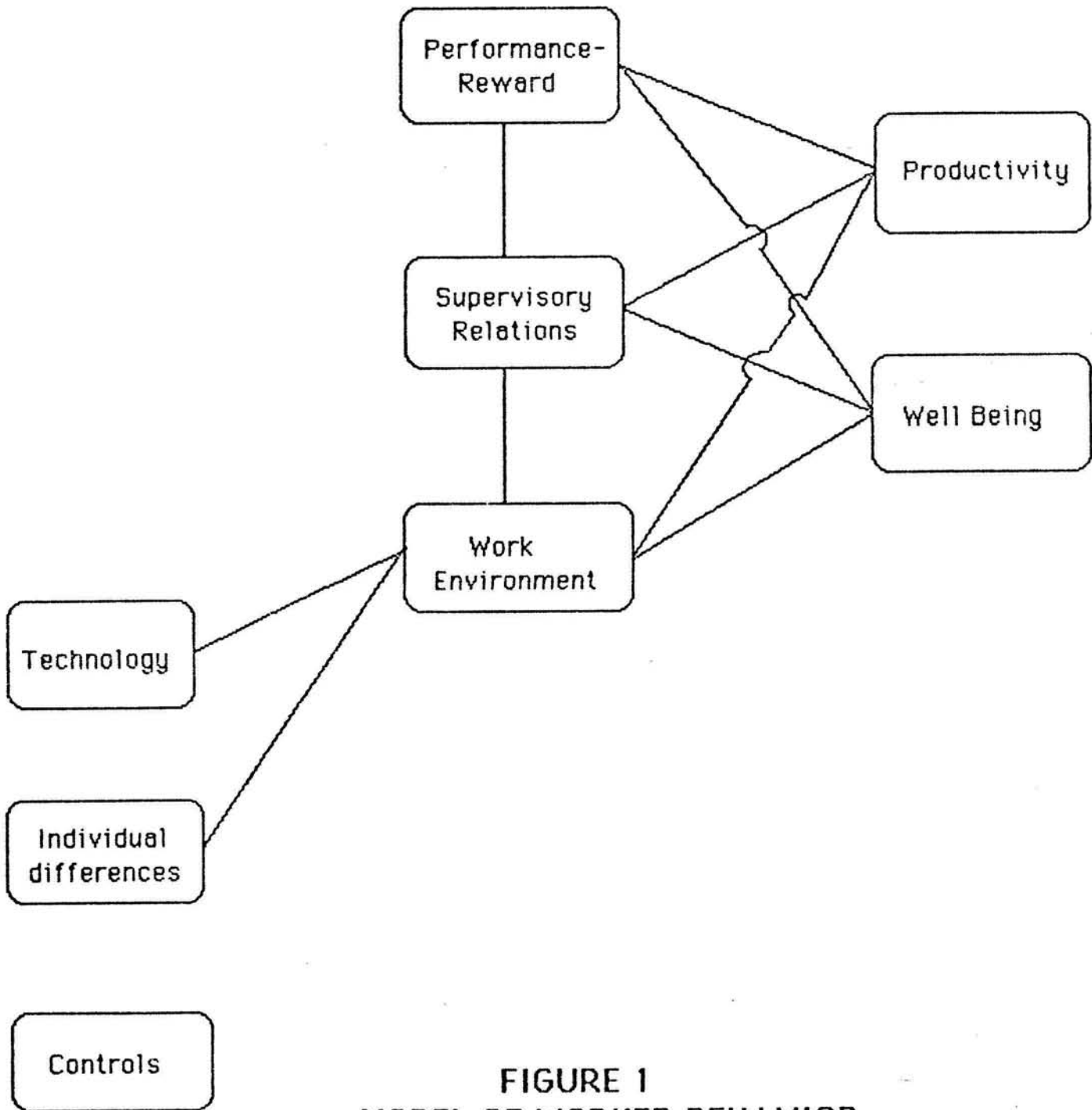


FIGURE 1
MODEL OF WORKER BEHAVIOR