THE IMPACT OF ROLE VARIABLES ON INFORMATION SYSTEM PERSONNEL OUTCOMES: AN EMPIRICAL INVESTIGATION

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Abstract

This study examines the antecedents of job satisfaction, commitment and turnover intentions for 229 information systems development personnel (ISDP) employed by nine companies within several industries. The antecedents studied include boundary spanning, role ambiguity and role conflict. A model of these variables is built and tested via path analysis. A secondary analysis is performed to explore the impacts of task differences on the study variables. The task differences include analytic and programming tasks.

The analyses revealed the following. Systems analysts span more boundaries than programmers. The major hazard faced by systems analysts when they span boundaries is role conflict which negatively impacts their job satisfaction, commitment and intention to quit. The overall effect of boundary spanning is to reduce ISDP intention to quit despite its positive relationship with role conflict. Systems analysts and programmers are both intolerant of role ambiguity. Role ambiguity is very detrimental greatly reducing ISDP job satisfaction, commitment and increasing ISDP intention to quit. Role ambiguity is not related to boundary spanning nor is it related to analytic or programming duties. Programmers are less committed than systems analysts and are more likely to express intentions to leave.

The above information is used to make recommendations to IS management. Finally, recommendations and directions are suggested regarding future research.

1.0 INTRODUCTION

Qualified data processing (DP) personnel are a costly and scarce resource [Datamation, 1982]. The effective management of this resource is important to the success of both the DP department and the increasingly computer-dependent organization. Yet, the management of DP personnel is extremely difficult with much of this difficulty traced to the turnover of DP staff [Miller, 1980].

A 1982 industry survey revealed DP turnover to be 20% with the increase in demand for new DP personnel growing at 15% every year [Gray, 1982]. While certain levels of turnover are necessary to eliminate less effective employees and to encourage innovation [Mobley, 1982], it is not at all clear what an appropriate turnover rate is for IS personnel. However, 20% turnover means that almost half of the DP staff changes every two years; in a field such as data processing where it is estimated to take 18 months for an employee to become maximally productive, 20% turnover is excessive [Bartol and Martin, 1982; Cournoyer, 1983].

DP staff turnover is very expensive. One study reports that the costs of recruiting and training a project leader is $26,000 or 87% of the project leader's $30,000 salary [Barrocci and Cournoyer, 1982]. Additionally, Ives and Olson [1981] found that retaining and recruiting staff is a major preoccupation of the chief information officer's time.

Given the current turnover problem facing the DP profession, it is surprising that only a handful of studies have explored turnover and its antecedents among DP professionals. A review of this limited literature reveals two variables which consistently appear to be important deterrents of DP personnel turnover, these are job satisfaction and organizational commitment [Bartol, 1983; Awad, 1977; Taylor and Tanniru, 1981].

Beyond their relationship to turnover, job satisfaction and organizational commitment have other important consequences for the effective management of DP personnel. While no causal relationship has been established, job satisfaction and job performance have been found to be concomitantly linked [Schwab and Cummings, 1970]. Additionally, a lack of job satisfaction is related to increased absenteeism, ill-health and greivances [Locke, 1976]. Organizational commitment of staff is believed to lead to increased organizational effectiveness [Steers, 1977; Scholl, 1981], and has been found to relate positively to organizational adaptability [Angle and Perry, 1981]. Adaptability is important for DP departments as they operate within a rapidly changing environment; they must be able to adapt to the new technologies as they become available in order to effectively service the organization.

Good people are becoming more difficult to find, keep and manage. Coupled with increasing salaries, companies are paying more and getting less [Miller, 1980]. It follows therefore, that attention to the turnover, job satisfaction and commitment of DP personnel is an important part of building a stable effective

staff, and is a necessary step to begin controlling DP personnel turnover.

This study examines the process by which DP personnel develop turnover intentions. Turnover intentions rather than actual turnover are considered for several reasons. First, turnover intentions have been found to be the best predictor of actual turnover [Mobley, 1982]. Second, it is known that in periods of general economic slowdown, when alternate jobs may not be readily available, actual turnover may be severely restricted. Therefore even though personnel may be generally unhappy and intend to quit this may not be possible until the economic climate improves and alternative jobs are more plentiful. Given the poor economic climate at the time of this study, it was felt that turnover intentions would provide a better measure of personnel disaffection.

To understand how DP personnel develop turnover intentions, a model of information system development personnel (ISDP) turnover intentions, job satisfaction and commitment and their antecedents is formulated and tested. The variables in this model include boundary spanning, role ambiguity, and role conflict. Boundary spanning refers to the individual's crossing of intra and inter-organizational boundaries in order to perform his/her job [Adams, 1976;Tushman and Scanlan, 1981]. The prescriptive literature [Murach, 1977; Mader and Hagen, 1974] suggests that the systems analyst is required to interact with individuals outside the data processing department, necessitating the crossing of many intra-organizational boundaries. Systems

analysts must also translate the special languages that evolve in the various business units into terms understandable to the DP department, another activity characteristic of boundary spanners. Therefore, many of the duties of DP personnel may be characterized as boundary spanning activities.

There are a number of consequences associated with boundary spanning activities. Role conflict and ambiguity are among the reported outcomes of boundary spanning, and these variables have been related to turnover and job dissatisfaction [Van Sell et al, 1981]. Role conflict occurs when the individual receives conflicting job performance information or is expected to do too much [Van Sell et al, 1981]. Role ambiguity refers to the lack of clear and precise information regarding what is expected of the role incumbent [Van Sell et al, 1981].

There are several studies which suggest that role conflict and ambiguity are particular problems for ISDP and thus important MIS research variables [Woodruff, 1980; Bostrom, 1980; Goldstein and Rockart, 1984]. Woodruff [1980] examined the personality profiles of 202 data processing personnel and found they possess significantly higher needs for achievement, cognitive structure, autonomy and a lower need for change than other workers in general. The high need for cognitive structure and low need for change are indicative of individuals with relatively little tolerance for ambiguity.

Kahn et al [1964] found that individuals with a high need for cognition (a construct similar to cognitive structure) displayed a stronger relationship between role conflict and job related tension, indicating DP personnel are prone to the adverse effects of role conflict and ambiguity. Morris and Snyder [1979] report that satisfaction, organizational commitment and propensity to leave the organization are strong negative correlates of inter-sender role conflict for individuals with high levels of autonomy related needs, a characteristic of DP personnel.

While the results are mixed [e.g. Morris and Snyder, 1979; Abdel-Halim, 1981], there is some evidence [Johnson and Stinson, 1975] that individuals with high need for achievement, such as DP personnel, suffer more aversely from the effects of inter-sender conflict and task ambiguity. Abdel-Halim [1981a] reports that jobs in mediating (service) technologies with high Job Diagnostic Scores (JDS) are more vulnerable to role conflict and ambiguity. Couger and Zawacki[1978] found that DP jobs scored high on the JDS, which suggests that DP positions may be very susceptible to role conflict and ambiguity. The evidence is highly suggestive, therefore, that systems professionals with their high JDS job scores and personality profiles- high need for achievement, autonomy, cognition and low need for change- are particularly prone to the adversive effects of role conflict and role ambiguity.

Two studies [Bostrom, 1980; Goldstein and Rockart, 1984] have directly investigated the role characteristics of system designers and their effects on work related outcomes. Bostrom concluded that high levels of role conflict and ambiguity are associated with system designers' positions; he also found that both ambiguity and conflict are negatively associated with designer job satisfaction. Goldstein and Rockart [1984], report that role ambiguity and role conflict are negatively correlated with general job satisfaction, growth satisfaction (the amount of personal growth and development one receives from one's job), satisfaction with co-workers and satisfaction with supervision. In general, Goldstein and Rockart found that the correlations between job satisfaction and role variables are consistently higher than the correlations between job satisfaction and job characteristics (e.g. task identity, skill variety, identity, feedback and significance), highlighting the importance of role conflict and ambiguity in predicting DP personnel job satisfaction.

To summarize, given the characteristics and personalities of ISDP and the results reported by Goldstein and Rockart and Bostrom, role conflict and role ambiguity appear to be variables of particular relevance to MIS personnel research concerned with ISDP job satisfaction, commitment and turnover.

2.0 RESEARCH MODEL AND HYPOTHESES

Boundary spanning, role conflict, role ambiguity, organizational commitment, and intention to quit are all variables which have been studied extensively in the behavioral literature.

- - - Insert Figure 1 here - - -

The model presented in figure 1 is drawn from this literature. Each hypothesized path in the model is explained in the following section.

H1: The greater the number of boundary spanning activities ISDP are engaged in, the greater their intentions to quit.

Adams [1976] suggests that boundary spanning incumbents experience weakened organizational bonds due to their physical and psychological distance from other organizational members. These weakened bonds are reflected in greater intentions to quit. As ISDP span boundaries they are exposed to a greater number of alternative job opportunities both within and outside the organization. Increased awareness of alternative employment opportunities should heighten ISDP intentions to quit.

H2: The greater the number of boundary spanning activities ISDP engage in, the greater their job satisfaction.

Prior research [Miles, 1980a; Keller and Holland, 1975; Keller et al, 1976] has reported a positive relationship between boundary spanning activities and job satisfaction. This

relationship may exist because boundary spanners are believed to have inherently more interesting work and thus should be more satisfied.

H3: The greater the number of boundary spanning activities ISDP engage in, the greater their role conflict.

H3a: The greater the number of boundary spanning activities ISDP engage in, the greater their role ambiguity.

Boundary spanners often assume the role of change agents attempting to influence the behavior of individuals whose preferences may be in conflict; this can lead to role conflict for the change agent [Adams, 1976]. Keller and Holland [1975] posit that conflicting and misunderstood expectations for role performance are often sent to boundary spanners. Additionally, Keller et al [1976] state that since both internal and external role senders have expectations for boundary spanners, these expectations may be inconsistent and result in role conflict or, vague and unclear resulting in role ambiguity. The position that boundary spanning activities lead to role conflict is supported by a large body of empirical work [Miles, 1976; Kahn et al, 1964; Miles and Perrault, 1976; Miles, 1980a].

H4: The greater the number of boundary spanning activities ISDP are engaged in, the less their feelings of commitment to the organization.

Similar to H1, this hypothesis is based on the work of Adams [1976] which argues that boundary spanners experience weakened organizational linkages. Commitment is an organizational linkage. Therefore, the more boundary spanning activities the

weaker the individual's commitment.

H5: The greater the ISDP experience of role conflict, the less their job satisfaction.

H5a: The greater the ISDP experience of role ambiguity, the less their job satisfaction.

Dubinsky and Mattson [1979] report that the preponderance of the evidence indicates quite clearly that role conflict is negatively related to job satisfaction and found that role conflict and ambiguity both decrease job satisfaction. This finding is further supported by the work of Morris and Koch [1979] and Van Sell et al [1981]. Additionally, two studies [Bostrom, 1980; Goldstein and Rockart, 1984] found clear evidence of a relationship between DP personnel role conflict and ambiguity, and job dissatisfaction.

H6: The greater the ISDP role conflict, the greater their intention to leave.

H6a: The greater the ISDP role ambiguity, the greater their intention to leave.

It is expected that as ISDP experience role conflict and ambiguity they will seek to reduce this by withdrawing. A primary withdrawal mechanism is to leave the organization. Miles [1976] found that both role conflict and role ambiguity are related to the propensity to leave the organization. In their review of the behavioral literature, Van Sell et al [1981] report that while inconsistent findings exist, role conflict and role ambiguity appear to be positively related to an individual's

propensity to leave the organization. Finally, Mobley's [1982] review of the behavioral literature reports that intention to quit was positively related to role ambiguity and role conflict.

H7: The greater the ISDP role conflict, the less their commitment.

H7a: The greater the ISDP role ambiguity, the less their commitment.

Just as role conflict and ambiguity increase an individual's intention to leave, it is expected that role conflict and ambiguity will also weaken an individual's attachment to his organization, and this may result in reduced commitment. Dubinsky and Mattson [1979], Morris and Koch [1979], Bedeian and Armenakis [1981], Morris and Sherman [1981], Mowday et al [1982] and Van Sell et al [1981] all found role conflict and ambiguity to be significant and important detractors of organizational commitment.

H8: The greater the ISDP job satisfaction, the less their intentions to leave.

Jamal [1981], Arnold and Feldman [1982] and Steers and Mowday [1981] all found that reduced job satisfaction enhances an individual's intention to leave. In general, strong support exists for this hypothesized relationship.

H9: The greater the ISDP job satisfaction, the greater their commitment.

The preceding hypothesis is based on work by Brief and Aldag [1980] who view the facets of job satisfaction - work, promotions, supervision, people and pay - as antecedents of

commitment; their empirical results are supportive of this position.

H10: The greater the ISDP commitment, the less their intentions to leave.

This hypothesis is consistent with the literature that views organizational commitment as an organizational linkage. The more strongly linked an individual is to an organization the less likely that individual will plan to leave that organization. This view is strongly supported by the empirical literature [Morris and Sherman, 1981; Steers 1977; Hom et al, 1979; Steers and Mowday, 1981; Arnold and Feldman, 1982].

The behavioral literature [e.g. Morris and Koch, 1979] highlights the need to look beyond simple correlations and develop causal models to fully understand the impacts of role variables on job outcomes. Many of the MIS studies concentrate on only one outcome variable [e.g. Bostrom, 1980; Goldstein and Rockart, 1984] and fail to develop causal models [e.g. Bostrom, 1980] limiting our understanding of this complex phenomena. Building and testing a causal model such as the one in figure 1 is necessary in order to understand the dynamics by which ISDP develop intentions to leave. It is only once this process is understood that strategies to reduce turnover can be developed.

3.0 TASK DIFFERENCES

Randolph and Posner [1981] argue that when examining role-related variables and their consequences it is important to examine task characteristics, particularly task differences. Indeed, given the different tasks involved in developing and implementing a system it is expected that task differences will have a significant effect on the way DP personnel experience role characteristics and outcomes. The two general categories of tasks and duties involved in the design, development and implementation of a system that were examined by this study are systems analysis and programming.

Murach [1977] describes systems analysis as requiring the gathering of information from employees at all levels and from various departments of the organization. To perform systems analysis, an individual, he states, must be familiar with computer equipment and programming and be able to develop plans, solutions and systems from the information gathered. Programming, on the other hand, is described [Murach, 1977] as the process of producing computer code, i.e., the sequence of computer instructions required to transform input into output. Programming duties include the testing of code to assure proper functioning and the preparation of documentation for the code. Programming, unlike systems analysis, requires interacting with personnel, primarily internal to the MIS department.

Further highlighting the different tasks involved in programming and systems analysis is a study by Cheney and Lyons [1980] in which they asked IS managers to rank the importance of various skills required of programmers, systems analysts and data processing managers. While the managers reported some skill overlap, they ranked system design and human relations skills as high for systems analysts and ranked operating systems and database management systems skills as key for programmers. To summarize, the systems analyst works with both technically naive users and computer department specialists and as such needs strong human relations skills, an understanding of user area needs, and good technical skills. The programmer, on the other hand, needs primarily a strong technical orientation to successfully carry out his/her job duties.

While most MIS literature [Murach, 1977; Cheney and Lyons, 1980] identifies individuals as either systems analysts or applications programmers, in practice few individuals are employed solely as either one. Rather, most systems positions involve some combination of both tasks. Subjects in this study included individuals with only systems analysis tasks, only programming tasks, and combinations of both tasks. It was expected that reported role characteristics and work outcomes would depend upon the individual's mix of tasks and duties. The following hypotheses examine the consequences of different tasks and duties.

Haa: Individuals with more analytic duties will exhibit greater boundary spanning characteristics than individuals with more programming duties.

Due to the expected boundary spanning nature of the systems analyst position and the correlation found in the literature between boundary spanning and role conflict, it is expected that:

Hbb: Individuals with more analytic duties will perceive more role conflict to be associated with their jobs than will individuals with more programming duties.

Additionally, the process of designing information systems is, at least in part, an art. Information is vague regarding the methods for analyzing systems and the consequences of design activities are often uncertain. Programming, on the other hand, is a detailed and precise process with little ambiguity. Therefore, it is expected that:

Hcc: Individuals with more analytic duties will perceive more role ambiguity than will individuals with more programming duties.

Boundary spanning characteristics have been found to relate negatively to organizational commitment, and as analysts are expected to exhibit more boundary spanning characteristics it is hypothesized that:

Hdd: Individuals with more analytic duties will indicate less commitment than individuals with more programming duties.

Finally, as a consequence of their lower commitment:

Hee: Individuals with more analytic duties will have greater intentions to quit than individuals with more programming duties.

4.0 MEASURES

In constructing the instrument to test the model and hypotheses presented above, measures with extensive histories of reliability and validity were employed whenever possible. Accordingly, the JDI [Smith et al, 1969] was used to measure job satisfaction, The Rizzo et al [1970] scale was used to measure role conflict and role ambiguity. Organizational commitment was measured using the Porter and Smith [Mowday et al, 1979] instrument and intention to quit was measured via three items developed by Mobley et al [1978].

4.1 ADDITIONS TO MEASURES

Based on prior research [Schuler et al, 1982] there was concern that the role ambiguity scale needed to be expanded. Schuler et al [1982] suggest that the commonly used operationalization of role ambiguity is inadequate and should be expanded to include task and reward ambiguity. The task and reward scales were built by decomposing Schuler's definition into several items for each of the two constructs.

Because it is possible that DP personnel, particularly those who are entirely internal to the DP department may be significantly committed to the department but not the organization the definition of commitment was expanded to include both department and organization.

To gather boundary spanning data a measure developed by Miles and Perrault [1976] was adapted and used. The Miles and Perrault [1976] scale measures the boundary spanning activities of laboratory research and development personnel. For use in the ISDP setting, it was necessary to generalize the questionnaire by replacing all references to the laboratory setting with non-situation specific terminology.

Information regarding DP personnel job tasks was gathered using eight items (3 programming items, 5 analysis items) developed by Zmud for use in an unpublished study. A job task score was calculated by taking the averages of the three programming items and the five analytic items; the programming average was then subtracted from the analytic average. The more negative the job task score the more programming the individual is engaged in while the more positive the score the more analytic duties engaged in.

The job task scale, commitment scale and role ambiguity scale were all subjected to extensive validity testing and found to possess desirable characteristics. The measures and details regarding their development and testing may be found in Baroudi [1984].

5.0 THE SAMPLE AND SELECTION

Nine companies, primarily from the New York/Boston area, participated in the study with data collected from a total of 229 individuals. The 229 subjects represents an overall response rate of 85 percent.

The study participants included applications programmers, programmer/analysts, analysts, and project leaders in centralized DP groups. Additionally, to assure that the study participants were engaged in comparable tasks, only those individuals working on internal systems development projects were included. The participating companies varied in size from approximately 30 programmers and analysts to over one thousand. The different industries represented are listed in figure 2.

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Descriptive information on the individual participants is presented in figure 3.

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The data was gather by on-site administration of the questionnaire. The questionnaire took approximately 45 minutes to complete. All subjects were guaranteed anonymity and the participating companies were provided with a summary of the overall findings.

6.0 RESULTS

Path analysis [Kenny, 1979; Billings and Worten, 1978] was used to test the model proposed in figure 1 while correlational analysis [Cohen and Cohen, 1975] was used to test the hypotheses regarding DP personnel task differences. Descriptive statistics and reliabilities for the variables are presented in figure 4.

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6.1 TESTING THE MODEL

To test the relationships hypothesized by the model path coefficients were calculated and tested for statistical significance at the .05 (two-tailed) level. The coefficients are presented in figure 5. Of the fourteen hypothesized paths seven were not significant at the .05 level. The non-significant paths were trimmed from the model [Heise, 1969] resulting in a new "trimmed" model.

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The path coefficients for the trimmed model were (shown in figure 6) computed and tested for significance at the .05 level. The final trimmed path model with the respective beta weights for each path is presented in figure 7.

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One path not included in the original path model, which would imply a zero path coefficient, was found to be significant. This was the path between role ambiguity and role conflict. This path should have been included in the original model.

6.2 TESTING THE RESULTING MODEL

Two statistical tests which can be applied to determine how well the trimmed model captures the relationships in the sample data include testing for omitted third variables and reconstructing the correlation matrix. First, the correlations among the residuals were computed and none found to be significant at the .05 level. This provides evidence that the trimmed model does not omit any important third variables that might account for the relationships described by the model. The second test was the rebuilding of the original correlation matrix from the trimmed path model [Kerlinger and Pedazhur, 1973]. To reproduce each correlation coefficient the direct, indirect and common cause effects were calculated and summed. A detailed description of these effects and how to calculate them can be found in Stumpf and Hartman [1983].

Figure 8 presents the three effects, the original correlations, and the amount of unexplained residual for each reconstructed correlation. A rule of thumb prescribed by Billings and Wroten [1978] is that the difference between the original and reconstructed correlations should be no more than .05.

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The effects not explained by the model are generally below Billings and Wroten's [1978] .05 level; however there are four residuals large enough to warrant further attention. Not surprisingly, the two largest deviations involve role conflict and commitment and role conflict and intention to quit. These two deviations can be explained by the failure to include a path from role conflict to role ambiguity. Had this path been included the indirect effect of role conflict on both commitment and intention to quit would have been greater, substantially reducing the residuals.

The residual for the path from boundary spanning to intention to quit, while above the .05 cutoff, is quite small (only .08) and thus most likely does not indicate any serious practical failing of the model. The large residual for the path between boundary spanning and job satisfaction suggests that the model does not accurately reflect the true relationship between these variables. While boundary spanning does have a negative effect via role conflict it also must have a positive effect not captured by the model as the original correlation was positive. However, the original correlation was not significant, hence its value may not be stable.

Six of the paths hypothesized by the original model were supported by this analysis. Five direct paths hypothesized between the study variables and intention to quit were not supported. However, with the exception of boundary spanning, all

of the variables were found to influence intention to quit in the expected direction although the relationships were indirect, operating through other variables.

The trimmed model illustrates that role ambiguity is extremely dysfunctional, directly reducing job satisfaction and commitment which in turn increases the individual's intention to quit. Role conflict is also dysfunctional, though less severely than ambiguity, directly reducing job satisfaction which in turn reduces commitment and increases intention to quit. Role conflict was found to be partially attributable to ISDP boundary spanning activities.

In general, the model confirms that both role conflict and role ambiguity are important variables in the process by which DP personnel develop intentions to quit. While the model indicates that role conflict is partially attributable to boundary spanning activities it provides no information as to the antecedents of role ambiguity.

6.3 TASK DIFFERENCES

To test the six hypothesized relationships Pearson correlations were computed between the job task score and boundary spanning, role conflict, role ambiguity, job satisfaction, commitment, and intention to quit. Figure 9 lists each hypothesized task difference, the Pearson correlation for the variables and whether the data was supportive, non-supportive or ran counter to the hypothesized relationship.

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The analysis revealed that analytic duties, as expected, related positively to boundary spanning and role conflict. Systems analysts span more boundaries and experience more role conflict than their programmer counterparts. Contrary to expectation, analytic duties were found to be unrelated to role ambiguity. These findings are in agreement with the trimmed model which suggests that boundary spanning, a primary duty of systems analysts, leads to role conflict but is unrelated to role ambiguity.

Relationships counter to those hypothesized were found for Hdd and Hee. Individuals with more analytic duties were found to be more committed and less likely to have intentions of quitting than those with more programming duties. These findings are also consistent with with the trimmed model. Individuals with more analytic duties also tend to be boundary spanners as confirmed by Haa. The model predicts that these individuals, due to their boundary spanning activities, have enhanced commitment and reduced intentions to quit.

The task difference analysis demonstrated that boundary spanning is an elegant and powerful way to describe many of the duties of the systems analyst, as boundary spanning and the job task score share 25% of their variance. Finally, contrary to expectations, it is the programmer and not the systems analyst who is the high-risk employee as programmers are less committed and more likely to intend to leave the organization.

7.0 DISCUSSION AND IMPLICATIONS

This study has helped to explain the process whereby DP personnel develop turnover intentions. It also has offered some insights into the differences between programmers and analysts.

The results provide important information for the IS manager. Given the severely dysfunctional outcomes associated with role ambiguity, it is important to evaluate the extent to which IS department policies and practices create or reduce ambiguity. During informal discussions held with the study participants it became apparent that reward policies and task assignments are major areas of uncertainty for IS personnel. Reward systems, job assignments, objectives, and tasks should, to the extent possible, be clearly specified. It may not be feasible, however, to remove or reduce ambiguity for all projects. There may be assignments that evolve over time making it difficult to specify clearly at the beginning, objectives and the methods to achieve these as yet ambiguous goals. Additionally, because DP is a dynamic field with rapidly changing technology and tools, it may be impossible or undesirable to eliminate all role ambiguity for DP personnel as companies attempt to take advantage of these new and unfamiliar technologies. However, IS management should be cognizant of the dangers of role ambiguity and attempt whenever feasible to identify ambiguity so that it may be controlled.

While the task analysis did not reveal significant differences in role ambiguity for analysts and programmers, it did find several other significant differences which provide important information regarding DP career paths. Given that ISDP with more analytic duties span more boundaries and tend to experience more role conflict than their programmer counterparts, these positions are quite dissimilar. Indeed, boundary spanning and the analytic task score share 25% of their variance suggesting that a large number of the job duties analysts are responsible for involve boundary spanning activities. These results challenge the appropriateness of promoting programmers to analytic positions without first evaluating how well the programmer will function as a boundary spanner. It may be inappropriate to have a single career path for both analysts and programmers. Just as systems programming and support has emerged in many companies as a separate career path from applications work, perhaps there should also be distinct career ladders for systems analysis and programming.

7.1 RECOMMENDATIONS FOR FUTURE RESEARCH

While this study has been useful in forwarding our understanding of IS personnel, several limitations to this research exist.

First, while the study employed carefully constructed measures, most with lengthy histories of reliability and validity, and employed powerful statistical techniques, the data were cross-sectional. Longitudinal studies are needed to fully

address the issue of causation.

Second, a major limitation of this study is its failure to relate the variables studied to IS personnel performance. While this study provides information that role conflict is detrimental in terms of ISDP turnover intentions, its effects on performance are uncertain. It is possible that role conflict may be necessary for the performance of certain DP positions. For example, in order to design a system it may be necessary for the analyst to experience the role conflict that comes from interviewing different users and then balancing these potentially opposing needs with the limited resources of the DP department. This role conflict may result in a better system than the analyst who remains isolated within the DP department, unexposed to role conflict, designing a system without gathering the actual user requirements.

There is reason to suspect, however, that the experience of role conflict by the programmer will result in poorer performance. The code required should be clearly detailed with all conflict resolved before the specifications are presented to the programmer. Further research on the impact of conflict and ambiguity on ISDP performance should be conducted.

Third, in depth research into DP career paths is needed as this study suggests that the skills required for analytic and programming work are quite different. The assumption of a need for separate DP career paths, one for programming and one for analysts, needs to be explored. Research into this area should

include examination of the differeing cognitive processes, attitudes and skills required of analysts and programmers. Once adequate information has been generated to determine the appropriateness of IS career paths then selection and training guidelines can be developed to more effectively select, promote and manage the careers of IS personnel.

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NUMBER OF COMPANIES	INDUSTRY	NUMBER OF SUBJECTS
1	COMMERCIAL BANKING	24
3	INSURANCE	84
2	BROKERAGE	41
1	PUBLIC ACCOUNTING	27
1	INVESTMENT BANKING	26
1	ELECTRONICS MANUFACTURING	26
9		229

Figure 2

DESCRIPTIVE STATISTICS

AGE

RANGE	NUMBER	PERCENT
20-30	96	42%
30-40	98	43%
40-50	30	13%
50-60	5	2%
	229	100%

GENDER

Female	92	40%
Male	137	60%
	229	100%

YEARS EXPERIENCE IN DATA PROCESSING

Mean	6.1 years
Minimum	1.0 years
Maximum	27 years
S.D.	4.5 years

YEARS WITH COMPANY

Mean	4.332 years
Minimum	1.0 years
Maximum	25.0 years
S.D.	4.9 years

EDUCATION

High School Degree	6	3%
Technical School Experience	8	4%
Some College	37	16%
College Degree	99	43%
Some Graduate Work	35	15%
Master's or Higher Degree	44	19%
	229	100%

Figure 3

VARIABLE	MEAN	THEORETICAL MINIMUM	MINIMUM	THEORETICAL MAXIMUM	MAXIMUM	S.D.	RELIABILITY CRONBACH'S ALPHA
Boundary Spanning	19.2	10.0	10.0	50.0	39.0	6.5	.80
Commitment	101.731	30.0	33.0	210.0	177.0	31.5	.94
Role Conflict	31.102	8.0	10.0	56.0	52.0	8.4	.79
Role Ambiguity	15.1	3.0	8.5	21.0	20.6	2.3	.85
Job Satisfaction	110.9	0.0	31.8	216.0	164.4	25.3	.91
Intention to Quit	8.2	3.0	3.0	15.0	15.0	3.1	.89

Figure 4

MODEL PATH COEFFICIENTS

PATH	PATH COEFFICIENT
BS to RA	r BS, RA
BS to RC	r BS, RC
BS to JS	beta JS, BS. RA, RC
BS to COMM	beta COMM, BS. RA, RC, JS
BS to IQ	beta IQ, BS. RA, RC, JS, COMM
RA to JS	beta JS, RA. BS
RA to COMM	beta COMM, RA. BS, JS
RA to IQ	beta IQ, RA. BS, JS, COMM
RC to JS	beta JS, RC. BS
RC to COMM	beta COMM, RC. BS, JS
RC to IQ	beta IQ, RC, BS. JS, COMM
JS to COMM	beta COMM, JS. BS, RA, RC
JS to IQ	beta IQ, JS. BS, RA, RC, COMM
COMM to IQ	beta IQ, COMM. BS, RA, RC, JS
BS = Boundary Spanning	RA = Role Ambiguity
RC = Role Conlicct	JS = Job Satisfaction
Comm = Commitment	IQ = Intention to Quit

Legend: r refers to the correlation between two variables.

beta refers to the beta weight that results from the regression of the specified variables.

For example, beta JS, BS. RA, RC is the beta weight resulting from regressing BS on JS (dependent variable) partialing RA and RC.

Figure 5

TRIMMED MODEL PATH COEFFICIENTS

PATH	PATH COEFFICIENTS
BS to RC	r BS, RC
BS to COMM	beta COMM, BS. RC, JS
RC to JS	r RC, JS
RA to JS	r RA, JS
RA to COMM	beta COMM, RA. JS
JS to COMM	beta COMM, JS. BS, RC, RA
COMM to IQ	r IQ, COMM

Figure 6

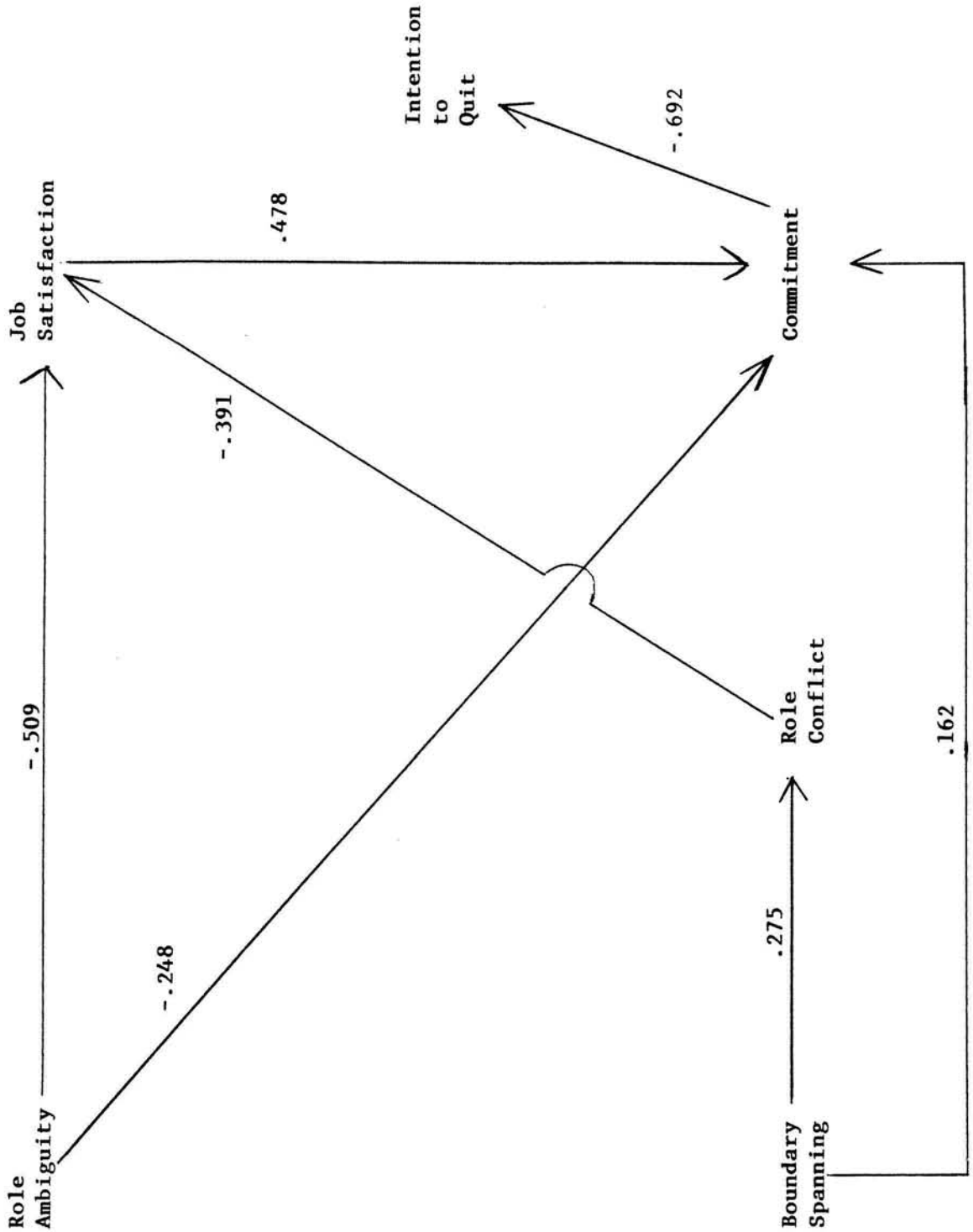

FIGURE 7

PATH	ORIGINAL CORRELATION	RECONSTRUCTED CORRELATION	DIFFERENCE	DIRECT EFFECT	INDIRECT EFFECT	COMMON CAUSE EFFECT
BS to IQ	-.161	-.076	.08	0.00	-.076	0.00
BS to COMM	.164	.11	.05	.162	-.052	0.00
BS to JS	.047	-.107	.15	0.00	-.107	0.00
BS to RC	.275	.275	0.00	.275	0.00	0.00
RA to JS	-.509	-.509	0.00	-.509	0.00	0.00
RA to COMM	-.499	-.499	0.00	-.248	-.244	0.00
RA to IQ	.359	.341	.01	0.00	.341	0.00
RC to JS	-.391	-.391	0.00	-.391	0.00	0.00
RC to COMM	-.272	-.143	.13	0.00	-.187	.044
RC to IQ	.24	.10	.14	0.00	.129	-.031
JS to COMM	.618	.617	0.00	.478	0.00	.139
JS to IQ	-.436	-.406	.03	0.00	-.331	-.075
COMM to IQ	-.692	-.692	0.00	-.692	0.00	0.00

Reconstructed Correlation = Direct Effect + Indirect Effect + Common Cause Effect

Difference = Original Correlation - Reconstructed Correlation

Figure 8

HYPOTHESIS	CORRELATION	SUPPORT
Haa: Individuals with more analytic duties will exhibit greater boundary spanning characteristics than individuals with more programming duties	.5812 p = .000	Supported
Hbb: Individuals with more analytic duties will perceive more role conflict to be associated with their jos than will individuals with more programming duties	.2172 p = .001	Supported
Hcc: Individuals with more analytic duties will perceive more role ambiguity than will individuals with more programming duties	.0537 p = .218	Not Supported
Hdd: Individuals with more analytic duties will indicate less commitment than individqals with more programming duties	.1318 p = .02	Counter
Hee: Individuals with more analytic duties will have greater intentions to quit than individuals with more programming duties quit.	-.1670 p = .006	Counter

Figure 9