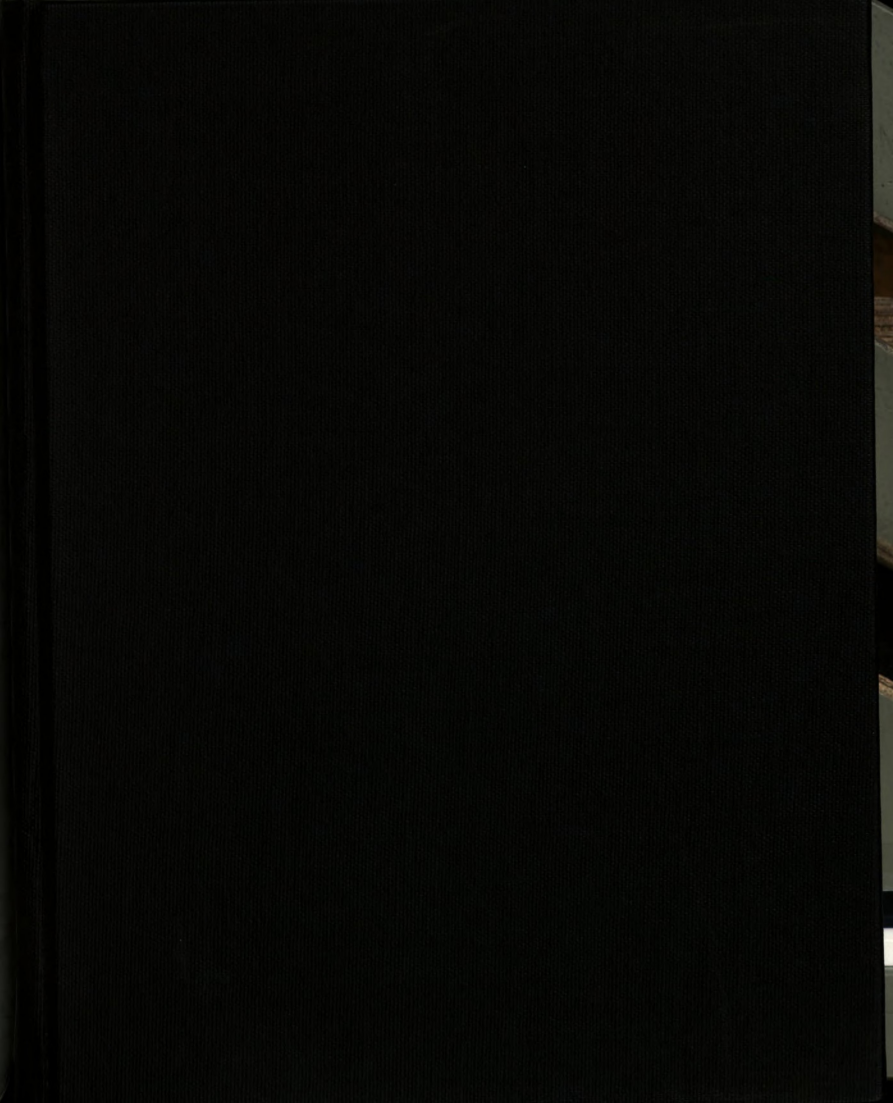




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A

JOB MAINTENANCE
INSTRUCTIONAL SIMULATION

By

Boyd F. Robinson, Jr.

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Administration and Curriculum

1983

ABSTRACT

A JOB MAINTENANCE INSTRUCTIONAL SIMULATION

BY

Boyd F. Robinson, Jr.

Job maintenance skills are those that allow workers to remain productively employed. Such skills are also called employability skills, job retention skills, and survival skills. A workshop developed by Bobbitt, Robinson and Serowik used an instructional simulation of the job maintenance process called the Job Maintenance Game to instruct adults on how to keep a job. The model of the process posited that four determinants of job maintenance — employee decisionmaking, employee productivity, employee motivation, and environmental effects — account for job retentions or job terminations.

The problem of the study concerned the performance of selected CETA Work Experience Program members in the Job Maintenance Game. Study participants were assigned to either Group I with relatively stable employment records or Group II with relatively unstable employment records. The study was a formative evaluation of the game that investigated (1) a between-groups comparison of selected predispositions and game strategies, (2) the within-group changes in strategies from Game 1 to Game 2, and (3) the relationships between determinants and job terminations. A computer simulation of the Job Maintenance

Game established the theoretical limits of the game and served to establish the general (non-statistical) reliability of the game.

There were 29 Group I and 35 Group II participants. Data were analyzed using nonparametric statistics. Findings indicated that Group I participants were older, better educated, had more promotions and more work experience than Group II. Group II out-performed Group I during Game 1, though differences were not statistically significant. Participants did not vary in their strategies during Game 2 by employment history category. For Group I, a statistically significant increase in the quality of strategy was noted from Game 1 to Game 2 while Group II showed a statistically non-significant decrease in that regard.

For Group I, the determinants were significantly correlated with job terminations for Game 1 and even more strongly correlated for Game 2. The reverse was true for Group II where weak non-significant correlations were obtained from Game 1 with even weaker results for Game 2. Predispositions of participants did not appear to vary by employment history category.

DEDICATED
TO
THOSE WHO
INSPIRE
OTHERS

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Chapter I

INTRODUCTION

For many blue-collar workers in the nation, the task of remaining productively employed is of serious concern. The problem is that many workers lack the necessary skills to prevent job loss. Such skills may be referred to as job maintenance skills. In essence, workers lacking job maintenance skills are unable to exercise control over their job behavior and job performance as well as their job, home, and community environment to an extent that would allow them to remain productively employed. Symptoms of the problem may include high turnover, reduced productivity, and low employee morale which can have substantial economic and social effect. While the most obvious response is to assist affected workers to acquire the needed job maintenance skills, the means to accomplish that task are not self-evident. One promising educational or training approach that is being used increasingly in many educational and training situations is instructional simulation. While the development of simulated training activities is an involved undertaking, the results may be well worth the investment. This study examines the use of a specific educational simulation as a means for blue-collar workers to acquire job maintenance skills.

Background of the Study

This study resulted from the author's experience with a developmental project funded through the Michigan Department of Labor to address the problem of workers with inadequate job maintenance skills. In an effort to provide instructors of manpower training programs with a training package dealing with job maintenance skills, Bobbitt, Serowik, and the author of this study developed in late 1975 and early 1976 a resource unit entitled Job Maintenance Workshop: A Resource Manual For Instructing Adults On How To Keep A Job.¹

The workshop was piloted several times during development with apparent success in motivating and holding the interest of participants, though empirical tests were not conducted. Piloting and later presentations of the workshop were given to members of a number of Comprehensive Employment and Training Act (CETA) Work Experience Programs who had experienced difficulty in remaining stably employed. Positive responses to the workshop were obtained from group leaders and participants in almost all cases. It was generally felt by participants that the workshop promoted a better understanding of the process of job maintenance.

The central element of the workshop is the Job Maintenance Game, an educational simulation/game of the job maintenance process. The Job Maintenance Game is an instructional board game that can be used in the teaching of job maintenance skills and strategies. It was designed to simulate the process by which employees keep or lose jobs

¹Frank Bobbitt, Boyd F. Robinson, Jr., and Faith Serowik, Job Maintenance Workshop: A Resource Manual For Instructing Adults On How To Keep A Job, Special Paper No. 28, Center for Rural Manpower and Public Affairs (East Lansing: Michigan State University, 1976).

under conditions of employment typically experienced by blue-collar workers. It may be played with a maximum of eight players in a given game. Essentially, the Job Maintenance Game requires players to make a number of job-related decisions which affect the player's ability to maintain a job in a positive or negative fashion depending upon the quality of the decisionmaking. Chance also affects the player's ability to maintain a job as it was built into the game's rule structure and various board events. The player may, to a degree, overcome the negative effects of chance through quality decisionmaking while taking advantage of the positive effects of chance.

The Job Maintenance Game may be used independently or as a complement to other learning activities of the workshop. The game introduces participants to the language and nature of the process and appears to allow for the discovery and learning of the strategies of job maintenance. Debriefing of participants following the game reinforces learning through an examination of the changes in feeling, beliefs, attitudes and opinions of participants. Group discussion of how strategies in the game relate to the real world of work also serves to reinforce what was learned in the game.

Observation of game participants during developmental and post-developmental workshop stages leads the author to suggest that the Job Maintenance Game does:

1. Allow for active learner participation.
2. Hold the interest of the participants.
3. Provide a basis for changes in beliefs and opinions regarding job maintenance.
4. Provide a basis by which participants can understand the process of job maintenance.
5. Provide a basis for the acquisition or learning of job maintenance strategies.

Though preliminary findings appeared to indicate that the game had value as an instructional device, additional knowledge of the operations and outcomes was needed. In order to acquire data regarding the theoretical outcomes of the Job Maintenance Game, the development of a computer simulation of the game was undertaken.² Essentially, the purpose of that development was to provide a research tool to test the game under controlled conditions. While no attempt was made to develop the simulation as a computer-based learning game, the flexibility to change the input parameters, including both strategies of play and the game's rule structure, was built in to provide a means of "tuning" the game. Other objectives which could be achieved through the computer simulation include reliability testing, comparison of the outcomes of specific strategies, and determination of theoretical relationships among major outcome variables in the game.

The version of the Job Maintenance Game used in the study represented a first approximation of an educational simulation of the job maintenance process. As such, any strong claims regarding the effectiveness of the game as an instructional device must be deferred until the validity of the simulation is demonstrated. In the continuing development of the Job Maintenance Game, there are a number of considerations which logically precede a final or summative evaluation of game validity. Essentially, those considerations relate to a formative evaluation of the game and to the methodology by which such evaluation is achieved.

²Joanne Berry, "Documentation for a Computer Simulation of the Job Maintenance Game," Agricultural Economics. Michigan State University (Unpublished Documentation, June 1977).

Statement of the Problem

The study was concerned with a formative evaluation of the Job Maintenance Game through an investigation of the game performance of participants from selected public manpower programs. The primary purpose was to provide information which would (1) serve as a basis for later revision and refinement of the Job Maintenance Game and (2) serve to clarify the relationships among the major variables in the Job Maintenance Game.

The problem of the study centered on an investigation of performance in the Job Maintenance Game and several predispositions of participants for selected public manpower programs. Participants were divided on the basis of their records of employment which yielded subgroups of individuals with relatively stable employment records and individuals with relatively unstable employment records.

There were four specific areas of concern to the study. The first area was related to the extent to which the identified subgroups differed in their job maintenance strategies. The second area was related to the extent to which each subgroup was able to improve its job maintenance strategies. The third area dealt with relationships among a number of dimensions and factors in the Job Maintenance Game, while the fourth area was concerned with the extent to which the groups differed on a number of predispositions toward selected factors of the job maintenance process and toward simulation games.

Job maintenance strategies in the game were essentially defined by three key dimensions of participant decisionmaking. Those dimensions were: (1) simulated production decisions which are player decisions to acquire production units, representing a basic desire to

be productive, (2) simulated job maintenance decisions which are player decisions to acquire job maintenance tokens, representing the desire to improve as a worker, and (3) simulated job decisions which are player decisions to use job maintenance tokens, representing a desire to make quality job-related decisions.

Player decisions on those dimensions plus the effects of chance combine to determine levels of performance on a set of job maintenance factors. The job maintenance factors of interest for the study were: (1) simulated productivity, (2) simulated net job maintenance effort, and (3) simulated job terminations. The above dimensions and factors are defined in a later section on definition of terms. Indices of the quality of job maintenance strategies were achieved directly through measures of the key dimensions and indirectly through measures of the job maintenance factors in the simulation. The participant predispositions of interest in the study were predispositions toward the role of productivity and the role of employee decisionmaking in the job maintenance process and predispositions toward participation in simulation games.

Need for the Study

The primary need for the study was to investigate the impact of the Job Maintenance Game as an instructional device. Inasmuch as the Job Maintenance Game had been used in public manpower programs and inasmuch as an empirical evaluation of the game had not been conducted, the need to conduct a formative evaluation of the game to provide a basis for improvement and revision was apparent. Other specific needs for the study were peripheral and enabling in nature.

One need for the study which could be only indirectly addressed was concerned with developing a better understanding of the use of simulation as a research and educational tool. However, as Boocock and Schild have noted, ". . . the newness and complexities of the field are such that virtually any well-thought-out evaluative research will make a genuine contribution to our knowledge. . . ." ³ It is hoped that the results of this study will in a way contribute to that goal.

Another reason for conducting the study was a strong societal need to address the problem of workers with inadequate job maintenance skills. Providing high quality training programs devoted to assisting such workers in acquiring additional skills, thereby allowing them to become stably employed, is a pressing concern. It is believed that the results of the study will serve to facilitate the development of quality job maintenance training programs.

An additional need concerns the development of a better understanding of the process of job maintenance. Previous research relating to job maintenance has tended to be fragmented. Studies relating factors such as to absenteeism, job satisfaction, turnover, working conditions, worker attitudes, and job stability have investigated various aspects of the job maintenance process. In addition, such research has tended to be highly management-oriented and designed to provide management with ways of manipulating the job environment to overcome problems relating to job maintenance. The Job Maintenance Game incorporates the process of job maintenance in a holistic and

³Sarane S. Boocock and E. O. Schild (eds.), Simulation Game In Learning (Beverly Hills: Sage Publications, Inc., 1968), p. 266.

worker-oriented manner. Such an approach should lead to a better understanding of the job maintenance process.

Assumptions of the Study

The following assumptions were made in order to facilitate the implementation of the study:

1. The basic difference between workers with relatively stable employment records and workers with relatively unstable employment records was the difference in the strategies they used to maintain their jobs.
2. The strategies used by participants in the Job Maintenance Game reflect the strategies that the participants would use in the world of work.
3. The Job Maintenance Game sufficiently reflected the reality of the work setting to make inferences about the strategies of the participants meaningful.
4. The Job Maintenance Game was as reliable for use with workers with relatively stable employment records as it was for workers with relatively unstable employment records.

Chapter II

REVIEW OF RELATED LITERATURE

The study was an investigation of an instructional simulation of the process through which employees attempt to maintain their jobs. The review of literature dealt specifically with two major areas of research relevant to the investigation which were the evaluation of simulation games and the determinants of job maintenance. Additionally, studies paralleling the thrust of this study were reviewed separately. For reader convenience, the highlights of the review are presented at the end of each major section.

Background of the Review

Research and other literature concerning the employment scene has been extensive over the last fifty years. A 1955 seven-part report by the Psychological Service of Pittsburgh included over fifteen hundred citations relating to research and opinion on job attitudes alone.⁴ Research relating to simulation games in the classroom and their evaluation is of more recent vintage. Boocock and Schild noted in 1968 that ". . . the design of simulation games for classroom use

⁴Psychological Service of Pittsburgh, Job Attitudes: Review of Research and Opinion, 7 Vols. (Pittsburgh: Psychological Service of Pittsburgh, 1955).

is essentially a phenomenon of the last decade. . . ."⁵ In a 1976 bibliography of research findings, Bailey stated that "Simulation/game research is still in the early stages of its evolution. . . ." Bailey provides approximately one hundred citations of empirical studies concerning instructional simulation.⁶ Compared with the voluminous research conducted regarding job satisfaction, productivity, working conditions, and other determinants of job maintenance, research on simulation games and their evaluation has been limited.

Research in the two areas of interest are subject to similar criticisms. In general, both areas are treated by researchers from numerous disciplines. In a multitude of labor turnover studies, the determinants of job maintenance have been researched by industrial psychologists, social psychologists, organizational theorists, economists, and others, as has been noted by Pettman.⁷ Research relating to simulation games has been conducted by researchers in education, business, computer science, mathematics, military science, and other disciplines. Research findings have tended to be fragmented, ambiguous or inconsistent, and difficult to synthesize into a meaningful whole. With regard to labor turnover research, Pettman stated that ". . . there has been a paucity of integration of disciplines."⁸ The

⁵Sarane S. Boocock and E. O. Schild, Simulation Games and Learning (Beverly Hills: Sage Publications, Inc., 1968), p. 15.

⁶Charles W. Bailey, "Instructional Simulation Games: A Bibliography of Research Findings," International Journal of Instructional Media, 4 (1) 1976-77: 78.

⁷Barrie O. Pettman, ed., Labor Turnover and Retention (New York: John Wiley and Sons, Inc., 1975), p. 47.

⁸Ibid., p. 48.

same conclusion seems eminently applicable to research relating to simulation games in light of this review of literature and Cruickshank and Mager's statement that "Although there is a body of knowledge about instructional simulation and games it certainly is not organized"9

Based on the review conducted by this author, it would further appear that objective studies of an empirical nature based on sound methodologies are limited in both areas while highly opinionated articles and materials abound. Though only a few reviews of research were located for the two areas, reviews do appear to adequately reflect the current state of affairs. The reviews with relevance to the determinants of job maintenance have a longer history with more updating than is the case with reviews relating to the evaluation of simulation games. Reviews in both the areas have served to synthesize the respective research as well as seems possible.

The review of the literature for this study involved both a conventional search and a computer search of the ERIC system for literature in the two areas of interest. The ERIC search generated almost 250 citations of potential use related to job maintenance and almost 150 citations of potential use related to the evaluation of simulation games. Abstracts of the above citations were reviewed, and slightly over 21 percent were selected for additional examination. In the area of job maintenance, 51 citations were examined in the jour-

⁹Donald R. Cruickshank and Gerald M. Mager, "Toward Theory Building in the Field of Instructional Games and Simulations," Programmed Learning and Educational Technology, 13 (3) (July, 1976), p.5.

nals or on microfiche. In the area of evaluation of simulation games, 34 citations were selected for additional examination. Approximately 25 research documents from both the conventional and computer searchers formed the basis of the review for the determinants of job maintenance. For the evaluation of simulation games, about 20 books and documents formed the basis of the review.

A word of explanation concerning the heavy dependence on other reviews as the basis for the review of literature for this study is necessary. Typically, researchers are bound to review the research of similar studies in their field of endeavor. For this study, the research studies would be those that: (1) research the use of the Job Maintenance Game specifically, (2) research similar simulation games with respect to the content of the game, or (3) research the use of simulation games on the population of concern. With respect to these three categories, only one research study representing category (2) was found by the writer. As one study would produce for a very short review, the area of review was expanded to include the determinants of job maintenance and the evaluation of simulation games. The review was expanded with the intent of researching the concept of job maintenance by examining the literature concerning employee turnover. An examination of the literature concerning the evaluation of simulation games was conducted to better understand the formative evaluation of the job maintenance game. In both cases the type of research findings needed was summative rather than specific. As such, the use of research reviews which summarized the findings was deemed adequate for both major content areas.

Determinants of Job Maintenance

As one might suspect, the treatment of a subject by researchers in a number of disciplines has meant that each discipline has tended to develop its own terminology to describe the subject area. With regard to job maintenance outcomes, the terminology used by the various disciplines has included job retention/termination, turnover, quits, voluntary and involuntary separations, withdrawal behavior, and job survival. Such diversity creates obstacles to summarizing research studies. Further, each of the terms may have been measured by a number of different means. Muchinsky and Tuttle have noted in a review of 150 studies relating to employee turnover that Gaudet in 1960 had documented 25 indices of turnover used in research studies.¹⁰ Because of that diversity, little attempt has been made to define employee turnover in precise terms from an interdisciplinary point of view. For the purpose of this study the writer assumes that the various terms describe the same general phenomenon, and in particular that job termination is an expression of the variable for individuals, while employee turnover reflects a group measurement of the same variable.

As Muchinsky and Morrow stated, "The history of research on employee turnover is both lengthy and diverse as turnover has been the object of research for over 65 years. . . ."¹¹ During that period the

¹⁰Paul M. Muchinsky and Mark L. Tuttle, "Employee Turnover: An Empirical and Methodological Assessment," Journal of Vocational Behavior, 14 (1) (February 1979), p. 65.

¹¹Paul M. Muchinsky and Paula C. Morrow, "A Multidisciplinary Model of Voluntary Employee Turnover," Journal of Vocational Behavior, 17 (3) (December 1980), p. 263.

above authors estimate that from 1500 to 2000 publications of all types have dealt with employee turnover.¹² To date, there have been six major reviews of the literature on employee turnover. Porter and Steers reported in 1973:

"In the past there have been some four reviews of the literature dealing with turnover and absenteeism. Three of these (Brayfield and Crockett, 1955; Herzberg, Mausner, Peterson, and Capwell, 1957; Vroom, 1964) are now somewhat dated in relation to all of the research carried out during the past decade or so, and the fourth (Schuh, 1967) represents a highly specialized review of only a portion of the available literature."¹³

In addition to the four reviews mentioned above, two other reviews (Porter and Steers, 1973, as well as Muchinsky and Tuttle, 1979) have summarized the literature on the prediction of turnover. As the two latter reviews are the most recent and most encompassing, those reviews will be used extensively for the purposes of this study. Essentially, the two reviews were directed toward identifying the determinants or predictors of turnover as well as specifying the direction of the relationship between the predictors and turnover.

Before turning to an examination of research results concerning the determinants of job maintenance (predictors or determinants of turnover), a brief statement about the nature of the factors and dimensions of the Job Maintenance Game is in order. Those factors and dimensions discussed in the introduction are an outgrowth of the job maintenance concept to be discussed in the chapter entitled Conceptual Framework. The four elements of the job maintenance concept plus the

¹²Ibid.

¹³Lyman W. Porter and Richard M. Steers, "Organizational, Work, and Personal Factors in Employee Turnover and Absenteeism," Psychological Bulletin, 80 (2) (1973), p. 151.

outcome variables provide a basis on which the parameters of the review of literature may be delineated. The four elements of the job maintenance concept are employee decisionmaking, employee productivity, employee motivation, and environmental effects. The outcome variables of interest are job retention and job termination.

Porter and Steers, in 1973, chose to report their review of turnover research on the basis of four categories representing levels within an organization.¹⁴ Those categories were (1) organization-wide factors, (2) immediate work environment factors, (3) job content factors, and (4) personal factors. In addition, Porter and Steers also summarized the literature with regard to overall job satisfaction.

After reviewing the category scheme used by Porter and Steers, Muchinsky and Tuttle, in 1979, stated:

"While one can find fault with any clustering procedure, we chose to group studies on the basis of similar empirical predictors, and in so doing arrived at five categories to summarize previous research: attitudinal (job satisfaction), biodata, personal, work-related, and test-score predictors."¹⁵

While the category schemes for the two reviews differed, many of the individual factors were essentially the same. The 1979 review represented an update with additional studies included, and each review covered some areas not covered by the other.

As the category schemes used by the two reviewing teams do not match well with each other or with the organizing scheme of this study, the review of the research studies will be presented on the basis of individual factors. Only those research results relating to

¹⁴Porter and Steers, p. 152.

¹⁵Muchinsky and Tuttle, p. 44.

the elements of the job maintenance concept will be included. It should also be noted that for any given factor under consideration, the two reviewing teams covered many of the same studies. However, the overlap was not complete as each covered studies that the other did not include.

Porter and Steers placed most of the studies regarding job satisfaction into a single separate category, but satisfaction regarding pay and promotion, supervisory relations, peer group interactions, and job content individually were placed under one of the four categories based on levels within the organization. The Muchinsky-Tuttle Review placed all studies related to satisfaction under the attitudinal category. All findings relating to satisfaction will be considered together for this review.

Attitudinal Factors

With regard to job satisfaction, the Porter and Steers Review found fourteen studies which had negative relationships with turnover and one which showed a zero relationship. Those reviewers noted that many studies have underscored the importance of job satisfaction in predicting turnover. They further stated: "However, it appears that expressed intentions concerning future participation may be an even better predictor."¹⁶ In summary, Porter and Steers found that recent evidence is consistent with earlier findings regarding the effect of job satisfaction on turnover. For thirty-seven of forty-one studies, Muchinsky and Tuttle reported a negative relationship between satisfaction and turnover and stated: "The large amount of research on

¹⁶Porter and Steers, p. 153.

attitudinal predictors of turnover yields highly consistent results: job dissatisfaction is associated with turnover."¹⁷

Satisfaction concerning pay and promotion has been found to be negatively related to turnover. In ten studies reported by Porter and Steers, those reviewers found all to report negative relationships between pay and promotion and turnover. Further, they stated: "Pay and promotional considerations often appear to represent significant factors in the termination decision."¹⁸

Satisfaction with supervisory relations has in general been found to be negatively related to turnover. Of several studies cited by Porter and Steers, four reported a negative relationship, two reported a negative but curvilinear relationship, and one reported a zero relationship. The reviewers go on to state: "Several studies have pointed to the importance of supervisory style as a major factor in turnover. Apparently, when one's expectations concerning what the nature of supervision should be like remain substantially unmet, his propensity to leave increases."¹⁹

With regard to satisfactory peer group interactions, Porter and Steers stated:

". . . most of the research in the area of co-worker satisfaction demonstrates the potential importance of such satisfaction in retention. Such findings, however, are not universal. A possible explanation for the divergent findings is that some people have a lower need for affiliation than others and may place less

¹⁷Muchinsky and Tuttle, p. 58.

¹⁸Porter and Steers, p. 156.

¹⁹Ibid., p. 161.

importance on satisfactory co-worker relations."²⁰

Of the six studies reported by the above reviewers, four reported a negative relationship between co-worker satisfaction and turnover, but two reported a zero relationship between the two variables.

Satisfaction with job content is another area for which a negative relationship with turnover has been found. Of nine studies cited by Porter and Steers, eight reported a negative relationship between turnover and satisfaction with job content. The reviewers noted that satisfaction with job content refers to the general level of satisfaction that a worker has for assigned tasks and further stated: "In general, turnover has been found to be positively related to dissatisfaction with the content of the job among both blue- and white-collar workers."²¹

The relationship between turnover and the various attitudinal factors including morale, motivation, perceived equity, and the numerous aspects of job related satisfaction was investigated in a substantial number of studies. The dominant result was that there is a consistent negative relationship between turnover and employee attitudes. Muchinsky and Tuttle stated: ". . . the vast amount of research indicates that people withdraw from their jobs because they are not satisfied with their jobs."²²

²⁰Ibid.

²¹Ibid., p. 164.

²²Muchinsky and Tuttle, p. 58.

Personal Factors

The age of employees was found to be related to turnover in most of the studies reported. Porter and Steers reviewed nine studies and Muchinsky and Tuttle reviewed those nine plus two additional studies which reported negative relationships between age and turnover. One additional study involving male office workers showed a zero relationship, while another study involving public service organization trainees showed a positive relationship between age and turnover. Porter and Steers stated in summary: "Age is strongly and negatively related to turnover. . . ." ²³

Tenure of employees is also negatively related to turnover. All eight studies cited by both reviewing teams reported a negative relationship. Porter and Steers stated that: ". . . increased tenure appears to be strongly related to the propensity to remain. One possible explanation here may be that increases in tenure result in increases in personal investment on the part of the employee in the organization. . . ." ²⁴ With regard to reasons for increased job tenure, Sekscenski has noted that many factors are associated with the length of time employees choose to remain with an employer. He further stated: "Individual characteristics such as age, sex, marital status, and race also are important determinants of how long a worker wants to remain in any one job." ²⁵

²³Porter and Steers, p. 167.

²⁴Ibid., p. 151.

²⁵Edward S. Sekscenski, "Job Tenure Declines As Work Force Changes," Monthly Labor Review, Special Labor Force Report 235 (December 1979), p. 48.

Family size and family responsibility are two variables that show a relationship to turnover. However, family size has in general been reported to be negatively related to turnover, while family responsibility has been consistently reported to be positively related to turnover. One study by Stone and Athelstan (1969) as reviewed by Porter and Steers reported a positive relationship between family size and turnover for a group of 453 female physical therapists. Porter and Steers provided insight into that relationship in their statement:

"On the other hand, Knowles (1964) found increased family size to be inversely related to turnover among male factory workers. This differential impact of size on male and female turnover can easily be explained by the nature of traditional role differentiation in the past. Whether such trends continue in the face of the current reevaluation of role divisions between men and women remains to be demonstrated."²⁶

With regard to family responsibility and its effect on turnover, Muchinsky and Tuttle cite several studies involving both male and female workers that report a positive relationship between family size and turnover. The reviewers stated: "The same finding has been reported across employees of various types of jobs and both sexes."²⁷ With regard to family size, Muchinsky and Tuttle added: "The relationship between family size and turnover seems to be moderated by whether the employee is the primary or secondary wage earner. For primary wage earners the relationship appears to be positive, while for secondary wage earners the relationship seems to be negative."²⁸

²⁶Porter and Steers, p. 167.

²⁷Muchinsky and Tuttle, p. 54.

²⁸Ibid.

Work-related Factors

Recognition and feedback is an area that has not been investigated extensively in its relationship to turnover. Only two studies were cited by the two reviewing teams, and both studies reported a negative relationship between the variables. With regard to one of the studies by Ross and Zander (1957), Muchinsky and Tuttle stated: "those workers who terminated their employment perceived themselves as receiving less feedback and recognition than those employees who remained with the company."²⁹

With regard to task repetitiveness, Porter and Steers stated: "While efficiency or reduced operating costs may be the goal of such actions as the routinization of job technology, such a goal may at times have the unintended consequence of increasing costs through increases in absenteeism and turnover."³⁰ The same five studies were cited by both reviewing teams. Four of the studies reported that task repetitiveness was positively related to turnover, while a fifth study found no relationship. In summary, Porter and Steers noted: ". . . the available data tend to indicate that both absenteeism and turnover are positively associated with task repetitiveness, although such a conclusion may represent an over simplification of the nature of the relationship."³¹

The relationship of job autonomy and responsibility to turnover has consistently been found to be negative. All of the studies

²⁹Ibid., p. 58.

³⁰Porter and Steers, p. 162.

³¹Ibid., p. 164.

reviewed by Porter and Steers (six) and by Muchinsky and Tuttle (five) reported a negative relationship. As Porter and Steers stated with regard to the relationship of job autonomy and responsibility to both absenteeism and turnover: ". . . a strong positive relation has been found consistently between both forms of withdrawal and a perceived lack of sufficient job autonomy and responsibility."³²

In a study related to the area of job autonomy and responsibility, Mowday, Stone, and Porter in 1979 investigated the interaction of employee personality characteristics and job scope in predicting turnover. This study was a specific application of a more general theme which was that of considering the interaction of personal characteristics and environmental considerations as determinants of turnover. In that study, three employee personality characteristics--achievement, autonomy, and affiliation--were assessed. A personality inventory was used to measure the strength of employee needs in the three areas and another instrument was used to ascertain job scope. When those factors were correlated with turnover, relatively low correlations were found between the three personality needs and turnover and no direct relationship was found between job scope and turnover. However, when partial correlation was used to control for interaction effects, the findings were quite different. As the writers stated: ". . . the extent to which employees with a given personality characteristic are likely to leave the organization appears to depend upon the characteristics of the job and the immedi-

³²Ibid.

ate work environment."³³ The researchers further stated: "The overall results of this study support the view that interactions between employee characteristics and the nature of the work environment are an important consideration in turnover."³⁴

Intervening Variables

In a 1978 study, Koch and Steers examined the relative predictive powers of job satisfaction as well as job attachment with regard to turnover. In defining these variables the researchers stated: ". . . job satisfaction deals principally with cognitions and affective responses to the job."³⁵ They further noted: ". . . job attachment refers to an attitudinal response to one's job that is characterized by a congruence between one's real and ideal jobs, an identification with one's chosen occupation, and a reluctance to seek alternate employment."³⁶ The researchers indicated also that job attachment is close to the idea of behavioral intentions. The results of the study indicate that job attachment was a better predictor of turnover than overall job satisfaction. While noting that job satisfaction disregards consideration of behavioral intentions, the writers stated that: "Attachment, on the other hand, might be viewed as an

³³Richard T. Mowday, Eugene F. Stone, and Lyman W. Porter, "The Interaction of Personality and Job Scope in Predicting Turnover," Journal of Vocational Behavior, 15 (1) (August 1979), p. 86.

³⁴*Ibid.*, p. 88

³⁵James L. Koch and Richard M. Steers, "Job Attachment, Satisfaction, and Turnover Among Public Sector Employees," Journal of Vocational Behavior, 12 (1) (February 1978), p. 120.

³⁶*Ibid.*

intervening variable between satisfaction and overt behavior like turnover. . . ."37

Personality and Test Score Factors

Porter and Steers reviewed studies in a number of areas not reviewed by Muchinsky and Tuttle. Two of those areas are of particular interest. Studies concerning the congruence of a person's job with his/her vocational interest were reviewed with regard to the effect of congruence on turnover. The three studies reviewed by the researchers reported negative relationships between the specified congruence and turnover. As Porter and Steers noted: "From limited studies, turnover appears to be related positively to the similarity between job requirements and vocational interests."38

With regard to extreme personality characteristics and turnover, Porter and Steers reviewed five studies all of which found a negative relationship. As those writers stated:

"Apparently, the possession of more extreme personality traits may lead to an increased tendency to leave the organization. While further investigation is definitely in order here, a tendency exists for employees manifesting very high degrees of anxiety, emotional instability, aggression, independence, self-confidence, and ambition to leave the organization at a higher rate than employees possessing such traits in a more moderate degree."39

Under the broad rubric of test score predictors, Muchinsky and Tuttle identified four sub-groupings which were personality, interest, intelligence, and aptitude and ability. While Porter and Steers made

³⁷Ibid., p. 126

³⁸Porter and Steers, p. 151.

³⁹Ibid.

extreme personality characteristics a separate grouping, Muchinsky and Tuttle included such studies under the broader area of personality. With regard to personality predictor scores, Muchinsky and Tuttle reviewed fourteen studies. While four of the studies reported finding no relationship between personality and turnover, ten studies reported a positive relationship. However, in only four studies were the results cross-validated, and in only one of those studies did the findings hold up to cross-validation. As those writers stated: "It is probably best to conclude that personality differences have a very marginal impact on turnover."⁴⁰

Studies related to vocational interest predictor scores reported mixed findings. Of eleven studies reviewed by Muchinsky and Tuttle, seven reported negative findings with regard to turnover. Four studies reported no relationship between interest and turnover. With regard to interest, Muchinsky and Tuttle stated: "It seems relatively reasonable to conclude that there appears to be some negative relationship between vocational interest and turnover."⁴¹

Of nine studies relating intelligence predictor scores to turnover, four reported negative findings, two reported curvilinear results, one reported positive results and two reported no relationship between intelligence and turnover. Muchinsky and Tuttle noted in their summary that other factors such as type of work may have an effect on the relationship between intelligence and turnover.⁴²

⁴⁰Muchinsky and Tuttle, p. 48.

⁴¹Ibid., p. 49.

⁴²Ibid.

Muchinsky and Tuttle reported: "Similar to the results involving intelligence as a predictor, studies using aptitude and ability as a predictor have reported positive, negative, zero, U-shaped and inverted U-shaped relationships to turnover."⁴³ With regard to bio-data, these writers reviewed sixteen studies which did not have high correlation coefficients but which tended to be stable when cross-validated. The researchers noted: ". . . the vast majority of evidence indicates that bio-data items can in fact predict turnover reasonably well."⁴⁴

Recent Research Factors

In the reviews of literature by Porter and Steers and by Muchinsky and Tuttle, some attention was given to the needs for future research. Porter and Steers noted that (1) an increased emphasis on the psychology of the withdrawal process was needed, (2) a major focus should be placed on the extent to which an entering employee's expectations are met, (3) some attention should be directed to the differential value of employees, (4) more attention should be given to the simultaneous study of turnover and absenteeism, and (5) more emphasis should be placed on the effects of organizational interventions on withdrawal behavior.⁴⁵ In discussing methodological and interpretive issues in turnover research, Muchinsky and Tuttle noted that (1) very little attention has been devoted to the measurement problem in

⁴³Ibid., p. 50.

⁴⁴Ibid.

⁴⁵Porter and Steers, pp. 173-174.

turnover research, (2) the practice of breaking samples of employees into "short tenure" and "long tenure" groups is an arbitrary empirical creation which varies from study to study and which does not allow for generalizing meaning to these groups, (3) more attempts should be made to investigate voluntary versus involuntary turnover, (4) sex and racial subgroup comparisons should be made, (5) the cross-validation of predictor turnover relationships should be re-emphasized, and (6) more studies should deal with ways to reduce employee turnover.⁴⁶

Some of the concerns of those reviewers have been addressed in subsequent research studies. Three such studies have relevance to the purposes of this study. In a 1979 report of research, Wanous, Stumpf, and Bedrosian stated: "Since reviewers of the job survival literature have often been critical of the approaches taken, this study attempts to overcome many of the weaknesses previously identified."⁴⁷ In that study the authors (1) controlled for an organizational variable which was length of tenure, (2) separated turnover into voluntary and involuntary categories, (3) included organizational and personal variables as well as job attitudes and job performance as independent variables, and (4) used multivariate methods to assess the effects of the independent variables. With regard to the findings, the authors stated: "For those employees who left involuntarily, job performance is positively and strongly related to the length of job survival."⁴⁸ The

⁴⁶Muchinsky and Tuttle, pp. 65-70.

⁴⁷John P. Wanous, Steven A. Stumpf, and Hrach Bedrosian, "Job Survival of New Employees," Personal Psychology, 32 (4) (Winter 1979), p. 651.

⁴⁸Ibid., pp. 659-660.

writers further noted that the mean performance level of the involuntary termination group was significantly lower than either stayers or voluntary leavers. It was also reported that (1) job performance was a stronger predictor of involuntary turnover than job attitudes, (2) organizational variables were stronger predictors of job survival than any of the personal variables, and (3) mixed results were found for the comparison of job attitudes and job performance with voluntary turnover.

Another multivariate analysis study by Parasuraman in 1982 investigated the relationship between organizational commitment and behavioral intentions and employee decisions to terminate employment. Parasuraman goes on to state with regard to current conceptual models that: "These models view job attitudes, especially satisfaction, as salient precursors of behavioral intentions and posit that intentions in turn constitute the most proximate determinants of turnover behavior. . . ." ⁴⁹ The researcher included personal variables, attitudinal variables, behavioral variables, and behavioral intentions as independent variables in the study. The findings of the study suggest that (1) dissatisfaction with perceived promotional opportunities is a primary motivation in the decision to leave the organization, (2) stress plays an important role in inducing voluntary turnover, and (3) absenteeism behavior only partially predicts subsequent turnover. The writer stated in summary:

⁴⁹Saroj Parasuraman, "Predicting Turnover Intentions and Turnover Behavior: A Multivariate Analysis," Journal of Vocational Behavior, 21 (1) (August 1982), p. 111.

"Contrary to previous findings (Muchinsky and Tuttle, 1979), the conclusion that emerges from this study is that personal variables and job satisfaction have little direct effect on the enacted decision to terminate employment. The effects of these variables are channeled through behavioral intentions, which provide the most proximate predictor of actual turnover."⁵⁰

As reported by Muchinsky and Morrow, Hollingsworth in 1978 found similar results in a study using correlational and regression analysis. In citing Hollingsworth's study, Muchinsky and Morrow stated: "The results revealed that the best predictor of actual turnover was intention to quit, and that the effect of job dissatisfaction was on thinking of quitting and intentions rather than on turnover itself."⁵¹ Muchinsky and Morrow stated prior to introducing a multidisciplinary model of voluntary employee turnover that:

"Previous research suggests that turnover has three major sets of determinants. The three determinants are individual, work related, and economic opportunity factors. . . . Each determinant consists of variables which have been established as correlates of turnover through empirical verification or variables which have recently been proposed as probable antecedents of turnover."⁵²

With regard to the economic determinant, Muchinsky and Morrow stated: ". . . there is no current review of the literature of the variables comprising this determinant. . . ."⁵³ These writers provided, however, a brief analysis to satisfy the purpose of their writing. They noted that inverse relationship between average

⁵⁰Ibid., p. 119.

⁵¹Muchinsky and Morrow, p. 265.

⁵²Ibid., p. 267.

⁵³Ibid., p. 273.

earnings and voluntary turnover exists and that the rate of unemployment is inversely related to turnover. They also stated: "Of the three determinants of turnover, previous research suggests that the economic determinant has the strongest impact on turnover."⁵⁴

With regard to the three determinants, Muchinsky and Morrow also stated: "It is hypothesized that these determinants exist in a dynamic relationship, with the economic determinant serving to control the degree of predictability accorded the individual and work-related determinants."⁵⁵ The idea that a group of variables may have a dynamic relationship is one that holds much interest for the concept of job maintenance, which will be discussed in the next chapter. Before proceeding to a discussion of the elements of job maintenance as they relate to the findings of this review, a brief review of those findings by category is in order.

Determinant Research in Brief

Porter and Steers,⁵⁶ who used levels within the organization as a classifying basis, found that personal factors such as age, tenure, and congruence of job and vocational interest were in general negatively related to turnover while extreme personality characteristics were positively related to turnover. With regard to job content factors, Porter and Steers reported a negative relationship in general between turnover and satisfaction with (1) job content, (2) job auto-

⁵⁴Ibid.

⁵⁵Ibid., p. 274.

⁵⁶Porter and Steers, pp. 152-169.

onomy and responsibility, and (3) role clarity. Task repetitiveness, another job content factor, was found to be positively related to turnover. With regard to immediate work environment factors, Porter and Steers found that satisfaction with supervisory relationships, receipt of recognition and feedback, supervisor's experience, and satisfactory peer group interactions were generally negatively related to turnover work unit size though these factors appeared to be positively related to turnover. The organizational-wide factor of satisfaction with pay and promotion was negatively related to turnover, while the job satisfaction category generated a consistently negative relationship to turnover.

Muchinsky and Tuttle⁵⁷ used a different set of categories as an organizing theme for their review of literature related to turnover. As those writers noted, the research concerning work-related factors is very diverse. As they concisely stated: "Work unit size and task repetitiveness are positively related to turnover, while receipt of recognition and job autonomy have been found to be negatively related to turnover. People-oriented leadership factors are negatively related to turnover, while production-oriented factors are positively related to turnover."⁵⁸ In the attitudinal category, Muchinsky and Tuttle found the same highly consistent results that Porter and Steers found, that is, job satisfaction is negatively related to turnover. With regard to factors in the personal category, consistent results again were found. Age and length of employment are negatively related

⁵⁷Muchinsky and Tuttle, pp. 44-65.

⁵⁸Ibid., p. 63.

to turnover, while degrees of family responsibility are positively related to turnover. For the bio-data category, Muchinsky and Tuttle stated: "In terms of strength of association and replicability, bio-data items appear to be the best predictors of turnover."⁵⁹ In the test-score predictor category, the results were highly diverse. Personality factors tended to have a marginal effect on turnover, while a negative relationship was found in most of the studies between vocational interest and turnover.

Consistent results were not found for the relationship between intelligence and turnover nor the relationship between aptitude and ability and ability and turnover.

The four elements of the job maintenance concept may be related to both the review of literature categories used by Porter and Steers and by Muchinsky and Tuttle and to the three major sets of turnover determinants. Roughly speaking, environmental effects of the job maintenance concept take into consideration what Muchinsky and Tuttle refer to as the work-related category. Further, environmental effects would also include what Porter and Steers call job content factors, immediate work environmental factors, and organizational-wide factors. Both the economic and the work-related determinants of the Muchinsky and Morrow Model would also be included under the environmental effects element of the job maintenance concept.

The employee motivation category of the job maintenance concept is most related to Muchinsky and Tuttle's attitudinal category and Porter and Steers' job satisfaction category though in reality

⁵⁹Ibid.

there is only a small degree of equivalence involved. There is little correspondence between employee decisionmaking and employee productivity and the other categorical concerns. Both of the job maintenance elements could logically be placed under the personal category of Porter and Steers or Muchinsky and Tuttle or under the individual determinant in the Muchinsky and Morrow model. While the match is not good between the various schemes, seeing how the elements of job maintenance roughly relate to the findings of the review of literature should be some value to the reader when the job maintenance concept is examined in the next chapter.

Evaluation of Simulation Games

The review of literature with regard to simulation games is primarily limited to those materials related to evaluation. In the area of simulation game evaluation, the three categories of interest are (1) theory and research, (2) simulation research findings, and (3) evaluation methodology. In contrast to the literature related to job maintenance, the literature related to the evaluation of simulation games is not well organized nor is the conduct of research as rigorous. In a 1976 analysis of progress of simulation games, Shirts stated: "I am not suggesting that we know nothing after 10 years plus of research and development, only that what is known is not known in the sense that most professionals would prefer - answers backed by hard research data."⁶⁰ Little in that regard seems to have changed since 1976.

⁶⁰R. Garry Shirts, "Simulation Games: An Analysis of the Last Decade," Programmed Learning and Educational Technology, 13 (2) (July 1976), p. 37.

Theory and Research

Theory and research advances relating to simulation games reflect the lack of hard research data. Coombs in a 1978 article on the future of simulation and gaming research noted:

"An interesting phenomenon happens at national meetings when the subject is simulation gaming: a lot of what goes on is repetitious. Each year's meeting attracts interested but relatively naive individuals, and their discovering that simulation gaming can be an effective instructional method makes up the bulk of what is accomplished. This is not what you would expect if simulation gaming were smashing ahead with frequent innovations."⁶¹

Even so, a substantial number of claims are made for simulation gaming. In an undated publication by Garry Shirts entitled "An Inventory of Hunches About Simulations As Educational Tools" as cited by Coombs, Shirts provided some insight into the status of simulation gaming by listing some of the claims made about it. These claims as cited by Coombs are presented below:

"(1) Maybe simulations are 'motivators'. . . ; (2) maybe a simulation experience leads students to more relevant and sophisticated inquiry. . . ; (3) maybe simulations give participants a more integrated view of some of the ways of men. . . ; (4) maybe participants in simulations learn skills: decisionmaking, resource allocation, communication, persuasion, influence resisting. . . ; (5) maybe simulations affect attitudes. . . ; (6) maybe simulations provide participants with explicit, experimental, gut-level referents about ideas, concepts, and words used to describe human behavior. . . ; (7) maybe participants in simulations learn the form and content of the model which lies behind the simulation. . . ; (8) maybe the main importance of simulations is their effect on the social setting in which the learning takes place. . . ; and (9) maybe simulations lead to personal growth. . . ."⁶²

⁶¹Don H. Coombs, "Is There A Future for Simulation and Gaming Research," Educational Communication and Technology: A Journal of Theory Research and Development, 26 (2) (Summer 1978), p. 99.

⁶²Ibid., pp. 104-105.

Others including Fletcher and Greenblat have noted the various claims made by the designers of simulation games. Fletcher identified a number of areas for which claims were made. Those areas include (1) motivation; (2) skills such as interpersonal communication, persuasion, negotiation, advocacy and manipulation of information, decision-making, rational strategy selection, resource allocation; (3) knowledge of facts and principles, of outcome of various strategies, and of the structure of the underlying model of the game; (4) self-awareness; (5) attitudes toward the role played by a particular participant, toward the content of the simulation, or toward parts of the participants' life; and (6) understanding of the complexities and problems of the situation.⁶³

Greenblat, in a 1973 review of claims and evidence regarding simulation games, identified six categories of claims which were: (1) motivation and interest, (2) cognitive learning, (3) changes in the character of later course work, (4) affective learning regarding subject matter, (5) general affective learning, and (6) changes in classroom structures and relations.⁶⁴ As Greenblat stated: "Those who have used games tend to be highly enthusiastic and to report very favorable outcomes, but the empirical evidence to systematically test their claims is still limited."⁶⁵

⁶³Jerry L. Fletcher, "The Effectiveness of Simulation Games as Learning Environments: A Proposed Program of Research," Simulation and Games, 2 (4) (December 1971), pp. 442-448.

⁶⁴Cathy S. Greenblat, "Teaching with Simulation Games: A Review of Claims and Evidence," Teaching Sociology, 1 (1) (October 1973), pp. 66-68.

⁶⁵*Ibid.*, pp. 62-63.

The use of simulation games has increased over the last fifteen years. As Reiser and Gerlach stated in a 1977 article: "Ten years ago the use of simulation games in schools was practically unheard of; today hundreds of teachers all over the country are employing simulation games in their classrooms. New simulation games are being developed at a very rapid pace to meet this demand."⁶⁶

Though the situation has improved over the past decade, the four criticisms that were offered by Fletcher in 1971 still have some validity. As that writer noted (1) there are only a few games that have been developed to the point of being really playable, that is, sufficiently "de-bugged," (2) the games that exist vary enormously, (3) there is a lack of clear relationship between the objectives and the structure of the games, and (4) there is no agreement regarding administrative procedures across games.⁶⁷

Much of the poor state of affairs in the simulation gaming field may be traced to the lack of organization or lack of structure associated with the growing body of knowledge. As Cruickshank and Mager have posited: "In order for the field of instructional simulation and games to make a permanent mark on instructional practice, its advocates must create an organized body of knowledge about it."⁶⁸ Those writers proposed: "We should be doing systematic research on the use of games and simulations as instructional alternatives. By

⁶⁶Robert A. Reiser and Vernon S. Gerlach, "Research on Simulation Games in Education: A Critical Analysis," Educational Technology, 17 (12) (December 1977), p. 13.

⁶⁷Fletcher, pp. 425-427.

⁶⁸Cruickshank and Mager, p. 5.

research we mean determining relationships between variables."⁶⁹

Previous research dealing with simulation games has been fraught with difficulty. As Greenblat noted: ". . . this problem stems from the methodological shortcomings of many of the research studies."⁷⁰ Greenblat went on to state:

"Many of the studies suffer from poor research design: "after-only" tests which preclude measurement of change; lack of control groups even where the intention is to draw conclusions about the value of simulations compared to other techniques; failure to consider Hawthorne effects; and poor criteria for accepting or rejecting hypotheses."⁷¹

Greenblat also noted that sampling techniques, the heterogeneous nature of some samples, the poor methods of putting concepts into operation, and the lack of control for student characteristics are general methodological problems in games research. Greenblat also identified a number of problems that are specific to games research. That writer pointed out that length of play, size of playing group, amount and quantity of pre-game preparation, and conditions of administration are all variables that may be important in explaining differential outcomes.

Methodological problems have certainly been a hindrance to the attainment of answers backed by hard research data and consequently have hindered the development of an organized body of knowledge for the field of simulation games. Granted that the state of the art is far from ideal, at least one event discussed below offers hope and encouragement.

⁶⁹Ibid., p. 8.

⁷⁰Greenblat, "Teaching with Simulation Games," p. 76.

⁷¹Ibid.

Simulation Research Findings

In 1966, Cherryholmes, as reported by Pierfy, used the findings from six empirical studies to review the effectiveness of educational simulations. In 1977, Pierfy updated that survey of the field of comparative simulation game research by reporting on twenty-two research studies which compared simulation games with more conventional classroom instruction.⁷² While the progress from a six-study review to a twenty-two study review of literature may seem meager, the progress in terms of the reliability of the research summary provides a measure of hope with regard to prospects for an organized body of knowledge.

In a 1976 bibliography of research findings Bailey identified eight research surveys and almost one hundred empirical studies on instructional simulation/games that had been selected from the literature during the period from 1960 to 1975.⁷³ In 1977, as noted earlier, Pierfy selected twenty-two empirical studies for inclusion in his survey of research. The reviewer stated:

"Simulation game evaluation research can be classified into three categories: (1) descriptive studies of the effects of a particular game usually employing just one group of subjects, (2) explanatory studies attempting to establish cause-and-effect relationships for the varying impact of the game on particular subjects, and (3) comparative studies of learning through games as opposed to learning through other educational experiences. . . ."⁷⁴

⁷²David A. Pierfy, "Comparative Simulation Game Research: Stumbling Blocks and Stepping Stones," Simulations and Games, 8 (2) (June 1977), p. 256.

⁷³Bailey, pp. 77-86.

⁷⁴Pierfy, pp. 255-256.

Pierfy's review related only to the latter category of comparative simulation game research. Given Bailey's identification on about one hundred empirical studies, Pierfy's selection of twenty-two from only the comparative research area seems very reasonable.

Pierfy summarized the research findings over four areas which were (1) learning, (2) retention, (3) attitude change, and (4) interest.⁷⁵ Twelker also summarized research findings by category which were (1) factual knowledge, (2) intellectual skills, (3) psychomotor skills, (4) attitudes, and (5) motivation.⁷⁶ Wentworth and Lewis used six categories of somewhat more lengthy titles for their review. However, the essence of those categories may be captured in the following shortened versions which are (1) feasibility studies, (2) participant characteristics, (3) participant behaviors, (4) thinking skills, (5) cognitive learning, and (6) interests and attitudes.⁷⁷ The areas used by Reiser and Gerlach as organizing themes were (1) interest, (2) attitudes, (3) feeling of efficacy, (4) knowledge, and (5) intellectual skills.⁷⁸ For the purposes of this review summary, findings will be reported for the areas of (1) cognitive learning and retention, (2) attitudes, (3) interest and motivation, and (4) intellectual skills.

⁷⁵Ibid., pp. 257-260.

⁷⁶Paul A. Twelker, "Examining the Research Evidence on Simulation Gaming," Improving Human Performance Quarterly, 4 (3) (1976), pp. 97-99.

⁷⁷Donald R. Wentworth and Darrell R. Lewis, "A Review of Research on Instructional Games and Simulations in Social Studies Education," Social Education, 37 (5) (May 1973), pp. 432-440.

⁷⁸Reiser and Gerlach, p. 14.

Cognitive Learning and Retention. Pierfy reported that nineteen of the twenty-two studies he reviewed concerned the relationship between learning and method of instruction. Researchers for fourteen of the studies reported finding no significant differences between the extent of learning with simulation games and with more conventional instruction. However, researchers for three studies found significant gains in favor of simulation games while researchers for two studies found significant learning gains in favor of more conventional instruction. As Pierfy stated: "In the realm of Social Studies content in the cognitive domain, simulation games generally seem to be about as effective as conventional instructional methodology."⁷⁹ Concerning factual knowledge, Twelker stated: "From a review of eleven studies conducted between 1963 and 1971, it may be concluded that simulation/gaming generally seems to be about as effective as conventional methods of instruction for teaching factual knowledge."⁸⁰ Wentworth and Lewis found similar results and provided additional insight with their statement that:

"Moreover, nearly all of the studies reviewed have research design limitations. This limitation involves population selection, test construction and validation, inadequate controls in the research design, and limited statistical analysis of the data. It would be unwise to draw any firm conclusions about the impact of learning games on student learning from the research to date."⁸¹

Reiser and Gerlach are in agreement with the other reviewers about the relationship between learning and method of instruction. As

⁷⁹Pierfy, p. 259.

⁸⁰Twelker, p. 97.

⁸¹Wentworth and Lewis, p. 437.

those writers pointed out:

"Many studies have been designed to examine the effects of simulation games on student acquisition of knowledge. The studies often involve a comparison of the effects of simulation games and traditional instruction. The results of most of the studies of this type indicate that students acquire approximately the same amount of knowledge in a simulation game as they do in traditional instruction."⁸²

In the area of retention of learning, Pierfy found eleven studies with research designs that included a delayed post-test. In eight of the studies researchers found significant differences favoring the simulation game group; in three studies no significant differences were found. Pierfy concluded: "It appears that students who participate in simulation games will retain learned information longer than if they learned the information through more conventional approaches."⁸³

Attitudes. Concerning attitudes, the second category to be considered, Twelker finds support for the contention that simulation games can change participant attitudes and opinions. As the writer stated: ". . . simulation/gaming can often increase sympathetic understanding about problem situations in which people find themselves, but this effect may not be enduring. The research also shows that simulation/ gaming can change attitudes and opinions, but often in reverse of what the designer intends."⁸⁴

Based on the non-enduring quality of attitude changes and the

⁸²Reiser and Gerlach, p. 15.

⁸³Pierfy, p. 259.

⁸⁴Twelker, pp. 98-99.

reversal of intent found for a number of simulation games, it would appear that research in the area has generated some conflicting results. In discussing that situation, Reiser and Gerlach noted: "In some instances, the research results indicated simulation games affect attitudes while in other instances the results indicate attitudes are not affected. The findings have no apparent pattern."⁸⁵

Pierfy's review findings were presented on a comparative basis, that is, simulation games were compared to conventional instruction. Results appear more clearcut. However, Pierfy's findings did not really address the question of the absolute extent to which simulation games change participant attitudes. As Pierfy stated:

"Eleven studies were designed to measure the effectiveness of simulation games on attitudinal change. Eight of the studies which looked at attitude change through simulation versus attitude change through conventional instruction found that the simulation games had a greater impact on attitudes, in a positive direction, than traditional teaching methods."⁸⁶

Wentworth and Lewis shed additional light on simulation game effects on participant attitudes. With regard to the research studies that they reviewed the writers stated:

". . . it must be emphasized that most of these researchers drew conclusions from data obtained by instruments of their own devising and which were not validated or proven reliable. The research on attitudes leaves us in a paradoxical situation: It demonstrates the most promising research results to date, but most of the findings cannot be generalized beyond the situation that was investigated."⁸⁷

⁸⁵Reiser and Gerlach, p. 14.

⁸⁶Pierfy, p. 260.

⁸⁷Wentworth and Lewis, p. 438.

Research on the effects of participation in simulation games on participant attitudes has produced mixed results. It would seem that the conclusions to be reached are that (1) simulation games can change attitudes, (2) simulation games do have more effect on attitudes than conventional instruction, (3) it is difficult to predict how long attitudinal changes endure and which direction attitudes tend to change, and (4) many of the results cannot be generalized.

Interest and Motivation. In the area of interest and motivation, some definitional problems are evident. Some researchers use the term "interest" to indicate interest in participation in simulation games while others use it to describe the interest generated by the simulation game with regard to the content. Some researchers use "motivation" to mean motivation to play the simulation game, while others use the term to indicate motivation to act in the real world as a result of participation in the simulation game.

Using the term "interest" to mean interest in participation in simulation games, Pierfy reported that in seven out of eight studies the researchers found: ". . . students reported more interest in simulation game activities than in more conventional classroom activities."⁸⁸ Reiser and Gerlach noted: "It is frequently maintained that simulation games arouse student interest to a greater extent than do conventional teaching methods."⁸⁹ In citing five research studies, those writers also stated: "The results of a number of studies do indicate high student interest in participating in simulation

⁸⁸Pierfy, p. 260.

⁸⁹Reiser and Gerlach, p. 14.

games."⁹⁰ The writers continued by noting that though a few studies indicate that participant interest in the subject matter is increased by simulation games, most studies have found that such interest is not increased by participation in simulation games. Concerning the issue, Reiser and Gerlach based on the studies they reviewed stated:

". . . assertions that simulation games are effective interest-arousing devices should be qualified. Interest is usually aroused in the simulation games themselves, but not necessarily in the subject matter the games represent."⁹¹

With regard to motivation to take action in the real world, Twelker reported mixed findings in the studies he reviewed. Twelker stated: "Evidence reveals that simulation/gaming can often change students' motivation to take action in the real world."⁹² However, the writer hastened to add that both increases and decreases in motivation had been found when he stated: "Simulation/gaming may enhance or depress motivation depending on a host of interrelated factors."⁹³

Intellectual Skills. The last category for consideration, that of intellectual skills, has not been investigated to the extent that some other areas have received attention. Two studies that measured the effect of game participation on critical thinking skills were reviewed by Wentworth and Lewis. One of the studies by Reigel found no significant differences between the control and experimental group. A study by Garvey and Seiler found that the control group out-

⁹⁰Ibid.

⁹¹Ibid.

⁹²Twelker, p. 99.

⁹³Ibid.

performed the experimental group. Wentworth and Lewis stated:

"Games and simulations may have great potential for developing student academic skills, just as simulation exercises have excellent records in teaching astronauts how to manipulate space craft. However, the research to date has not confirmed these assertions."⁹⁴

Twelker also reviewed research studies relating to intellectual skills. The writer indicates that Cherryholmes in 1965 reviewed six empirical studies and concluded that simulation games do not result in the acquisition of more decisionmaking skills compared with more conventional instruction. In his 1976 review Twelker stated:

"From a review of eight studies conducted between 1963 and 1973, it may be concluded that simulation/gaming seems to be about as effective as conventional methods of instruction for teaching intellectual skills and higher cognitive outcomes."⁹⁵

While the research on instructional simulation has been sparse and not very positive, Reiser and Gerlach have perhaps summarized the findings most concisely. Those writers stated:

"Results indicate that simulation games rarely have a significant effect on the acquisition of knowledge, and usually do not have a significant effect on intellectual skills. The intellectual skill most likely to be affected by game participation is the ability to play the game. In the affective domain, there is no apparent pattern to the effects simulation games have on feelings of efficacy and attitudes toward the subject matter represented in a game. Studies also have indicated that students are interested in participating in simulation games, but that the simulation games do not necessarily arouse student interest in the subject matter the games represent. Taken as a whole, these results do not indicate that simulation games are a highly effective instructional device."⁹⁶

⁹⁴Wentworth and Lewis, p. 435.

⁹⁵Twelker, p. 97.

⁹⁶Reiser and Gerlach, pp. 15-16.

Wentworth and Lewis also provided insight into the process with their conclusions about the status of simulation gaming research.

They stated:

". . . most of the research conducted to date on games and simulations have obscured rather than clarified our knowledge about games and simulations. Research identifying behavioral variables and using more careful controls and more sensitive instruments must be conducted and replicated before the field of games and simulation research can move out of its infancy stage. Such research with a broader, more imaginative perspective would surely be of great value to everyone concerned with the use of games and simulations in the classroom."⁹⁷

Evaluation Methodology

As has been noted by Pierfy⁹⁸, research on simulation games has been directed toward describing the nature of specific games, explaining the relationship between independent and dependent variables, or comparing the extent of learning for simulation games versus that of conventional instruction. While the objectives of such research are fairly specific, the overall objectives for the evaluation of simulation games are much more broadly based. As Gaines has stated: ". . . the over-dependency on experimental research methodology in evaluation studies of simulations and games has probably done more to retard systematic evaluation in this area than it has to advance."⁹⁹ Gaines goes on to state: "At best, the information provided by experimental design, or variation thereof, is insufficient

⁹⁷Wentworth and Lewis, p. 439.

⁹⁸Pierfy, pp. 255-256.

⁹⁹W. George Gains, "Systematic Evaluation of Social Science Classroom Simulatoin Games," Audiovisual Instruction, 18 (10) (December 1973), p. 28.

for a comprehensive evaluation of a simulation or game. An evaluator who focuses solely on experimental evidence will hold a nearsighted or myopic view of reality."¹⁰⁰

The need for sound evaluation approaches for the systematic evaluation games would seem to be apparent. While progress has been made in that area in recent years, it certainly has been slow in coming. As Robinson stated: "In contrast to the rapid growth in the number of games and simulations, there has been very slow progress in evaluation techniques."¹⁰¹

The purpose or objective of evaluation is a key concern when the decision to begin an evaluation effort is made. With regard to simulation games there are many aspects that may be evaluated. Are simulation games to be evaluated for the purpose of facilitating the selection of appropriate games by classroom teachers? Are the specific outcomes of a game run to be evaluated? Are the learning benefits of the simulation game to be evaluated. In short, what is the purpose of evaluation. In calling attention to various scholars of evaluation, Orbach stated: "Grobman (1970), for example, divides the areas of interest to program evaluators into four major categories: 'what to evaluate,' 'when to evaluate,' 'who should evaluate,' and 'how should evaluation be carried out?'"¹⁰²

One of the major types of evaluation used in simulation gaming

¹⁰⁰Ibid.

¹⁰¹J. N. Robinson, "Are Economic Games and Simulations Useful?", Simulation and Games, 9 (1) (March 1978), p. 6.

¹⁰²Eliezer Orbach, "Some Theoretical Considerations in the Evaluation of Instructional Games," Simulation and Games, 8 (3) (September 1977), p. 341.

is the overall evaluation for classroom use. In that regard, Gaines stated: ". . . the goal of systematic evaluation of classroom simulations and games must be to facilitate decisionmaking with regard to questions of selection, adoption, and utilization. To accomplish this end will require the collection of a variety of information in addition to that provided by experimental design."¹⁰³

Gaines went on to identify a number of researchers who have developed evaluation instruments or systems. Gaines noted that Stadsklev's 1970 system presented an evaluator with the task of rating a series of criteria on an eleven point scale. Gaines also noted that Henderson and Gaines in 1971, developed a thirty-nine item evaluation form that used a partial branching scheme. While the Henderson-Gaines system focused on external factors, Gillespie's 1972 system was an internal evaluation based on the inner workings of the game. The above was noted by Gaines prior to the presentation of a new evaluation instrument to specifically evaluate the classroom simulation or game. As Gaines stated:

"To evaluate classroom simulations and games requires that many kinds of information, such as goals, alternatives, costs, reliability, and validity, be systematically collected. Only then will there be a basis for informed and intelligent decisionmaking regarding the purchase and use of classroom simulations and games."¹⁰⁴

Liggett, in a 1977 article, presented an evaluation instrument for use with urban simulation games. In that article, Liggett stated: "Three kinds of evaluation or assessment are common in gaming: validating the underlying model, critiquing a session just completed, and

¹⁰³Gaines, p. 28.

¹⁰⁴Ibid., p. 32.

evaluating a game run."¹⁰⁵ With regard to the validation of the underlying model, the purpose of evaluation is to establish that simulation games are a reasonable facsimile of reality. A major purpose of critiquing a completed session is to provide participants with an opportunity to convert their playing experience into knowledge or insight. As Liggett noted about critiquing or debriefing sessions: "Gaming experts agree almost unanimously on the importance of a directed discussion with the players after a run."¹⁰⁶ As Liggett further noted with regard to evaluating a game run: "Evaluation is undertaken primarily to determine whether the goals and objectives of the operator in staging the run were met."¹⁰⁷

While the purposes of evaluation are an important matter, the question of when evaluation should begin is also important. As Orbach stated in his 1977 article:

". . . most evaluation experts are convinced that the evaluation should start as soon as the developers of a program begin its planning, and much before they start its development. One expression of this conviction may be found in Scriven's (1967) article on the 'Methodology of Evaluation', where he coins the term, formative evaluation."¹⁰⁸

Formative evaluation is of particular interest to the direction of this in that the study findings will provide information for the continuing development of the Job Maintenance Game. In a 1976

¹⁰⁵Helen Liggett, "An Evaluation Instrument for Use with Urban Simulation Games," Simulation and Games, 8 (2) (June 1977), p. 157.

¹⁰⁶*Ibid.*, p. 158.

¹⁰⁷*Ibid.*

¹⁰⁸Orbach, p. 341.

journal article, Stolovich stated: "This article views formative evaluation as a means of assessing a process or product in order to improve it. It focuses on the formative evaluation of games in order to improve their instructional effectiveness and motivational strength."¹⁰⁹

Stolovich identified three major themes which relate to a formative evaluation of simulation games which are (1) process versus outcome data, (2) goal-based versus goal-free posture, and (3) player versus expert source. Concerning the first theme, Stolovich noted that outcome data deals essentially with the idea of "What did the players learn?" Stolovich further stated:

"While outcome data are very important, process data are also essential to the formative evaluation of a game. The use of unobtrusive measures, such as, observation systems or check-lists, permits valuable information to be gathered on such process variables as game playability, interest level during various phases of the game, attainment of sub-objectives, and clarity of rules."¹¹⁰

The goal-based posture concerns how well players attain the game objectives, that is, to what extent do players learn what the designer intended for them to learn? As Stolovich also stated:

"From a goal-free posture, data are collected on actual effects of game totally independent of its objectives. Through observation, open-ended questionnaires, and debriefing, positive or negative side-effects of a game can be discovered."¹¹¹

Formative evaluation may also use an expert source to appraise

¹⁰⁹Harold D. Stolovich, "Formative Evaluation of Instructional Games," Improving Human Performance Quarterly, 4 (3) (1976), p. 126.

¹¹⁰*Ibid.*, p. 127.

¹¹¹*Ibid.*

the simulation game. Stolovich noted that game designers can provide feedback on playability, interest level, rule structure and other tips, while subject matter experts can examine game content and assess the adequacy of the underlying model. Experts familiar with the context in which the game is to be used and experts familiar with the target population can provide helpful feedback as Stolovich noted.

From the player perspective, Stolovich stated:

"Trying out the game with available players who may not be truly representative of the target populations is the first step toward verifying that the game is playable. Later, actual representative players in more naturalistic settings can provide valuable clues as to how well the game works and what further changes are necessary."¹¹²

Based on the three themes discussed above, Stolovich presented a six stage chronology of evaluation which are:

- STAGE I - Game Designer Self-Evaluation - (initial revision of crude design)
- STAGE II - Expert Appraisal - (various experts provide feedback)
- STAGE III - Limited Local Tryout (available participants tryout game)
- STAGE IV - Game Tryouts with Representative Players - (testing with target group in realistic setting)
- STAVE V - "'Hands Off' Field Testing" - (independent evaluator tests game)
- STAGE VI - Long Term Evaluation - (designer monitors long term effects)

Formative evaluation appears to be a most desirable process that should provide assurance for a reasonably well-developed simulation game if it is used rigorously and correctly. As Stolovich noted

¹¹²Ibid., p. 128.

in the introduction to his paper: "One of the major causes for the paucity of formative evaluation of games is the absence of any systematic set of guidelines for game developers."¹¹³ The six stage chronology of evaluation should serve to remedy, in part that situation.

Specific Research on Employment Simulations

Before concluding the review of literature, one additional document should be reviewed. As was stated earlier, only one citation was found in the literature about a similar simulation in the same general content area. Gade, in 1980, stated: "To bring more experiential learning opportunities into the classroom, I have developed a simulation activity called the 'Triget Factory'. This exercise has been effective in helping prospective counselors learn the realism of conditions and factors of working."¹¹⁴

Gade followed up participation in the exercise with discussions in a subsequent class where new material was introduced. A midterm examination over that new material was used as a basis for evaluation. The experimental group had a mean score of 83 percent, while the control group had a mean score of 71 percent. While the difference was statistically significant, it was very questionable that the difference in learning could be attributed to the simulation exercise. Gade in describing the simulation exercise stated:

¹¹³Ibid., p. 126.

¹¹⁴Eldon Gade, "The Triget Factor: A Simulation Exercise of Job Behavior," Vocational Guidance Quarterly, 28 (4) (June 1980), p. 369.

"The Triget Factory activity is an animated learning experience. Students enjoy the opportunity to act out worker roles and other class members like having the opportunity to be more active and participate in a learning exercise. The discussions that follow the operation shutdown are usually emotional, dynamic, and realistic. In short, the exercise seems to stimulate 'fun learning.'"¹¹⁵

The literature is replete with the type of article reviewed above. In 1981, Bredemier and Greenblat stated very cogently in the summary for a review of the educational effectiveness of simulation games:

"We do not yet have (1) a theoretically based taxonomy of games with (2) clear theories about (a) what aspects of them are expected to have (b) what sorts of distinct effects (c) on what sorts of students (d) for what reasons. Until these tasks are addressed, we shall probably continue to see results of investigations about 'effectiveness' that are consistent, ambiguous, and nondefinitive in support or revision of widespread 'impressions.'"¹¹⁶

Bredemier and Greenblat summarized very well the state of the art in simulation game evaluation research.

Simulation Research in Brief

With regard to theory and research on instructional simulations, the organized body of knowledge simply does not exist. While the area has certainly grown in the past decade, the absence of an organizing structure inhibits progress. Many claims have been made for instructional simulations but evidence supporting such claims is sparse. The status of research on evaluation of simulation games is

¹¹⁵Ibid., p. 371.

¹¹⁶Mary E. Bredemeier and Cathy S. Greenblat, "The Educational Effectiveness of Simulation Games," Simulation and Games, 12 (3) (September 1981), p. 327.

that results are not backed by hard research data.

Simulation games appear to be about as effective as other methods of instruction in the cognitive learning area. Participants in simulation games do appear to retain learned information longer than if acquired via more traditional methods. Instructional simulations do appear to be able to change attitudes, however, direction of change does not always follow the game designer's intent and the attitude changes do not appear to be enduring. While high interest about participation in instructional simulations has been documented, carryover of that interest to the content area was not documented.

Progress in the area of evaluation methodology has been very slow. At the same time the number of games and simulations has experienced rapid growth. An over-dependence on experimental design has to a degree resulted in a nearsighted view of the reality of instructional simulation. A more comprehensive method of evaluation is needed to alleviate that condition. A number of researchers have proposed systems in that regard. Formative evaluation offers hope in that it is a comprehensive approach that begins with initial simulation development. Stolovich's six stage chronology of evaluation appears particularly useful as a comprehensive evaluation device.

Chapter III

CONCEPTUAL FRAMEWORK

In recent years there has been a surge of interest by vocational educators and others regarding the skills and abilities needed by workers to acquire and retain jobs. Such job-seeking and job-retention skills have been referred to as employability skills and occupational survival skills. Employability skills are those with associated attitudes and knowledges necessary for an individual to gain, hold, and advance in a job but excludes those training skills which are vocational, occupational, or technical in nature.

In a summary of a dissertation research, O'Neil refers to occupational survival skills as ". . . the basic knowledges, traits, and competencies necessary for an individual to possess in order to maintain a job."¹¹⁷ Bobbitt and others use the somewhat more descriptive term "job maintenance skills" to designate the skills needed by a worker to remain productively employed.¹¹⁸ The job

¹¹⁷Sharon Lund O'Neil, "Occupational Survival Skills: Implications for Job Maintenance and Mobility" (A research study summary based on Ph.D. dissertation) "Worker Perceptions of Skills Necessary for Survival in the World of Work" (Urbana-Champaign: University of Illinois, May 1976).

¹¹⁸Frank Bobbitt, Boyd F. Robinson, Jr., and Faith Serowik, "Job Maintenance Workshop: A Resource Manual for Instructing Adults on How To Keep A Job", Special Paper No. 28, Center for Rural Manpower and Public Affairs, (East Lansing: Michigan State University, 1976).

maintenance concept was the basis upon which the simulation/game of the study was developed. The conceptual framework for the study rests on an examination of both the job maintenance concept and the Job Maintenance Game.

The Job Maintenance Concept

Job maintenance refers to the process by which employees attempt to remain stably employed. Formally defined, job maintenance is the coping process through which employed workers attempt to control the effects of their behavior and the effects of the job, home, and community environment in a manner that increases their usefulness as employees and contributes to their security and job stability. Job maintenance strategies are defined as the job-related decisions made by a worker to control (or not to control) the effects of behavior and the effects of the environment in the job situation. The quality of the job maintenance strategies determines whether the job maintenance outcome will be job retention or job termination.

Four major elements associated with the job maintenance concept are: (1) employee decisionmaking, (2) employee productivity, (3) employee motivation, and (4) environmental effects. The job maintenance concept is a theoretical construct based on the premise that variations in the effect of the above elements are sufficient to explain job maintenance outcomes including both job retention and job termination. That is to say, the effectiveness of employee decisionmaking, the extent of employee productivity, the consequences of environmental effects and the extent of the employee's motivation are the major determinants in the job maintenance process. Over a period

of time the process of job maintenance will result in job retention and a stable employment pattern or job termination and an unstable employment pattern. Figure 1, Model of the Job Maintenance Process, provides a pictorial presentation of the concept.

It is assumed within the structure of the concept that employees have substantial control over their behavior and only marginal control over the environment. With regard to both behavior and environment, it is further assumed that employees have more control over their effect on job performance and stable employment than over the actual circumstance. For example, an employee who is a drug user may refrain from using drugs on the job, thereby avoiding negative effects on job performance, while an employee with poor transportation may leave for work early to decrease the risk of arriving late for work because of a car breakdown.

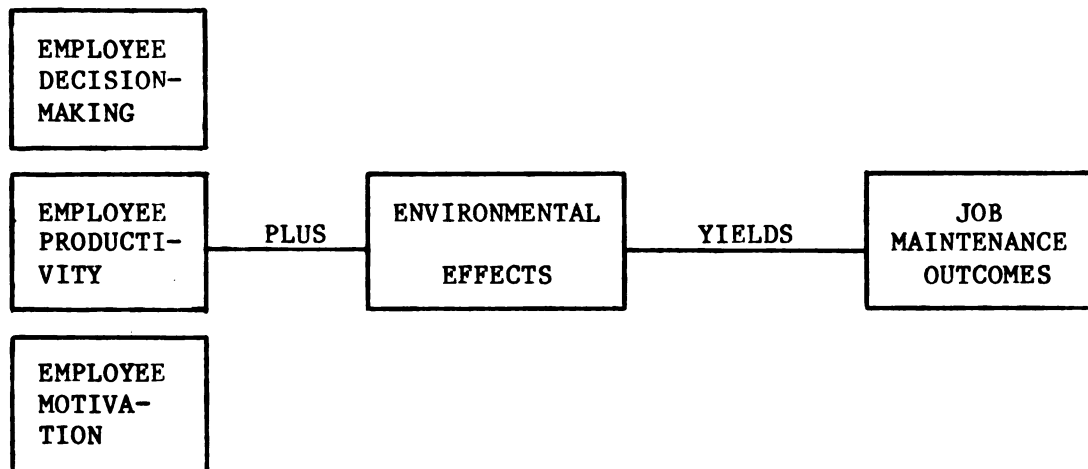


Fig. 1. Model of the Job Maintenance Process

Employee decisionmaking is considered to be a most important determinant of job maintenance outcomes. An employee who is able to make quality job-related decisions has made a major step in assuring

job stability. Many job related decisions may actually be made at the subconscious level such that the employee may be unaware that a decision has been made. For example, a worker who automatically follows a given safety rule has made a subconscious decision to do so, which may have as great an effect on job maintenance outcomes as a conscious or subconscious decision to violate the safety rule.

In at least one regard, productivity may be the least important determinant of job maintenance outcomes. For the most part, production standards tend to be set at a reasonably attainable level so that most employees have little or no trouble meeting minimum acceptable levels of productivity. Further, compared to the other determinants, productivity tends to be more of an either/or situation where it is seemingly apparent to the employer whether or not a given employee meets minimum productivity standards.

An employee's motivation to select positive job maintenance strategies represents perhaps the least quantifiable of the determinants. There seems little doubt that employees do find it necessary to invest energy in maintaining a job. Even so, it is difficult to ascertain which individual in a group demonstrates the most, or the least, motivation regarding job maintenance activities.

The effect of the job, home, and community environment is perhaps second only to employee decisionmaking in terms of effect on job maintenance outcomes. Marital problems, good supervision, poor working conditions, challenging work, or inadequate transportation can have a tremendous effect on the individual's ability to maintain a job. It is with regard to environmental effects that chance plays its role in determining whether employees keep or lose jobs. There are

limits to the extent to which an employee may moderate the negative effects of chance and the tendency of the good and bad effects of chance to "average out" is small consolation for the employees who have lost a job for reasons over which they had little or no control.

The status of workers in the labor market is a key independent variable in the study. Workers who have stable employment records enjoy a higher socioeconomic status than those with unstable employment records. In general, workers with stable employment records may be defined as those who have held the same or a similar full-time job for a period of several years with no incidence of being fired or of voluntarily resigning unless such resignation was for the purpose of taking a more desirable job, or those who have held a series of jobs by virtue of promotions or by making moves "up the ladder" to obtain each job. Workers with unstable employment records may be defined as workers who have experienced difficulty in staying on the job as evidenced by a history of being fired, voluntarily resigning without other job offers, "job hopping," or long periods of unemployment.

The Job Maintenance Game

The Job Maintenance Game was originally designed to facilitate a number of objectives within a workshop setting. The version of the Job Maintenance Game used in this study allowed for (1) the inclusion of a substantial amount of job maintenance content within a short time frame, (2) the reduction of abstract concepts such as job maintenance, employee decisionmaking, environmental effects, and employee motivation, to a concrete operational level, (3) the stimulation of interest and participation of the learners, (4) the enhancement of relatively unskilled instructor abilities to present job maintenance concepts,

and (5) the provision of a relatively simple approach to teaching job maintenance strategies.

As an instructional board game the Job Maintenance Game requires each player to assume the role of a blue-collar worker in a typical factory setting. The workers then produce goods (automobiles), make work related decisions, attempt to become better workers, are affected by various life situations and chance events, are penalized for poor work performance in several ways including job loss, and receive a weekly wage for each completed board cycle. The object of the game is for the workers to keep their jobs. Competition in the game is between the player and the job situation. A photo-reduction of the 22x22 inch gameboard is shown in Figure 2, The Job Maintenance Game Playing Board.

The essence of the Job Maintenance Game is a simulation of the blue-collar work world based on the job maintenance concept. The game has its antecedents in the four major elements of the job maintenance concept. The first major element, that of employee decisionmaking, is represented in the game by a set of decision cards that require workers (players) to make either good job-related decisions by expending personal job maintenance effort symbolized by job maintenance tokens or by risking specified negative outcomes by making poor job-related decisions. Employee productivity in the game is represented by a set of production cards or units which may be obtained by the worker in the course of the game through several means. Workers who fail to meet minimum production levels are penalized. Employee motivation in the game is represented by job maintenance tokens which may also be acquired at some cost in the course of the game. As noted

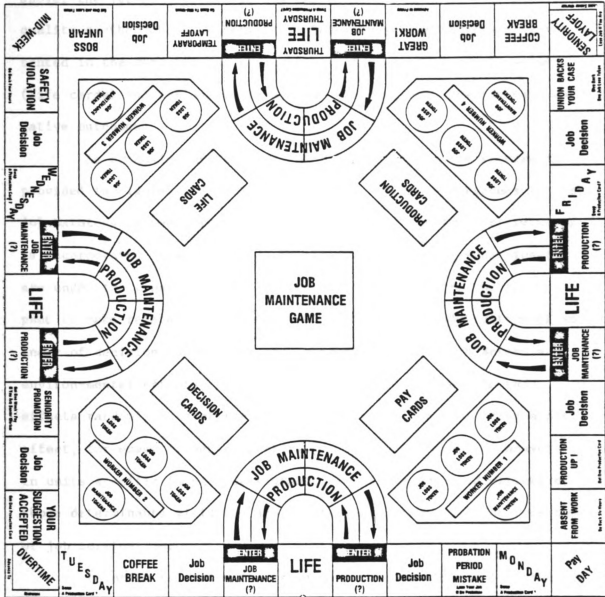


Fig. 2. The Job Maintenance Game Playing Board.

above, the job maintenance tokens may be expended in pursuit of quality on-the-job decisionmaking. Environmental effects are represented in the game by chance occurrence of a set of life situation (life cards) and various board events, yielding both positive and negative outcomes.

An expansion of the Model of the Job Maintenance Process is provided in Figure 3, Flowchart of the Job Maintenance Process in the Job Maintenance Game, to illustrate how each of the four determinants is incorporated into the game. The first three of the determinants are under the general control of the player and require the participant to make related decisions which allow for the construction of an index of decision quality for each category. The fourth determinant, environmental effects, is controlled by chance in the game and affects randomly each of the three determinants, thus yielding a net effect, for example, net productivity. The net effects are measured in units specific to each determinant area. The combined effects of those determinants yield the job maintenance outcomes of job retention or job termination.

In order to assist the reader in relating the model of the process to the actual play of the game on the board, an illustration of how the determinants are made operational in the game is provided. Figure 4, Methods By Which Four Major Determinants of Job Maintenance Are Expressed in the Job Maintenance Game, provides a summary of determinants were implemented in terms of game events and board artifacts.

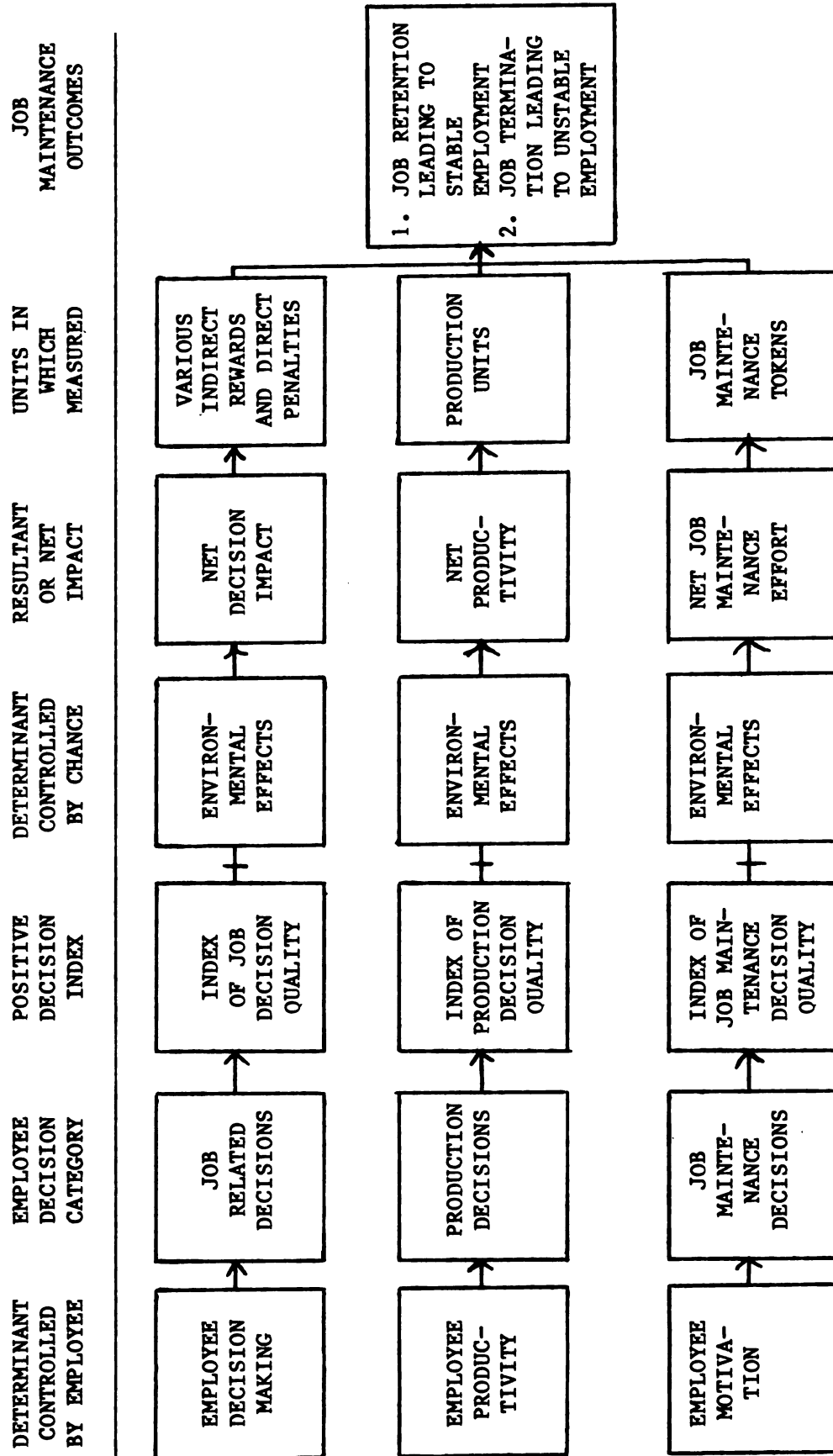


Fig. 3. Flowchart of the Job Maintenance Process in the Job Maintenance Game

DETERMINANTEXPRESSED BY

- | | |
|-------------------------------|--|
| 1. EMPLOYEE
DECISIONMAKING | <ul style="list-style-type: none"> A. Eight job decision spaces on board B. A set of job decision cards C. Two of thirty-six life situation cards D. Using job maintenance tokens to avoid penalties E. Penalties including being fired, getting job loss tokens, etcetra. F. Game rules relating to job decisions |
| 2. EMPLOYEE
PRODUCTIVITY | <ul style="list-style-type: none"> A. Four board spaces to enter production B. Three board spaces for chance production C. Fifteen of thirty-six job decision cards D. Seven of thirty-six life situation cards E. A set of production cards or units F. Game rules relating to production |
| 3. EMPLOYEE
MOTIVATION | <ul style="list-style-type: none"> A. Four board spaces to enter job maintenance B. Four of thirty-six life situation cards C. A set of job maintenance tokens D. Three job maintenance tokens for players initially E. Game rules relating to job maintenance |
| 4. ENVIRONMENTAL
EFFECTS | <ul style="list-style-type: none"> A. All board spaces are chance events B. A set of life situation cards C. All negative decisions from job decision cards D. Some game rules impact as chance events |

Fig. 4. Methods By Which Four Major Determinants of Job Maintenance Are Expressed in the Job Maintenance Game.

In its simplest form job maintenance is a function of productivity, decisionmaking, motivation, and chance. Each of these elements is dynamically related to the others. The result of the game's dynamics is believed to be a reasonable simulation of the real world of work. Additional information relating to the Job Maintenance Game as well as the specific details of the format and rules of the game may be found in Appendix C, Facilitator's Guide to the Job Maintenance Game.

Objectives of the Study

The objectives of the study are:

1. Determine whether differences in performance on the Job Maintenance Game by participants in selected public manpower programs serve to distinguish between those individuals with relatively stable employment records and those individuals with relatively unstable employment records.
2. Determine whether participation in the Job Maintenance Game leads to improvement in game job maintenance strategies for participants in selected public manpower programs.
3. Determine the impact of several major variables on job terminations in the Job Maintenance Game.
4. Determine whether differences in several predispositions of participants in selected public manpower programs serve to distinguish between those individuals with relatively stable employment records and those individuals with relatively unstable employment records.

Null Hypotheses of the Study

The Null hypotheses of the study are presented below:

- H₁: There is no significant difference between the productivity of participants with relatively stable employment records and participants with relatively unstable employment records in the Job Maintenance Game.
- H₂: There is no significant difference between the net job maintenance effort of participants with relatively stable

employment records and participants with relatively unstable employment records in the Job Maintenance Game.

- H₃: There is no significant difference between the job decisions of participants with relatively stable employment records and participants with relatively unstable employment records in the Job Maintenance Game.
- H₄: There is no significant difference between the production decisions of participants with relatively stable employment records and participants with relatively unstable employment records in the Job Maintenance Game.
- H₅: There is no significant difference between the job maintenance decisions of participants with relatively stable employment records and participants with relatively unstable employment records in the Job Maintenance Game.
- H₆: There is no significant difference between the number of job terminations of participants with relatively stable employment records and participants with relatively unstable employment records in the Job Maintenance Game.
- H₇: There is no significant difference between the level of productivity in a first and second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₈: There is no significant difference between the level of net job maintenance effort in a first and second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₉: There is no significant difference between the job decisions in a first and second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₀: There is no significant difference between the production decisions in a first and second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₁: There is no significant difference between the job maintenance decisions in a first and second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.

- H₁₂: There is no significant difference between the number of job terminations in a first and second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₃: There is no relationship between productivity and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₄: There is no relationship between net job maintenance effort and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₅: There is no relationship between job decisions and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₆: There is no relationship between production decisions and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₇: There is no relationship between job maintenance decisions and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₈: There is no significant difference between the predisposition of participants with relatively stable employment records and participants with relatively unstable employment records with regard to the role of productivity in the job maintenance process.
- H₁₉: There is no significant difference between the predisposition of participants with relatively stable employment records and participants with relatively unstable employment records with regard to the role of employee decisionmaking in the job maintenance process.
- H₂₀: There is no significant difference between the predisposition of participants with relatively stable employment records and participants with relatively unstable employment records with regard to participation in simulation games.

Research Hypotheses of the Study

In order to increase the likelihood of rejecting the null hypotheses, the researcher chose to make many of the research hypotheses directional in nature. That is, the researcher has specified in advance whether or not differences exist between the groups involved and whether relationships between variables are positive or negative. For hypotheses where the direction is specified, the region of rejection has been shifted from a two-tailed test to a one-tailed test. The research hypotheses are presented below:

- H₁: There is no significant difference between the productivity of participants with relatively stable employment records and participants with relatively unstable employment records in the Job Maintenance Game.
- H₂: The level of net job maintenance effort is significantly higher for participants with relatively stable employment records than for participants with relatively unstable employment records in the Job Maintenance Game.
- H₃: The job decisions of participants with relatively stable employment records are significantly more positive than for participants with relatively unstable employment records in the Job Maintenance Game.
- H₄: There is no significant difference between the production decisions of participants with relatively stable employment records and participants with relatively unstable employment records in the Job Maintenance Game.
- H₅: The job maintenance decisions of participants with relatively stable employment records are significantly more positive than for those participants with relatively unstable employment records in the Job Maintenance Game.
- H₆: The number of job terminations of participants with relatively stable employment records are significantly lower than those for participants with relatively unstable employment records in the Job Maintenance Game.
- H₇: The level of productivity increases significantly from a first playing to a second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.

- H₈: The level of net job maintenance effort increases significantly from a first playing to a second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₉: Job decisions become significantly more positive from a first playing to a second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₀: Production decisions become significantly more positive from a first playing to a second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₁: Job maintenance decisions become significantly more positive from a first playing to a second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₂: The number of job terminations decreases significantly from a first playing to a second playing of the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₃: There is a negative relationship between productivity and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₄: There is a negative relationship between net job maintenance effort and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₅: There is a negative relationship between job decisions and number of job determinations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₆: There is a negative relationship between production decisions and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.

- H₁₇: There is a negative relationship between job maintenance decisions and number of job terminations in the Job Maintenance Game for (1) participants with relatively stable employment records and (2) participants with relatively unstable employment records.
- H₁₈: The predisposition of participants with relatively stable employment records is significantly more positive than for participants with relatively unstable employment records with regard to the role of productivity in the job maintenance process.
- H₁₉: The predisposition of participants with relatively stable employment records is significantly more positive than for participants with relatively unstable employment records with regard to the role of employee decision-making in the job maintenance process.
- H₂₀: The predisposition of participants with relatively stable employment records is significantly more positive than for participants with relatively unstable employment records with regard to participation in simulation games.

Definition of Measures and Terms

The following definitions relate specifically to the research.

1. Computer Simulation - An imitative representation of a real world phenomenon. The process involves the development of a model of the phenomenon which is used to construct a software application that is a dynamic representation of reality.
2. Debriefing - A process by which participants are led through a discussion period following an instructional game to bring out and emphasize the salient learning that the simulation designer intended to be learned.
3. Employment Turnover - The number of employees that must be replaced by a business during a specified period as a result of quitting, resigning, or firings.
4. Environmental Effects - The entire range of events that effect a worker's ability to remain productively employed over which the worker has little or no control.
5. Index of Job Decisions - A measure of the quality of decisionmaking regarding job-related employee behaviors operationally defined as the number of times a game participant is faced with a job decision event minus the number of times risks were taken divided by the number of times participant was faced with a job decision event multiplied by 100.

6. Index of Job Maintenance Decisions - A measure of the desire or motivation of a participant to remain employed operationally defined as the number of times a participant has an opportunity to enter job maintenance loop minus the number of times participant chose not to enter divided by the number of times participant had the opportunity to enter multiplied by 100.
7. Index of Production Decisions - A measure of the desire of a participant to be productive operationally defined as the number of times the participant had an opportunity to enter the production loop minus the number of times participant chose not to enter divided by the number of times participant had the opportunity to enter multiplied by 100.
8. Instructional Simulation - A teaching device that emulates a model of a real world process or phenomenon. Board games, role plays, and teaching oriented computer simulations or types of instructional simulations.
9. Job Maintenance - The process by which a worker retains or fails to retain a job.
10. Job Maintenance Game - An educational simulation of the process by which an employee keeps or loses a job.
11. Job Maintenance Strategies - The total decisions made by a worker in attempts to control the effects of his own behavior and the effects of environment in the job situation which results in either job retention or job termination.
12. Job Retention - The keeping of one's job in the Job Maintenance Game.
13. Job Terminations - The loss of one's job in the Job Maintenance Game.
14. Net Job Maintenance Effort - A measure of a participant's capability to cope with the task of remaining employed in the Job Maintenance Game operationally defined as the number of job maintenance tokens acquired by a participant in the job maintenance loop minus the number of job maintenance tokens lost by virtue of chance.
15. Net Productivity - A measure of a participant's production in the Job Maintenance Game operationally defined as the number of production units acquired by a participant through the production loop plus the number of production units acquired by chance minus the number of production units lost by chance.

Chapter IV

DESIGN AND PROCEDURE

The design of the study is descriptive/comparative in nature with emphasis on the investigation of between group comparisons, within group changes, and relationships between several factors and an outcome variable. The research procedures followed a standard format of instrument design, research arrangements, data collection, data analysis, and report writing. The population of the study were participants in CETA Work Experience Programs of Rural Michigan counties, and the sample was composed of participants from selected CETA Work Experience Programs. Treatment of the data consisted of an analysis using nonparametric statistics. The nature of the simulation/game as an instructional device dictated several limitations to the study.

Design of the Study

The descriptive/comparative nature of the study design was dictated by three factors. First, the treatment (participation in the Job Maintenance Game) and observation (data collection) occurred simultaneously as contrasted with the more typical research design where treatment is followed by a post-test. Second, as only a single treatment was available and as the data collection instrument was specifically designed for the treatment, the use of a control group was not

possible. Third, the use of subgroups based on the stability of each participant's previous employment prevented random assignment to groups. As control of assignment of subjects to groups and of treatment to groups was not feasible, the use of an experimental design was precluded.

The design of the study centers on an investigation of three concerns that were an outgrowth of the objectives of the study which are:

1. A between groups comparison of both selected predispositions and game strategies of the participants.
2. The within group changes in strategies from a first play to a second play of the game.
3. The relationships between a number of factors and dimensions of the game and the major outcome variable of job terminations.

The design is shown in Figure 5, A Paradigm of the Research Design.

General Procedures of the Study

The research procedures were conducted in a manner described in the following steps:

1. An instrument for recording participant game behavior in the Job Maintenance Game was developed and two forms were produced. See Data Collection Forms Number 1 and Number 2 in Appendix B.
2. An instrument for the recording of participant personal and job history and for the measurement of participant predispositions toward the role of productivity and the role of employee decisionmaking in the job maintenance process as well as participant predispositions toward participation in simulation games was developed. See Data Collection Form Number 3 in Appendix B.
3. The computer simulation of the Job Maintenance Game was used to produce a series of computer "runs" which served as one basis for making minor modifications and rule changes in the actual game.

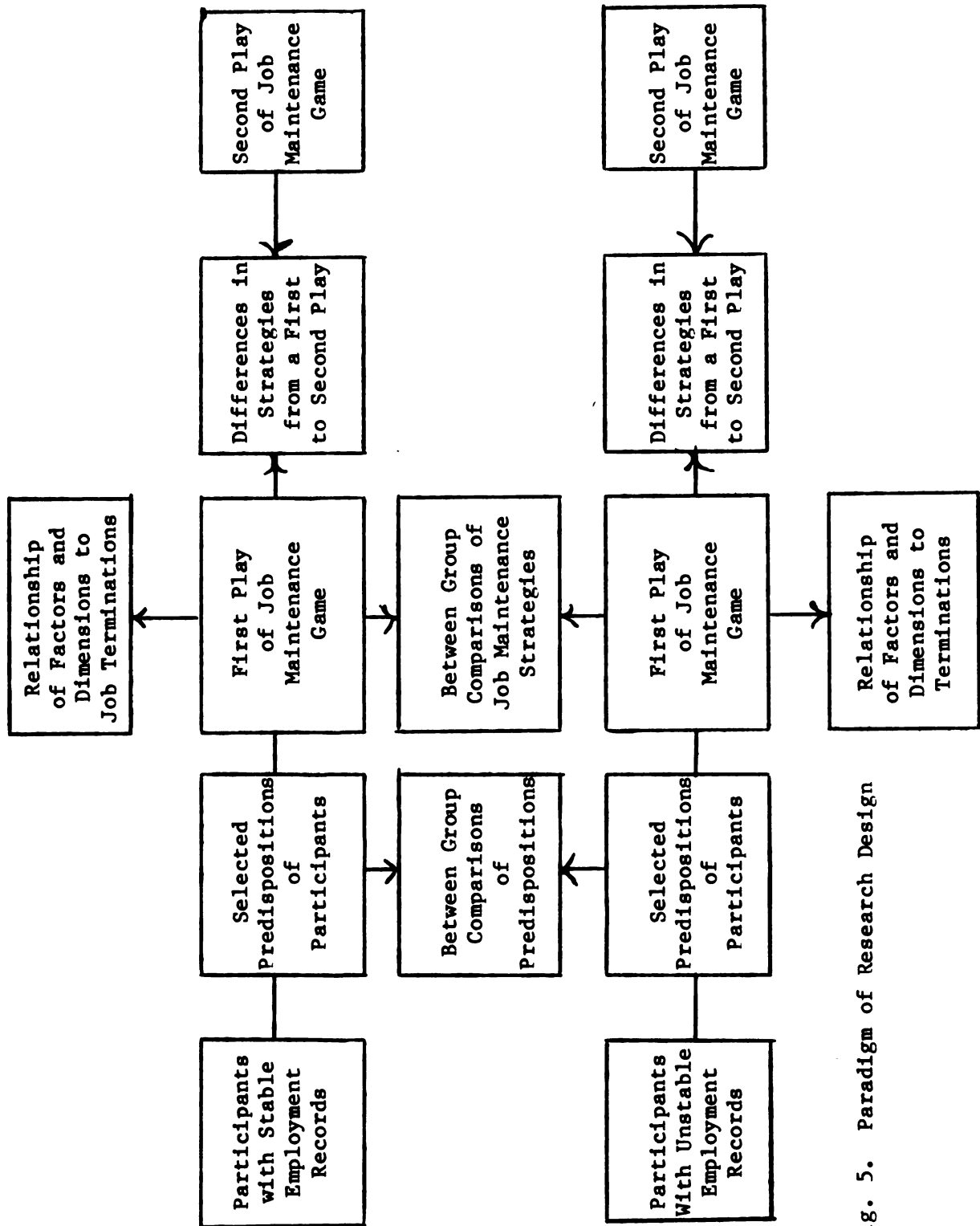


Fig. 5. Paradigm of Research Design

4. A CETA program in a rural Michigan County was selected to pilot test the instruments and the Job Maintenance Game. A small sample of 15 CETA workers participated in piloting the instruments and in playing the Job Maintenance Game. Feedback from this group also served as a basis for making final adjustments in the instruments and game.
5. Refinements and modifications were made in the instruments and Job Maintenance Game based on the computer simulation results and the pilot test. The amended rules and guidelines of the game are documented in the Facilitator's Guide to the Job Maintenance Game found in Appendix C.
6. The cooperation of four CETA Program Supervisors for four rural counties in Michigan was obtained to conduct the study. Supervisors assisted in selecting a sample of participants for the study. Additionally, the supervisors served in scheduling participants and in making facilities available for conducting the research. Supervisors also assisted in scheduling CETA program staff to serve as recorders for the collection of data. See letter to Director of partici-pating CETA Programs in Appendix A.
7. Immediately prior to each research session, CETA program staff members as well as others were trained to serve as recorders for the collection of data.
8. The facilitator's role in the Job Maintenance Game was primarily the responsibility of the researcher with assistance from an experienced professional University staff member.
9. The research was conducted at sites in four rural Michigan counties on six separate occasions. Dates, sites, and participant numbers are documented in Appendix E, Listing of Research Sites.
10. At the end of each research session the data collection forms were reviewed for completeness and were reconciled for internal consistency. Inconsistent or incomplete data was omitted from the study.
11. Data collection forms were coded for key punching and key-punched for computer analysis.
12. The analysis of data was conducted using nonparametric statistics including the Mann-Whitney U Test, the Wilcoxon Matched Pairs Signed Rank Test, and the Kendall Rank Order Correlation Coefficients from the Statistical Package for the Social Sciences (SPSS). The CDC 6500 Computer at the Michigan State University Computer Laboratory was used to analyze the data with the SPSS program.

Specific Procedures of Data Collection

During the data collection phase at the various research sites, specific procedures were followed in order to assure consistency in the collection of data. CETA staff members for the work experience program at each site were trained as data recorders for the study. On two occasions, professional educators served in that capacity. Data recorders were provided with an overview of the game and given instructions on how to use Data Collection Forms Number 1, 2, and 3. Time was allowed for a short try-out at recording data and for questions from the data recorders.

Participants were given a brief description of the nature of their involvement, and were then asked to complete Data Collection Form Number 3. Participants received assistance from data recorders in the completion of the employment history and predisposition items on Form Number 4. Those data forms were then collected. Participants were then given a brief overview of the Job Maintenance Game and were asked to adjourn to previously set up game tables where they were divided into groups of four to six. From two to four tables of players would then play simultaneously.

In order to get the games started, one table would be given initial instructions as specified in Appendix C, Facilitator's Guide to the Job Maintenance Game, while all other participants observed. The process of getting the first game started took about 5 minutes, at which time the other groups were knowledgeable enough to begin their game play. Each first play of the Job Maintenance Game was allowed to proceed for approximately one hour. The various groups differed somewhat in the speed of play and variations between research sites were

noted. The average number of completed board cycles per participant varied from a low of 3.1 to a high of 5.1 cycles which was sufficient to generate the needed data.

Immediately following the first play of the game a debriefing session was conducted following the format of the Debriefing Guide for the Job Maintenance Game found in Appendix D. The debriefing session was approximately forty to sixty minutes in length depending on group size.

After the debriefing session a second play of the Job Maintenance Game was conducted with the same participants. This playing session was somewhat shorter than the first play of the game primarily due to the fact that the participants played at a faster pace. The average number of completed board cycles per participant for each group of participants varied from a low of 2.6 to a high of 5.1 cycles. However, only one group had an average below 3.8 cycles per participant. While the results for the group with 2.6 cycles was somewhat less than desirable, the other groups had sufficient cycles per participant to generate needed data.

Even though the collection of data proceeded smoothly, a few difficulties were encountered. During the piloting of the instrument and game procedures, CETA staff members assisting in data collection were very effective. In addition, adequate time was available to train and inform the staff for their data collection roles. As a result the pilot testing was very successful with only minor concerns to be resolved.

However, at the first research site, problems in scheduling were encountered which resulted in unavoidable delays and inadequate

time for training data recorders. As a result the data collection at the site was incomplete and was omitted from the study. While subsequently the scheduling improved, limited time to train data recorders at the next two sites resulted in several participant's data being unusable. Data collection at the other sites preceeded well and a sufficient number of participants were included for the purposes of the study.

Members of the various CETA staffs served to assist the researcher in assigning participants to either the stably employed or unstably employed subgroups based on participant responses. These data recorders further served in reviewing the data forms for completeness and internal consistency. The checking of the data completed the data collection process.

Population and Sample

The population of the study were participants in CETA Work Experience Programs in Rural Counties of Michigan. The programs were administered under the federally funded Comprehensive Employment and Training Act (CETA) during the Seventies and were designed to provide basic work experience and training in the area of employability skills to those with persistent unemployment problems. Some of the participants in the programs were there by virtue of severe difficulties in staying on a job while others entered the program primarily due to the unavailability of employment in rural counties during that time period. The differences between program participants allowed for the establishment of two subgroups for the purposes of this study. The two subgroups of were workers with relatively stable employment records and workers with relatively unstable employment records. Data

collected from each participant concerning personal employment history were used to assign each study participant to one of the categories. For a listing of the type of personal history data that was collected, see Data Collection Form Number 4 in Appendix B.

The sample of the study consisted of sixty-four participants from four rural Michigan counties. Twenty-nine of the participants had relatively stable employment records while thirty-five participants had relatively unstable employment records.

Treatment of the Data

The unique methods and instruments used to obtain the data dictate that the reader be provided with a description of the general nature of that data in order to facilitate understanding. Data on the predispositions of participants and data relating to participants employment history were collected using the previously mentioned Data Collection Form Number 3 and were straightforward in nature. The raw data were used to establish a file of 64 cases for a set of SPSS variables.

Other data for the study were not collected using a typical or standard format. Data generated by the participants' play of the Job Maintenance Game were recorded in Data Collection Forms 1 and 2. The data were collected on a by-job basis as participants started over as new workers each time they lost their job in the game. Data were collected for a first play and second play of the game and were used to establish a set of SPSS variables for both games. As the basic unit of analysis for the study was the individual, the data were collapsed from 92 cases (number of jobs) in the first game and 102 cases in the

second game to a file for each of the 64 participants. At that time the data file for predispositions and employment history were aggregated with data files for Game 1 and Game 2 to make a single data file with 64 cases. Some new variables were then constructed using the existing data.

Though technically not a part of the study, the computer simulation of the Job Maintenance Game provided much information useful in the study. Data generated by the simulation included a by-job tally of playing events representing a number of variables and a game summary file on the same variables plus additional new variables constructed from the raw data. The computer simulation output was then transformed into a set of SPSS variables suitable for analyzing with statistical routines in the SPSS package. The output variables and SPSS variables are documented in Appendix F, "Documentation for a Computer Simulation of the Job Maintenance Game."¹¹⁹ Though the set of variables and data generated by the computer simulation paralleled those generated by participant's play, there was not a variable for variable correspondence between the two sets of variables. While most of the variables were indeed the same, comparisons between the computer simulation and the participant's play were approached with caution.

The statistics used in analyzing data of the study varied according to type. Data relating to predispositions and employment history and data from the computer simulation were analyzed using

¹¹⁹Joanne Berry, "Documentation for a Computer Simulation of the Job Maintenance Game," Agricultural Economics, Michigan State University (Unpublished Documentation, June 1977).

descriptive statistics. For categorical data, frequency counts with the mean, median, and mode were computed. Continuous data were analyzed by computing means with standard deviations and confidence intervals.

Data from the participant's play of the Job Maintenance Game were analyzed using nonparametric statistics. While most of the variables in the game were at least of an interval scale, the underlying phenomena which the variables represent may be interval in nature. For example, productivity in the Job Maintenance Game is measured in terms of number of production units, which meet the requirements of a ratio scale; however, the underlying phenomenon of productivity in many situations would meet only the requirements for an ordinal scale. For that reason nonparametric statistics were most appropriate for analyzing game results in the study.

Differences between the subgroups of interest regarding selected predispositions and game strategies (hypotheses 1 through 6, plus 18, 19, and 20) were analyzed using the Mann-Whitney U-Test. The probability level for acceptance of the Null hypotheses was set at $\alpha = .1$. Within-group differences between a first play and a second play of the game for both subgroups (hypotheses 7 through 12) were analyzed using the Wilcoxon Signed Rank Test. The probability level for acceptance of the Null hypotheses was also set at $\alpha = .1$. The relationships between a number of factors and dimensions of the game and the major outcome variables of job terminations (hypotheses 13 through 17) were analyzed using Kendall Correlation Coefficients and Spearman Correlation Coefficients which are two measures of rank order correlation.

The treatment of the data is summarized below in highlight form.

<u>Type of Data</u>	<u>Statistics Used</u>
Categorical Data	Frequency Count with Means
Continuous Data	Means with Standard Deviations
Between-Groups Comparisons	Mann-Whitney U Test
Within Group Strategy Changes	Wilcoxon Matched Pairs Signed Rank Test
Relationship of Determinants to Job Terminations	Kendall Rank Order Correlation Coefficients

Limitations of the Study

The limitations of the study are:

1. As the sample of the study was not randomly selected, it cannot be assumed to be representative of the population of participants from CETA manpower programs and, consequently, findings cannot be generalized to such a population.
2. The length of time needed to conduct data collection sessions (approximately four hours per session) along with the small number of participants per session (maximum of 18) dictated that the number of subjects in the sample be kept relatively low.
3. The Job Maintenance Game has a number of other variables of interest which could not be included in this study without overburdening the management of the study.
4. Time and monetary constructs did not allow for the application of statistical tests of reliability to the computer simulation of the Job Maintenance Game.

Chapter V

FINDINGS

The findings of the study may be subdivided into: (1) general findings related to the characteristics and nature of the targeted subgroups, (2) findings related to the nature of the Job Maintenance Game, (3) specific findings related to the hypotheses, and (4) other findings.

General Findings

The key independent variable in the study was the relative stability of employment history for study participants. Data obtained from participants concerning their work history provided a basis by which participants could be classified into two subgroups relative to employment stability. Of the 64 total participants, 29, or 45 percent, were classified as being relatively stably employed (Group I) and 35, or 55 percent, were classified as being relatively unstably employed (Group II).

Inasmuch as participants were classified on the basis of work history, it would be expected that the two subgroups would differ in that regard. Data obtained from participants for three demographic variables, however, were not used for classification purposes and differences between the subgroups on the variables of age, sex, and edu-

cation is of special interest.

Participants in Group I were older than participants in Group II. As is shown in Table 1 concerning characteristics, participants with relatively stable employment history had a mean age of nearly 30 years while their counterparts in Group II averaged only about 25 years in age. The sex of the participants was a further example of intragroup differences. Group II was composed of 24, or about 69 percent, males while Group I had 16, or about 55 percent males. The two groups also differed in education or years of schooling received. Group I showed a mean of 12 years of schooling which is equivalent to that of a high school graduate. Group II, as is evidenced in Table 1, had an average of slightly over 11 years of schooling, somewhat below that of a high school graduate. The group with relatively stable employment history appeared to be older, better educated, and composed of a higher percentage of females, though no statistical tests of significance were applied.

With regard to work history, participants from Group I had almost 10 years of work experience, substantially more than Group II participants with less than six years. Despite this, Group II had held a slightly greater number of jobs than did Group I, which is indicative of a higher rate of job turnover in Group II. The relatively stable Group I averaged four jobs over ten years while the relatively unstable Group II averaged almost 5 jobs in nearly six years.

Surprisingly, Group II reported receiving a higher rate of promotions than did Group I even though the first group did receive more total promotions. Group I received an average of 1.8 promotions

TABLE 1

CHARACTERISTICS OF PARTICIPANTS WITH RELATIVELY
STABLE EMPLOYMENT HISTORY AND PARTICIPANTS
WITH RELATIVELY UNSTABLE EMPLOYMENT HISTORY

Characteristic	GROUP I	GROUP II
	with Relatively Stable Employ- ment Record	with Relatively Unstable Employ- ment Record
	N = 29	N = 35
Mean years of age	29	24.9
Number and percentage male N = 40	16 (55.2) ^a	24 (68.6) ^a
Number and percentage female N = 24	13 (44.8) ^a	11 (31.4) ^a
Mean years of schooling	12.0	11.3
Mean years of work experience	9.9	5.6
Mean months of unemploy- ment	24.3	32.9

^aPercentages are shown in parentheses

over 9.9 years which represents one promotion each 5.5 years while Group II reported receiving an average of 1.3 promotions in 5.6 years which represents one promotion each 4.3 years.

The fact that promotions received during military service were counted may have had an effect on the situation to the extent that such promotions tend to be automatic. If the number of military promotions were about equal between the groups, then the group with the least average years of work experience would appear to have a higher rate of promotions because less automatic promotion policies in the private sector.

It can also be seen in Table 1 that the mean years of work experience for the groups varied from 5.6 years for the relatively unstable Group II to 9.9 years for the relatively stable Group I. The difference in length of work experience between the groups of 4.3 years was approximately the same as the between-group difference in average age which was 4.6 years. It would appear that the difference in extent of work experience was primarily due to age.

The two groups also differed in the extent of previous unemployment. Group I averaged approximately 2 years (24.3 months) of unemployment while the relatively unstable group averaged nearly 33 months of unemployment. Group II had 8.6 months more of unemployment than did Group I. This appeared to be offset by the fact that Group II had less than a high school education on the average with 8.4 months of education less than did Group I. It may well be that Group II spent that time after dropping out of high school in the ranks of the unemployed.

Data obtained from participants concerning job losses, presented in Table 2, were broken into the four categories of lay-offs, quits when a new job had already been obtained, quits with no new job in hand, and firings. Total job losses for Group I amounted to 3.2 per participant while Group II participants averaged 3.9 job losses. However, when length of work experience is considered, Group I participants lost a job on the average of once every 3.1 years while Group II participants lost a job on the average of once every 1.4 years. Job losses due to layoffs in Group I, as can be seen in Table 1, was slightly more than one per participant while Group II averaged somewhat less than one lay-off per participant, again in a shorter time frame.

Group I participants reported total quits averaging 2.1 per participant while Group II participants reported 2.5 quits. As is shown in Table 2, Group I was less likely to quit without first getting a new job and was much less likely to have been fired than was Group II.

While being fired was rare for Group I, Group II participants averaged being fired once in about 10 years. Group I averaged quitting a job about once in 8 years while Group II averaged quitting a job once in a little over two years. With regard to the success in dividing the participants into groups based on employment history, it would appear that there are indeed significant differences between the groups, though no statistical tests were applied for this data.

Job Maintenance Game Findings

Findings related to the Job Maintenance Game originate from two sources which are: (1) preliminary data from runs of the Job

TABLE 2

EMPLOYMENT RELATED CHARACTERISTICS OF PARTICIPANTS WITH
RELATIVELY STABLE EMPLOYMENT HISTORY AND PARTICIPANTS
WITH RELATIVELY UNSTABLE EMPLOYMENT HISTORY

Characteristic	Group I with Relatively Stable Employment Records	Group II with Relatively Unstable Unstable Employment
	Group Mean	Group Mean
Number of jobs held	4.0	4.7
Number of promotions	1.8	1.3
Number of lay-offs	1.1	.8
Number of total quits	2.1	2.5
Number of quits to take a new job	1.3	1.2
Number of quits with no new job in hand	.8	1.3
Number of times fired	.1	.6
Number of total job losses	3.2	3.9

Maintenance Game Computer Simulation and (2) data from participants' playing of the Job Maintenance Game. Data from the first source serve as a bench mark against which participant data may be compared. Some of the data generated by both the computer simulation and the participants' playing of the game may be used to examine the general reliability of the computer simulation.

As was noted in the introduction chapter, the computer simulation was designed to allow the flexibility to change player strategies and some game rules. These input variables (I. V.) are documented in Appendix F, Documentation for a Computer Simulation of the Job Maintenance Game.

Examples of player strategy input variables include criteria for decisionmaking on production, maintenance, and job decision cards, as well as others. Examples of rule changes include the number of die to be rolled, the number of job loss tokens accumulated to terminate a job, the number of production units required to be turned in at the Pay Day space plus many others in this area. The standard value (S. V.) of each of thirty-three input variables was set to coincide with the original rules of the Job Maintenance Game. A series of strategies was developed to both fine tune the Job Maintenance Game for the purposes of research and to test the theoretical outcomes of the computer simulation version of the Job Maintenance Game. Those strategies are documented in Appendix G, "Description of the Strategies used in the Computer Simulation of the Job Maintenance Game."

Strategies to Define Theoretical Limits

The first of the strategies was entitled MAXIMUM STRATEGY and represented a low risk strategy with all input variables set to

maximum. The RANDOM STRATEGY set input variables related to player strategies to a random or 50-50 basis. For example, the decision to enter the production loop was randomized. Other input variables related to game rules were set to standard value. The MINIMUM STRATEGY set player strategy input variables to the most negative choice which represented a high risk strategy. For example, production was set never to enter the production loop. Again, game rules were left at standard value. The OPTIMAL STRATEGY set the production and job maintenance variables to limit amounts gained after a certain level. Other input variables were standard value.

Three other strategies designed to reduce the role of productivity in the game and based on the maximum strategy were also developed. The MAXIMUM STRATEGY WITH ONE DIE (MAX 1D) allowed the simulation to roll one die instead of two and set the number of board cycles to 50 instead of 100. The MAXIMUM STRATEGY WITH PRODUCTION - MAINTENANCE CHANGES (MAX PMC) set the number of production cards and the number of job maintenance tokens to two instead of one for landing on spaces in the respective loops and changed the number of initial job maintenance tokens from three to four. The MAXIMUM STRATEGY WITH ENTER LOOP CHANGES (MAX ELC) changed from one to two the number of production cards and job maintenance tokens received for entering the respective loops.

The first four strategies were developed to test the theoretical limits of the computer simulation and Job Maintenance Game with regard to a number of key dimensions. Table 3 shows the results of the computer runs for those strategies on a number of important variables. Those strategies will be discussed shortly, but first a few

TABLE 3

COMPARISON OF THE RESULTS OF FOUR STRATEGIES FOR TESTING THE
THEORETICAL LIMITS OF THE COMPUTER SIMULATION OF THE
JOB MAINTENANCE GAME ON SELECTED VARIABLES RELATED TO
THE DETERMINANTS OF JOB MAINTENANCE

Variables	Computer Simulation Results by Strategy ^a			
	MAXIMUM	OPTIMUM	RANDOM	MINIMUM
Number of total board cycles ^b	408	420	419	401
Total number of jobs held	93	92	129	161
Number of board cycles per job ^b	4.4	4.6	3.3	2.5
Index of job decision quality ^c	69.8	68.5	37.7	0.0
Index of production decision quality ^c	100.0	99.1	45.4	0.0
Index of job maintenance decision quality ^c	100.0	98.5	52.1	0.0
Net productivity per job ^d	3.3	3.4	1.5	.6
Net job maintenance effort per job ^e	6.5	5.9	4.1	2.8
Total number of net job loss tokens	253	234	344	468

^a For further explanation of the nature of the strategies see Appendix G.

^b Number of board cycles include both complete and partial board cycles.

^c For a definition of indices see Definition of Measures and Terms in Chapter III.

^d Measure of the mean number of net production units per job.

^e Measure of the mean number of net job maintenance tokens per job.

points about the nature of the computer simulation need to be noted.

The computer simulation was designed to run with four "players" to facilitate the interaction necessary to create some of the dynamics of the game. However, the basis for analysis of the computer simulation results was the number of jobs generated rather than the number of players. The purpose of using jobs rather than players as the unit of analysis was to facilitate the testing of theoretical relationships and to facilitate comparison of actual participant results where the number of players varied.

With the exception of the MAX (1D) strategy which was set to fifty cycles, all strategies in Tables 3 and 4 were set to operate one hundred cycles. That is to say, that with four players the first player to reach one hundred complete cycles caused the computer simulation to terminate play. However, as partial cycles were involved each time a player "lost a job," the total number of board cycles exceeded four hundred for all strategies except MAX (1D) which appropriately exceeded two hundred. The range for one hundred cycle strategies varied from 401 to 419 which would seem to be within the range of chance variation though no statistical tests were used.

The total number of jobs as evidenced in Table 3 is another way of stating the number of job terminations for the players. In a four player game the number of job losses would be four less than the total number of jobs. Further, considering only job terminations would reduce the total board cycles because any board cycles for the last four jobs would not be included. Consequently, the number of board cycles per job is a fair estimate of the board cycles per job termination. As the two are very close together no attempt will be

made to report the computer simulation data on the basis of number of job terminations. The total number of jobs varied for the first four strategies from a low of 92 for the optimum strategy to a high of 161 for the minimum strategy with the maximum and random strategy falling between the two as would be predicted by the design of the simulation.

The number of board cycles per job is of special interest in that it is an approximate measure of the average cycles completed for each job termination. That is, for a given strategy the figure provides an approximate measure of the length of a job from start to termination. Table 3 demonstrates that, as expected, the minimum strategy results in the fastest turnover with a job termination occurring on the average of about every 2.5 board cycles. The highest number of board cycles per job was found for the optimum strategy. At 4.6 board cycles per job, the optimum strategy yielded slightly better results than the maximum strategy at 4.4 board cycles per job, indicating that turnover was slightly less with the optimum strategy. The random strategy yielded a value of 3.3 board cycles per job, falling slightly less than halfway between the minimum and maximum strategy. The author's experience with the Job Maintenance Game suggests that board cycle ranges of from 3.5 to 4.5 are most desirable in that cycles in that range can be generated by participants in approximately one hour of play, thereby giving ample opportunity for a job to be lost or retained.

The index of job decision quality which is a measure of the percent positive decisions made on job decision cards by the computer could theoretically vary from 0 to 100. Under maximum strategy the "players" always made positive decisions if they could, while under

the minimum strategy "players" never made positive decisions. The results indicated that for the minimum strategy, the expected results of a zero index was obtained. While expected results for the maximum strategy for that index could not be specified in that "players" would not always have the necessary tokens to make positive decisions, the actual result of 69.8 appears reasonable. The result for the random strategy for the index of job decision quality at 37.7 was approximately halfway between the minimum and maximum strategy as would be expected.^a

^aThe index of job decision quality is one of five indices which were used in the study. The indices are constructed variables using either raw data from the computer simulation or actual participants play to build new variables. Each "player" or participant is represented by a case in the data file and values for the new variables are computed for each case. That is, each "player" or participant will have an individual value computed for the index of job decision quality. Then the group value for the index was obtained by computing the mean value for all of the participants. However, that method is not the only method for computing a group value. An alternate method of computing the indices involves first summing and obtaining means for each of the original variables and then using the formula to compute a new group value for each index. For example, the formula for a hypothetical index might be $A \text{ minus } B \text{ plus } C \text{ equals } D$. In the study the formula was applied to each individual case to provide a new variable value for each individual. Then the values of each case were averaged to obtain a group value for the constructed variable. In the alternate method the mean value of A, B, and C were first obtained, then the formula applied to generate a group value. Each method yields a different result which is to say that the method in the study weights each case differently than the alternate method. The index of job decision quality for the computer simulation under maximum strategy generated a group mean of 69.8 using the study method. The mean value obtained by first averaging the original data is 63.4. While the latter value is a "more accurate" representation of the group mean for some purposes, computation of various statistics in the study requires an individual value be utilized for each case. The above points out one of the problems associated with "averaging averages" through the construction of new variables. For the purposes of the study, the first method described will be used for both computer simulation and participant data.

The other two indices follow similar patterns, except that the expected results for the maximum strategy can be exactly specified in these cases. For the index of job maintenance decision quality and the index of productivity decision quality, the maximum strategy dictates that players always enter the maintenance or production loop. Consequently, the expected result is the maximum level of 100. Likewise, the minimum strategy would be expected to generate a zero value for the two indices. The actual results match the expected theoretical values as shown in Table 3. Further, the random strategy for the two indices should fall approximately halfway between the minimum and maximum strategies as is the case with values of 52.1 for the index of job maintenance decision quality and 45.4 for the index of productivity decision quality.

The optimum strategy would be expected to generate results somewhat similar to those of the maximum strategy. The key elements for that strategy were enter production loop if the number of production cards held was less than four and enter job maintenance loop if the number of job maintenance tokens was less than six. As shown in Table 3, the computer "players" had indices for productivity decision quality and job maintenance decision quality exceeding 98 which means that entry to the two loops occurred in over 98 percent of the cases. That means that possession by the "players" of four or more production cards and six or more job maintenance token was a rare event. The key elements of the optimum strategy had little effect and the results are very similar to results for the maximum strategy.

The amount of net job maintenance effort and net productivity per job follows the predictable pattern of the lowest levels being

found for the minimum strategy and the highest levels found for the maximum strategy. The one exception to the pattern of the optimum strategy slightly exceeding the maximum strategy with regard to net productivity per job can easily be accounted for by the differences in the number of total board cycles for the two strategies. As shown in Table 6, Appendix H, to be highlighted later, the higher productivity for the optimum strategy can be accounted for by chance production due to a twelve board cycle difference between the maximum and optimum strategy.

The values for net job maintenance effort per job vary from 2.8 job maintenance tokens for the minimum strategy to 6.5 tokens for the maximum strategy with the optimum strategy value (5.9) falling near the maximum strategy value and the random strategy value (4.1) falling somewhat below the halfway point. The values for net productivity range from .6 production units per job for the minimum strategy to 3.4 units for the optimum strategy, slightly ahead of the maximum strategy at 3.3 as previously explained. The value for the random strategy (1.5) again falls somewhat below the halfway point.

The values of the above indices and summative variables approximate very well the expected results, and can be said to be highly supportive of the general reliability of the computer simulation and consequently the job maintenance game. Other results of the computer simulation runs to be discussed later will also lend credence to the reliability of the game and its computer simulation.

Strategies to Reduce the Role of Productivity

Early in the original development, pilot-testing, and use of the Job Maintenance Game it was noted that production appeared to play

too great a role in the job termination process. That is, low productivity appeared to account for too high a percentage of the job loss tokens leading to job termination. It was felt that this did not reflect the reliability of the research findings in that low productivity has not generally been reported as a key variable in job terminations.

The above situation provided some of the impetus for the original development of the computer simulation of the Job Maintenance Game. After initial development of the computer simulation, the last three of the previously mentioned computer simulation strategies were designed with the intent of reducing the number of job terminations resulting or partially resulting from low productivity. Table 4 documents the results for those strategies for a number of important variables.

The number of total board cycles shown in Table 4 appeared to be within the range of acceptable responses as has been previously discussed and noted. All three of the strategies represent variations of the maximum strategy and two of the strategies are based on one hundred cycle termination schemes such that little variations in the number of board cycles would be expected. The one exception, the fifty cycle maximum (1D) strategy, as previously noted, also fell within the range of expected results.

With regard to the total number of jobs held, it may be concluded that all three of the strategies were effective in reducing the turnover or number of job terminations. The maximum (ELC) strategy was most effective with a total of 57 jobs held followed by the maximum (1D) strategy with 62 jobs held as contrasted with the original

TABLE 4

COMPARISON OF THE RESULTS OF THREE STRATEGIES DESIGNED TO REDUCE THE ROLE OF PRODUCTIVITY IN THE COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME ON SELECTED VARIABLES RELATED TO THE DETERMINANTS OF JOB MAINTENANCE

Variables	Computer Simulation Results by Strategy		
	MAXIMUM (1D) ^a	MAXIMUM (PMC) ^a	MAXIMUM (ELC) ^a
Number of total board cycles ^b	215	410	415
Total number of jobs held	62	78	57
Number of board cycles per job ^b	3.5	5.3	7.3
Index of job decision quality ^c	73.9	77.7	79.2
Index of productivity decision quality ^c	100.0	100.0	100.0
Index of job maintenance decision quality ^c	100.0	100.0	100.0
Net productivity per job ^d	10.3	4.3	7.7
Net job maintenance effort per job ^e	13.6	9.2	15.2
Total number of net job loss tokens	126	189	131

^aFor an explanation of the nature of the strategies, see Appendix G.

^bNumber of board cycles include both complete and partial board cycles.

^cFor a definition of indices, see Definition of Measures and Terms in Chapter III.

^dMeasure of the mean number of net production units per job.

^eMeasure of the mean number of net job maintenance tokens per job.

maximum strategy with 93 jobs held.

The rate of turnover may be examined by using the number of board cycles per job as a fair estimate. As seen in Table 4, the lowest rate of turnover was found with the maximum (ELC) strategy where turnover occurred about once every 7.3 cycles, while the highest turnover occurred with the maximum (1D) strategy where the apparent rate was about one turnover every 3.5 cycles. It should be noted, however, that the amount of time needed for a participant to play 3.5 cycles rolling a single die under the maximum (1D) strategy would be approximately the same as for the participant to play 7.3 cycles under the maximum (ELC) strategy where participants would be rolling two dice. Because rolling of a single die essentially packs more game events into a single cycle, the two strategies actually are very similar with regard to turnover. The maximum (PMC) strategy resulted in turnovers at the rate of one every 5.3 cycles.

Some variation among the three strategies is noted with regard to the index of job decision quality. Both the maximum (PMC) and maximum (ELC) strategies changed the rules relating to job decision events, thereby increasing the number of job maintenance tokens that were generated and consequently made positive responses to job decision cards more frequent. As a result, an increase in the index of job decision quality would be expected. Compared to the index of job decision quality for the maximum strategy valued at 69.8, the value for the maximum (PMC) strategy (77.7) and the value for the maximum (ELC) strategy (79.2) represent sizable increases for this index. While no changes in the rules relating to job decision events were made for the maximum (1D) strategy, the effect of rolling one die

served to increase the number of job maintenance tokens generated leading to an expected increase in the value of the index of job decision quality. The value of that index for the maximum (1D) strategy was 73.9, somewhat above the maximum strategy value of 69.8.

As the enter production and enter job maintenance decisions were set to always enter for all of the maximum strategies, the expected values for the index of production decision quality and the index of job maintenance decision quality were at the maximum value of 100. As seen in Table 4, those values were obtained.

The values for net productivity per job varied substantially among the three strategies. Only one of the values, that of the maximum (PMC) strategy (4.3), was similar to the value (3.3) for the original maximum strategy. The maximum (PMC) strategy was designed to reduce the role of low productivity in causing job terminations by increasing the number of production cards gained by landing on a spot in the production loop. The increase in net productivity provides some evidence that the role of productivity may have been reduced with the maximum (PMC) strategy. However, the conclusive evidence in this regard will be highlighted later from Table 10, Appendix H. Both the maximum (ELC) strategy and the maximum (1D) strategy yield substantial increases in net productivity with values of 7.7 and 10.3, respectively. The increase for the maximum (1D) strategy came about as a result of a higher frequency for enter production events and landing on a spot within the production loop brought about by rolling a single die. The increase for the maximum (ELC) strategy occurred by virtue of an increase from one to two in the number of production cards received for entering the loop.

Increases in the level of net job maintenance effort per job can be noted in Table 4 when compared to the bench mark data obtained for the original maximum strategy with a value of 6.5. Similar arguments to those relating to net productivity can be used to explain the increases in net job maintenance effort which in all cases approximated the expected values.

Highlights of Determinants for Computer Simulation Strategies

For the sake of brevity, a number of tables for the computer simulation strategies related to employee decisionmaking, employee productivity, employee motivation, and job maintenance outcomes were relegated to the appendices. Those tables are of three general types and may be found in Appendix H. The first type of table (Tables 5 through 8) provides data on various variables relating to the four categories above for the four strategies for testing the theoretical limits of the Job Maintenance Game. The second type of table (Tables 9 through 12) provides corresponding data for the three strategies designed to reduce the role of productivity in causing job terminations. The third type of table (Tables 14 through 17) compares the total participants' results of a first playing of the Job Maintenance Game with those obtained with the computer simulation of the game under maximum strategy. Highlights for the tables are provided for the first type in terms of the model of the job maintenance process, that is, in terms of the four categories above. Highlights of the second type are discussed in terms of the three strategies for reducing the role of productivity in causing job terminations. Highlights of the third type are discussed in terms of the four categories

relating to the model of the job maintenance process.

The first set of tables in Appendix H to be highlighted are for the maximum, optimum, random, and minimum strategies and the highlights are presented below in a list format:

- A. Highlights Related to Employee Decisionmaking (Table 5, Appendix H)
 1. The number of job related decisions required was a function of chance and did not vary significantly by strategy except for a slight drop in value from the maximum strategy to the other strategies.
 2. The number of positive job decisions made was a function of two levels of decisionmaking (job decisions and job maintenance decision) and varied by strategy with values within the range of expectations.
 3. The number of job loss tokens awarded as penalties for negative job decisions varied by strategy, as expected, with one exception. The minimum strategy yielded a value of 88 job loss tokens when a higher value in the vicinity of 108 was expected. While chance variation is a possibility, other unseen factors may account for the apparent difference.
- B. Highlights Related to Employee Productivity (Table 6, Appendix H)
 1. The number of opportunities to enter the production loop is a function of chance and the rules surrounding the manner of entry to the production loop. For the strategies in question, the number varied from a low of 200 to a high of 250, and each strategy value is within the range of expected values.
 2. All other variables related to employee productivity varied by strategy and fell within the expected range of values.
 3. The optimum strategy exceeded the maximum strategy for all variables related to employee productivity. Much of the increase may be accounted for by the 12 board cycle difference between the optimum and maximum strategy. The balance of the increase may be accounted for by difference in rules between the strategies.
- C. Highlights Related to Employee Motivation (Table 7, Appendix H)
 1. The number of opportunities to enter the job maintenance loop varied from a low of 204 with the minimum

strategy to a high of 310 for the maximum strategy. It was expected that the optimum strategy would slightly exceed the maximum strategy. However, the actual result was 270 for the optimum strategy, which was 40 less than the maximum strategy. No reason except chance occurrence can be offered for the discrepancy.

The number of opportunities to enter the job maintenance loop influenced a number of other variables relating to employee motivation, resulting in those variables being less for the optimum strategy than for the maximum strategy. Other variables not influenced by the above showed expected values.

2. All other variables for the four strategies generated values within the expected range.

D. Highlights Related to Job Maintenance Outcomes (Table 8, Appendix H)

1. The number of job loss tokens received by "players" is summarized in Table 8, Appendix H. All variables for the four strategies generated reasonable values in line with expectations with the exception of one.
2. As previously noted in the employee decisionmaking highlights, the minimum strategy yielded a lower number of job loss tokens from decision risks. Again, only chance variation can be offered as an explanation of the discrepancy.

The second set of tables in Appendix H to be highlighted (Tables 9 through 12) concern the maximum (1D), the maximum (PMC), and the maximum (ELC) strategies. These strategies were designed with the intent of reducing the role of productivity in causing job terminations. As each of the strategies above is essentially a variation of the original maximum strategy, the highlights presented below will use the maximum strategy results as a bench mark to which the other strategies may be compared:

A. Highlights Related to the Maximum (1D) Strategy (Tables 9 through 12, Appendix H)

1. The effect of rolling one die instead of two was substantial, with the number of board cycles per job being reduced and consequently reducing the number of

production units needed by almost half while at the same time greatly increasing the number of production units, job maintenance tokens, and other board events.

2. There was a significant increase in the number of job decisions required (622) by the maximum (1D) strategy as compared with the maximum strategy value of 556. A higher percentage of positive decisions resulted from a substantial increase in the number of job maintenance tokens generated in the loop (693) as compared with the bench mark value of 349. The result was to cut the number of job loss tokens received from decision risks by half from the bench mark value of 52 to the maximum (1D) value of 27.
 3. The number of opportunities to enter the production loop for the maximum (1D) strategy was similar to that of the maximum strategy, but higher production was obtained in the loop due to rule changes. The higher loop production (479 vs. 184) was actually unnecessary because of the reduced demand for production units from the bench mark value of 385 to the maximum (1D) value of 198. As a result, job loss tokens for low productivity dropped from 170 to 30. The goal of reducing the role of productivity in job terminations was achieved.
 4. A greater opportunity to enter the job maintenance loop (394 vs. 310) for maximum (1D) strategy as compared to the maximum strategy was followed by an increase in the number of job maintenance tokens generated in the loop due to rule changes for the maximum (1D) strategy (693) as compared to the bench mark value of 349. This led to a higher number of job maintenance tokens being used on job decisions (656 vs. 479) and to fewer job loss tokens being received from job decision risks.
 5. The total number of net job loss tokens received was down from the bench mark value of 253 to the maximum (1D) value of 126, indicating it was substantially easier for "players" to maintain a job using the maximum (1D) strategy.
- B. Highlights Related to the Maximum (PMC) Strategy (Tables 9 through 12, Appendix H)
1. The effects for the maximum (PMC) strategy of increasing the number of production cards and job maintenance tokens received for landing in the respective loops as well as increasing the number of initial job maintenance tokens were definite but minimal in nature, compared with both the maximum (1D) and maximum (ELC) strategy.

2. The number of job decisions required was similar for both maximum (PMC) and maximum strategies (550 vs. 556). However, a greater number of positive decisions (394 vs. 352) brought about by an increase in job maintenance tokens generated in the loop (440 vs. 349) resulted in slightly fewer job loss tokens for job decision risks (42 vs. 52).
 3. There was a small increase from 226 to 239 in the number of opportunities to enter the production loop for the maximum (PMC) strategy relative to the maximum strategy. As a result of the change in game rules an increase in the amount of production in the loop from 184 to 220.5 was noted. The increase in loop production led to an increase in number of production units turned in at payday (248 vs. 215) which resulted in a small decrease from 170 to 138 in the number of job loss tokens attributed to low productivity.
 4. There was also a small increase from 310 to 328 in the number of opportunities to enter the job maintenance loop. However, a large increase in the number of job maintenance tokens (440 vs. 349) acquired in the loop resulted in a sizable increase in the number of tokens used on job decisions from 479 to 559. The number of job loss tokens for job decision risks was slightly reduced as previously noted.
 5. The total number of net job loss tokens was reduced from the original maximum strategy value of 253 to 189 for the maximum (PMC) strategy. A reduction of 32 tokens for low productivity plus small reductions in a number of areas accounted for the decrease.
- C. Highlights Related to the Maximum (ELC) Strategy (Tables 9 through 12, Appendix H)
1. The effects for the maximum (ELC) strategy of increasing the number of production cards and job maintenance tokens for entering the respective loops was substantial compared to the maximum (PMC) strategy.
 2. A slightly higher number of job decisions required (570 vs. 556) was noted. A substantially higher number of positive decisions (453 vs. 352) was brought about by the significant increase in job maintenance tokens required in the loop (729 vs. 349) which occurred by virtue of the rule changes. This led to a significant decrease in the number of job loss tokens for job decision risks from 52 for the original maximum strategy to 30 for the maximum (ELC) strategy.

3. While the opportunities to enter production were similar for both strategies, a significantly greater amount of production from the loop from 184 to 304 was obtained. As a result a substantially greater amount of production (313 vs. 215) was turned in at the Pay Day space, thereby reducing the number of job loss tokens for low productivity from the maximum strategy value of 170 to the maximum (ELC) value of 85.
4. A slight increase in the number of opportunities to enter the job maintenance loop probably due to chance was followed by the large increase in number of job maintenance tokens generated in the loop. A substantial increase in the number of tokens used for job decision risks (656 vs. 479) led to the decrease in job loss tokens for job decision risks.
5. The total net job loss tokens generated by the maximum (ELC) strategy was 131 which was significantly less than the 253 noted for the maximum strategy.

Overall, the three strategies were effective in achieving the design objective of reducing the role of productivity in causing job terminations. The strategies had the following positive events:

1. The number of total jobs was reduced, thereby reducing the turnover rate.
2. An increase in the level for the index of job decision quality was noted for all three strategies.
3. An increase in net job maintenance effort and net productivity was noted for three strategies.
4. An increase in the percentage of positive job decisions was noted for the strategies.
5. A reduction in the number of job loss tokens for job decision risks was obtained.
6. A large increase in the amount of loop production was found.
7. An increase in the number of opportunities to enter the job maintenance loop and large increase in the number of tokens generated was noted.
8. The number of job maintenance tokens used on job decisions increased substantially.
9. A significant decrease in the total number of net job loss tokens was obtained.

The three strategies also generated a number of strategy specific negative effects that are summarized below by strategy:

A. Negative Effects of Maximum (1D) Strategy

1. Because of the packing effect of rolling one die the estimate of time needed to complete actual play using the strategy was approximately two hours.
2. Rolling one die would probably slow down the "action" of the game considerably.
3. The strategy generates unacceptably large amounts of surplus production.

B. Negative Effects of Maximum (PMC) Strategy

1. The strategy failed to generate sufficiently high levels of productivity.
2. The strategy also failed to reduce sufficiently the number of job loss tokens for low productivity.
3. The number of board cycles per job was on the extreme high end of the desirable range that is the length of each job and consequently the time to play the game would be extended significantly.

C. Negative Effects of Maximum (ELC) Strategy

1. The number of board cycles per job was very high which would have resulted in extending the length of the game beyond the two hour mark.
2. The number of job maintenance tokens generated was higher than desirable.

Game Rule Changes and Their Effects

While the three strategies were rather effective in reducing the role of productivity, the strategies also generated unacceptably negative effects which precluded their use in actual play. Another approach was developed during Step 5 of the General Procedures for the Study. Unfortunately, the nature of the approach did not allow testing with the computer which would have involved additional programming of the computer simulation. After the results of the pilot test and

the computer simulation runs were examined, it was decided to attempt to reduce the role of productivity in causing job terminations in the following manner.

1. The amount of production gained by chance was increased. When participants landed on the board space marked Great Work they were awarded two production cards. Previously none had been awarded.
2. The ability of participants to meet the requirement of turning in a complete production unit at pay day was increased. Participants were allowed to turn in a production card with a complete automobile pictured on the back or two production cards with either two rear portions pictured or two front portions pictured or one front and one back portion pictured to meet the one unit production requirement. Previously, the participants had been required to turn in a production card with a complete pictured automobile or two cards with a front portion and rear portion pictured.

The above rule changes represent the only changes made in the original rules of the Job Maintenance Game for the purposes of this study. The amended rules for the Job Maintenance Game are documented in Appendix C. While it was not possible to test the above changes with a computer simulation run, the participants of the study did provide data which may be compared with the various strategies for the computer simulation in order to gain an idea of the effects that the changes had on the overall nature of the Job Maintenance Game. While the comparison does provide numerous insights into the nature of the Job Maintenance Game, the reader is cautioned to remember that with regard to production the rules of the two approaches were slightly different.

General Comparison of Participants and Computer Simulation

Results. Table 13 provides a comparison of participant results and results from several computer simulation strategies. As the optimum strategy was very similar to the maximum strategy, it was omitted from

TABLE 13

COMPARISON OF THE RESULTS OF A COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME WITH TOTAL PARTICIPANTS FIRST PLAY OF THE JOB MAINTENANCE GAME FOR SELECTED VARIABLES RELATED TO THE DETERMINANTS OF JOB MAINTENANCE

Variables	Computer Simulation Results by Strategy ^a			Participants Actual Play
	MAXIMUM	RANDOM	MINIMUM	
Number of total board cycles ^b	408	419	401	285
Total number of jobs held	93	129	161	92
Number of board cycles per job ^b	4.4	3.2	2.5	3.1
Index of job decision quality ^c	69.8	37.7	0.0	58.7
Index of productivity decision quality ^c	100.0	45.4	0.0	92.2
Index of job maintenance decision quality ^c	100.0	52.1	0.0	87.7
Net productivity per job ^d	3.3	1.5	.6	4.3
Net job maintenance effort per job ^e	6.5	4.1	2.8	6.6
Number of net job loss tokens	2.7	2.7	2.9	1.3

^aFor further explanation of the nature of the strategies see Appendix G.

^bNumber of board cycles include both complete and partial board cycles.

^cFor a definition of indices see Definition of Measures and Terms in Chapter III.

^dMeasure of the mean number of net production units per job.

^eMeasure of the mean number of net job maintenance tokens per job.

the comparison. The variables in the table are presented either as a percentage index or on an average per-job basis in order to facilitate comparing the two approaches. Variables from other tables for the participant-computer comparison were presented on a by-board cycle basis. Those tables, Tables 14 through 17, will be highlighted in the text. But as previously noted, they were placed in the appendices for the sake of brevity.

In the process of a first play of the Job Maintenance Game the 64 participants held 92 jobs and made 285 cycles around the board which included both completed and partial cycles. The average number of board cycles per job was 3.1 for the participants while the computer simulation under maximum strategy generated 4.4 board cycles per job. The length of the job in the game is a function of both player strategy and internal dynamics. The participants were closest to the random strategy results of 3.2 board cycles per job. The length of job varied from 2.5 board cycles for the minimum strategy to 4.4 cycles for the maximum strategy, a difference of less than two board cycles per job.

The nature of the game is such that even under the best strategy players lose their jobs on the average of once every 4.4 board cycles, and under the worst strategy players still keep their jobs for an average of 2.5 board cycles. This certainly emphasizes the need to keep the actual play of the game within reasonable time limits or the result will be that all participants will eventually lose their jobs. The longest any "player" was able to keep a job for the computer simulation under maximum strategy was 20 board cycles. Under the minimum strategy the longest job lasted 7 board cycles. The actual

participants in the game were under time constraints such that the longest job also lasted only 7 board cycles.

With regard to the three indices presented in Table 13, the results of the participants' actual play fell between the random and maximum computer strategies most closely approximating the maximum strategy. While the responses of the computer simulation strategies were fixed, the participants were free to respond individually and in a variety of ways. The 8 point and 12 point differentials between the maximum computer results and participant results for the index of production decision quality and the index of job maintenance decision quality, respectively, could be accounted for by (1) participants who did not need to be more productive, and (2) participants who did not desire to be more productive.

In that regard an interesting sidelight of the results shown in Tables 6 through 7 of Appendix H is that under maximum strategy the 310 opportunities to enter the job maintenance loop are substantially higher than the 226 opportunities to enter the production loop. As the number of board spaces devoted to enter production and enter job maintenance are the same, it would be reasonable on a probability basis to expect that opportunities to enter would also be the same, which is exactly the case for the minimum computer strategy where the production loop opportunities are 200 and the job maintenance loop opportunities are 204.

The discrepancy occurs for the maximum strategy because of the fact that under that strategy opportunities to enter the production loop—which comes two spaces before the job maintenance loop entry point on the physical layout of the board—are always taken. The

production loop is four spaces in length prior to being attached to the job maintenance loop entry point. Consequently, if the players choose to enter the production loop, they are on a simple probability basis twice as likely to land on the job maintenance entry point than if they had not chosen to enter the production loop. The result is that a reinforcing effect in the game serves to make the decision to be productive pay off directly in production units and indirectly in job maintenance tokens. During the original design of the game this highly desirable addition to the game dynamic was not anticipated.

With regard to net productivity per job, Table 13 offers some evidence that the change in rules regarding production does serve to reduce the role of productivity in job terminations. Participants actual play generated a value of 4.3 production units per job, fully one production unit greater than the maximum strategy average value. Confirmation of this reduced role for productivity will be provided as a part of the highlights of Tables 15 through 17 in Appendix H.

The value of net job maintenance effort per job was about the same for both participants and the maximum computer strategy. Highlights of Table 16, Appendix H, show that though the participants received fewer job maintenance tokens through the loop, this was offset by more tokens gained initially due to higher turnover.

While the number of net job loss tokens per job varied only slightly for the three computer strategies in Table 13, the participants' result was significantly different. The apparent low value of the participants (1.3 vs. 2.1 for the maximum strategy) was partially due to a reduction in the number of job loss tokens for low productivity as shown in Table 15, Appendix H, and partially due to the fact

that 42 of the 64 participants never lost their job. While the computer simulation offered plenty of time for players to lose their jobs, the participants were much more limited.

Highlights of Determinants for Participant and Computer Simulation Results. The data from Tables 14 through 17 found in Appendix H can best be presented in highlight form. The tables are a comparison of participants results and the computer simulation under maximum strategy.

A. Highlights Related to Employee Decisionmaking (Table 14, Appendix H).

1. The higher number of job related decisions required per board cycle for the maximum strategy was most likely due to a random response built into the strategy for life cards with an advance three spaces option. Participants would normally refuse this option if it caused them to land on a job decision space while the simulation only acted randomly.
2. The number of positive decisions per cycles was smaller for participants due to the smaller number of job related decisions required. The number of negative decisions per cycle was about the same for both participant and computer.

B. Highlights Related to Employee Productivity (Table 15, Appendix H)

1. Many of the productivity variables were almost identical for participants and maximum computer strategy.
2. Substantial difference did exist between the participants and the maximum strategy regarding chance production which was expected in accordance with the previously described rule changes.
3. Game rules provided that a participant or "player" turn in one production unit for each complete board cycle. The amount of production turned in as shown in Table 15 is reported both for complete plus partial cycles and complete cycles alone. The latter is a more meaningful basis for this particular variable. On that basis participants had a higher rate of turning in production (66% of the time) than did the maximum strategy at 56% of the time.

4. Participants produced one production unit per cycle while the maximum strategy generated only three-fourths unit per cycle.

C. Highlights Related to Employee Motivation (Table 16, Appendix H)

1. As the maximum strategy dictated always entering the production loop, the strategy out-performed the participants on number of entries to the job maintenance loop per cycle. This advantage translated into more actual entries and larger numbers of job maintenance tokens from the loop.
2. However, the above was offset by the participants' greater turnover and consequently the greater number of initial tokens which were issued at the start of a new job.
3. The two factors above serve to cancel each other out as the net number of job maintenance tokens gained per cycle for participants and maximum strategy was almost identical.

D. Highlights Related to Job Maintenance Outcomes (Table 17, Appendix H)

1. There was only one significant difference between the participants and the maximum strategy as it relates to job maintenance outcomes. The number of job loss tokens per cycle from low productivity was substantially lower for the participants (.29 vs. .42). As a result the total number of net job loss tokens per cycle was lower for the participants.
2. Though two of the computer strategies designed to reduce the role of productivity out-performed the rule changes designed to achieve the same purpose, the latter as confirmed above did reduce the number of job terminations from low productivity without the serious negative side effects generated by the computer strategies.

The general reliability of the computer simulation of the Job Maintenance Game would appear to be supported by the results of the various strategies examined and the results of the participants actual playing of the game. However, no statistical measures of reliability were computed. The computer simulation appeared to operate consistently in a predictable manner that generated expected results. Only

two or three examples of variables with questionable results were obtained. A further discussion of the reliability of the computer simulation and the Job Maintenance Game may be found in the Summary and Conclusions.

Specific Findings Related to the Hypotheses

The problem of the study centered on an investigation of the performance in the Job Maintenance Game of sixty-four participants who were members of a number of CETA Work Experience Programs. The hypotheses of the study were an outgrowth of four areas of concern which were (1) the extent to which two participant groups differed in their job maintenance strategy, (2) the extent to which the two participant groups were able to improve their job maintenance strategies, (3) the relationship of the determinants of job maintenance to job maintenance outcomes, and (4) the extent to which the participant groups differed on a number of predispositions.

Introductory Overview

A brief but more general examination of the data from the perspective of the model of the job maintenance process is in order before a specific examination of the hypotheses is undertaken. The data will be examined from the perspective of (1) the determinants of job maintenance, (2) employee decisionmaking, (3) employee productivity, (4) employee motivation, and (5) job maintenance outcomes.

The data to be analyzed in terms of the model of job maintenance will be limited to that of participants playing of the Job Maintenance Game for the first time. The manner in which participants responded in a first playing of the Job Maintenance Game was based on attitudes, beliefs, opinions, and feelings that the participants

brought to the research session. The results of a first playing are of great importance to the study. The second playing was based on knowledge the participants had gained from the first playing as well as in the debriefing session. Tables 32 through 35, Tables of Data Related to General Findings of Participants' Second Playing of the Job Maintenance Game, may be found in Appendix I. A brief analysis of the findings related to the second playing may be found under the section entitled Other Findings.

As shown in Table 18, which relates to the determinants of job maintenance, the number of board cycles varied for the two groups. Participants with relatively stable employment records (Group I) completed 109 board cycles while participants with unstable employment records (Group II) completed 135 board cycles for a total of 244 board cycles for both groups. Each time participants passed the Pay Day space on the game board, they (1) received a pay card representing one week's pay, (2) received penalties for each job decision card on hand, and (3) turned in either a complete unit of production or received a job loss token. Because of these events, completed board cycles were important in the game. However, when participants lost their jobs or the game ended, they were rarely on the Pay Day space which meant there were partial or uncompleted cycles. During the partial cycles, many of the same events also occurred as during complete cycles. Participants, as a result, collected job loss tokens, job maintenance tokens, and production units during the partial cycles. Consequently, the partial cycles were also of importance and were added to the number of complete cycles to yield total board cycles. In Table 18, as a result of partial cycles, the number of total cycles is shown to

TABLE 18

A COMPARISON OF THE RESULTS OF PARTICIPANTS FIRST PLAYING OF THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY AND BY TOTAL GROUP FOR SELECTED VARIABLES RELATED TO DETERMINANTS OF JOB MAINTENANCE

VARIABLES	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=29 PARTICIPANTS	GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=35 PARTICIPANTS	TOTAL GROUP N=62 PARTICIPANTS
	NUMBER	NUMBER	NUMBER
Number of complete board cycles ^a	109	135	244
Number of total board cycles ^b	125	154	279
Total number of jobs held	44	48	92
Number of jobs per participant	1.5	1.4	1.4
Number of total board cycles per job ^b	2.8	3.2	3.0
Index of job decision quality	51.4	64.7	58.7
Index of productivity decision quality	86.4	97.1	92.2
Index of job maintenance decision quality	84.4	90.0	87.7
Net productivity per job	2.8	3.2	3.0
Net job maintenance effort per job ^e	1.3	1.8	1.6
Total number of net job loss tokens per job	1.3	1.3	1.3

^aNumber times participants past pay day and received one pay card.

^bNumber of board cycles includes both complete and partial board cycles.

have risen to 125 for Group I and to 154 for Group II.

Another important consideration is the number of jobs held. Theoretically, participants with better job maintenance strategies will keep their jobs longer and will suffer fewer job losses than those with less effective strategies. Consequently, from a research point of view, the number of board cycles per job is also important. Group I which was composed of 29 participants held 44 jobs during the playing of the first game for an average of 1.5 jobs per participant. Group II which was composed of 35 participants held 48 jobs for an average of about 1.4 jobs per participant. The finding that Group II participants with relatively unstable employment records were better able to keep their jobs than the more stable Group I participants was very surprising. Group II averaged 3.2 board cycles per job compared with Group I with 2.8 total board cycles per job. The difference, however, can be attributed to the difference for the average number of jobs per participants between the two groups.

With regard to the indices in Table 18, Group I consistently performed at a lower rate than did Group II. The index of job decision quality averaged over 13 points lower for Group I compared with Group II which indicates that Group I took job related risks at a higher rate than did Group II. As consequences for the range of risks varied, it is impossible to say Group II decisions represent wiser choices than Group I. The values for the index of productivity decision quality were 86.4 and 97.1 for Group I and Group II, respectively. The lower value for Group I, however, could be because of less need for production as opposed to a lesser desire on the part of Group I participants to be productive. The difference between Group I

(84.4) and Group II (90.0) for values for the index of job maintenance decision quality is also subject to a similar argument as a possible explanation.

The values for net productivity per job (2.8 and 3.2, respectively, for Group I and Group II) and the values for net job maintenance effort (1.3 and 1.8, respectively, for Group I and Group II) would appear to support the preceding arguments for the two variables. However, the two groups differ little with regard to net productivity and net job maintenance effort as will be substantiated in a later discussion of the variables on a per board cycle basis. Apparently the differences between the groups for the two indices of net productivity and net job maintenance effort represent real differences in the quality of decisionmaking related to the two variables.

The last variable in Table 18 concerns the total number of job loss tokens received by the respective groups. Both Group I and Group II have the same value for the variable, and later discussions will show that the two groups do not differ significantly when the data are compared on a by-board-cycle basis.

Overall, the analysis of data in Table 18 demonstrates that the two groups used somewhat different strategies in the first playing of the Job Maintenance Game. It is clear from the data that Group II participants made more positive decisions regarding the three indices related to job decisions, productivity decisions, and job maintenance decisions and accumulated higher levels of production units and job maintenance tokens on a per job basis than did Group I participants. An examination of more specific data for employee decisionmaking, employee productivity, employee motivation, and job maintenance

outcomes should shed light on the reasons for the higher level of performance of Group II participants. In order to standardize the comparison of the responses of the two groups for individual variables, the results are reported on the basis of the mean number per total board cycle.

With regard to employee decisionmaking, it may be stated that regardless of whether the basis for analysis is number per participant, per job, or per board cycle, Group II was required to make more job-related decisions than did Group I. Group II had a higher percentage of positive job related decisions (62.6 percent) than did Group I (50.4 percent) which required the use by Group II of relatively larger numbers of job maintenance tokens.

As shown in Table 19, the number of job-related decisions required by Group I was 141 and by Group II was 198. The mean number of such decisions by board cycle was 1.13 and 1.28 for Group I and Group II, respectively. The number of positive decisions made was 71, or .57 per board cycle, for Group I and 124, or .81 per board cycle, for Group II. As the percentage of positive responses was higher for Group II, it follows that the percentage of negative decisions would be lower. The data in Table 19 show that on a per board cycle basis, the number of negative decisions was higher for Group I, .56 per board cycle, than for Group II, .48 per board cycle.

With regard to the difference between the groups on the number of job-related decisions required, it should be noted that the Group II results of 1.28 decisions per board cycle compared favorably with the computer simulation results which varied from 1.36 decisions per board cycle for the maximum strategy to 1.25 decisions per board cycle

TABLE 19

A COMPARISON OF THE RESULTS OF PARTICIPANTS FIRST PLAYING OF THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY AND BY TOTAL GROUP FOR SELECTED VARIABLES RELATED TO EMPLOYEE DECISIONMAKING

VARIABLES	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=125 PARTICIPANTS ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=154 PARTICIPANTS ^a		TOTAL GROUP N=62 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number job re- lated decisions required ^b	141	1.13	198	1.28	339	1.22
Number positive decisions made ^c	71	.57	124	.81	195	.70
Number negative decisions made ^d	70	.56	74	.48	144	.52
Number negative decisions re- sulting in penalties ^e	42	.34	27	.18	89	.32
Number job loss tokens awarded as penalties ^f	10	.08	14	.09	24	.09

^aNumber of board cycles includes both complete and partial board cycles.

^bRepresented by the number of times player lands on a job decision space, is required to take a job decision card and make a decision.

^cRepresented in the game by the number of times player uses job maintenance tokens to make positive job decisions.

^dRepresented in the game by the number of times player does not use job maintenance tokens to make positive job decisions.

^eRepresented in the game by the number of times player made negative decisions and received any penalties for being "caught."

^fRepresented in the game by the number of times player made negative decisions and received a penalty of a job loss token for being "caught."

for the minimum strategy. However, the Group I results of 1.13 decisions per board cycle fell outside of the limits generated by the computer. While strategy differences between the groups cannot be ruled out as a possible explanation for the low Group I results, it is not highly likely that it is true. The writer can offer no explanation except strategy differences or chance variation for the apparent anomaly.

Penalties for making negative decisions varied from no penalty where participants on a chance basis "got away" with taking risks to more substantial penalties for being "caught". Penalties were graduated from minor penalties such as losing a turn to more serious penalties involving lost production. Further graduations were made from a severe penalty of receiving a job loss token to the ultimate penalty of being fired. As participants knew what penalty would be exacted for "getting caught", insight into the strategies used by the respective groups may be obtained by examining data related to penalties for negative decisions. In Table 19 it is shown that Group I had a higher mean number of penalties per board cycle (.34) for negative decisions than Group II (.18 per board cycle), while at the same time receiving a lower mean number of job loss tokens per board cycle (.08 versus .09). This would indicate that Group I participants tended to avoid taking risks when the severe penalty of receiving a job loss token was involved but took more risks when the penalties were less severe. Group II on the other hand, tended to discriminate less regarding the severity of penalties.

Data relating to employee productivity are presented in Table 20. As is shown, the number of opportunities to enter the production

TABLE 20

A COMPARISON OF THE RESULTS OF PARTICIPANTS FIRST PLAYING OF THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY AND BY TOTAL GROUP FOR SELECTED VARIABLES RELATED TO EMPLOYEE DECISIONMAKING

VARIABLES	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=125 PARTICIPANTS ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=154 PARTICIPANTS ^a		TOTAL GROUP N=279 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number of oppor- tunities to enter produc- tion loop	68	.54	91	.59	159	.57
Number of times production loop entered	58	.46	88	.57	146	.52
Amount of pro- duction from loop	53.5	.43	74.0	.48	127.5	.46
Amount of chance production	80.0	.64	91.0	.59	171.0	.61
Amount of lost production	8.5	.07	12.0	.08	20.5	.07
Amount of pro- duction turned in	72.0	.58	90.0	.58	162.0	.58
Net productivity	125.0	1.00	153.0	.99	278.0	.996
Amount of needed pro- duction	109.0	.87	135.0	.88	244.0	.87
Amount of un- met production	37.0	.30	45.0	.29	82.0	.29
Amount of sur- plus production	53.0	.42	63.0	.41	116.0	.42

^aNumber of board cycles includes both complete and partial cycles.

loop was .54 and .59 per board cycle for Group I and Group II, respectively. The computer simulation results varied from a low of .48 opportunities per board cycle for the minimum strategy to .60 opportunities per board cycle for the optimum strategy. As is evident, the Group I and Group II results fall within the computer limits. The differences between the two Groups are most likely attributable to differences in strategy, though chance variation cannot be ruled out.

Group I participants chose to enter the production loop less frequently than did Group II. On a percentage basis, Group I participants chose to enter the loop 85.3 percent of the time while Group II participants chose to enter the loop 96.7 percent of the time. That differential would account for most of the by-board-cycle difference between Group I at .46 entries per board cycle and Group II at .57 entries per board cycle. Both Group I and Group II participants averaged higher rates of production in the loop with values of .92 and .84 production units per entry to the loop, respectively, as compared to the maximum and optimum computer simulation strategies of .81 and .76 units per entry, respectively. It should be noted that the value for rate of loop production per entry quoted above may be calculated from Table 6 and Table 20 data, but that the information is not actually presented in the tables. No explanation can be offered for participant data exceeding the maximum and optimum strategy values of the computer simulation.

Based on the number of entries to the production loop, a higher rate of loop production per board cycle would have been expected for Group II participants. However, the loop production per

board cycle of .48 for Group II exceeded the maximum strategy for the computer simulation of .45 loop production units per board cycle. It would appear that chance factors may be at work in this situation.

Group I enjoyed a slightly higher incidence of chance production per board cycle (.64) than did Group II (.59) which served to offset the favorable difference that Group II enjoyed in loop production per board cycle. There were no substantial differences between the two Groups regarding other variables presented in Table 20. Essentially no variation was noted between the groups on the amount of lost production, the amount of production turned in, net productivity, amount of needed production, amount of unmet production, and the amount of surplus production. It was interesting that both groups averaged very close to one production unit for each board cycle which was the number required to be turned in each board cycle at the Pay Day space.

The number of opportunities to enter the job maintenance loop as presented in Table 21 was 69, or .55 per board cycle, for Group I and 94, or .61 per board cycle, for Group II. The number of actual entries to the job maintenance loop was .46 entries per board cycle for Group I and .55 entries per board cycle for Group II. The difference between the two groups is assumed to be due to chance and accounts for about 55 percent of the difference between the groups with regard to actual entries to the loop. It follows that the remaining 45 percent of the difference between Group I and Group II on the number of actual entries to the job maintenance loop is due to the use of different job maintenance strategies.

TABLE 21

A COMPARISON OF THE RESULTS OF PARTICIPANTS FIRST PLAYING OF THE JOB
MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY AND BY TOTAL GROUP
FOR SELECTED VARIABLES RELATED TO EMPLOYEE MOTIVATION

VARIABLES	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=125 PARTICIPANTS ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=154 PARTICIPANTS ^a		TOTAL GROUP N=62 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number of oppor- tunities to enter produc- tion loop	69	.55	94	.61	163	.58
Number of times job maintenance loop entered	58	.46	85	.55	143	.51
Number of job maintenance tokens gained from loop	75	.60	110	.71	185	.66
Number of job maintenance tokens initially	132	1.06	144	.94	276	.99
Number of job maintenance tokens lost by chance	18	.14	22	.14	40	.14
Number of job maintenance tokens used on decisions	103	.83	156	1.01	259	.93
Net number of job maintenance tokens gained	189	1.51	232	1.51	421	1.51

^aNumber of board cycles includes both complete and partial cycles.

Given the difference in number of actual entries to the job maintenance loop for both groups, a larger number of tokens per board cycle would be expected for Group II. As shown in Table 20, the number of job maintenance tokens gained in the loop was .60 and .71 tokens per board cycle for Group I and Group II, respectively. When the number of entries to the loop were held constant, the two groups did not vary with regard to the number of tokens gained in the loop.

Each time participants started a new job, they were issued three job maintenance tokens. Consequently, the difference between Group I at 1.06 initial tokens per board cycle and Group II at .94 initial tokens per board cycles is strictly due to the difference in the number of jobs held by the two groups of 44 and 48 jobs held, respectively, for Group I and Group II. The groups did not vary with regard to number of job maintenance tokens lost by chance nor by the net number of job maintenance tokens gained. The latter was true because the higher rate of tokens gained in the loop by Group II was offset by a higher rate of tokens initially received by Group I.

As previously noted, Group II made a higher rate of positive job decisions which would require that Group II use more job maintenance tokens per board cycle than Group I. As shown in Table 21, Group I used .82 tokens per board cycle while Group II used 1.01 tokens per board cycle.

The data in Table 22 is concerned with variables related to job maintenance outcomes. The number of job loss tokens received from various sources did not vary substantially between the two groups. The small actual numbers involved certainly underscores the likelihood that any differences are merely due to chance. The slight difference

TABLE 22

A COMPARISON OF THE RESULTS OF PARTICIPANTS FIRST PLAYING OF THE JOB
MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY AND BY TOTAL
GROUP FOR SELECTED VARIABLES RELATED TO JOB OUTCOMES

VARIABLES	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=125 PARTICIPANTS ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=154 PARTICIPANTS ^a		TOTAL GROUP N=279 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number of job loss tokens from board	16	.13	27	.18	43	.15
Number job loss tokens from life cards	10	.08	9	.06	19	.07
Number of job loss tokens from decision risks	10	.08	14	.09	24	.09
Number of job loss tokens from life productivity	37	.30	45	.29	82	.29
Total number of job loss tokens received	73	.58	95	.62	18	.60
Total number of job loss tokens returned by chance	18	.14	31	.20	49	.18
Total number of net job loss tokens	55	.44	64	.42	119	.43

^aNumber of board cycles includes both complete and partial cycles.

in total number of job loss tokens received by the groups is somewhat offset by an inverse difference between the groups regarding the number of tokens returned by chance. The results reflect a very small difference between the groups in the number of net job loss tokens. The values for the number of net job loss tokens is .44 and .42 tokens per board cycle, respectively, for Group I and Group II which represents less than one-half of a token received for each time around the board.

The preceding overview of the results of the first playing of the Job Maintenance Game should provide the reader with an introductory perspective for the analysis of the data related to the hypotheses. In summary of the overview, it should be stated that (1) the data were examined on the basis of total board cycles including both complete and partial cycles, (2) the Group II participants with relatively unstable employment records were slightly better able to keep a job than the more stable Group I participants, (3) Group II participants made more positive decisions with regard to productivity, job maintenance efforts, and job decisions, and (4) there appeared to be a real difference in the strategies of the two groups.

Hypotheses Related to a Between-Groups Comparison of Strategies

The first set of hypotheses to be analyzed relate to the extent to which the two groups differed in their job maintenance strategies on a first playing of the Job Maintenance Game. Hypotheses 1 through 6 were tested using the Mann-Whitney U Test which tests the proposition that the two groups were drawn from the same population.

That test, according to Siegel¹²⁰ ". . . is a most useful alternative to the parametric t test when the researcher wishes to avoid the t test's assumptions, or when the measurement in the research is weaker than interval scaling." Further, Siegel has noted that the test is more powerful than the median test which also tests the above proposition. The Mann-Whitney U Test assumes two independent samples and ordinal measurement.

The first alternative hypothesis is nondirectional and predicts no difference between the groups with regard to productivity. A non-directional alternative hypothesis requires a two-tailed test in order to test the null form while a directional hypothesis calls for a one-tailed test. While both directional and nondirectional hypotheses are found among the alternative hypotheses, it was decided to present the data in the tables on the basis of two-tailed probability. The alpha (α) level for rejection of the null hypotheses was set at .10. For nondirectional hypothesis, the probability must be smaller than .05 in order to reject the null hypotheses. For a directional hypothesis, the probability must be smaller than .10 in order to reject the null hypotheses.

The first hypothesis predicts that there will be no difference between the groups in the amount of net productivity generated in a first playing of the game. As shown in Table 23, the mean rank for Group I was 32.3 and for Group II was 32.6 with a U value of 520.5 In Table 24, it is shown that the net productivity in production units

¹²⁰Sidney Siegel, Nonparametric Statistics For the Behavioral Sciences (New York: McGraw-Hill, 1956), p. 116.

TABLE 23

A COMPARISON OF THE MANN-WHITNEY U VALUES FOR THE DETERMINANTS
OF JOB MAINTENANCE IN A FIRST PLAYING OF THE JOB MAINTENANCE
GAME FOR PARTICIPANTS BY EMPLOYMENT HISTORY CATEGORY

MANN-WHITNEY U RESULTS FOR						
VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS		MANN-WHITNEY U VALUE AND PROBABILITY	
	NUMBER OF PAR- TICIPANTS	MEAN RANK	NUMBER OF PAR- TICIPANTS	MEAN RANK	U	TWO-TAILED PROBABILITY
Net productivity	29	32.3	35	32.6	502.5	.946
Net job maintenance effort	29	29.5	35	35.0	420.5	.236
Index of job decision quality	29	26.7	35	37.3	339.5	.023
Index of pro- ductivity de- cision quality	27	27.8	32	31.9	372.5	.148
Index of job maintenance decision quality	24	29.5	35	30.4	407.5	.274
Number of job terminations	29	34.7	35	30.7	444.0	.307

TABLE 24

A COMPARISON OF THE RESULTS OF PARTICIPANTS' FIRST PLAYING AND
AND SECOND PLAYING OF JOB MAINTENANCE GAME BY EMPLOYMENT
HISTORY CATEGORY FOR SELECTED VARIABLES RELATED
TO THE DETERMINANTS OF JOB MAINTENANCE

VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOYMENT RECORDS			GROUP II WITH RELATIVELY UNSTABLE EMPLOYMENT RECORDS		
	NUMBER OF PARTICI- PANTS	GAME 1	GAME 2	NUMBER OF PARTICI- PANTS	GAME 1	GAME 2
Net productivity	29	125.0	126.0	35	153.0	154.0
Net job maintenance effort	29	189	229	35	232	256
Index of job decision quality	29	51.4	67.1	35	64.7	60.3
Index of pro- ductivity de- cision quality	27	86.4	100.0	32	97.1	97.8
Index of job maintenance decision quality	24	84.4	87.4	35	90.0	81.7
Number of job terminations	29	16	19	35	13	19

was 125.0 for Group I and 153.0 for Group II. While Group II was slightly higher in mean rank, the difference was not substantial nor statistically significant. The two-tailed probability was .946 at the opposite end of the continuum from the level of .05 needed to reject the null hypothesis. For the first hypothesis, the null form was accepted.

Hypothesis number 2 is a directional hypothesis predicting that Group I will have a higher level of net job maintenance effort than Group II. In Table 24 it is shown that Group II with a value of 232 actually exceeded Group I with a value of 189 with regard to net job maintenance effort. The mean rank values which are presented in Table 23 are 29.5 for Group I and 35.0 for Group II with a U value of 420.5. However, the between-group difference is not significant at the required .10 level given the actual probability of .236. For hypothesis 2, the null hypothesis is accepted.

Hypothesis number 3 relates to the job decisions of the participants and predicts that a significant difference exists which favors Group I over Group II. The actual results demonstrate that the reverse was true, that is, Group II actually outperformed Group I at a statistically significant level. The mean rank as presented in Table 23 was 26.7 for Group I and 37.3 for Group II. The U value of 339.5 had an associated probability of .023 which was well within the region of rejection of .10 for rejecting the null hypothesis. The difference between the groups on the quality of job decisions is shown in Table 24. The index of job decision quality for Group II was 64.7 which was substantially higher than the value of 51.4 for Group I. While the

null hypothesis was rejected, the alternative hypothesis was not supported as a reversal of the direction of predicted difference was obtained.

Hypothesis number 4 predicted no significant difference between the groups on production decisions. The index of productivity decision quality found in Table 24 has values of 86.4 and 97.1 for Groups I and II, respectively. The mean rank of that variable in Table 23 has values of 27.8 and 31.9 for the same respective groups with a Mann-Whitney U value of 372.5. The two-tailed probability of .148 was not significant at the required .05 level. Accordingly, the null hypothesis was accepted.

Hypothesis number 5 was concerned with the difference between the groups on job maintenance decisions. In Table 24 it may be seen that the index of job maintenance decision quality varied somewhat between the groups for the first playing with values of 84.4 and 90.0 respectively, for Group I and Group II. That difference was not statistically significant as shown in Table 23. The Mann-Whitney U value of 407.5 was based on the mean rank values of 29.5 and 30.4 for Group I and Group II, respectively. The actual two-tailed probability was .274 which was not within the region of rejection of .10 for the directional hypothesis. The actual results were again a reversal of the predicted direction for the alternative hypothesis though the difference was not significant. The null hypothesis which predicted no significant difference with regard to job maintenance decisions was accepted.

One of the key differences predicted between Group I and Group II was dealt with in hypothesis number 6. It was thought that a par-

ticipant with a relatively unstable employment history would have significantly more job terminations than a participant with relatively stable employment history. This, however, was not the case. While hypothesis 4 predicted a significant difference favoring Group I for the number of job terminations (fewer job terminations being desirable), the data in Table 24 show that Group I had sixteen job terminations among twenty-nine participants which was an average of .55 terminations per participant. The thirty-five participants in Group II, however, had only thirteen job terminations which was an average of .37 terminations per participant. The relatively low numbers involved may have been the reason that the difference between the groups was not significant. Table 23 shows that the mean rank of participants is numerically higher for Group I at 34.7 than for Group II at 30.7. The U value of 444.0 had an associated probability of .307 which was not significant. The null hypothesis was accepted.

With regard to the first six hypotheses relating to the determinants of job maintenance, it may be stated that in general Group II out performed Group I. Group II did perform better in each of the six areas though the differences were statistically significant in only the area of job decision quality. For all six areas either the alternative hypothesis predicted no significant differences or predicted a difference favoring Group I. The fact that results for all six areas favored the participants of Group II was very surprising. Given that the nature of the design made the study susceptible to the regression effect, caution must be used in interpreting the results. A further discussion of the regression effect may be found in the section on Other Findings.

Hypotheses Related to Within Group Changes in Strategies

The next set of hypotheses to be considered (hypotheses 7 through 12) examines the determinants of job maintenance from the perspective of the extent to which participants by group differed with regard to strategies from a first playing to a second playing of the game.

The hypotheses set were tested using the Wilcoxon Matched Pair Signed Rank Test which examines the proposition that the second variable in a pair has the same median as the first variable. As Siegel noted, the Wilcoxon test takes into account both the direction and magnitude of the differences within pairs of variables.¹²¹ According to Conover, the assumptions regarding each member of the paired variables are that (1) each is a continuous random variable, (2) each has a symmetric distribution, (3) each are mutually independent, (4) each has the same median, and (5) each has a measurement scale that is at least interval.¹²²

With regard to the last assumption it should be noted that while each of the variable pairs to be considered are in fact interval in nature, the underlying phenomenon which each represent may not in some cases be evaluated using an interval measurement. The writer will assume that the data are robust to any possible violation of the scaling assumption.

¹²¹Ibid., p. 75.

¹²²W. J. Conover, Practical Nonparametric Statistics, (New York: John Wiley and Sons, 1971), p.207.

Hypotheses 7 through 12 are actually a double set of hypotheses in that each hypothesis applies to both of the groups in the study. The hypotheses as they apply to Group I will be examined first, followed by an examination of the same hypotheses for Group II.

Group I Changes in Strategies. Alternative hypothesis number 7 for Group I predicts that there is no significant difference in productivity from a first playing to a second playing of the game. As shown in Table 24, the net productivity for Group I was 125.0 production units for the first game and 126.0 for the second game. While there was a slight apparent increase in productivity from Game 1 to Game 2, the difference disappeared when an increase of 17 board cycles for Game 2 was considered. The actual decrease was not significant as shown in Table 25. The mean ranking of the negative ranks was 15.0, while the mean ranking for the positive ranks was 13.2. The two-tailed probability of .820 did not approach the required level of .05. The null form of hypothesis number 7 for Group I was accepted.

Alternative hypothesis number 8 for Group I predicted a significant difference in favor of Game 2 with regard to net job maintenance effort. As the data in both Table 24 and 25 demonstrate, there was a difference in favor of Game 2. While the difference approached a statistically significant level, it failed by a small margin. The net job maintenance effort was 189 in Game 1 and 229 in Game 2. The mean ranking for net job maintenance effort was 8.1 for the negative ranks and 12.1 for the positive ranks with an associated probability of .135. The probability was just short of the required level of .10. As a result the null form for hypothesis 8 was accepted.

TABLE 25

A COMPARISON OF WILCOXON MATCHED PAIRS SIGNED RANK VALUES FOR THE DETERMINANTS OF JOB MAINTENANCE FOR THE WITHIN GROUP CHANGES IN STRATEGY FROM A FIRST PLAYING TO A SECOND PLAYING OF THE JOB MAINTENANCE GAME FOR GROUP I PARTICIPANTS WITH RELATIVELY STABLE EMPLOYMENT RECORDS

VARIABLE	WILCOXON MATCHED PAIR SIGNED RANK VALUES FOR GROUP I PARTICIPANTS WITH RELATIVELY STABLE EMPLOYMENT RECORDS					
	NUMBER OF NEGATIVE RANKS	MEAN RANKING	NUMBER POSITIVE RANKS	MEAN RANKING	NUMBER OF CASES	TWO-TAILED PROBABILITY
Net productivity	12	15.0	15	13.2	29	.820
Net job maintenance effort	8	8.1	12	12.1	29	.135
Index of job decision quality	10	11.1	18	16.4	29	.036
Index of pro- ductivity de- cision quality	0	0	5	3.0	22	.043
Index of job maintenance decision quality	3	3.7	5	5.0	23	.327
Number of job terminations	6	7.2	8	7.8	29	.551

Hypothesis number 9 was concerned with the difference in the quality of job decisions. For Group I, the alternative hypothesis predicted an increase for Game 2 over Game 1. The index of job decision quality as shown in Table 24 has a value of 51.4 in Game 1 and 67.1 in Game 2, which would appear to be a substantial increase. The mean ranking for the negative ranks of that index was 11.1 and the mean ranking for the positive ranks was 16.4 as shown in Table 25. The associated probability was .036 which was well within the limits of the one-tailed region of rejection value of .10. The null hypothesis was rejected in this case and the alternative hypothesis 9 was supported. Apparently Group I participants were able to improve the quality of job decisions as they progressed from Game 1 through the debriefing session and into Game 2.

The alternative hypothesis number 10 predicted no significant difference for Group I from first to second playing of the game with regard to the quality of production decisions. The value for the index of productivity decision quality increased from 86.4 during Group I's first game to the maximum value of 100.0 for their second game as shown in Table 24. In Table 25, the value for the mean of the negative ranks was 0 and the value for the mean of the positive ranks was 3.0. The associated probability for the index was .043 which was within the limits of the required level of .05 for rejecting the null hypotheses. The null form was rejected for hypothesis number 10.

In explanation of the above, the raw data show that for Group I, five participants in Game 2 never landed on the enter production space. As a result, they did not have values for the index of productivity decision quality. The other 24 participants, however, had

index values at the maximum level of 100.0 which indicated that each time they had an opportunity to enter the production loop they did so. In Game 1, only 2 participants from Group I had missing data for the index, and the remaining 27 averaged 86.4 as noted above. However, 21 of the preceding 27 Group I participants had index values of 100.0. Further, 6 of 7 Group I participants who had a value of less than 100.0 in the first game increased their index value to the maximum for the second game. One of the 7 had a missing data value for the index. It would appear correct to conclude that Group I participants learned either in the first game, during debriefing, or during the second game to be productive at every opportunity.

Alternative hypothesis number 11 for Group I data predicted a significant difference in favor of Game 2 for the quality of job maintenance decisions. Values for the index of job maintenance decisions shown in Table 25 are 84.4 for Game 1 and 87.4 for Game 2. The difference between Game 1 and Game 2 was slight, and as shown in Table 25 the difference did not lead to a statistically significant result. The mean ranking for the negative ranks was 3.7 and for the positive ranks was 5.0. The associated probability of .327 was not within the limits of the .10 level required for rejection. The null hypothesis was accepted. The slight difference noted was in the predicted direction.

The number of job terminations was the subject of hypothesis number 12. The alternative hypothesis predicted that for Group I the number of job terminations would be greater in Game 1 than in Game 2. This, however, was not the case. As shown in Table 24, the number of job terminations for Game 1 was 16 and the number for Game 2 was 19.

While the increase from Game 1 to Game 2 was not significant, the low numbers involved certainly make it a matter of concern. As shown in Table 25, the mean rankings for negative ranks and positive ranks are 7.2 and 7.8, respectively, and the associated probability is .551. The null hypotheses concerning job terminations was accepted.

For the most part, Group I participants improved with regard to the determinants of job maintenance from the first playing to the second playing of the Job Maintenance Game. With regard to net job maintenance effort, job decision quality, productivity decision quality, and job maintenance decision quality, the Group I participants improved from Game 1 to Game 2. Only job decision quality and productivity decision quality yielded a significant result. The apparent slight decrease in net productivity from Game 1 to Game 2 was not significant and appeared to be a function of chance as it related to the differential number of opportunities to enter the production loop in the respective games. Additional analysis may be found in the section on Other Findings. The slightly greater number of job terminations for Game 2 appeared to be related to the increase in the number of board cycles from Game 1 to Game 2.

It should be mentioned again that hypotheses 7 through 12 are a double set that apply separately to both Group I and Group II. The testing of those hypotheses for Group I is complete and now the hypotheses will be retested for Group II. Alternative hypotheses were stated the same for both groups and directional hypotheses were in the same direction for both groups. As such, it should not be necessary to repeat the alternative hypotheses for the testing for the Group II data.

Group II Changes in Strategy. Hypothesis number 7 for Group II, which concerns net productivity, was nondirectional. However, as was found with Group I, a slight decrease was noted. A very slight increase in net productivity value from 153.0 to 154.0 from Game 1 to Game 2 is shown in Table 24. The mean ranking of the negative ranks and the positive ranks is 15.5 and 20.0, respectively, as shown in Table 26. The associated probability was .959 and the null hypothesis was accepted.

Hypothesis number 8, which concerns net job maintenance effort, was not statistically significant for the Group II data. However, Table 24 data did support the prediction of an expected increase from Game 1 to Game 2. With regard to net job maintenance effort, Group II showed an increase from 232 in the first game to 256 in the second game. The mean ranking found in Table 26 was 12.7 for the negative ranks and 17.9 for the positive ranks with an associated probability of .746. The null hypothesis was accepted.

Hypothesis number 9, which concerned the quality of job decisions, predicted an increase from Game 1 to Game 2; but the reverse was true. The index of job decision quality for Group II was 64.7 for Game 1 and 60.3 for Game 2, a decline of 4.4 points. The mean ranking found in Table 26 was 19.4 for the negative ranks and 14.5 for the positive ranks. The probability associated with those rankings was .386. The null hypothesis was accepted.

For hypothesis number 10, which concerned the quality of productivity decisions, no significant difference was predicted. The result, however, did approach statistical significance. As shown in

TABLE 26

A COMPARISON OF WILCOXON MATCHED PAIRS SIGNED RANK VALUES FOR THE DETERMINANTS OF JOB MAINTENANCE FOR THE WITH GROUP CHANGES IN STRATEGY FROM A FIRST PLAYING TO A SECOND PLAYING OF THE JOB MAINTENANCE GAME FOR GROUP II PARTICIPANTS WITH RELATIVELY UNSTABLE EMPLOYMENT RECORDS

WILCOXON MATCHED PAIR SIGNED RANK VALUES						
VARIABLE	FOR GROUP II PARTICIPANTS WITH RELATIVELY STABLE EMPLOYMENT RECORDS					
	NUMBER OF NEGATIVE RANKS	MEAN RANKING	NUMBER POSITIVE RANKS	MEAN RANKING	NUMBER OF CASES	TWO-TAILED PROBABILITY
Net productivity	19	15.5	15	20.0	35	.959
Net job maintenance effort	16	12.7	13	17.9	35	.746
Index of job deci- sion quality	17	19.4	16	14.5	35	.386
Index of productivity decision quality	0	0	3	2.0	29	.109
Index of job maintenance decision quality	10	7.5	4	7.4	33	.149
Number of job terminations	5	10.9	12	8.2	35	.298

Table 24, the index value was 97.1 for Game 1 and 97.8 for Game 2. Nonetheless, the participants in the group must have been fairly consistent in their responses as a probability of .109 was found. In Table 26, it is shown that the mean ranking was 0 for the negative ranks and 2.0 for the positive ranks. The associated probability was not quite significant at the required .05 level. The null hypothesis was accepted.

Hypothesis number 11 predicted an increase from Game 1 to Game 2 for the index of job maintenance decision quality. However, Table 24 shows a decrease from 90.0 in Game 1 to 81.7 in Game 2 for the above index values. The mean ranking found in Table 26 shows a value of 7.5 for the negative ranks and 7.4 for the positive ranks while the probability of .149 was again close to the required level of .10 it was not within the region that would allow the researcher to document a statistically significant decrease. The null hypothesis was accepted.

Hypothesis number 12 predicted a decrease for Group II in the number of job terminations from Game 1 to Game 2. Table 24 shows that the reverse was true. An actual increase from 12 to 19 for Game 1 and Game 2, respectively, was found. The mean ranking, however, shows values of 10.9 for the negative ranks and 8.2 for the positive ranks as presented in Table 26. The apparent discrepancy in direction between the actual number of terminations and the mean ranking may have been caused by the fact that two of the 35 Group II participants accounted for 6 of the 19 job terminations in Game 2. The two participants did not affect the calculation of the statistical test to the extent they affected the total number of job terminations. The

associated probability of .551 meant that the null hypothesis was accepted.

In general, Group II participants tended to regress with regard to the determinants of job maintenance from the first playing to the second playing of the Job Maintenance Game. While none of the decreases were statistically significant, at least two appeared to be substantial numerical decreases. The index of job maintenance decision quality was the only decrease which approached statistical significance. Two actual increases from Game 1 to Game 2 were noted with the increase in the quality of productivity decisions being the only one that approached statistical significance. In order to clarify the results of hypotheses 7 through 12 for both groups, an overview as presented in Table 27 was prepared which should be helpful to the reader in understanding the findings.

Hypotheses for Determinants Relationship to Job Terminations

The next group of hypotheses to be considered (hypotheses 13 through 17) are also a double-set, that is, once again the hypotheses apply independently to both Group I and Group II participants. As before, Group I will be considered first, followed by Group II. The hypothesis will be examined only for Game 1 data; however, the second game will be discussed in the section on Other Findings. The group of hypotheses in question examines the relationships between the determinants of job maintenance and the extent of job terminations.

To test hypotheses 13 through 17, a nonparametric form of correlation was selected. While both Spearman rank-order correlation and Kendall rank-order correlation were available, Kendall correlation

TABLE 27

RESULTS OF HYPOTHESES TESTING FOR A GROUP SIX HYPOTHESES RELATED TO THE DETERMINANTS OF
JOB MAINTENANCE FOR THE WITHIN GROUP CHANGES IN STRATEGY FROM A FIRST PLAYING TO
A SECOND PLAYING OF THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY

RESULTS FOR GROUP I					RESULTS FOR GROUP II	
ALTERNATIVE HYPOTHESES IN SHORTENED FORM	ALTERNATIVE FORM (PREDICTED)	PROBABILITY LEVEL FOR REJECTION	ACTUAL TWO-TAILED PROBABILITY	DIRECTION OF RESULT	ACTUAL TWO-TAILED PROBABILITY	DIRECTION OF RESULT
7. No S. D. between Game 1 & Game 2 on net producti- vity	$G_1 = G_2$	.05	.820	$G_1 > G_2$	.959	$G_1 > G_2$
8. S. D. between Game 1 & Game 2 on net job main- tenance effort	$G_2 > G_1$	.10	.135	$G_2 > G_1$	.365	$G_1 > G_2$
9. S. D. between Game 1 & Game 2 on quality of job decisions	$G_2 > G_1$	.10	.036*	$G_2 > G_1$	.386	$G_1 > G_2$
10. No S. D. between Game 1 & Game 2 on quality of pro- ductivity decisions	$G_1 = G_2$	.05	.043*	$G_2 > G_1$	.109	$G_2 > G_1$
11. S. D. between Game 1 & Game 2 on quality of job maintenance decisions	$G_2 > G_1$	.10	.327	$G_2 > G_1$	.149	$G_1 > G_2$
12. S.D. between Game 1 & Game 2 on number of job terminations	$G_1 > G_2$	.10	.551	$G_2 > G_1$	.298	$G_2 > G_1$

*Significant at appropriate level

was chosen as the writer was more familiar with its usage. As Siegel has commented, both Spearman and Kendall correlations are equally powerful in rejecting the null hypothesis. He also stated that the two forms of correlation ". . . have different underlying scales, and numerically they are not directly comparable to each other."¹²³ As a general rule, the Kendall coefficients are smaller than the equivalent Spearman coefficients.

Relationships for Group I. Hypothesis number 13 predicted a negative relationship between net productivity and the number of job terminations for Group I in Game 1. As shown in Table 28, a small negative correlation was found. The Kendall Tau Value for that relationship was $-.074$. Hypotheses 13 through 17 were directional in nature and the probabilities associated with each coefficient in Table 28 are presented as one-tailed probabilities. Based on those two conditions, the level for rejection of the null hypothesis is $.05$. As shown in Table 28, the coefficient for the correlation of job terminations with net productivity has a one-tailed probability of $.288$ which does not reach a statistically significant level. The null hypothesis was accepted.

Hypothesis number 14 for Group I in Game 1 predicted a negative correlation between net job maintenance effort and the number of job terminations. Again, a negative correlation was found. The negative correlation coefficient of $-.183$ found in Table 28 approached but did not reach statistical significance. The associated one-tailed probability of $.082$ was just outside of the limit for the required $.05$

¹²³Sidney Siegel, Nonparametric Statistics For the Behavioral Sciences, (New York: McGraw-Hill, 1956), p. 219.

TABLE 28

AN ANALYSIS OF KENDALL CORRELATION COEFFICIENTS FOR THE RELATIONSHIPS
 BETWEEN JOB TERMINATIONS AND THE DETERMINANTS OF JOB MAINTENANCE
 IN A FIRST PLAYING OF THE JOB MAINTENANCE GAME
 FOR PARTICIPANTS BY EMPLOYMENT HISTORY CATEGORY

KENDALL CORRELATION COEFFICIENTS FOR						
NUMBER OF JOB TERMINATIONS FOR FIRST GAME CORRELATED WITH	GROUP I WITH RELATIVELY STABLE EMPLOYMENT RECORDS			GROUP II WITH RELATIVELY UNSTABLE EMPLOYMENT RECORDS		
	NUMBER	TAU	ONE TAILED PROBABILITY	NUMBER	TAU	ONE TAILED PROBABILITY
Net productivity	29	-.074	.288	35	-.031	.397
Net job maintenance effort	29	-.183	.082	35	-.032	.394
Index of job deci- sion quality	29	-.133	.157	35	-.052	.331
Index of productivity decision quality	27	-.227	.049	32	-.309	.007
Index of job mainte- nance deci- sion quality	24	-.399	.004	35	-.100	.199
Number of job terminations for second game	29	.079	.275	35	-.201	.045

level. The null hypothesis was also accepted for hypothesis 14.

Hypothesis number 15 predicted a negative relationship for the correlation of job terminations with the quality of job decisions. The value of the correlation coefficient in Table 28 for the above relationship was $-.133$ and the associated probability was $.157$. While the predicted direction of the relationship was again correct, the correlation was not statistically significant. The null hypothesis was accepted.

A negative relationship was also predicted for hypothesis number 16 for the correlation of job terminations with the quality of productivity decisions for Group I participants' first playing of the game. As shown in Table 28, a negative relationship which was statistically significant was found. For that relationship the correlation coefficient was $-.227$ and the associated probability was $.049$. Apparently the decisions of Group I participants were an important consideration in avoiding job terminations. Based on a statistically significant probability, the null hypothesis was rejected and the alternative hypothesis was supported.

The last hypothesis of the set, number 17, which also predicted a negative relationship, was concerned with the correlation of job terminations and the quality of job maintenance decisions. The strongest measure of correlation for Group I participants in the first game was found for this relationship. A Kendall Tau Value of $-.399$ was found as shown in Table 28. The associated probability of $.004$ was well within the limits of the $.05$ level of rejection required. For Group I participants in Game 1 there was a fairly strong correlation between use of job maintenance tokens to make positive decisions

and the frequency with which they lost their jobs. The null hypothesis asserted no relationship between the variables in question and was rejected.

Though there was no hypothesis put forth regarding the relationship between job termination in the first game and job termination in the second game, it was of some interest. The last entry in Table 28 shows that a slight positive correlation that was not statistically significant was found. If participants had reversed the direction of their strategies in the second game, a strong negative correlation would have been expected. If participants had substantially improved their strategies, a strong positive correlation would have been expected. The slight positive correlation may indicate some improvement in strategy for Group I participants from Game 1 to Game 2.

It may be stated that Group I participants performed in the predicted direction in Game 1 with regard to the relationship between job terminations and the determinants of job maintenance. Only two of the variables, productivity decision quality and job maintenance decision quality, had correlation coefficients that were statistically significant. As all the variables were reasonably close to statistical significance, larger numbers of participants would probably have been sufficient to document statistical significance.

In comparing the correlation results of net productivity and the quality of productivity decisions, it would appear that the effects of chance were responsible for the substantially lower coefficient value for net productivity. A similar argument is applicable to the lower results obtained for net job maintenance effort compared to the quality of job maintenance decisions. Participants' primary

control over net productivity and net job maintenance effort is expressed through their strong control over productivity decision quality and job maintenance decision quality. Consequently, the relatively lower results for net productivity and net job maintenance effort were predictable.

As the testing of hypotheses 13 through 17 is complete for Group I, the reader is again reminded that those hypotheses were a double set which apply to both Group I and Group II. The results of the application of hypotheses 13 through 17 will now be discussed for Group II for their first playing of the game. For Group II, negative relationships were again predicted for all of the determinants of job maintenance as they related to the number of job terminations.

Relationships for Group II. Hypothesis number 13 for Group II concerned net productivity. As shown in Table 28, the relationship between net productivity and job terminations had a correlation coefficient value of $-.031$ with an associated one-tailed probability of $.397$. The relationship was weak and not statistically significant; therefore, the null hypothesis was accepted.

Hypothesis number 14 concerned net job maintenance effort. The correlation between that variable and the number of job terminations in Game 1 was neither strong nor statistically significant. As shown in Table 28, a correlation coefficient of $-.032$ with an associated one-tailed probability of $.394$ was not significant at the $.05$ level. The null hypothesis was accepted.

The alternative hypothesis, number 15, predicted a negative relationship between the quality of job decisions and the number of job terminations. A negative correlation coefficient of $-.052$ was

found which had a one-tailed probability of .331. As the probability did not meet the required level of .05, the null hypothesis was accepted.

For Group II data, hypothesis number 16 predicted a negative relationship for the correlation of the quality of productivity decisions with the number of job terminations in Game 1. As shown in Table 28, a strong measure of correlation was found which was very highly significant. The Kendall Tau coefficient value was $-.309$ with an associated one-tailed probability of .007. The decision to be productive in the Job Maintenance Game appears to be strongly correlated with the extent to which job terminations occur. The null hypothesis which predicted no relationship between productivity decisions and job terminations was rejected.

Hypothesis number 17 concerned the relationship of job terminations to the quality of job maintenance decisions. Group II showed a weaker correlation than did Group I. As shown in Table 28, the correlation coefficient value for the relationship was $-.100$ with an associated probability of .199 which did not reach the .05 level of significance. The null hypothesis was accepted.

The last entry in Table 28 for the relationship between the number of job terminations in the first and second games for Group II reveals that a strong negative correlation ($-.201$) exists. Further, the relationship was significant within the limits of the required .05 level. Though no hypothesis was put forth, the result is certainly of interest. Apparently Group II participants tended to change the nature of their strategies during Game 2.

In general, Group II had weaker correlation results for the relationship between the determinants of job maintenance and the number of job terminations than did Group I. While the relationships were all negative as predicted, they did not tend to be statistically significant. The hypothesis which concerned the index of productivity decision quality actually had a statistically significant correlation coefficient. The weak correlation coefficient for Group II indicates that participants were less consistent in their strategy selection.

Hypotheses Related to Selected Predispositions of Participants

The final group of hypotheses was concerned with between group differences in several predispositions of the participants. Each of the hypotheses 18 through 20 predicted a significant difference in favor of Group I for the several dispositions. The Mann-Whitney U Test was used to test the hypotheses.

Prior to playing the first game the participants were asked to indicate the importance they attached to (1) the role of productivity in staying employed, (2) the role of job related decisions in staying employed, and (3) their enjoyment in playing board games. The participants responded on a nine point Likert Scale with "1" being of no importance and "9" being of high importance. Table 29 shows the mean rating of participants' responses with regard to the three predispositions in question by employment history category.

Hypothesis number 18 predicted that Group I would have a significantly higher predisposition toward the importance of employee productivity in the job maintenance process. The mean rating found in Table 29 was 8.28 for Group I and 8.23 for Group II. The mean rank as

found in Table 30 was 33.6 for Group I and 31.6 for Group II. A Mann-Whitney U Value of 475.0 was obtained with an associated two-tailed probability of .630. The slight difference between the groups was not statistically significant at the required .10 level; therefore, the null hypothesis was accepted. Apparently participants placed a rather high value on the importance of the role of productivity in the job maintenance process.

Hypothesis number 19 predicted a significant difference favoring Group I with regard to participant predispositions toward the role of employee decisionmaking in the job maintenance process. As shown in Table 29, the Group I value of 8.38 was somewhat larger than the Group II value of 8.06. The mean rank value for Group I as shown in Table 30 was 35.8, while the mean rank value for Group II was 29.7, which yielded a Mann-Whitney U Value of 411.0. The associated two-tailed probability was .156 and the null hypothesis was accepted.

The final hypothesis, number 20, concerned the between group differences of participants toward participation in simulation games. The alternative hypothesis predicted that Group I would have significantly higher values than Group II. The mean rating as shown in Table 29 for Group I was 6.41 and Group II was 5.46. While there was an apparent substantial difference between the groups, neither of the groups had a very high mean rating. The mean rank as shown in Table 30 was 36.2 for Group I and 29.4 for Group II. The associated two-tailed probability of .138 almost reached the .10 required level of significance. Again, the null hypothesis was accepted.

TABLE 29

A COMPARISON OF THE MEAN RATINGS FOR THE PREDISPOSITIONS OF PARTICIPANTS TOWARD TWO ASPECTS OF THE JOB MAINTENANCE PROCESS AND TOWARD PARTICIPATION IN SIMULATION GAMES

VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=29 PARTICIPANTS	GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=35 PARTICIPANTS	TOTAL GROUP N=64 PARTICIPANTS
	MEAN RATING	MEAN RATING	MEAN RATING
Predisposition of participants toward the im- portance of employee pro- ductivity in the job mainte- nance process ^a	8.28	8.23	8.25
Predisposition of participants toward the im- portance of employee deci- sions in the job maintenance process ^a	8.38	8.06	8.20
Predisposition of participants toward partici- pation in simu- lation games ^a	6.41	5.46	5.89

^aEach number in the above table is the mean of participants rating of predispositions on a nine point Likert Scale. The scale ranged from "1" representing "of least importance" to "9" representing "of most importance."

TABLE 30

A COMPARISON OF THE MANN WHITNEY U VALUES FOR THE PREDISPOSITIONS
OF PARTICIPANTS TOWARD TWO ASPECTS OF THE JOB MAINTENANCE
PROCESS AND TOWARD PARTICIPATION IN SIMULATION GAMES

MANN-WHITNEY U RESULTS FOR						
VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS		MANN-WHITNEY U VALUE AND PROBABILITY	
	NUMBER	MEAN RANK	NUMBER	MEAN RANK	U	TWO-TAILED PROBABILITY
Predisposition of participants toward the im- portance of employee pro- ductivity in the job mainte- nance process	29	33.6	35	31.6	475.0	.630
Predisposition of participants toward the im- portance of employee deci- sions in the job maintenance process .156		29	35.8	35	29.7	411.0
Predisposition of participants toward partici- pation in simu- lation games	29	236.2	35	29.4	399.0	.138

While no statistically significant results were found with regard to the three predispositions, larger numbers of participants more than likely would have led to significant results for the last two hypotheses. Group I consistently had higher mean ratings for the predispositions though they were not statistically significant. Given that they attached higher importance to employee decisionmaking, it is interesting that Group I out-performed Group II with regard to the quality of job decisions in the game.

Other Findings

Results presented in this section are concerned with (1) an overview of the results for Game 2, (2) the highlights by determinant category for Game 2 for both Groups, (3) a comparison of the two groups with regard to their within-group and between-group changes in strategies from Game 1 to Game 2, and (4) an analysis of correlation coefficients for the determinants in Game 2. With regard to the highlights of Game 2, Table 31 provides summary data for both Game 1 and Game 2 which is useful in the analysis of all of the above areas. Other tables regarding Game 2 highlights (Tables 32 through 35) may be found in Appendix I.

Overview of the Results for Game 2

During the playing of the first game and during the debriefing session, participants had the opportunity to learn how effective their strategies were in maintaining their jobs. In Game 2, participants had the opportunity to try out any modifications in their strategies. As shown in Table 31, participants apparently did vary their strategies from Game 1 to Game 2. However, before looking at a comparison

TABLE 31

A COMPARISON OF THE RESULTS OF PARTICIPANTS' FIRST PLAYING AND SECOND
PLAYING OF THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY
CATEGORY FOR SELECTED VARIABLES RELATED TO THE
DETERMINANTS OF JOB MAINTENANCE

VARIABLES	GROUP I WITH RELATIVELY STABLE EMPLOYMENT RECORDS N = 29 PARTICIPANTS		GROUP II WITH RELATIVELY UNSTABLE EMPLOYMENT RECORDS N = 35 PARTICIPANTS	
	GAME 1	GAME 2	GAME 1	GAME 2
Number completed board cycles	109	116	135	139
Number total board cycles	125	142	154	158
Total number of jobs held	44	48	48	54
Number job terminations	16	19	13	19
Net producti- vity per total board cycle	1.00	.89	.99	.97
Net job mainte- nance effort per total board cycle	1.51	1.61	1.51	1.62
Index of job decision quality	51.4	67.1	64.7	60.3
Index of pro- ductivity deci- sion quality	86.4	100.0	97.1	97.8
Index of job maintenance decision quality	84.4	87.4	90.0	81.7
Number job ter- minations per total board cycle	.13	.13	.08	.12

of the two groups, a brief summary of the results of Game 2 for each group is in order.

For Group I, the number of completed board cycles during Game 2 was 116, as shown in Table 31. When partial cycles were added, the number of total board cycles was 142. By comparison, Group II had 139 completed board cycles and 158 total board cycles. The average number of total board cycles per participant was 4.9 for Group I and 4.5 for Group II. The number of jobs held per participant was 1.7 for Group I and 1.5 for Group II. The number of job terminations for Game 2, as found in Table 31, was 19 for both Group I and Group II. The average number of terminations per participant was .66 for Group I and .54 for Group II.

With regard to net productivity per total board cycle, Group II with a value of .97 units per cycle did slightly better than Group I with .89 units per cycle. There was essentially no difference between the groups concerning the net job maintenance effort per total board cycle. Group I had a mean of 1.61 job maintenance tokens per cycle and Group II had 1.62 tokens per cycle. Group I did tend to make more positive decisions with regard to job decisions, production decisions, and job maintenance decisions than Group II. As shown Table 31, Group I had higher indices for those three areas than did Group II. For the index of job decision quality, Group I had a value of 60.3. With regard to the index of productivity decision quality, Group I had a maximum index value of 100.0 compared to the slightly lower value of 97.8 for Group II. Values for the index of job maintenance decision quality were 87.4 and 81.7 for Group I and Group II, respectively. The number of job terminations per total board

cycle did vary only slightly between the two groups. Group I had .13 terminations per cycle, while Group II had .12 terminations per cycle during Game 2.

Highlights of Determinants in Game 2

The data from Tables 32 through 35, found in Appendix I, will be presented in highlight form. Those tables compare the two groups with regard to employee decisionmaking, employee productivity, employee motivation, and job maintenance outcomes.

I. Highlights Related to Employee Decisionmaking for Game 2 (Table 32, Appendix I)

- A. The two groups did not vary substantially in performance on any of the variables related to employee decisionmaking. The two groups were required to make job related decisions about the same number of times per board cycle (1.19 decisions per cycle for Group I versus 1.22 decisions per board cycle for Group II).
- B. While the two groups were very similar with regard to the number of positive decisions made per board cycle (.75 for Group I and .72 for Group II), the values for the number of negative decisions, the number of negative decisions resulting in penalties, and the number of job loss tokens awarded as penalties per board cycle were slightly higher for Group II.

II. Highlights Related to Employee Productivity for Game 2 (Table 33, Appendix I)

- A. The major difference between the groups regarding employee productivity was in the number of opportunities to enter the production loop. The per board cycle performance for the Groups was .41 opportunities per cycle for Group I and .51 opportunities per cycle for Group II.
- B. As shown in Table 33, Appendix I, the large number of opportunities to enter the production loop combined with a very high rate of positive decisions by both groups on decisions to enter the production loop resulted in a consistent advantage for Group II in (1) amount of production from the loop, (2) amount of production turned in, and (3) the amount of net productivity.

III. Highlights Related to Employee Motivation for Game 2 (Table 34, Appendix I)

- A. The two groups did not differ in the number of opportunities to enter the job maintenance loop with means per board cycle of .65 and .64 for Group I and Group II, respectively.
- B. Group I participants had a higher percentage of actual entries to the job maintenance loop which did not, however, translate into a substantially higher number of job maintenance tokens gained from the loop.
- C. Little variation was noted between the groups on the number of job maintenance tokens lost by chance, used on decisions, or the net number of tokens gained.

IV. Highlights Related to Job Maintenance Outcomes for Game 2 (Table 35, Appendix I)

- A. The two groups did not differ on the total number of job loss tokens received. There was slight offsetting variation for the number of job loss tokens received from the board, from Life Cards, and from low productivity.
- B. The number of job loss tokens returned by chance was higher for Group II (.20 per board cycle versus .16 per board cycle) than for Group I. As a result, the net number of job loss tokens received was slightly higher for Group I.

Within-Group and Between-Group Changes in Strategy

The preceding highlights suggest that there were few differences between the groups on a second playing of the Job Maintenance Game, a conclusion which is supported by Mann-Whitney U values for Game 2 as shown in Table 36. None of the probabilities associated with the mean ranks for the determinants of job maintenance reached a .10 significance level and only one of the variables, the index of job decision quality, had a substantial difference between the mean rank of the two groups. By contrast, the difference in mean ranking for that variable in Game 1 was both substantial and statistically significant.

As noted previously, the groups did appear to differ in their strategies for Game 1 and Game 2. Changes for both within-group and between-group strategies are reflected in the data in Table 31, which table provides an overall view of the results of the participants playing of the Job Maintenance Game.

While Group I was moving from 4.3 to 4.9 total board cycles per participant, Group II went from 4.4 to 4.5, a much smaller increase. Group I participants then improved their ability to maintain their job relative to Group II participants. Both groups increased the total number of jobs held and the number of job terminations, which appeared to be caused simply by the increase in number of board cycles.

Net productivity decreased for each group with Group I showing the larger decrease caused by the differential between the groups in opportunities to enter the production loop. At the same time that net productivity was decreasing, the quality of productivity decisions was going up substantially for Group I and slightly for Group II. As shown in Table 31, Group I went from 86.4 to 100.0 in the index of productivity decision quality. Apparently Group I learned very well that to be productive was an important decision to make. Group II went from 97.1 to 97.8 on that same index.

With regard to the index of job maintenance decision quality, both groups went from about 1.5 to 1.6 tokens per board cycle for Game 1 and Game 2, respectively. However, while Group I participants showed a moderate increase from 84.4 to 87.4 for the index of job maintenance decision quality, Group II participants showed a sharp decrease from 90.0 to 81.7 for that index. Data from Table 34 in

TABLE 36

A COMPARISON OF THE MANN-WHITNEY U VALUES FOR THE DETERMINANTS OF JOB
MAINTENANCE IN A SECOND PLAYING OF THE JOB MAINTENANCE GAME
FOR PARTICIPANTS BY EMPLOYMENT HISTORY CATEGORY

MANN-WHITNEY U RESULTS						
VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS		MANN-WHITNEY U VALUE AND PROBABILITY	
	NUMBER	MEAN RANK	NUMBER	MEAN RANK	U	TWO-TAILED PROBABILITY
Net productivity	29	33.9	35	31.4	467.5	.588
Net job maintenance effort	29	33.2	35	31.9	486.5	.775
Index of job decision quality	29	35.4	35	30.1	423.0	.251
Index of pro- ductivity de- cision quality	24	28.5	31	27.6	360.0	.379
Index of job maintenance decision quality	28	32.4	33	29.8	422.0	.472
Number of job terminations	29	33.9	35	31.3	466.5	.532

Appendix I show that Group II participants were able to obtain as many job maintenance tokens despite a reduced opportunity to enter the Job Maintenance loop.

Group I improved job decision quality from Game 1 to Game 2 from 51.4 to 67.1 which was a sizable increase while Group II experienced a moderate decrease from 64.7 to 60.3. Though the overall number of job terminations increased for both groups, Group I had about the same number of terminations per board cycle. Group II, however, increased from .08 to .12 for the number of job terminations per board cycle.

Group I tended to improve their strategies from Game 1 to Game 2. In contrast, Group II tended to decrease the quality of their strategies from Game 1 to Game 2. There were a few variables for the groups that were exceptions to the tendencies. Overall, while Group I participants were going up in the quality of their strategies, Group II participants were going down.

Determinant Relationships to Job Terminations in Game 2

An examination of the extent of correlation of the determinants of job maintenance with the number of job terminations for Game 2 provides some interesting points. In Table 37, it is shown that Group I results show a negative correlation among all of the determinants and number of job terminations in the second game. Negative correlations would be predicted if participants tended to use effective job maintenance strategies. For net productivity, net job maintenance effort, the index of productivity, the index of decision quality, and the index of job maintenance decision quality, a negative correlation significant of the .10 level was found for Group I

TABLE 37

AN ANALYSIS OF KENDALL CORRELATION COEFFICIENTS FOR THE RELATIONSHIPS
 BETWEEN JOB TERMINATIONS AND THE DETERMINANTS OF JOB MAINTENANCE IN A SECOND PLAYING OF THE JOB MAINTENANCE GAME
 FOR PARTICIPANTS BY EMPLOYMENT HISTORY CATEGORY

KENDALL CORRELATION COEFFICIENTS						
NUMBER OF JOB TERMINATIONS FOR SECOND GAME CORRELATED WITH	GROUP I WITH RELATIVELY STABLE EMPLOYMENT RECORDS			GROUP II WITH RELATIVELY UNSTABLE EMPLOYMENT RECORDS		
	NUMBER	TAU	ONE TAILED PROBABILITY	NUMBER	TAU	ONE TAILED PROBABILITY
Net productivity	29	-.178	.088	35	.108	.181
Net job maintenance effort	29	-.362	.003	35	.033	.389
Index of job deci- sion quality	29	-.074	.288	35	.093	.216
Index of productivity decision quality	24	-.000	.001	31	.155	.111
Index of job mainte- nance deci- sion quality	28	-.232	.042	33	.093	.244

participants playing of the second game. For Group I, only the index of job decision quality did not yield a significant result.

The correlation results for Game 2 further demonstrate the drop in quality of strategies for Group II. As shown in Table 37, all the correlation coefficients for determinants correlated with terminations are positive. While all Group II correlation coefficients for Game 1 were negative, only one was statistically significant. None, however, were significant for the second game.

In general it may be said that Group I started relatively poorly in the first game and improved during the second game. The most surprising result, however, was that Group II started well in the first game but experienced a significant decline in the second game. A number of possibilities in explanation will be examined in the Summary and Conclusions.

Chapter VI

SUMMARY AND CONCLUSIONS

In addition to a summary and a set of conclusions, summary a brief set of recommendations is provided in Chapter VI. The summary portion includes an overview of the background of the study, problem of the study, as well as the need for the study. Additionally, the summary includes the important aspects of the review of literature and a brief examination of the job maintenance concept as well as the Job Maintenance Game. The objectives of the study, the population and sample of the study, and the treatment of the data are highlighted. A brief review of the findings is also given. The conclusions are based on the review of literature and the findings of the study. Finally, a set of recommendations for further study, for revision of the Job Maintenance Game, and for the expanded usage of the Job Maintenance Game are provided.

Summary

Many workers in this nation lack the necessary job maintenance skills to remain productively employed. The training of those workers to upgrade their job maintenance skills is an important task. One promising approach to such training involves the use of instructional simulation. In 1976 Bobbitt, Robinson, and Serowik developed a workshop to instruct adults on how to keep a job called the Job

Maintenance Workshop.¹²⁴ A central part of the workshop was an instructional board game developed by the author of this study. The instructional game was a simulation of both the blue-collar work setting and the process by which workers keep or lose jobs. Preliminary findings from the developmental and post-developmental phases suggested that the simulation game was valuable as an instructional device to hold interest, change attitudes, develop knowledges, and acquire strategies relating to job maintenance.

A computer simulation of the Job Maintenance Game was developed in order to test the theoretical limits of the game. The computer simulation results along with a pilot-test of the instructional simulation served as the basis by which refinement of the Job Maintenance Game rule structure were implemented prior to conducting the research study. The study was a formative evaluation of the job maintenance game designed to provide information to revise and refine the instructional game as well as to clarify the relationships among the major variables of the study.

The problem of the study centered on an investigation of the performance of selected participants from Comprehensive Employment Training Act (CETA) Programs in the Job Maintenance Game. The primary need for the study was to demonstrate the value of the Job Maintenance Game as an instructional device. Other needs included (1) developing additional understanding of simulation as a research and educational tool, (2) addressing the problems of workers with inadequate job

¹²⁴Frank Bobbitt, Boyd F. Robinson, Jr. and Faith Serowik, Job Maintenance Workshop: A Resource Manual for Instructing Adults on How to Keep a Job, Special Paper No. 28, Center for Rural Manpower and Public Affairs (East Lansing: Michigan State University, 1976).

maintenance skills, and (3) developing a better understanding of the process of job maintenance.

The job maintenance concept refers to the process by which employees attempt to remain stably employed. The concept is a theoretical construct which posits that the determinants of job maintenance, or the four elements of employee decisionmaking — employee productivity, employee motivation, and environmental effects (independent variables) are sufficient to explain the job maintenance outcomes (dependent variables) — are job retention or job termination. Another key independent variable in the study is the status of workers in the labor market, that is, whether workers have relatively stable or relatively unstable employment records.

The Job Maintenance Game requires players (workers) to assume the role of blue-collar workers in a typical factory setting. The object of the game is for workers to keep their jobs. All of the determinants of job maintenance are included in the game and players must make job related decisions as well as decisions about the extent of their productivity and motivation to improve as workers. In addition, various environmental factors operate on a chance basis to generate both positive and negative effects. The extent to which players are able to retain their jobs is a function of both the quality of decisionmaking which is under the control of the player and the effects of the environment which are controlled by chance.

The objectives of the study center around four areas which may be characterized by the following questions:

1. Do the job maintenance strategies of participants differ by employment history category?

2. Do participants acquire knowledge and skill in a first playing of the Job Maintenance Game that leads to improvement in strategy for a second playing of the game?
3. Do any of the determinants of job maintenance affect the extent of job terminations in the Job Maintenance Game?
4. Do the predispositions of participants differ by employment history category?

The design of the study was descriptive/comparative in nature.

The design centered on an investigation of (1) a between groups comparison of selected predispositions and game strategies, (2) the within group changes in strategies from a first playing to a second playing of the game, and (3) the relationships between the determinants of job maintenance and the job maintenance outcome variable of job terminations.

The procedures of the study involved the development of data collection instruments, the generation of computer simulation data, the implementation of a pilot-test, the refinement and modification of instruments and game rules, the selection of CETA programs and participants for the study, the training of data recorders, the implementation of research and collection of data, the checking of data for internal consistency, the coding and key-punching of data, the analysis of the data, and the report writing.

The population of the study were participants in CETA Work Experience Programs in rural counties of Michigan. The sample of the study consisted of sixty-four participants from four rural Michigan Counties. Twenty-nine of the participants had relatively stable employment records, while thirty-five had relatively unstable employment records.

The data of the study were analyzed using nonparametric statistics from the Statistical Package for the Social Sciences (SPSS). Data related to participant predispositions, participant employment history, and the computer simulation runs were analyzed using descriptive statistics. For categorical data, frequency counts using mean, median, and mode were used. Continuous data were analyzed using means with standard deviations and confidence intervals. Between groups comparisons were analyzed using the Mann-Whitney U Test. Within group changes in strategy were analyzed using the Wilcoxon Signed Rank Test. The relationships of the determinants of job maintenance to job terminations were analyzed using Kendall Rank Order Correlation Coefficients.

The review of literature included an examination of research findings for both the determinants of job maintenance and the evaluation of simulation games. While research in both areas lacked coherence and tended to be fragmented and inconsistent, research relating to the determinants of job maintenance was more voluminous and more methodologically sound than research on the evaluation of simulation games. Both areas had been investigated by researchers in numerous disciplines and neither area had received much attention concerning interdisciplinary integration of findings. A number of literature surveys and reviews, however, have made some progress in that direction. The inconsistent use of terminology due to the lack of communication between disciplines is a particular source of vexation.

For research on the determinants of job maintenance, a review by Porter and Steers¹²⁵ and a review by Muchinsky and Tuttle¹²⁶ were particularly concise in synthesizing the findings in this area. The terminology used in the literature were factors related to turnover which corresponds to the determinants of job maintenance outcomes as used in this study. In the interest of brevity, the findings of the review with regard to some of the more important factors related to turnover are presented in tabular format on the following page.

Even though relationships were found for most of the factors above, very few of the factors are accurate predictors of turnover. Recent studies have emphasized the need to consider intervening variables in research related to turnover. Wanous, Stumpf, and Bedrosian in 1979 found that job performance was a stronger predictor of involuntary turnover than job attitudes, and organizational variables were stronger predictors of job survival than were personal variables.¹²⁷ Parasuraman in 1982 concluded that personal variables and job satisfaction had little direct effect on turnover, but instead the effects of those variables were channeled through behavioral intentions which was a much better predictor of turnover. As reported by Muchinsky and Morrow, Hollingsworth had found similar results in 1978 which

¹²⁵Lyman W. Porter and Richard M. Steers, "Organizational, Work, and Personal Factors in Employee Turnover and Absenteeism," Psychological Bulletin, 80 (2) (1973), pp. 151-176.

¹²⁶Paul M. Muchinsky and Mark L. Tuttle, "Employee Turnover: An Empirical and Methodological Assessment," Journal of Vocational Behavior, 14 (1) (February 1979), pp. 43-77.

¹²⁷John P. Wanous, Steven A. Stumpf and Hrach Bedrosian, "Job Survival of New Employees," Personnel Psychology, 32 (4) (Winter 1979), pp. 651-662.

AN OVERVIEW OF RESEARCH FINDINGS REGARDING
THE FACTORS RELATED TO TURNOVER

<u>Factor or Determinant</u>	<u>Relation- ship to Turnover</u>	<u>Factor or Determinant</u>	<u>Relation- ship to Turnover</u>
1. Overall Job Satisfaction	Negative	2. Satisfaction with Pay and Promotion	Negative
3. Satisfaction with Supervisory Relations	Negative	4. Satisfaction with Peer Interactions	Negative or None
5. Satisfaction with Job Content	Negative	6. Employee Attitudes	Negative
7. Employee Age	Negative	8. Employee Tenure	Negative
9. Family Size	Negative	10. Family Responsibility	Positive
11. Recognition and Feedback	Negative	12. Task Repetitiveness	Positive or None
13. Job Autonomy and Responsibility	Negative	14. Job Attachment	Negative
15. Congruence of Job with Vocational Interest	Positive	16. Extreme Personality Characteristics	Negative Negative
17. Overall Personality	Inconclusive	18. Intelligence	Inconclusive
19. Aptitude and Ability	Inconclusive	20. Bio-data	Fair Predictor of Turnover

indicated that the best predictor of turnover is intention to quit.¹²⁸

Muchinsky and Morrow, based on previous research, identified three

¹²⁸Paul M. Muchinsky and Paula C. Morrow, "A Multidisciplinary Model of Voluntary Employee Turnover," Journal of Vocational Behavior, 17 (3) (December 1980), pp. 263-290.

sets of determinants of turnover which are individual, work-related, and economic opportunity factors. Those writers further noted that the economic determinant appears to have the strongest impact on turnover.¹²⁹

The status of research with regard to evaluation of simulation games is simply that in general answers backed by hard research data are not available. Theory and research advances reflect the lack of hard research data. An organized body of knowledge about instructional simulation does not currently exist. Methodological problems such as sampling techniques, heterogeneity of samples, poor conceptual implementation, and lack of control of intervening variables have been a real hindrance to advances in research. Much of the simulation game research has compared learning through games to learning through more conventional instruction. The review of literature draws heavily from such research in the areas of (1) cognitive learning and retention, (2) attitudes, (3) interest and motivation, and (4) intellectual skills.

For cognitive learning in general, research findings indicate that simulation/gaming appears to be about as effective as other conventional methods of instruction. For retention of learning the research results to date suggest that participants in simulation games will retain information longer than those acquiring that information through conventional instruction. With regard to attitudes, the research findings support the idea that simulation games can change attitudes, but the changes do not appear to be enduring and in many

¹²⁹Ibid.

cases attitude changes are a reversal of designer intent. The research findings do support the idea that there is a high level of student interest in participating in simulation games; however, simulation games do not appear to increase interest in the content area of the simulation game. Concerning motivation, simulation games appear to either enhance or depress motivation to take action in the real world depending on many factors. Research to date, though inconclusive, does not support the idea that simulation games are superior to conventional instruction in the acquisition of critical thinking skills, decisionmaking skills, or other intellectual skills. Research regarding the evaluation of simulation games is sparse and not very positive.

Progress in the development of evaluation techniques has been slow even though some new evaluation techniques have been proposed since the mid-seventies. One of the most promising approaches is formative evaluation which is designed to assess a product or process during the developmental process in order to improve it. Stolovich has presented a six-stage chronology of the formative evaluation process.¹³⁰ Only one report of research involving a similar simulation in the same content area was found. Questionable research methods made that study of limited value to the purposes of the present study. Much work remains to be done to provide answers backed by hard research data which will serve as a basis for building an organized body of knowledge.

¹³⁰Harold D. Stolovich, "Formative Evaluation of Instructional Games," Improving Human Performance Quarterly, 4 (3) (1976), pp. 126-141.

The findings of the study included general findings related to the participants, findings related to the Job Maintenance Game, findings related to the hypotheses, as well as other findings. A key independent variable based on participants' work history was the relative stability of employment records. Of 64 participants, 29, or 45 percent, were classified as being relatively stably employed (Group I), while 35, or 55 percent, were classified as being relatively unstably employed (Group II).

Group I participants were older, better educated, and had a higher percentage of females than Group II. Group I had a better employment record relative to Group II in most of the categories for which data were collected. Group I participants had more promotions, more lay-offs, more quits to take a new job, and more work experience than did Group II. On the other side, Group II had more months of unemployment, more jobs held, more total quits, more quits with no new job in hand, more firings, and more total job losses than did Group I. However, Group II did have a higher rate of promotions than did Group I. It would appear that there are substantial differences between the groups though no statistical tests of significance were used.

The computer simulation was developed to test the theoretical limits of the Job Maintenance Game and was designed to allow for changes in player strategies and rule structure. A series of strategies including a Maximum, an Optimum, a Random, and a Minimum Strategy was formulated to test the theoretical limits of the game. These four strategies provided a backdrop against which real participant data could be compared. Three other strategies were designed to reduce the role of productivity in generating numbers of job terminations by

changing the rule structure. While those strategies were successful in reducing the role of productivity, they also had negative side effects which precluded their use in the Job Maintenance Game. As a result, some changes in the rule structure were made even though the nature of the rule structure changes would not permit testing with the computer simulation. The changes in rule structure were made prior to implementing the research procedures of this study.

With regard to the theoretical limits of the Job Maintenance Game, job duration varied from a low of 2.5 board cycles per job for the Minimum strategy, to a high of 4.4 board cycles per job for the Maximum strategy. The writer's experience with actual play of the game suggests that for four to six players, board cycle ranges of 3.5 to 4.5 may be generated in about one hour thereby giving ample opportunity for a job to be lost or retained. Several indices were important both in defining the theoretical limits of the game and in evaluating participants' actual play. The index of job decision quality varied from a low of 0 for the Minimum strategy to a high 69.8 for the Maximum strategy. The interpretation here is that the percentage of positive decisions that can be made for job-related decisions is only about 70 percent under ideal conditions because participants do not always have the necessary job maintenance tokens to make positive decisions. The index of productivity decision quality varies from a low of 0 for the Minimum strategy to a high of 100.0 for the Maximum strategy. The index of job maintenance decision quality also varies from 0 for the Minimum strategy to 100.0 for the Maximum strategy. For both of these computer simulation strategies, "players" are not encumbered with regard to their elect to make

positive (or negative) decisions. Net productivity per job varied from .6 production units per job for the Minimum strategy to 3.3 production units per job for the Maximum strategy which indicated that net productivity can be substantially controlled by the strategy which the participant selects. This is also true about the net job maintenance effort per job which varied from a low of 2.8 job maintenance tokens per job for the Minimum strategy to a high of 6.5 job maintenance tokens per job for the Maximum strategy. The indices along with other specific game data serve to effectively define the limits of the Job Maintenance Game. Those limits make the meaningful interpretation of the results of participants actual playing of the game possible.

The computer "runs" for the computer simulation also serve to establish the reliability of the Job Maintenance Game. Given strategies generated predictable results over several runs though only a single large run was reported for each strategy. Overall, participants' results which generally fell within the theoretical limits also tend to support the idea that the Job Maintenance Game is reliable for use under a wide variety of strategies.

For the first playing of the Job Maintenance Game, Group II participants unexpectedly performed slightly better than Group I participants. In support of that result, Group II made more positive decisions with regard to productivity, job maintenance effort, and job-related decisions. Overall, there appeared to be a real difference between the strategies of the two groups.

Both directional and nondirectional hypotheses were used. The alpha level for rejection of the null hypotheses was set at $\alpha = .10$, which meant rejecting at the level .05 for nondirectional hypotheses

and at the .10 level for directional hypotheses.

In the interest of brevity, the findings are presented in a tabular format where G_1 stands for Group I and G_2 stands for Group 2.

BETWEEN-GROUP COMPARISON OF STRATEGY DIFFERENCES FOR
FIRST PLAYING OF JOB MAINTENANCE GAME

<u>Alternative Hypotheses</u>	<u>Predicted Direction</u>	<u>Actual Result</u>	<u>Statistical Significance</u>	
H_1 = No S.D. on Net Productivity	$G_1 = G_2$	$G_2 > G_1$	.946	N.S.
H_2 = S.D. on Net Job Maintenance Effort	$G_1 > G_2$	$G_2 > G_1$	.236	N.S.
H_3 = S.D. on Job Decision Quality	$G_1 > G_2$	$G_2 > G_1$	.023	SIG.
H_4 = No S.D. on Production Decision Quality	$G_1 = G_2$	$G_2 > G_1$	.148	N.S.
H_5 = S. D. on Job Maintenance Decision Quality	$G_1 > G_2$	$G_2 > G_1$	.274	N.S.
H_6 = S.D. on Number of Job Terminations	$G_2 > G_1$	$G_1 > G_2$	.307	N.S.

As is shown, Group I was expected to perform better in a first playing of the game for the four hypotheses and to perform equally well on two other hypotheses compared with Group II. Actual results indicate that, surprisingly, Group II performed better on all of the measures though most differences between the groups were not statistically significant. With regard to the quality of production decisions a statistically significant difference was found. Hypotheses 7 through 12 were a double set of hypotheses which applied individually to each group. Results for Group II are presented below where G_1

stands for playing Game 1 and G_2 stands for playing Game 2.

WITHIN GROUP COMPARISON OF STRATEGY CHANGES FROM A FIRST PLAYING
TO A SECOND PLAYING OF THE GAME FOR GROUP I

<u>Alternative Hypothesis</u>	<u>Predicted Direction</u>	<u>Actual Result</u>	<u>Statistical Significance</u>	
H ₇ = No S.D. on Net Productivity	$G_1 = G_2$	$G_1 > G_2$	.820	N.S.
H ₈ = S.D. on Net Job Maintenance Effort	$G_2 > G_1$	$G_2 > G_1$	.135	N.S.
H ₉ = S.D. on Job Decision Quality	$G_2 > G_1$	$G_2 > G_1$	.036	SIG.
H ₁₀ = No S.D. on Production Decision Quality	$G_1 = G_2$	$G_2 > G_1$	.043	SIG.
H ₁₁ = S.D. on Job Maintenance Decision Quality	$G_2 > G_1$	$G_2 > G_1$	.327	N.S.
H ₁₂ = S.D. on Number of Job Terminations	$G_1 > G_2$	$G_1 > G_2$	.551	N.S.

For the most part, Group I showed improvement in the quality of strategies from Game 1 to Game 2. Statistically significant differences representing improvements in the quality of job decisions and production decisions were found for Group I. Learning appears to have taken place with regard to those two determinants of job maintenance. Improvements in strategies were also noted for the number of job terminations and for net job maintenance effort as well as job maintenance decision quality. However, the differences were not statistically significant. With regard to net productivity, a statistically non-significant reversal of predicted direction was found. It was determined that the decrease in productivity from Game 1 to Game 2 was

a function of chance in that in Game 2 all Group I participants exercised the option to be productive at every opportunity. It may be said that Group I improved substantially with regard to quality of strategies from Game 1 to Game 2. Group II results for those same hypotheses are presented below.

WITHIN-GROUP COMPARISON OF STRATEGY CHANGES FROM A FIRST
PLAYING TO A SECOND PLAYING OF THE GAME FOR GROUP II

<u>Alternative Hypothesis</u>	<u>Predicted Direction</u>	<u>Actual Result</u>	<u>Statistical Significance</u>	
H ₇ = No S.D. on Net Productivity	G ₁ =G ₂	G ₁ >G ₂	.959	N.S.
H ₈ = S.D. on Net Job Maintenance Effort	G ₂ >G ₁	G ₂ >G ₁	.365	N.S.
H ₉ = S.D. on Job Decision Quality	G ₂ >G ₁	G ₁ >G ₂	.386	N.S.
H ₁₀ = No S.D. on Production Decision Quality	G ₁ =G ₂	G ₂ >G ₁	.109	N.S.
H ₁₁ = S.D. on Job Maintenance Decision Quality	G ₂ >G ₁	G ₁ >G ₂	.149	N.S.
H ₁₂ = S.D. on Number of Job Terminations	G ₁ >G ₂	G ₂ >G ₁	.298	N.S.

As may be noted above, most of the measures represented a reversal of predicted direction. None of the measures, however, were statistically significant. It may be stated that Group II did not improve the quality of their strategies from a first to second playing of the Job Maintenance Game. In fact, there is some evidence, though not statistically significant, to indicate that the quality of their strategies actually decreased during Game 2.

Hypotheses 13 through 17 were also a double-set which was applied independently to each group but which was concerned only with data from the first game. Those hypotheses were concerned with examining the relationships between the determinants of job maintenance and the extent of job terminations. For Group I, two of the determinants were fairly high in correlation with number of job terminations. For all the determinants negative correlations were predicted. The index of productivity decision quality and the index of job maintenance decision quality had negative correlation coefficients of $-.227$ and $-.399$, respectively, which were statistically significant. Those results are indicative of the important part that decisionmaking plays in the Job Maintenance Game. Other determinants had negative correlations, some fairly strong, which were not statistically significant.

For Group II, all of the determinants of job maintenance were negatively related to the number of job terminations. However, only one, the index of productivity decision quality, was strongly correlated ($-.309$) and statistically significant. Most correlation coefficients for Group II were substantially lower than the respective ones for Group I. In support of the decrease in quality of strategy for Group II from Game 1 to Game 2, a negative correlation of $-.201$ which was statistically significant was found between the number of job terminations for Game 1 and the number of job terminations for Game 2.

The final group of hypotheses, 18 through 20, were concerned with between group differences in several predispositions of the participants. Only slight differences were found between the groups regarding predispositions toward the importance of employee

productivity, the importance of employee productivity, and the importance of employee decisions in the job maintenance process. A somewhat larger difference favoring Group I was found with regard to predispositions toward participating in simulation games. However, none of the predispositions were statistically significant. Larger numbers of participants likely would have produced significant results.

Other findings in the study dealt primarily with the results of Game 2. In the second playing of the game, Group I out-performed Group II on nearly all of the determinants of job maintenance as well as other measures. With regard to net job maintenance effort, the index of job decision quality, the index of productivity decision quality, the index of job maintenance decision quality, and the number of job terminations, Group I had more effective strategies than did Group II. Only in the area of net productivity did Group II exceed Group I. It was apparent that from Game 1 to Game 2, Group I participants increased the quality of their strategies, while the quality of Group II strategies declined. One factor that substantially supports the increase for Group I and the decrease for Group II is the correlation coefficients for the relationship between the determinants of job maintenance and the number of job terminations in Game 2. For Group I, the negative correlations tended to increase in size (become more negative) and statistical significance, while Group II correlations for all of the determinants reversed direction from negative to positive and became statistically less significant. From the results of the study it would appear that participants with relatively stable employment records are able to use initial learning in the job

maintenance game to improve their strategies, while participants with relatively unstable employment records appear not to be able to translate initial learning into more effective strategies.

Conclusions

The questions generated by the objectives of the study offer an organizing scheme by which some of the conclusions of the study may be presented.

1. Do the job maintenance strategies of participants differ by employment history category?
 - A. For a first playing of the Job Maintenance Game, the strategies of participants in general did not vary by employment history category. However, job decision quality was significantly higher for the relatively unstable group.
 - B. For a second playing of the Job Maintenance Game, the job maintenance strategies of the participants did not vary by employment history category.
2. Do participants acquire knowledge and skill in a first playing of the Job Maintenance Game that leads to an improvement in strategy for a second playing of the game?
 - A. For Group I, participants appear to have acquired sufficient knowledge and skill in a first playing of the game (or in the debriefing session) to improve at least a portion of their job maintenance strategies. Job decision quality and production decision quality increased significantly from Game 1 to Game 2.
 - B. For Group II, participants did not appear to have acquired knowledge and skill to improve their job maintenance strategies. A non-significant reversal in direction of quality occurred with Group II.
3. Do any of the determinants of job maintenance affect the extent of job terminations in the Job Maintenance Game.
 - A. For a first playing of the Game, Group I participants showed significant correlation coefficients for the relationship between both production decision quality and job maintenance decision quality and the number of job terminations. Both net job maintenance effort and job decision quality approached significance in that regard. Only net productivity failed to

even approach a statistically significant relationship with the extent of job terminations.

- B. For a first playing of the Job Maintenance Game, Group II data did not generate strong relationships between the determinants of job maintenance and number of job terminations. Only the index of production decision quality was significantly related to job terminations.
 - C. For a second playing of the Job Maintenance Game, Group I data generated even stronger relationships between determinants and terminations. Only one determinant, job decision quality, did not approach statistical significance.
 - D. For a second playing of the Job Maintenance Game, Group II data generated even weaker relationships between determinants and job terminations. Only one determinant approached significance and that was production decision quality.
4. Do the predispositions of participants differ by employment history category?
- A. The predisposition toward the importance of employee productivity in the job maintenance process does not vary by employment history category.
 - B. The predisposition toward the importance of employee decisions in the job maintenance process was valued higher by Group I than Group II but did not quite reach a statistically significant level.
 - C. The predisposition toward participation in simulation games was valued higher by Group I than Group II, but again did not quite reach statistical significance.

Other conclusions regarding the study are:

- 1. The reliability of the Job Maintenance Game was supported by the results of both computer simulation runs and by the participants actual play. A comparison of the two different sources of data indicates that the Job Maintenance Game is both consistent and predictable regarding the outcomes of different strategies of play.
- 2. The greatest value of the computer simulation of the Job Maintenance Game was the generation of the theoretical limits of the Job Maintenance Game.
- 3. The most important outcome relating to participants' actual play was the fact that the playability of the game was established and demonstrated.

4. The review of literature provided strong support for the credibility of the job maintenance concept. The use of environmental effects as an intervening variable is supported by other research and theory. Only weak support was found for the role of productivity in the job maintenance process. Substantial research in the area of attitudes and satisfaction supported the motivational aspects of the job maintenance concept. The role of decisionmaking in the job maintenance process was not found in the literature. Support for that area rests on the logical foundation established in the conceptual framework.
5. The Job Maintenance Game is an effective method of teaching job maintenance strategies to participants with relatively stable employment records.
6. Among the possible explanations for the increase found for Group I and the decrease found for Group II regarding the quality of job maintenance strategies from Game 1 to Game 2 are:
 - A. Regression to the mean occurred for both groups and accounted for the differences.
 - B. Group I experimented during Game 1 to find an effective strategy to implement during Game 2, while Group 2 chose effective strategies to begin with only to lose the motivation to do well in Game 2. That process may actually occur in the real world also.
 - C. Both Groups attempted to improve their strategies by varying them for the second game which might work for Group I, but not for Group II. If this were true, it would mean that Group II was unable to recognize a successful strategy when they were using it.

Recommendations

The recommendations for the study are based on the review of literature, the findings of the study, as well as the Job Maintenance Game developmental process which predated the study. The recommendations are:

1. The study should be replicated with other populations.
2. The computer simulation should be revised to allow additional rules and inputs to be varied for testing purposes.
3. The computer simulation data should be used to test the same hypotheses of the study for various strategies instead of the employment history groups.

4. The computer simulation should be run several times for each of the strategies and the generated data should be subjected to tests of statistical significance.
5. The Job Maintenance Game should be revised in light of the findings of the study. (For example, the use of one-half units in the production phase should be eliminated.)
6. The Job Maintenance Game should be tested by independent evaluators in a research setting.
7. A microcomputer version of the Job Maintenance Game should be developed.
8. The Job Maintenance Game should be tested with students in vocational programs at the secondary and post-secondary level.
9. The job maintenance concept should be refined to provide for additional clarity and internal consistency.
10. The Job Maintenance Game should be used in research studies that compare the game to other methods of instruction.

APPENDICES

APPENDIX A

**LETTER TO DIRECTORS OF PARTICIPATING
COMPREHENSIVE EMPLOYMENT TRAINING
ACT PROGRAMS**

LETTER TO DIRECTORS OF PARTICIPATING CETA PROGRAMS

Dear Director,

This letter is a follow-up of our recent telephone conversation concerning our request for your cooperation in conducting research on a job maintenance training program. The Job Maintenance Workshop was developed at Michigan State University in 1976 under a contract with the Michigan Department of Labor. The workshop was designed for use in public manpower programs to provide program participants with training on methods of staying employed. Experience during the developmental and post-developmental stages indicates that the workshop is a valuable educational approach for instructing adults on how to keep a job.

A central element in the workshop is an educational simulation of the process of job maintenance called the Job Maintenance Game. While the results of use of the Job Maintenance Game to date have been positive and very encouraging, documentation in the form of research is needed. It is with regard to research on the Job Maintenance Game that your cooperation is solicited.

Your cooperation would involve the selection of a number of participants from your CETA programs and the arrangement for a room for the instructional and research activity. Approximately eighteen participants can be included in a single workshop session lasting from five to six hours. Two such sessions (one per day) involving a total of about thirty-six participants would be desirable.

Data to be collected in the research would consist of responses of the individual in the simulation, a brief work history, and opinions of the participants regarding several aspects of employment. Data collected from the individual participant would remain confidential with only summary information over several different counties in Michigan being reported.

Participants in this activity should benefit from receiving instruction in a unique manner that allows for active learner participation, high levels of interests, and a basis by which the strategies and skills of job maintenance may be acquired. In addition, if after observing the workshop results you wish to provide instruction to other CETA program individuals, we would be glad to assist you in that task.

Enclosed is a copy of the Job Maintenance Workshop and the accompanying Job Maintenance Game which should provide information to answer questions about the nature of the workshop and game.

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Thank you for your consideration in this matter. If you have questions or concerns, please contact us at the telephone number or address below.

Sincerely,

Boyd Robinson
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Okemos, Michigan 48864
Telephone - (517) 349-3474

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JOB MAINTENANCE GAME
DATA COLLECTION FORM NUMBER 1

NAME OF PLAYER _____	LOCATION _____	DATE _____
1. ID	WORKER NUMBER _____	WORKERS1 _____
2. CYCLES	NUMBER TIMES AROUND BOARD _____	CYCLES1 _____
3. JOB DECISION FACTORS	JOB DECISION EVENTS _____ NEGATIVE JOB DECISIONS _____ RISK ESCAPES _____	JOBDEC1 _____ NEGDEC1 _____ BADDEC1 _____
4. PRO- DUCTION FACTORS	ENTER PRODUCTION _____ TIMES ENTERED _____ UNITS ACQUIRED LOOP _____ UNITS GAINED BY CHANCE _____ UNITS LOST BY CHANCE _____ COMPLETE UNITS TURNED IN _____	PROSPOT1 _____ PRODUCE1 _____ PROLOOP1 _____ PROLUCK1 _____ PROLOSS1 _____ PROUSED1 _____
5. JOB MAIN- TEN- ANCE FACTORS	ENTER JOB MAINTENANCE _____ TIMES ENTERED _____ TOKENS ACQUIRED LOOP _____ TOKENS USED ON DECISIONS _____ TOKENS LOST BY CHANCE _____	JMSPOT1 _____ ENTERJM1 _____ JMTGAIN1 _____ JMTUSED1 _____ JMTLOST1 _____
6. JOB LOSS TOKEN FACTORS	TOKENS ACQUIRED BOARD _____ TOKENS ACQUIRED LIFE _____ TOKENS ACQUIRED JD RISKS _____ TOKENS RETURNED BY CHANCE _____	JLTOKEN1 _____ JLTLIFE1 _____ JLTRISK1 _____ JLTLUCK1 _____
7. JOB TERM- INATION FACTORS	BOARD SPACE NUMBER AT JOB TERMINATION _____ NO. PAY CARDS AT JOB TERMINATION _____ NO. JOB LOSS TOKENS AT TERMINATION _____ NO. JOB MAINTENANCE TOKENS AT TERM- INATION _____ NO. PRODUCTION UNITS AT JOB TERMIN- ATION _____ NO. JOB DECISION CARDS HELD AT JOB TERMINATION _____ NO. JOB MAINTENANCE TOKENS INITIALLY _____ NO. JOB LOSSES THIS JOB _____ GAME NUMBER _____	JLSPOT1 _____ PAYCARD1 _____ JLTHELD1 _____ JMTHELD1 _____ PROHELD1 _____ JDCHELD1 _____ JMTORG1 _____ JOBLOSS1 _____ GAMENUM1 _____

JOB MAINTENANCE RESEARCH
DATA COLLECTION FORM NUMBER 3

NAME _____ AGE _____ SEX _____

NUMBER OF YEARS IN SCHOOL _____

NUMBER OF YEARS OF WORK EXPERIENCE _____

NUMBER OF YEARS SINCE HIGH SCHOOL _____

NUMBER OF EMPLOYERS OR JOBS SINCE HIGH SCHOOL _____

NUMBER OF PROMOTIONS RECEIVED _____

NUMBER OF TIMES LAID OFF _____

NUMBER OF QUILTS TO TAKE A NEW JOB _____

NUMBER OF QUITTS WITH NO NEW JOB _____

NUMBER OF TIMES FIRED _____

NUMBER OF MONTHS UNEMPLOYED SINCE HIGH SCHOOL _____

1. How important do you feel a worker's productivity is to staying on the job? (Circle one only)

1 2 3 4 5 6 7 8 9

of no importance of medium importance of high importance

2. How important do you feel a worker's job-related decisions are to staying on the job? (Circle one only)

1 2 3 4 5 6 7 8 9

of no importance of medium importance of high importance

3. How well do you enjoy playing board games such as Monopoly, Chess, Life, Scrabble, etc.? (Circle one only)

1 2 3 4 5 6 7 8 9

Don't like them at all like them medium well like them very much

JOB MAINTENANCE RESEARCH
DATA COLLECTION FORM NUMBER 4

The status of workers in the labor market is a key independent variable of this research project. Workers who have stable employment records tend to enjoy a higher socioeconomic status than workers with unstable employment records. Stability of employment is defined by such factors as number of jobs held, number of quits, number of promotions, amount of unemployment, etc. For the purposes of this research, two sub-groups of the participants listed below must be formed to reflect the relative stability of the participant's employment record. In order to accomplish this task it will be necessary to examine the individual's work history from Data Collection Form Number 3 and your own previous knowledge of the individual. Please compare each of the listed individuals below to other participants of similar public manpower programs you have known regarding their employment stability. If you feel the individual is above average in employment stability, please place a check in the column market Relatively Stably Employed. If you feel the individual is below average in employment stability, please place a check in the column market Relatively Unstably Employed.

[illegible]

APPENDIX B

DATA COLLECTION FORMS

APPENDIX C

FACILITATOR'S GUIDE TO THE JOB MAINTENANCE GAME

FACILITATOR'S GUIDE TO THE
JOB MAINTENANCE GAME

An Instructional Simulation of the Process of Job Maintenance

Purpose: The Job Maintenance Game is designed to simulate the process of job maintenance--that is, the process of keeping a job--under conditions of employment typically experienced by blue-collar workers. The game was developed as a training aid for use with workers who have or may experience difficulty staying on the job. While the simulation was developed to accompany the Job Maintenance Workshop, it may also be used independently.

Educational Objectives: Although the facilitator who gains substantial experience with the simulation may be able to identify other educational objectives or outcomes, the Job Maintenance Game was developed with the following objectives in mind:

1. To increase participant understanding of the process by which employees maintain their jobs.
2. To increase participant awareness of the dynamics of job maintenance.
3. To increase participant knowledge of the factors of job loss.
4. To increase participant understanding of the importance of job-related decisions.
5. To increase participant awareness of the role of common life situations in the job maintenance process.
6. To increase participant awareness of the relative value of productivity in the job maintenance process.

Object of the Game: The objective of the Job Maintenance Game is for players to maintain or keep their job for the duration of the game.

Materials: Materials for the game include:

1. Playing Board - constructed by attaching the enclosed playing sheet with masking tape to the table. To construct additional games, photocopy the playing board, and attach the copy to poster board.
2. Playing Cards - constructed by cutting the enclosed playing card sheets into individual cards. To construct additional games, photocopy each set of playing sheets and attach the photocopies to a stiffer board of the same color as the original sheets. It will be necessary to write the appropriate name with a felt-tip pen on the reverse side of the card after cutting.

<u>Name of Card</u>	<u>Nature of Card</u>	<u>Color</u>	<u>Number</u>
Pay Cards	One Week's Pay	Yellow	24
	One Month's Pay	Green	12
Job Decision Cards	DecisionMaking	Blue	36
Life Cards	Chance Events	Salmon	36
Production Cards	Production Units (Cars)	Red	36

3. Player Tokens (not included) - a token representing each player must be obtained prior to playing. Player tokens from other commercial board games are ideal.
4. Job Loss Tokens (not included) - twenty-four (24) job loss tokens must be obtained prior to playing. The board was

designed with the intention of using red poker chips as job loss tokens. Other round flat objects may also be used.

5. Job Maintenance Tokens (not included) - thirty-six (36) job maintenance tokens must be obtained prior to playing. The board was designed with the intention of using white poker chips as job maintenance tokens. Other round flat objects may also be used.
6. Dice (not included) - a pair of dice must be obtained prior to playing.
7. Form for Recording Reasons for Job Loss (enclosed).

Requirements for Playing the Job Maintenance Game

The Job Maintenance Game may be played by a minimum of 4 and a maximum of 8 players. The enclosed board and playing cards are sufficient for that number. The game may be played by greater numbers if additional sets of materials are obtained or constructed.

The time required for playing the Job Maintenance Game ranges from one to two hours. If less than one hour is available, it is recommended that the game not be used as approximately 15 minutes of playing time is required for players to learn the rules and develop strategies of play. Additional time of 45 minutes or longer is necessary for the dynamics of the game to become clear and for the players to see the results of their strategies.

The game is played around a small table that will accommodate chairs for each of the players. An overhead projector (or a blackboard) is needed to post the reasons why each player receives job loss tokens.

Pre-game Preparation: Pre-game preparation requires the facilitator to (1) obtain needed materials and construct an appropriate number of games, (2) pre-play the Job Maintenance Game with friends, relatives, or colleagues, and (3) conduct an analysis or debriefing of the pre-play. Details of each step of the pre-game preparation are discussed below.

1. Pre-game Construction - After determining the number of participants in the target group, the facilitator must obtain materials for the size of the target group (Example - 4-8 participants require one set of materials) and construct the number of games needed in the previously specified manner. It is a good idea at this stage to package each set of materials with the possible exception of the board in 9 x 12 or larger manila envelopes. If an overhead projector is being used (and it is recommended), two or three overhead transparencies should be made of the enclosed form for recording reasons for job loss.

Work space is provided on the board for the first four players (or workers) to keep accumulated job loss and job maintenance tokens. These spaces are found in the four corners of the board and are labeled worker number 1, worker number 2, and so forth. Space for workers 5 through 8 is found on two separately enclosed boards. A facilitator will need to cut each additional work space and attach these to the playing board with masking tape. A single work space is centered behind each of the four spaces marked Life on the board.

2. Pre-playing the Game - The Job Maintenance Game simulates a very complex process. As might be expected, the game has a complex rule structure similar to the work environment it was designed to simulate. The facilitator should not attempt to serve in that capacity with the target group before first playing the game with others. As the rules and dynamics of the game are not apparent, pre-playing will provide the facilitator an opportunity to become familiar with the rules and to develop an understanding of the dynamics involved. In the pre-play, the procedures specified under the section entitled Directions for Play should be followed. The facilitator will need to facilitate as well as be a player in the pre-play.
3. Pre-play Analysis or Debriefing - Again, a rehearsal is in order. A facilitator must follow the directions set forth in the section entitled Analysis or Debriefing. If the game is pre-played with colleagues, they may be able to provide suggestions for conducting the actual analysis or debriefing.

Directions for Play

1. Set-up for the Game - It is desirable to arrange tables and chairs and set up the game prior to the arrival of the participants. When using the game in conjunction with the Job Maintenance Workshop, it is desirable also to have a pre-arranged set-up which is separate from the main workshop

setting (in another room or in a corner of the room. In setting up the game, the playing board is set out on or attached to the playing surfaces; Job Decision, Life, and Production Cards are first shuffled and placed face down on the appropriate squares of the board; Pay Cards are not shuffled but are placed face down on the board with all one month Pay Cards at the bottom of the stack and all one week Pay Cards at the top of the same stack. Player or worker tokens and the dice are placed in the center of the board. Job loss and job maintenance tokens are stacked to one side of the board.

2. Worker or Player Instructions - The facilitator should read the following information which appears in upper case letters. Information appearing in lower case is for the benefit of the facilitator and need not be read to participants.

THE JOB MAINTENANCE GAME CONCERNS WAYS AND MEANS OF KEEPING A JOB. WHILE IT IS A GAME, IT IS REALLY MORE THAN JUST A GAME. IT IS A GAME WITH WHICH PLAYERS CAN LEARN MORE ABOUT THE PROCESS OF STAYING ON THE JOB. IT IS ALSO A SIMULATION OF A WORK SETTING SUCH AS IS FOUND IN MANY SMALL FACTORIES AND LARGE INDUSTRIAL PLANTS ACROSS THE NATION. A SIMULATION YOU MAY ALREADY KNOW IS SOMETHING WHICH APPEARS IN SOME WAY TO BE LIKE ANOTHER OBJECT, PROCESS, OR THING. FOR EXAMPLE, A FLIGHT SIMULATOR FOR TRAINING AIRCRAFT PILOTS IS A DEVICE WHICH SIMULATES A FLYING AIRCRAFT. THE GAME YOU

ARE ABOUT TO PLAY IS AN EDUCATIONAL SIMULATION WHICH SIMULATES THE WORK PLACE AND THE WAYS AND MEANS BY WHICH WORKERS KEEP OR LOSE JOBS.

PLAYERS IN THIS GAME ARE REFERRED TO AS WORKERS. WHEN YOU BEGIN THE GAME, YOU ARE A NEW WORKER COMING ON THE JOB. AS YOU MAY HAVE ALREADY GUESSED, THE OBJECT OF THE GAME IS TO KEEP YOUR JOB. IN THIS GAME, AS IN A REAL JOB SITUATION, YOU ARE NOT TOLD ALL THE RULES AND INFORMATION YOU WILL NEED WHEN YOU FIRST COME ON THE JOB. IN THE REAL WORLD YOU LEARN RULES, COMPANY POLICY, SKILLS, AND OTHER INFORMATION OVER AN EXTENDED PERIOD OF TIME AS YOU ARE WORKING. SIMILARLY, YOU WILL LEARN THE NEEDED INFORMATION AND RULES OF THE JOB MAINTENANCE GAME AS YOU PLAY. FOR THAT REASON YOU ARE NOT ALLOWED TO ASK QUESTIONS. HOWEVER, AS THE GAME PROCEEDS, I WILL PROVIDE INFORMATION AS NEEDED. AT ANY TIME YOU DO NOT HEAR OR DO NOT UNDERSTAND, I WILL REPEAT THE INFORMATION FOR YOU. THE RULES OF THE GAME ARE SIMILAR TO THOSE IN THE WORK PLACE. AS THE SIMULATION IS NOT THE REAL WORK PLACE, SO PLEASE DO NOT ARGUE WITH THE RULES OR WHAT MAY SEEM UNFAIR. WE WILL BEGIN THE GAME WITH A ROLL OF THE DICE.

For two or more games, it is better to either have a facilitator for each game. If there is only one facilitator for one or more games, a single game should be started while the rest of the participants observe for about 5 minutes. Once the first game is underway, the facilitator may start a

second game with participants who are knowledgeable about how to begin. The worker in first position uses the work space for worker number one, and other workers around the board will use the work space closest to them. The facilitator will continue reading the information below to participants.

EACH WORKER WILL NOW SELECT A PLAYER TOKEN FROM THE CENTER OF THE BOARD. MAKE SURE YOU REMEMBER WHICH TOKEN IS YOURS. PLACE THE TOKEN ON THE SPACE MARKED PAY DAY. (Pause for workers to accomplish the task.)

THERE ARE FORTY (40) SPACES AROUND THE OUTSIDE OF THE BOARD, WHICH REPRESENT THE FORTY HOURS IN A WORK WEEK. EACH SPACE ALSO REPRESENTS AN EVENT THAT MAY OCCUR WHEN A WORKER IS ON THE JOB. YOU WILL BE LEARNING ABOUT THESE EVENTS AS YOU PLAY. EACH WORKER HAS A WORK SPACE. PLEASE SELECT A WORK SPACE NEAR YOU AND REMEMBER YOUR WORKER NUMBER.

(Pause) REMEMBER ALSO THAT YOU WILL LEARN THE RULES AS YOU PLAY AND WILL NOT BE ALLOWED TO ASK QUESTIONS. NOW, LET'S BEGIN. WORKER NUMBER 1 WILL ROLL THE DICE AND ADVANCE HIS (OR HER) TOKEN IN A CLOCKWISE DIRECTION THE NUMBER OF HOURS (SPACES) AS SHOWN ON THE DICE. THE GAME PROCEEDS WITH THE WORKER TO THE LEFT OF WORKER NUMBER 1 AND SO ON CLOCKWISE AROUND THE BOARD.

After the first worker rolls and advances the appropriate number of hours and lands on a specific space, the facilitator needs to be prepared to explain any rules

which may apply at this point. The Job Maintenance Game proceeds best if the facilitator has previously become familiar with the rules of the game and is able to cite "off the cuff" those rules that apply. As events occur which introduce artifacts of the game, such as job loss tokens, job maintenance tokens, and production cards, the facilitator will also need to provide rules or explanations and should if necessary refer to the sections that follow on general rules, rules relating to artifacts, and rules relating to game events (spaces on the board). The facilitator should avoid, if possible, reading the following sections to the participants.

It is important to note that the game begins rather slowly but picks up momentum as the participants learn the rules. To get the game started as quickly as possible, it is necessary to observe closely the following rules.

1. Do Not Allow Questions - While clarifications are in order, questions serve to bring the game to a halt. The play must move quickly if the participants are to gain an understanding of the game dynamics.
2. Do Not Try to Explain the Game, Let It Evolve - Provide only the barest minimum of information needed as situations arise.
3. Stay Close to the Game - By concentrating on the game the facilitator will provide information as it is needed.

4. Write Down Reasons For Job Loss Immediately - The facilitator should record immediately the reasons that a worker receives job loss tokens or otherwise loses a job. See the enclosed example form for recording reasons for job loss reasons.
5. Make Sure That Job Decisions and Life Cards Are Read Aloud - An important aspect of learning takes place when these cards are read.
6. Make Sure Workers Can Read - The facilitator will provide assistance to workers experiencing difficulty with reading.

As play proceeds, the facilitator may wish to make comments about how various situations that occur relate to the real world of work or make other comments relating to strategy of play. The facilitator must keep in mind, however, that it is a part of the game to allow the participants to discover such strategies or to realize the results of their decisionmaking.

The length of the game is dependent on several considerations including how quickly the game has developed, what the facilitator wishes to accomplish, and the time available. As a general rule, an hour is the minimum time needed. The facilitator should call the game and proceed to the analysis or debriefing when the objectives are accomplished.

General Rules of the Job Maintenance Game

1. A worker is required to surrender only that which he has.
In other words, one cannot lose what one does not have.
2. A worker rolling "doubles" is allowed to continue rolling the dice until such time as doubles are no longer rolled.
There is no penalty for rolling a string of doubles.
3. When a worker loses a job, that worker surrenders all cards, and tokens and begins again as a new worker.
4. New workers re-enter the game by placing their token on Pay Day, drawing three job maintenance tokens, and beginning when it is normal turn.

Rules Relating To Job Maintenance Game Artifacts

1. JOB LOSS TOKENS - These are the red poker chips which represent various reasons why workers may lose jobs, such as low productivity or absenteeism. When a worker receives a job loss token, that worker places the token on one of the spaces provided in the worker's work space. The worker must also announce that a job loss token has been received. The facilitator will determine the reason the token was received and makes a record for later analysis. If a worker accumulates three such tokens, the worker loses the job.
Remember, three strikes and the worker is out!
2. JOB MAINTENANCE TOKENS - These are the white poker chips which represent the desire and effort necessary to become a successful worker. Each worker begins the game with three

job maintenance tokens. (Workers may draw tokens from stack.) These three tokens are placed on the single space provided in each worker's work space.

3. PRODUCTION CARDS - These are the red cards on the board. There are three kinds of production cards: (1) a complete car, (2) a front-half of a car, and (3) a rear-half of a car. (Show examples) For each week that a worker is on the job, the worker must produce one complete production unit (car) either by acquiring a single card showing a complete car or by acquiring two half units (two fronts, two backs, or one front and one back). A worker must turn in a complete production unit each time Pay Day is reached (or passed), or, receive one job loss token for low productivity.
4. PAY CARDS - There are two types of pay cards on the board-- yellow pay cards (one week's pay) and green pay cards (one month's pay). Each and every time a worker passes Pay Day, the worker receives a yellow pay card (one week's pay). Any time a worker accumulates four yellow pay cards, that worker may turn in those cards and receive a green pay card (one month's pay). In addition, that worker may turn in one job loss token if one has been acquired. This represents an opportunity for an early mistake to be cancelled for loyal service over an extended time period.

Rules Relating to Job Maintenance Game Events (Spaces on the Board)

1. PAY DAY - The following events may occur (in the order given) as a worker reaches (or passes) the space on the board marked Pay Day:
 - A. The worker always receives a yellow pay card (one week's pay). (see pay cards, if necessary).
 - B. If a worker previously has drawn a job decision card and has not been able to turn it in prior to reaching Pay Day, the action specified on the card is implemented at this point (see Job Decision, if necessary).
 - C. The worker ~~must~~ turn in a complete production unit or receive a job loss token for low productivity. A worker may keep all production cards not needed to meet this requirement. If a worker does not have a complete production unit and receives a job loss token, the worker may keep all production cards on hand (see Production Cards and Job Loss Tokens, if necessary).
2. DAYS OF THE WEEK - Events occurring on these spaces relate to the job decision cards (see Job Decision, if necessary). Landing on the space marked Thursday also requires the worker to select a Life card (see Life Card, if necessary).
3. PROBATION PERIOD MISTAKE - A worker is on probation until after one week, at which time a yellow pay card (one week's pay) is acquired. If a worker lands on this space and has

no pay cards, he immediately loses his job, surrenders all cards and tokens, and starts over as a new worker. (Remember to write this on the job loss reason form.)

4. JOB DECISION - A worker landing on one of the eight spaces marked Job Decision must select a job decision card. The worker then reads the card aloud, makes a decision, and either uses the required number of job maintenance tokens or takes a chance. If a worker elects to use job maintenance tokens, the token(s) is returned to the stack at the side of the board and the job decision card is returned to bottom of the deck. If a worker elects to take a chance, the job decision card is retained by that worker and play proceeds. If that worker, during regular play, lands on a space marked by one of the days of the week prior to reaching or passing Pay Day, the worker may turn in the job decision card with no penalty. However, if the worker fails to get rid of the card, the penalty listed on the job decision card is implemented upon reaching or passing Pay Day. When a worker holds multiple job decision cards, a single card may be turned in with no penalty for each time the worker lands on a day of the week.
5. ENTER PRODUCTION - A worker landing on any of the spaces so marked may elect to enter the production loop on the next succeeding turn by placing his token on the word Enter. At the next turn for that worker, the dice are rolled, and the token is advanced around the production area and back to the

space along the edge of the board. For going through the production area, the worker receives one production card. If the worker lands on one or more of the four spaces in the production area, an additional production card is received for each space. For example, a worker may receive a maximum of three production cards by rolling double ones on the dice, thereby landing on the second space from Enter, rolling doubles ones again, thereby landing on the fourth space from Enter. In that case, the worker would receive one card for each production space landed on plus a card for going through the production area which would make a total of three production cards. If a worker lands on the space marked Enter Production as a result of going through the Job Maintenance loop, the worker may still exercise the option of going through the production loop (in effect, reversing direction).

6. LIFE - A worker landing on one of the four spaces marked Life must select one life card, read the card aloud, and follow the directions.
7. ENTER JOB MAINTENANCE - Workers landing on such spaces may elect to enter the Job Maintenance loop. Rules for this space are exactly like those for Enter Production except that job maintenance tokens are received (to a maximum of three) instead of production cards.
8. COFFEE BREAK - Time out, no action required here.
9. OVERTIME - Worker is allowed to work overtime, thereby advancing to mid-week.

10. YOUR SUGGESTION ACCEPTED - Worker landing here receives one production card for an idea suggested which improved production.
11. SENIORITY PROMOTION - A worker arriving here receives a pay card if that worker is the senior worker on the job, that is, if that worker has accumulated at least one more pay card than any other worker, otherwise no transaction occurs.
12. SAFETY VIOLATION - Landing on this space requires the worker to go back four hours (spaces). Worker must then follow the rules affecting the space (i.e., select a Life Card).
13. MID-DAY - Time out, no action required here.
14. BOSS UNFAIR - Worker landing here receives one job loss token.
15. TEMPORARY LAY-OFF - Worker landing here must go back to mid-week.
16. GREAT WORK! - Landing on this space allows worker to advance to the space marked Friday and receive two production cards.
17. SENIORITY LAY-OFF - A worker landing on this space is laid off (loses the job, turns in cards and tokens, and starts over as a new worker) if that worker has the least seniority, that is, has fewer pay cards than any other worker on the job. If the worker has as many or more pay cards than any of the other workers, no action occurs.
18. UNION BACKS YOUR CASE - A dispute with management is settled after the union takes the worker's side in a dispute. A worker may then give back one job loss token.

19. PRODUCTION UP! - Worker landing here receives one production card.
20. ABSENT FROM WORK - Worker landing here must go back six hours to the space marked Friday.

APPENDIX D

ANALYSIS OR DEBRIEFING GUIDE FOR THE JOB MAINTENANCE GAME

ANALYSIS OR DEBRIEFING GUIDE FOR
THE JOB MAINTENANCE GAME

In conducting the analysis or debriefing, a number of factors should be dealt with as primary concerns. Those factors are:

1. Examination of participant feelings with regard to the Job Maintenance Game.
2. Determination of whether or not any changes occurred in participants' beliefs or opinions as a result of playing the Job Maintenance Game.
3. Analysis of the participants' efforts to maintain their jobs in terms of the educational objectives of the job maintenance simulation.
4. Identification of the relationship between the Job Maintenance Game and the real world of work in terms of a transfer of learning potential.

The basic format of the analysis or debriefing section of the workshop consists of a series of questions to be explored in group sessions. Questions should be explored thoroughly and information clarified if necessary.

Feelings of the Participants

1. How did you feel about the Job Maintenance Game? Did you want the game to stop? Why? Why not?
2. Did you feel as if you were treated fairly in the game?

3. What aspects of the experience seemed unfair?
4. Did the experience seem real in any way?
5. Did you feel comfortable with the amount of information given?
6. Did you feel any anxiety about the possibility of losing a job? Why?
7. Did you feel more comfortable as the game progressed?
8. How did you feel about having to make decisions?
9. What other emotions did you feel during the game?
10. Did you feel as if you had ever been in the situation before? In what way?
11. How did you feel about your fellow workers?

The Job Maintenance Game was designed to reflect the real world of work in a number of ways. It was not designed as a "fair or unfair" experience but instead attempted to capture some of the typical problems and situations faced by most employees at one time or another. The game was actually based on a survey of employers' opinions of as to why employees lose jobs. The game was revised after employees had played and made comments. Perhaps the experience may feel real to participants to the extent that they have experienced similar situations on the job. The game was further developed to place the participant in a decisionmaking situation with minimum information with which to begin. Another element built into the game made it difficult for workers to overcome the effects of early errors in judgement. A missed opportunity to enter production or to enter job maintenance may have proven costly later in the game. The game reflected the old saying, "Nothing succeeds

like success." Once a worker was on top, it was relatively easy to stay on top; however, the worker who fell behind early probably found it very difficult to maintain a job. As a result, the worker having difficulty keeping a job experienced more anxiety than the worker experiencing no difficulty.

Changes in Participants' Beliefs and Opinions

Using the information, concerns, and feelings identified in the preceding section, participants should be asked to examine and compare their beliefs and opinions held about jobs and the job maintenance process before and after the simulation experience to identify what changes may have occurred. The following questions may be used to facilitate the discovery of changes in participants' beliefs and opinions occurring as a result of playing the Job Maintenance Game.

1. Do you feel that you learned from your experience with the game? If so, what?
2. Has the experience changed your beliefs or opinions with regard to how to keep a job? If so, in what way?
3. What changes in your plan or strategy did you make during the game?
4. If you were to start the game over, what would you do differently?

The Job Maintenance Game was designed to cause a worker to examine beliefs and opinions about keeping a job. Many worker will be able to see where changes in beliefs or opinions occurred.

Analysis of Participants' Efforts to Maintain a Job

Using the job loss reasons collected for each worker, an analysis of several workers' efforts to maintain a job should be

conducted by applying the following questions to each case. Each worker should be asked to examine his/her own case. Care should be exercised here to assure that interpretations are made by the worker only in terms of the game situation.

1. What strategies did you use to try to keep your job?
2. How well did the strategy work for you?
3. Why were you able to keep your job?
4. What caused you the most trouble in trying to keep your job?
5. What part did your decisionmaking play in your efforts to keep your job?
6. How were you affected by the various life situations (Life Cards) in the game?
7. How important was productivity in your efforts to keep your job?
8. If you lost your job, do you think you were fired? Do you think you quit? Do you think you were forced to resign?
9. Other questions that related to the unique aspects of a specific case may also be added.

The Job Maintenance Game places participants in a decision-making situation. Each decision made by the participant contributes to the overall strategy, that is, the collective decisions of each individual participant represents that person's plan or strategy to stay on the job. In the real world of work, the ability of an employee to maintain a job is highly dependent on personal decisionmaking and personal actions. Workers who followed the strategies listed below were most likely successful in maintaining their jobs.

1. Worker elected to enter the production in order to maintain adequate levels of production. However, there were no

significant advantages to the worker who attempted to acquire a large backlog of production units.

2. Worker elected to enter the job maintenance loop to maintain his ability to improve on the job. As the job maintenance tokens represented effort to improve, it was to the worker's advantage to accumulate those tokens in order to be able to avoid being forced into the position of taking a risk in job decision situations.
3. Worker elected to cooperate with fellow workers even though he may gain no significant advantage. The trading of production cards often held short-term advantages to only one of the workers involved in a potential trade. However, cooperation usually was a successful strategy in the longrun.
4. Worker elected to improve by using job maintenance tokens when job decisions were required. There was little advantage for the worker who took a chance on being a poor worker.
5. Worker elected to avoid excessive accumulation of production cards and job maintenance tokens, thereby increasing efficiency in acquiring seniority. There were a number of advantages for the worker with the most seniority and a number of disadvantages for the worker with the least seniority.

While the employee decisionmaking aspects of "staying on the job" in the Job Maintenance Game is under the control of the worker,

other aspects reflect chance events. Life Cards reflect various life situations that may occur. Approximately 40 percent of the Life Card occurrences are favorable to the worker, while about 60 percent are unfavorable occurrences. The various spaces around the board also represent chance events. Some of those events are favorable, while others are unfavorable, to the worker. Still other events represent opportunities and are favorable or unfavorable depending on the kind of decisions made by the worker. The worker in the Job Maintenance Game must adjust his/her strategy to take advantage of opportunities that arise.

Workers in the game could lose their jobs for a variety of reasons as shown on the job loss reason form. However, the way in which a worker loses a job is also important. Most workers in real life lose their jobs by voluntarily resigning or quitting. Many workers lose jobs by being laid off. Only a small proportion of workers actually lose jobs by being fired. An examination of the job loss reasons will give some idea as to whether the worker was fired, laid off, or quit. Essentially, the four reasons why workers may be fired which are: (1) employee theft, (2) drug or alcohol abuse on the job, (3) employee dishonesty, and (4) habitual absenteeism.

Relationship of the Game to the Real World - Transfer of Learning

In discussing the relationship of the game to the real world, it is desirable to focus on the potential for transfer of learning. What is the meaning of the experience for each participant in terms of the real work world? The questions below should help in structuring the discussion. As transfer of learning will be different for each

participant, no further information is given. Instead, the facilitator is urged to summarize the comments of the group at the end of the discussion period.

1. Do you feel that the game was like the real working world?
2. In what ways were your experiences in the game similar to experiences you have had on the job?
3. In what ways were your experiences in the game dissimilar to experiences you have had on the job?
4. Did you feel that you learned anything in the game that would help you stay on the job in the future? If so, what? If not, why not?
5. Has the game convinced you to change any of your strategies on the job? If so, what are they?

APPENDIX E
LISTING OF RESEARCH SITES

LISTING OF RESEARCH SITES

<u>DATE</u>	<u>COUNTY</u>	<u>TOWN</u>	<u>NUMBER OF PARTICIPANTS WITH</u>		
			<u>RELATIVELY</u> <u>STABLE</u> <u>EMPLOYMENT</u> <u>RECORDS</u>	<u>RELATIVELY</u> <u>UNSTABLE</u> <u>EMPLOYMENT</u> <u>RECORDS</u>	<u>UNUSABLE</u> <u>DATA</u>
7-15-77	Grand Traverse	Traverse ¹ City	5	9	1
8-11-77	Shiawassee	Corunna ²	-	-	21
8-17-77	Ottawa	Grand ³ Haven	4	1	5
8-23-77	Shiawassee	Corunna ³	8	8	6
9-8-77	Muskegon	Muskegon	5	3	2
9-15-77	Kalamazoo	Kalamazoo	6	6	0
9-16-77	Kalamazoo	Kalamazoo	3	13	0
10-5-77	Shiawassee	Corunna	3	4	0
Totals Are For Last Six Sites Only			29	35	13

¹This site was used to pilot test the instrument and game

²Scheduling problems and inadequate time for training data recorders resulted in incomplete data collection at this site and resulted in its being omitted from the study.

³Limited time for training recorders at each of these sites resulted in some unusable data.

APPENDIX F

DOCUMENTATION FOR A COMPUTER SIMULATION OF THE JOB MAINTENANCE PROCESS

DOCUMENTATION FOR A COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME

Programmed by Joanne Berry - July 14, 1977

This program simulates a job maintenance game designed by Boyd Robinson. This program can accommodate 2 to 8 players and can be played with 1 or 2 die and be played from 1 to however many rounds of the board one desires. During the simulation, tallies are kept per job and for the game as noted in the output description. Two files are also kept that can be used for additional statistical analysis. To play the game a particular strategy has to be inputted as explained in the description of the input variables. The standard values are for a maximum low risk strategy. Approximate cost for 4 players 100 rounds of the board and 2 die is about \$8.50 rate group 3 and take about 17 seconds. There is little change in the cost or time with use of different strategies.

Subroutines

- SHUFFLE - Shuffles the life, decision, and production cards.
- DECISION - Picks a decision card for player and makes decision.
- PRODUCE - Takes a player through the production loop.
- GETPROD - Entry point to produce.
Picks a production card.
- MAINTAIN - Takes a player through the job maintenance loop.
- PAYOUT - Gives a player his week's pay;
Checks if players has accumulated four weeks of pay.
If so, loses job token.
Check for decision cards--apply penalty.
Checks for full production unit--apply penalty.
Checks for job loss.
- JOB LOSS - Reinitializes player's arrays.
Prints information about particular job; e.g., how long the

player had it, how much seniority he had, how many maintenance units, etc.

- CHANCE - Puts back a decision card for the player.
- LIFE - Picks a life card for the player and carries out the instructions.
- SWAP - Swaps production cards with other players if desired. (inactive)
- NE - Function that rolls one die (on Hal Library).
- PENALTY - Enacts Penalty for a given decision card and checks for Job loss.
If Job is lost INCARD (param.) is set to -1.
- SUBROUTINE CHOICE - Makes the choice of whether or not to go through the Production or Maintenance Loop.
(param.) - (Production if = 1, Maintenance if = 1, deciding basis, number if deciding basis = 4, decision (IDE)

OUTPUT

a) At the end of the Game: (for each player)

Player No. (IC) was on spot (ISPOT(IC)) when the game stopped.

He had (NPAYC(IC)) Pay Cards, (NJOBLT(IC)) Job loss tokens, and

(NMAINT(IC)) Job maintenance cards in his possession. He had

(NPROC(IC)) production cards which were (KPROC(IC,1) TO NPROC(IC)).

He lost his job (JOBLOST(IC)) times during the game and went around

the board (NTARBT(IC)) times. Since he last lost his job he went

around (NTARSL(IC)) times. During the Game he landed on the

following spots the following number of times.

((I, NTOHSP(IC, I), I=1, 40)).

(Summary)

During the game all the players landed on the following spots the following number of times.

b) Two files are created by this program

1. a job loss tally file (see description)

2. a game summary file

4 records

FORMAT (29I3,/,4(10I4,1)

IC - Player number

ISPOT(IC) - Spot he was on when he lost his job.

NPAYC(IC) - Number of pay cards player had when he lost his job.

NJOBLT(IC) - Number of job loss tokens in the player's possession when he lost his job.

NMAINT(IC) - Number of maintenance tokens in the player's possession when he lost his job.

NPROC(IC) - Number of production cards in the player's possession when he lost his job.

KPROC(IC,20) - Description of first 20 production cards.

JOBLOST(IC) - Number of times this player lost his job during the game.

NTARBT(IC) - Total number of times player has gone around the board since the game began.

NTARSL(IC) - Number of times the player went around the board since the last time he lost his job.

NTONSP(IC,40) - Number of times each particular spot was landed on by this player.

JOBLOSS TALLY FILE DESCRIPTION
FORMAT (1013,2514)

JOBLOSS TALLY VARIABLE NO. NAME	SPSS NAME	SPSS VARIABLE LABEL
1. IPLAY	WORKER,	PLAYERS IN JOB MAINTENANCE GAME
2. ISPOT	JLSPOT,	SPACE WHERE JOB TERMINATED
3. NPAYC	PAYCARDS,	NUMBER PAYCARDS WHEN JOB LOST
4. NTARBT	GACYCLE,	NUMBER BOARD CYCLES DURING GAME
5. NTARSL	JOBCYCLE,	NUMBER BOARD CYCLES DURING JOB
6. JOBLOST	JOBLOSS,	NUMBER JOB LOSSES DURING GAME
7. NJOBLT	JLTOKEN1,	NUMBER JOB LOSS TOKENS AT TERMINATION
8. NMAINAC	JMTGAIN,	NUMBER JOB MAINTENANCE TOKENS ACQUIRED
9. NMAINLS	JMTLOST,	NUMBER JOB MAINTENANCE TOKENS LOST
10. NMAINT	JMTHELD,	NUMBER JOB MAINTENANCE TOKENS AT JOB LOSS
11. NPROAC(IPLAY,1)	CARGAIN1,	NUMBER FRONT PRODUCTION UNITS BY CHANCE
12. NPROAC(IPLAY,2)	CARGAIN2,	NUMBER REAR PRODUCTION UNITS BY CHANCE
13. NPROAC(IPLAY,3)	CARGAIN3,	NUMBER WHOLE PRODUCTION UNITS BY CHANCE
14. NPROLS(IPLAY,1)	CARLOSS1,	NUMBER FRONT PRODUCTION UNITS LOST
15. NPROLS(IPLAY,2)	CARLOSS2,	NUMBER REAR PRODUCTION UNITS LOST
16. NPROLS(IPLAY,3)	CARLOSS3,	NUMBER WHOLE PRODUCTION UNITS LOST
17. NPROC	CARHELD4,	NUMBER ALL PRODUCTION UNITS AT JOB LOSS
18. NTDEC	JOBDEC1,	NUMBER JOB DECISION EVENTS
19. NPOSDEC	JOBDEC2,	NUMBER NEGATIVE
20. NDECIS	JOBDEC3,	NUMBER JOB DECISION CARDS HELD AT JOB LOSS
21. NTPRO	PRODUCE1,	NUMBER ENTER PRODUCTION EVENTS
22. NTPRO	PRODUCE2,	NUMBER TIMES PRODUCTION LOOP ENTERED
23. NOPMAI	JOBMAIN1,	NUMBER ENTER JOB MAINTENANCE EVENTS
24. NTMAI	JOBMAIN2,	NUMBER TIMES MAINTENANCE LOOP ENTERED 25.
NMAINUS	JMTUSED,	NUMBER JOB MAINTENANCE TOKENS USED
26. NPROLP(IPLAY,1)	CARGAIN4,	NUMBER FRONT PRODUCTION UNITS BY LOOP
27. NPROLP(IPLAY,2)	CARGAIN5,	NUMBER REAR PRODUCTION UNITS BY LOOP
28. NPROLP(IPLAY,3)	CARGAIN6,	NUMBER WHOLE PRODUCTION UNITS BY LOOP
29. NPROUS(IPLAY,1)	CARUSED1,	NUMBER FRONT PRODUCTION UNITS TURNED IN
30. NPROUS(IPLAY,2)	CARUSED2,	NUMBER REAR PRODUCTION UNITS TURNED IN
31. NPROUS(IPLAY,3)	CARUSED3,	NUMBER WHOLE PRODUCTION UNITS TURNED IN
32. NJBOA	JLTOKEN2,	NUMBER JOB LOSS TOKENS FROM BOARD
33. NJBLL	JLTOKEN3,	NUMBER JOB LOSS TOKENS FROM LIFE CARDS
34. NJLRB	JLTOKEN4,	NUMBER JOB LOSS TOKENS TURNED IN
35.	JMTORG,	NUMBER JOB MAINTENANCE TOKENS INITIALLY
	NEWCYCLE,	COMPLETE PLUS PARTIAL CYCLES DURING GAME
	JLTOKEN5,	NUMBER JOB LOSS TOKENS FROM JD RISKS
	JDINDEX,	INDEX OF JOB DECISION QUALITY
	JMINDEX,	INDEX OF JOB MAINTENANCE DECISIONS
	PROINDEX,	INDEX OF PRODUCTION DECISIONS
	NETJME,	NET JOB MAINTENANCE EFFORT
	PROLOOP,	PRODUCTION THROUGH LOOP
	PROLUCK,	PRODUCTION DUE TO CHANGE
	PROLOSS,	LOST PRODUCTION DUE TO CHANCE

JOBLOSS TALLY VARIABLE NO. NAME	SPSS NAME	SPSS VARIABLE LABEL
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NETPROD,	NET PRODUCTION	
CARHELD1,	NUMBER FRONT PRODUCTION UNITS AT J LOSS	
CARHELD2,	NUMBER REAR PRODUCTION UNITS AT J LOSS	
CARHELD3,	NUMBER WHOLE PRODUCTION UNITS AT J LOSS	

DESCRIPTION OF INPUT VARIABLES

FORMAT (2013/1313)

IV(1) = Number of pay cards needed not be on probation - STANDARD VALUE (1).

IV(2) = Number of die being rolled, choices 1 or 2 - SV(2).

IV93) How to swap

(1) Swapping is omitted from the game - SV(1).

IV(4) = 1st Production Decision (see choices) - SV(1).

IV(5) = 2nd Production Decision (see choices) - SV(1).

IV(6) = 3rd Production Decision (see choices) - SV(1).

IV(7) = 4th Production Decision (see choices) - SV(1).

CHOICES

1) At every opportunity enter Production.

2) Enter production on a (50-50) Random Basis.

3) Never enter Production.

4) Enter Production only if Number of Production units is less than IV(22), IV(23), IV(24), IV(25), if IV(4), IV(5), IV(6), IV(7) respectively.

IV(8) = Chance of advancing on Life Card that gives that choices, i.e., (20 = 20%) SV(30).

IV(9) = Number of job loss tokens needed to accumulate to lose job - SV(3).

IV(10) = Number of pay cards a player receives for passing Pay Day - SV(1).

IV(11) = Number of weeks of pay needed to accumulate in order to give back (IV(12)) job loss tokens - SV(4).

IV(12) = Number of job loss tokens able to give back when player has accumulated IV(11) weeks of pay - SV(1).

IV(14) = Number of job loss tokens received for not turning in one complete production unit at pay day - SV(1).

Iv(15) = Criteria for taking a risk on a decision card (see decision choices) - SV(1).

DECISION CHOICES

- 1) Worker never takes a risk unless has to.
- 2) Worker takes a risk if number of job maintenance tokens equals 1, or has to.
- 3) Worker takes a risk if number of job maintenance tokens equals 1 or 2, or has to.
- 4) Worker takes a risk if Chance -- Loss of 2 turns -- Penalty 6.
- 5) Worker takes a risk if Chance -- Getting Life Card -- Penalty 7.
- 6) Worker takes a risk if Chance -- Loss of Single Production Card -- Penalty 5.
- 7) Worker takes a risk if Chance -- Loss of 2 Production Cards -- Penalty 4.
- 8) Worker takes a risk if Chance -- Loss of Complete Production Unit -- Penalty 3.
- 9) Worker takes a risk if Chance -- Getting 1 job loss token -- Penalty 2.
- 10) Worker takes a risk if Chance -- Getting fired -- Penalty 1.
- 11) Worker always takes a risk.
- 12) Worker takes a risk on a (50-50) Random Basis.

IV(16) = Number of production cards one receives for landing on a spot in the production loop - SV(1)

IV(17) = Number of production cards received for going through the production loop - SV(1)

IV(18) = Number of maintenance tokens one receives for landing on a spot in the maintenance loop - SV(1)

IV(19) = Number of maintenance tokens one receives for going through the maintenance loop - SV(1)

IV(20) = Number of maintenance tokens one gets when beginning a game - SV(3)

IV(21) = Number of rounds around the board are to be played - SV(100)

IV(22) - if IV(4) = 4 then set to number of production units needed in order to make false decision - SV(0)

IV(23) - if IV(5) = 4 then set to number of production units needed in order to make false decision - SV(0)

IV(24) - if IV(6) = 4 then set to number of production units needed in order to make false decision SV(0)

IV(25) - if IV(7) = 4 then set to number of production units needed in order to make false decision SV(0)

IV(26) - 1st Maintenance Decision (see choices) - SV(1)

IV(27) - 2nd Maintenance Decision (see choices) - SV(1)

IV(28) - 3rd Maintenance Decision (see choices) - SV(1)

IV(29) - 4th Maintenance Decision (see choices) - SV(1)

CHOICES

- 1) Enter Job Maintenance at every opportunity.
- 2) Enter Job Maintenance at a (50-50) Random Basis.
- 3) Never enter Job Maintenance.
- 4) Enter Job Maintenance only if number of maintenance units less than ((see IV(30) if IV(26), IV(31) if IV(27), IV(32) if IV(28), IV(33) if IV(29))

IV(30) - if IV(26) = 4 then set to number of Job Maintenance tokens needed in order to make a false decision.

IV(31) - if IV(27) = 4 then set to number of Job Maintenance tokens needed in order to make a false decision.

IV(32) - if IV(28) = 4 then set to number of Job Maintenance tokens needed in order to make a false decision.

IV(33) - if IV(29) = 4 then set to number of Job Maintenance tokens needed in order to make a false decision.

MAIN VARIABLES

ISPOT(NP) - Spot on board

I PROF(NP) - Production flag

MAINF(NP) - Maintenance flag

NPAYC(NP) - Number of Pay Cards

NJOBLT(NP) - Number of Job Loss Tokens

NMAINT(NP) - Number of Maintenance Tokens

NPROC(NP) - Number of Production Cards

KPROC(NP,40) - Kind of Production Cards

NDECIS(NP,10) - Number of Decision Cards in possession

KDECIS(NP) - Kind of Decision Cards in possession

JBLOST(NP) - Number of times Job lost
 NTARBT(NP) - Number of times around Board total
 NTARSL(NP) - Number of times around Board since last Job loss
 ISPOP(NP) - Spot in Production Circle
 ISPOM(NP) - Spot in Maintenance Circle
 MISS(NP) - Miss a Turn Flag
 IFPAY(NP) - Pay Flag
 NTONSP(NP),40) - Number of times landed on each spot
 NP - Number of Players this Game
 IPLAY - Which Player's Turn
 IFCH(NP) - Change in spot number flag due to move (Life Card, Decision Card, etc.)
 = 0, no change
 = 1, just particular player changed his spot
 = 2. all players changed their spot
 IN1 - Roll of 1st die
 IN2 - Roll of 2nd die
 IROLL - Sum of rolls for a player's turn
 NPROAV(NP,3) - Number of Production units acquired during the job
 NPROLS(NP,3) - Number of Production units lost during the job by chance and decision
 NMAINAC(NP) - Number of Maintenance tokens acquired during the job
 NMAINLS(NP) - Number of Maintenance units lost during the job
 NTDEC(NP) - Number of times worker has to make a decision during the job
 NPOSDEC(n) - Number of times worker took a chance
 NOPRO(NP) - Number of times worker has the opportunity to produce through loop
 NTPRO(NP) - Number of times worker elects to produce through loop

- NOPMAI(NP) - Number of times worker has an opportunity to improve himself by going through the maintenance loop
- NTMAI(NP) - Number of times worker elects to improve himself by going through the maintenance loop

VARIABLES IN SUBROUTINE CHOICE

- IDE - Parameter that indicates decision of whether to go through the maintenance or production loop.
- IDF - Method of decision of whether to go through the production or maintenance loop.
- IP - Deciding Production flag
- IM - Deciding Maintenance flag
- INO - If IDF is 4 this variable gives the maximum number of production or maintenance units for a positive decision.
- NV - Number of Production units player has.

LIFE CARDS

<u>NUMBER</u>	<u>DEFINITION</u>	<u>PENALTY</u>
1	Thinking about personal problems causes you to violate a safety rule.	Get one job loss token.
2	Your working hours cut.	Go back one day.
3	Quality of your work rises.	Gain two production cards.
4	Union wins new fringe benefits.	All workers get one pay card.
5	Plant shutdown.	All workers go back one day.
6	Your company starts an incentive program.	Gain two production cards.
7	You learned new job skills.	Advance 3 hours if you choose.
8	Car breaks down on the way to work	Go back 3 hours.
9	Your company begins a Job Enrichment Program.	Gain one production card.
10	New safety plan started by your company.	Advance 3 hours (if you choose.
11	Your supervisor is helpful.	Advance to next working day.
12	You left family problems at home.	Gain one production card.
13	Legal problems cause you to miss work.	Worker on right does your work and gets one production card.
14	Your job is not secure.	Get one job loss token.
15	You are hurt due to unsafe working conditions.	Off work. Lose one roll.
16	The quality of your work slips because of poor supervision.	Worker on your right must do a job over for you and gets one production card.
17	You are unfairly disciplined.	Get one job loss token.
18	Back wages due you.	Get one week's pay.
19	Problems with your spouse cause you to do poor work.	Lose one production card.

<u>NUMBER</u>	<u>DEFINITION</u>	<u>PENALTY</u>
20	Not enough time to do your job.	Worker on you right helps you out and gets one production card.
21	Your safety idea wins first prize.	Advance to Pay Day. Get one week's pay.
22	Your job is very dull.	Lose one production card.
23	You violate a company rule your supervisor failed to tell you about.	Get one job loss token.
24	Pay raise.	Get one pay card.
25	No chance to talk over problems with employer.	Lose one job maintenance token.
26	You brought home problems to the job.	Lose one roll.
27	Employer shows concern for your problems.	Advance to next working day.
28	No chance for personal improvement.	Lose one job maintenance token.
29	You lose your cool because of poor working conditions.	Go back 3 hours.
30	Your supervisor asks your opinion about a production problem.	Roll again.
31	You are called back from a layoff.	Roll again.
32	Money problems cause you to miss work.	Lose one job maintenance token.
33	You are laid off temporarily.	Go back to nearest Decision space.
34	No chance for promotion.	Go back to nearest Decision space.
35	Your supervisor discriminates against you.	Worker on your right receives a promotion and gets one pay card.
36	Employer shows no concern for your personal problems.	Lose one job maintenance token.

DECISION CARDS

<u>NUMBER</u>	<u>DEFINITION</u>	<u>PENALTY RANK</u>
1	Will you avoid being involved in employee theft	1
2	Will you avoid using drugs or alcohol on the job?	1
3	Will you avoid being a dishonest employee?	1
4	Will you avoid irresponsibility on the job?	2
5	Will you avoid being absent from work?	2
6	Will you avoid being absent from work?	2
7	Will you avoid being tardy to work?	2
8	Will you avoid dissatisfaction in your job?	2
9	Will you avoid dissatisfaction in your job?	2
10	Will you avoid being absent from work?	2
11	Will you avoid abusing company equipment?	2
12	Will you avoid dissatisfaction in your job?	2
13	Will you avoid violating company policy?	2
14	Will you avoid violating safety rules?	2
15	Will you avoid being tardy to work?	2
16	Will you avoid being unable to accept constructive criticism?	3
17	Will you avoid failure to complete assigned tasks?	3
18	Will you avoid being a poorly motivated worker?	3
19	Will you avoid failure to meet work deadlines?	3
20	Will you avoid being a poorly motivated worker?	3
21	Will you avoid failure to meet production standards?	4
22	Will you avoid being a worker who does not grow on the job?	4

<u>NUMBER</u>	<u>DEFINITION</u>	<u>PENALTY RANK</u>
23	Will you avoid being unconscientious on the job?	4
24	Will you avoid being a worker with low self-confidence?	4
25	Will you avoid being a worker who does not grow on the job?	4
26	Will you avoid being unable to work independently?	5
27	Will you avoid poor communications with your supervisor?	5
28	Will you avoid poor communications with your fellow workers?	5
29	Will you avoid poor communications with your supervisor?	5
30	Will you avoid losing interest in your job?	5
31	Will you avoid being a constant complainer?	6
32	Will you avoid being an employee who does not get along with fellow workers?	6
33	Will you avoid being a constaint complainer?	6
34	Will you avoid doing things that lead to poor health?	7
35	Will you avoid an inability to follow directions?	7
36	Will you avoid having insufficient technical job skills?	7

PENALTY RANKS

<u>NUMBER</u>	<u>TO AVOID RISK</u>	<u>RISK</u>
1	Then use three Job Maintenance tokens.	Then take a chance on being FIRED.
2	Then use two Job Maintenance tokens.	Then take a chance on getting one job loss token.
3	Then use one Job Maintenance token.	Then take a chance on losing a complete unit of production.
4	Then use one Job Maintenance token.	Then take a chance on losing two Production Cards.
5	Then use one Job Maintenance token.	Then take a chance on losing a single Production Card.
6	Then use one Job Maintenance token.	Then take a chance on losing two rolls.
7	Then use on Job Maintenance token.	Then take a chance on getting one Life Card.

APPENDIX G

DESCRIPTION OF THE STRATEGIES USED IN THE COMPUTER
SIMULATION OF THE JOB MAINTENANCE GAME.

DESCRIPTION OF THE STRATEGIES USED IN THE COMPUTER
SIMULATION OF THE JOB MAINTENANCE GAME

INPUT
VARIABLE (IV)
NUMBER

STRATEGY AND DESCRIPTION

MAXIMUM STRATEGY -

- | | |
|---------|---|
| IV(4-7) | 1. All input variables (IV) set to standard value representing a low risk strategy (see Appendix F for a complete listing of input variables and possible values) |
|---------|---|

RANDOM STRATEGY

- | | |
|-----------|--|
| IV(4-7) | 1. Enter production set on random basis (2). |
| IV(8) | 2. Chance of advancing on Life Card with that choice set to RANDOM (50). |
| IV(15) | 3. Criteria for taking risks with Decision Cards set to RANDOM (12). |
| IV(26-29) | 4. Enter Job Maintenance set on random basis (2). |
| | 5. All other input variables set to Standard Value. |

MINIMUM STRATEGY

- | | |
|-----------|--|
| IV(4-7) | 1. Enter production set to Never Enter (3). |
| IV(15) | 2. Criteria for taking risks with Decision Cards set to always take a risk (11). |
| IV(26-29) | 3. Enter Job Maintenance set to Never Enter (3). |
| | 4. All other input variables set to Standard Value. |

OPTIMUM STRATEGY

- | | |
|-----------|---|
| IV(4-7) | 1. Enter production if number of Production Units held is less than four (4). |
| IV(8) | 2. Chance of advancing on Life Card with that choice set to random (50). |
| IV(29-29) | 3. Enter Job Maintenance if number of Job Maintenance Tokens is less than 6. |
| | 4. All other input variables set to Standard Value. |

INPUT
VARIABLE (IV)
NUMBER

STRATEGY AND DESCRIPTION

MAXIMUM STRATEGY WITH ONE DIE

- | | |
|--------|---|
| IV(2) | 1. Number of Die being rolled set to one (1). |
| IV(21) | 2. Number board cycles to be played set to 50. |
| | 3. All other input variables set to Standard Value. |

MAXIMUM STRATEGY WITH PRODUCTION-MAINTENANCE
CHANGES

- | | |
|--------|---|
| IV(16) | 1. Number of Production Cards for landing on a spot in the Production Loop set to two (2). |
| IV(18) | 2. Number of Job Maintenance Tokens for landing on a spot in the Job Maintenance Loop set to two (2). |
| IV(20) | 3. Number of Job Maintenance tokens at beginning of game set to four (4). |
| | 4. All other input variables set to Standard Value. |

MAXIMUM STRATEGY WITH ENTER LOOP CHANGES

- | | |
|--------|--|
| IV(17) | 1. Number of Production Cards received for Entering Production Loop set at two (2). |
| IV(19) | 2. Number of Job Maintenance Tokens received for entering Job Maintenance Loop set at two (2). |
| | 3. All other input variables set to Standard Value. |

APPENDIX H

TABLES OF DATA RELATED TO EMPLOYEE DECISIONMAKING, EMPLOYEE
PRODUCTIVITY, EMPLOYEE MOTIVATION, ANND JOB MAINTENANCE
OUTCOMES FOR FINDING CONCERNING THE
NATURE OF THE JOB MAINTENANCE GAME

TABLE 5

COMPARISON OF THE RESULTS OF FOUR STRATEGIES FOR TESTING THE THEORETICAL LIMITS OF THE COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME FOR VARIABLES RELATED TO EMPLOYEE DECISION MAKING

VARIABLES	Computer Simulation Results by Strategy ^a			
	MAXIMUM	OPTIMUM	RANDOM	MINIMUM
Number of job related decisions required ^b	556	535	531	527
Number of positive decisions made ^c	352	333	209	0
Number of negative decisions made ^d	204	202	322	527
Number of job loss tokens awarded as penalties ^e	52	53	90	88

^aFor an explanation of the nature of the strategies see Appendix G.

^bRepresented in the game by the number of times player lands on a job decision space and is required to take a job decision card and make a decision.

^cRepresented in the game by the number of times player uses job maintenance tokens to make positive job decisions.

^dRepresented in the game by the number of times player does not use job maintenance tokens to make positive job decisions.

^eRepresented in the game by the number of times player made negative decisions and received a penalty of a job loss token for being "caught."

TABLE 6

COMPARISON OF THE RESULTS OF FOUR STRATEGIES FOR TESTING THE THEORETICAL
LIMITS OF THE COMPUTER SIMULATION OF THE JOB MAINTENANCE
GAME FOR VARIABLES RELATED TO EMPLOYEE PRODUCTIVITY

VARIABLES	Computer Simulation Results by Strategy ^a			
	MAXIMUM	OPTIMUM	RANDOM	MINIMUM
Number of opportunities to enter production loop	226	250	222	200
Number of times production loop entered	226	244	104	0
Amount of production from loop	184.0	185.5	83.5	0
Amount of chance production	152.5	158.0	149.0	140.0
Amount of lost production	30.0	31.0	38.5	43.5
Amount of production turned in	215.0	231.0	149.0	54.0
Net productivity	306.5	312.5	194.0	96.5
Amount of needed production	385.0	396.0	395.0	374.0
Amount of unmet production	170.0	165.0	246.0	320.0
Amount of surplus production	91.5	81.5	45.0	42.5

^aFor an explanation of the nature of the strategies see Appendix G.

TABLE 7

COMPARISON OF THE RESULTS OF FOUR STRATEGIES FOR TESTING THE THEORETICAL
LIMITS OF THE COMPUTER SIMULATION OF THE JOB MAINTENANCE
GAME FOR VARIABLES RELATED TO EMPLOYEE MOTIVATION

VARIABLES	Computer Simulation Results by Strategy ^a			
	MAXIMUM	OPTIMUM	RANDOM	MINIMUM
Number of opportunities to enter job maintenance loop	310	270	299	204
Number of times job maintenance loop entered	310	262	152	0
Number of job maintenance tokens gained from loop	349	298	170	0
Number of job maintenance tokens initially	279	276	387	483
Number of job maintenance tokens lost by chance	28	33	31	30
Number of job maintenance tokens used on decisions	479	451	284	0
Net number of job maintenance tokens gained	600	541	526	453
Number surplus job maintenance tokens held	121	90	242	453

^aFor an explanation of the nature of the strategies see Appendix G.

TABLE 8

COMPARISON OF THE RESULTS OF FOUR STRATEGIES FOR TESTING THE THEORETICAL
LIMITS OF THE COMPUTER SIMULATION OF THE JOB MAINTENANCE
GAME FOR VARIABLES RELATED TO JOB MAINTENANCE OUTCOMES

VARIABLES	Computer Simulation Results by Strategy ^a			
	MAXIMUM	OPTIMUM	RANDOM	MINIMUM
Number of job loss tokens from board ^b	57	54	49	50
Number of job loss tokens from life cards	40	39	37	31
Number of job loss tokens from decision risks	52	53	90	88
Number of job loss tokens from low productivity ^c	170	165	246	320
Total number of job loss tokens re- ceived	319	311	422	489
Total number of job loss tokens return- ed by chance ^d	66	77	78	21
Total number of net job loss tokens	253	234	344	468

^aFor an explanation of the nature of the strategies see Appendix G.

^bNumber of job loss tokens gained from boss unfair space.

^cNumber of job loss tokens gained for failing to turn in one produc-
tion unit at payday.

^dNumber of job loss tokens turned back in by chance.

TABLE 9

COMPARISON OF THE RESULTS OF THREE STRATEGIES DESIGNED TO REDUCE THE
ROLE OF PRODUCTIVITY IN THE COMPUTER SIMULATION OF THE JOB MAINTENANCE
GAME FOR VARIABLES RELATED TO EMPLOYEE DECISIONMAKING

VARIABLES	Computer Simulation Results by Strategy ^a		
	MAXIMUM (1D)	MAXIMUM (PMC)	MAXIMUM (ELC)
Number of job related decisions required ^b	622	550	570
Number of positive decisions made ^c	466	394	453
Number of negative decisions made ^d	156	156	117
Number of job loss tokens awarded as penalties ^e	27	42	30

^aFor an explanation of the nature of the strategies see Appendix G.

^bRepresented in the game by the number of times player lands on a job decision space and is required to take a job decision card and make a decision.

^cRepresented in the game by the number of times player uses job maintenance tokens to make positive job decisions.

^dRepresented in the game by the number of times player does not use job maintenance tokens to make positive job decisions.

^eRepresented in the game by the number of times player made negative decisions and received a penalty of a job loss token for being "caught."

TABLE 10

COMPARISON OF THE RESULTS OF THREE STRATEGIES DESIGNED TO REDUCE THE
ROLE OF PRODUCTIVITY IN THE COMPUTER SIMULATION OF THE JOB MAINTENANCE
GAME FOR VARIABLES RELATED TO EMPLOYEE PRODUCTIVITY

VARIABLES	Computer Simulation Results by Strategy ^a		
	MAXIMUM (1D)	MAXIMUM (PMC)	MAXIMUM (ELC)
Number of opportunities to enter production loop	399	239	222
Number of times production loop entered	399	239	222
Amount of production from loop	479.0	220.5	304
Amount of chance production	182.5	140.5	159.5
Amount of lost production	21.5	24.5	26.0
Amount of production turned in	168.0	248.0	313.0
Net productivity	640.0	336.5	437.5
Amount of needed production	198.0	386.0	398.0
Amount of unmet production	30.0	138.0	85.0
Amount of surplus production	472.0	88.5	124.5

^aFor an explanation of the nature of the strategies see Appendix G.

TABLE 11

COMPARISON OF THE RESULTS OF THREE STRATEGIES DESIGNED TO REDUCE THE
ROLE OF PRODUCTIVITY IN THE COMPUTER SIMULATION OF THE JOB MAINTENANCE
GAME FOR VARIABLES RELATED TO EMPLOYEE MOTIVATION

VARIABLES	Computer Simulation Results by Strategy ^a		
	MAXIMUM (1D)	MAXIMUM (PMC)	MAXIMUM (ELC)
Number of opportunities to enter job maintenance loop	394	328	342
Number of times job maintenance loop entered	394	328	342
Number of job maintenance tokens gained from loop	693	440	729
Number of job maintenance tokens initially	186	312	171
Number of job maintenance tokens lost by chance	39	33	32
Number of job maintenance tokens used on decisions	656	559	656
Net number of job maintenance tokens gained	840	719	868
Number surplus job maintenance tokens held	184	160	212

^aFor an explanation of the nature of the strategies see Appendix G.

TABLE 12

COMPARISON OF THE RESULTS OF THREE STRATEGIES DESIGNED TO REDUCE THE
ROLE OF PRODUCTIVITY IN THE COMPUTER SIMULATION OF THE JOB MAINTENANCE
GAME FOR VARIABLES RELATED TO JOB MAINTENANCE OUTCOMES

VARIABLES	Computer Simulation Results by Strategy ^a		
	MAXIMUM (1D)	MAXIMUM (PMC)	MAXIMUM (ELC)
Number of job loss tokens from board ^b	77	43	51
Number of job loss tokens from life cards	48	39	40
Number of job loss tokens from decision risks	27	42	30
Number of job loss tokens from low productivity ^c	30	138	85
Total number of job loss tokens re- ceived	182	262	206
Total number of job loss tokens turned in ^d	56	73	75
Total number of net job loss tokens	126	189	131

^aFor an explanation of the nature of the strategies see Appendix G.

^bNumber of job loss tokens gained from boss unfair space.

^cNumber of job loss tokens gained for failing to turn in one production unit at payday.

^dNumber of job loss tokens turned back in by chance.

TABLE 14

A COMPARISON OF THE RESULTS OF A COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME WITH TOTAL PARTICIPANTS FIRST PLAYING OF THE JOB MAINTENANCE GAME FOR SELECTED VARIABLES RELATED TO EMPLOYEE DECISION MAKING

VARIABLES	COMPUTER SIMULATION UNDER MAXIMUM STRATEGY N = 408 BOARD CYCLES ^a		FIRST PLAYING OF GAME FOR TOTAL PARTICIPANTS N = 279 BOARD CYCLES ^a	
	TOTAL NUMBER	NUMBER PER CYCLE	TOTAL NUMBER	NUMBER PER CYCLE
Number of job related decisions required ^b	556	1.36	339	1.22
Number of positive decisions made ^c	352	.86	195	.70
Number of negative decisions made ^d	204	.50	144	.52
Number of job loss tokens awarded as penalties ^e	52	.13	24	.09

^aNumber of board cycles includes both complete and partial cycles.

^bRepresented in the game by the number of times player lands on a job decision space and is required to take a job decision card and make a decision.

^cRepresented in the game by the number of times player uses job maintenance tokens to make positive job decisions.

^dRepresented in the game by the number of times player does not use job maintenance tokens to make positive job decisions.

^eRepresented in the game by the number of times player made negative decisions and received a penalty of a job loss token for being "caught."

TABLE 15

A COMPARISON OF THE RESULTS OF A COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME WITH TOTAL PARTICIPANTS FIRST PLAYING OF THE JOB MAINTENANCE GAME FOR SELECTED VARIABLES RELATED TO EMPLOYEE PRODUCTIVITY

VARIABLES	COMPUTER SIMULATION UNDER MAXIMUM STRATEGY N = 408 BOARD CYCLES ^a		FIRST PLAYING OF GAME FOR TOTAL PARTICIPANTS N = 279 BOARD CYCLES ^a	
	TOTAL NUMBER	NUMBER PER CYCLE	TOTAL NUMBER	NUMBER PER CYCLE
Number of opportunities to enter production loop	226	.55	159	.57
Number of times production loop entered	226	.55	146	.52
Amount of production from loop	184.0	.45	127.5	.46
Amount of chance production	152.5	.37	171.0	.61
Amount of lost production	30.5	.07	20.5	.07
Amount of production turned in ^b	215.0	.53 (.56)	162.0	.58 (.66)
Net productivity	306.5	.75	278	.996

^aNumber of board cycles includes both complete and partial cycles.

^bNumbers in parentheses are values based on completed cycles only which were 385 for the maximum strategy and 244 for the participant play.

TABLE 16

A COMPARISON OF THE RESULTS OF A COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME WITH TOTAL PARTICIPANTS' FIRST PLAYING OF THE JOB MAINTENANCE GAME FOR SELECTED VARIABLES RELATED TO EMPLOYEE MOTIVATION

VARIABLES	COMPUTER SIMULATION UNDER MAXIMUM STRATEGY N = 408 BOARD CYCLES ^a		FIRST PLAYING OF GAME FOR TOTAL PARTICIPANTS N = 279 BOARD CYCLES ^a	
	TOTAL NUMBER	NUMBER PER CYCLE	TOTAL NUMBER	NUMBER PER CYCLE
Number of opportunities to enter job maintenance loop	310	.76	163	.58
Number of times job maintenance loop entered	310	.76	143	.51
Number of job maintenance tokens gained from loop	349	.86	185	.66
Number of job maintenance tokens initially	279	.68	276	.99
Number of job maintenance tokens lost by chance	28	.07	40	.14
Number of job maintenance tokens used on decisions	479	1.17	259	.93
Net number of job maintenance tokens gained	600	1.47	421	1.51

^aNumber of board cycles includes both complete and partial cycles.

TABLE 17

A COMPARISON OF THE RESULTS OF A COMPUTER SIMULATION OF THE JOB MAINTENANCE GAME WITH TOTAL PARTICIPANTS' FIRST PLAYING OF THE JOB MAINTENANCE GAME FOR SELECTED VARIABLES RELATED TO JOB MAINTENANCE OUTCOMES

VARIABLES	COMPUTER SIMULATION UNDER MAXIMUM STRATEGY N = 408 BOARD CYCLES ^a		FIRST PLAYING OF GAME FOR TOTAL PARTICIPANTS N = 279 BOARD CYCLES ^a	
	TOTAL NUMBER	NUMBER PER CYCLE	TOTAL NUMBER	NUMBER PER CYCLE
Number of job loss tokens from board ^b	57	.14	43	.15
Number of job loss tokens from life cards	40	.10	19	.07
Number of job loss tokens from decision risks	52	.13	24	.09
Number of job loss tokens from life productivity ^c	170	.42	82	.29
Total number of job loss tokens re- ceived	319	.78	168	.60
Total number of job loss tokens re- turned by chance ^d	66	.16	49	.18
Total number of net job loss tokens	253	.62	119	.43

^aNumber of board cycles includes both completed and partial cycles.

^bNumber of job loss tokens gained from boss unfair space.

^cNumber of job loss tokens gained for failing to turn in one production unit at payday.

^dNumber of job loss tokens turned back in by chance.

APPENDIX I

TABLES OF DATA RELATED TO EMPLOYEE DECISIONMAKING, EMPLOYEE
PRODUCTIVITY, EMPLOYEE MOTIVATION, AND JOB MAINTENANCE
OUTCOMES FOR FINDINGS RELATED TO PARTICIPANTS'
SECOND PLAYING OF THE JOB MAINTENANCE GAME

TABLE 32

A COMPARISON OF THE RESULTS OF PARTICIPANTS' SECOND PLAYING OF
THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY
AND BY TOTAL GROUP FOR SELECTED VARIABLES RELATED
TO EMPLOYEE DECISIONMAKING

VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=142 BOARD CYCLES ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=158 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number of job related deci- sions required ^b	169	1.19	193	1.22
Number of posi- tive decisions made ^c	107	.75	113	.72
Number of nega- tive decisions made ^d	62	.44	80	.51
Number of nega- tive decisions resulting in penalties ^e	43	.30	57	.36
Number of job loss tokens awarded as penalties ^f	10	.07	15	.09

^aNumber of board cycles includes both complete and partial cycles.

^bRepresented in the game by the number of times player lands on a job decision space and is required to take a job decision card and make a decision.

^cRepresented in the game by the number of times player uses job maintenance tokens to make positive job decisions.

^dRepresented in the game by the number of times player does not use job maintenance tokens to make positive job decisions.

^eRepresented in the game by the number of times player made negative decisions and received any penalties for being "caught."

^fRepresented in the game by the number of times player made negative decisions and received a penalty of a job loss token for being "caught."

TABLE 33

A COMPARISON OF THE RESULTS OF PARTICIPANTS' SECOND PLAYING OF
THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY
AND BY TOTAL GROUP FOR SELECTED VARIABLES
RELATED TO EMPLOYEE PRODUCTIVITY

VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=142 BOARD CYCLES ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=158 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number of oppor- tunities to enter produc- tion loop	58	.41	81	.51
Number of times production loop entered	58	.41	79	.50
Amount of pro- duction from loop	48.0	.34	72.0	.46
Amount of chance production	87.0	.61	94.5	.60
Amount of lost production	9.0	.06	12.5	.08
Amount of production turned in	82.0	.58	98.0	.62
Net productivity	126.0	.89	154.0	.97
Amount of needed pro- duction	116.0	.82	139.0	.88
Amount of un- met production	34.0	.24	41.0	.26
Amount of sur- plus production	44.0	.31	56.0	.35

^aNumber of board cycles includes both complete and partial cycles.

TABLE 34

A COMPARISON OF THE RESULTS OF PARTICIPANTS' SECOND PLAYING OF
THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY
AND BY TOTAL GROUP FOR SELECTED VARIABLES
RELATED TO EMPLOYEE MOTIVATION

VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=142 BOARD CYCLES ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=158 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number of oppor- tunities to enter job maintenance loop	93	.65	101	.64
Number of times job maintenance loop entered	85	.60	87	.55
Number of job maintenance tokens gained from loop	101	.71	111	.70
Number of job maintenance tokens initially	144	1.01	162	1.03
Number of job maintenance tokens lost by chance	16	.14	17	.11
Number of job maintenance tokens used on decisions	138	.97	160	1.01
Net number of job maintenance tokens gained	229	1.61	256	1.62

^aNumber of board cycles includes both complete and partial cycles.

TABLE 35

A COMPARISON OF THE RESULTS OF PARTICIPANTS' FIRST PLAYING OF
THE JOB MAINTENANCE GAME BY EMPLOYMENT HISTORY CATEGORY
AND BY TOTAL GROUP FOR SELECTED VARIABLES
RELATED JOB MAINTENANCE OUTCOMES

VARIABLE	GROUP I WITH RELATIVELY STABLE EMPLOY- MENT RECORDS N=142 BOARD CYCLES ^a		GROUP II WITH RELATIVELY UNSTABLE EMPLOY- MENT RECORDS N=158 BOARD CYCLES ^a	
	NUMBER	MEAN PER CYCLE	NUMBER	MEAN PER CYCLE
Number of job loss tokens from board	34	.24	32	.20
Number job loss tokens from life cards	8	.06	8	.05
Number of job loss tokens from decision risks	10	.07	15	.09
Number of job loss tokens from life productivity	34	.24	41	.26
Total number of job loss tokens received	86	.61	96	.61
Total number of job loss tokens returned by chance	23	.16	31	.20
Total number of net job loss tokens	63	.44	65	.41

^aNumber of board cycles includes both complete and partial cycles.

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