1-1-1985

# The relationship of psychosocial variables to perceived levels of job satisfaction among high tech engineers.

Richard A. Riesenberg
*University of Massachusetts Amherst*

THE RELATIONSHIP OF PSYCHOSOCIAL VARIABLES TO PERCEIVED

LEVELS OF JOB SATISFACTION AMONG HIGH TECH ENGINEERS

A Dissertation Presented

By

RICHARD ALLAN RIESENBERG

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of
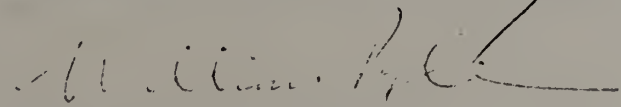
DOCTOR OF EDUCATION

May 1985

Education

THE RELATIONSHIP OF PSYCHOSOCIAL VARIABLES TO PERCEIVED

LEVELS OF JOB SATISFACTION AMONG HIGH TECH ENGINEERS


A Dissertation Presented
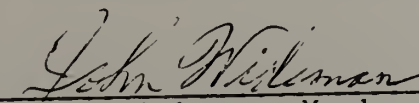
By

RICHARD ALLAN RIESENBERG


Approved as to style and content by:

Dr. Allen Ivey, Chairperson of Committee

Dr. William Pyle, Member

Dr. John Wideman, Member

Mario Fantini, Dean
School of Education


iii

ABSTRACT

THE RELATIONSHIP OF PSYCHOSOCIAL VARIABLES TO PERCEIVED

LEVELS OF JOB SATISFACTION AMONG HIGH TECH ENGINEERS

May, 1985

Richard Riesenberg, B.A., Harvard University

M.S., Simmons College, Ed.D., University of Massachusetts

Directed by: Professor Allen Ivey


The purpose of this study was to identify what job
dimensions are the most important to software development
engineers and to what extent they perceive opportunities
to attain such job dimensions.  The effect of demographic
and other special factors on perceived levels of job
satisfaction was also assessed.  The computerized question-
naire developed for this study had a reliability of .85 and
more than 69% of the population completed it.

The results revealed that overall the participants
ranked interesting work as the most important job dimen-
sion.  They perceived the greatest opportunities to have
satisfying working relationships, to do interesting work
and to have job security.  Higher levels of stress were
significantly correlated with reports of greater oppor-
tunities to experience intrinsic job dimensions.  Intent
to transfer or quit significantly correlated with reports
of fewer opportunities to attain extrinsic job dimensions.

# TABLE OF CONTENTS

## LIST OF TABLES

## ILLUSTRATIONS

Figure

# C H A P T E R   I

## INTRODUCTION

### Problem

The purpose of this study is to identify the factors
that most impact the perceived levels of job satisfaction
among software product development engineers.  While there
is an extensive amount of literature on job satisfaction,
the research thus far does not supply what we need to know
in order to facilitate the job satisfaction of this popula-
tion.  The paucity of research on this specific group is
not the only reason for conducting a further investigation
of this topic.  The decision to study such a population is
a result of the present and forcasted needs for these high-
in-demand, low-in-supply professionals who are strategic to
the success of high technology organizations.

In 1982, the Hay Associates completed a survey of 14
high technology companies to identify the major concerns of
those companies' line executives and senior human resource
management professionals.  Based on the consistency of
their results, the Hay Associates concluded that the sur-
vey's findings were believed to be applicable to the high
technology industry in general.  The authors stated that
high technology companies

. . . produce a multitude of different products
and services [and] share a common characteristic:
fast growth in a high technology field. . . . They
are driven by technological innovation not market
demand.  As far as technical professionals are con-
cerned, the demand far exceeds the supply and the
desire to retain individuals with critical talent
is a necessity not merely an espoused goal.  (Hay
Associates, 1982, p. 2)

The Hay Associates also examined the employment pat-

tens of this category of engineer.  As such engineers are

well aware of the shortage of trained professionals in

their field (McLean, 1984), they request and often receive

especially lucrative compensation and benefits packages.

Their "inadherence to professional ideals and standards is

a quality which makes them excellent producers and yet

causes problems of organizational commitment" (Hay Asso-

ciates, 1982, p. 3).

Currently, 21% of the high technology industry in the

United States is located in the New England area (Pollack,

1983).  Within this region, the industry tends to be geo-

graphically clustered.  Thus, for the majority of these

professionals, to change employers does not necessarily

connote a need to geographically relocate.

A report compiled by the Massachusetts High Technolo-

gy Council (1982) forcasted that the near future (1982 -

1985) employment needs for high technology professionals

will increase by 28% in the Massachusetts area.  This

equals a 15% annual compounded rate of growth.  The annual

rate of growth will be potentially hampered

> . . . by some estimates [that] 50,000 engineers
> leave the profession each year, almost as many as
> the 67,000 who received bachelor's degrees in engi-
> neering . . . the last year. [Simultaneously,]
> the half-life of an engineer is about five years.
> It is thought that many engineers spend much of
> their day doing drawings, photocopying or other
> work that could be done by others with less train-
> ing, freeing the engineers for more efficient use
> of their time. (Pollack, 1983, pp. 12, 14-15)

The organization participating in this study is lo-
cated near the Massachusetts - New Hampshire border. As
this Fortune 100 company is situated within a 50-mile
radius of the City of Boston, and even nearer to Routes 128
and 495 (where there is a significant concentration of high
technology industries), the participating organization is
actively involved in the recruitment and maintenance of an
efficient and effective workforce of high technology engi-
neers. For reasons of confidentiality, further identifying
information regarding the location, size and financial sit-
uation of the participating organization will not be inclu-
ded in this presentation.


## Purpose


The purpose of this localized study is to identify
the factors that most impact the perceived levels of job
satisfaction among software product development engineers
at the participating organization. The objective of this

study is to provide an expanded base of knowledge that pertains to these professionals. This type of information should prove useful to professionals who are confronted with maintaining an effective and efficient workforce of high technology engineers, especially in the areas of employee compensation, benefits, recruitment and retention. Furthermore, the study provides information that will assist in strategic planning efforts in these areas.

## Conceptual Framework

The following study is theoretically based on concepts from several theories that pertain to job satisfaction. In terms of the causal process of the job satisfaction phenomenon, this conceptual framework is based on Locke's (1976) discrepancy theory of job satisfaction. Succinctly, Locke reported that "job satisfaction and dissatisfaction are a function of the perceived relationship between what one wants from one's job and what one perceives it as offering" (p. 316). He proposed that job satisfaction or dissatisfaction is a product of an emotional value-percept discrepancy, plus its importance to the individual. More precisely,

> Every emotional response reflects a dual value
> judgement: the discrepancy (or relation) between
> what the individual wants . . . and what he per-
> ceives himself as getting, and the importance of

what is wanted.  (Locke, 1976, p. 1304)

The particular employee values that are focused on in this study are drawn from Maslow's (1954) need-hierarchy theory, the motivation-hygiene theory (Herzberg, Mausner, & Snyderman, 1959), Mumford's (1972) discrepancy model and from discussions with human resource professionals involved in the high technology industry.  A more detailed discussion of these theories follows in Chapter II, and the conceptual framework is presented in Chapter III.

Based on the above theoretical considerations, the literature pertaining to employee satisfaction, and interviews with professionals who work with the population under study, a questionnaire has been developed by this researcher.  This instrument was designed to: (1) have the respondents rank order what aspects of their work were the most important to them; and (2) identify to what extent they perceived opportunities to gain such valued experiences at work.  The rank ordering on the questionnaire is composed of the following eleven job dimensions:

1.  Building winning products

2.  Good pay

3.  Interesting work

4.  Job security

5.  Original work

6.  Opportunities for state-of-the-art

training in engineering

7.  Who one works with

8.  Opportunities for promotion

9.  Having the authority to get a job done

10. Knowledge of management's goals
    and objectives

11. Having enough help, equipment and infor-
    mation to get the job done

The rationale for the inclusion of these specific di-
mensions is presented in Chapter III.  Further questions
are included to ascertain the possible influence of demo-
graphic and other variables on the reported levels of job
satisfaction among the software product development engi-
neers who participated in this study.  The demographic and
special factors included in this study to account for pos-
sible individual differences in job satisfaction among the
participants were:

Demographic Factors

-age                            -level of education

-sex                            -level of pay

-marital status                 -length of service

-number of children            -last promotion

-job referral source            -employment status of
                                 spouse

Special Factors

-level of burnout               -intent to transfer

-level of stress          -hobbies

-intent to quit           -use of skills, abilities
                           and knowledge


## Premise and Hypotheses


The general premise of this dissertation is that it is possible to design an instrument specifically to measure job satisfaction of software product development engineers in a specific organization, and that these employees will have distinctive patterns of satisfaction. Underlying this general premise are the following specific hypotheses:

1. Depending on the demographic and special factors studied, there will be no significant differences in the software product development engineers' perceived extents of opportunity to attain the 11 job dimensions associated with job satisfaction.

2. Software product development engineers, due to the high demand and strategic need for their skills, and the nature of the work environment at the participating organization, will perceive the greatest opportunities to attain the following job dimensions: "good pay;" "having enough authority to get a job done;" and "who one works with."

3. The participating engineers will perceive the least opportunities to: "build winning products;" do "original work;" and gain "state-of-the-art training in engineering."

4. Software product development engineers, being high-in-demand and low-in-supply in the pioneering industry of computer technology, will most highly value job related issues concerning opportunities to: "build winning products;" do "original work;" and gain "state-of-the-art

training in engineering."

5. Software product development engineers, due to the design of their jobs and the high demand for their skills, will least value: "job security;" "having enough authority to get a job done;" and "knowledge of management's goals and objectives."

6. Depending on the demographic and special factors studied, participants will report no significant differences in their rankings of the 11 dimensions associated with job satisfaction.

## Overview of Procedures

The questionnaire was distributed to the 151 software product development engineers employed by the participating organization. While these engineers are not domiciled in the same building, all work within a 10-mile radius of each other. They do share primary equipment resources and are managed by the same executive management team. The participants accessed the questionnaire via their individual computer terminals by using an identical log-on procedure that was developed to maintain confidentiality.

A computerized questionnaire was developed in response to the participants' familiarity with this medium. The primary rationale for using such a state-of-the-art instrument was that where other populations might be more comfortable using a paper and pencil to write a letter or complete a questionnaire, the participants in this study do

these same tasks via their computer terminals. Further-
more, the participating organization's managers strongly
believed that the use of a computerized questionnaire would
enhance the engineers' interest in completing such a task.
A more detailed discussion of the methodology will be pre-
sented in Chapter IV of this report.

## Limitations

The findings of this study are statistically relevant
only to the software product development engineers employed
at the participating organization. Whether the forthcoming
findings would be consistent with those of other studies of
high technology or other professionals is not known. Simi-
larly, how the findings of this localized study would com-
pare to similar studies at other software research and de-
velopment divisions of the same organization is not known.
The reliability and validity of the questionnaire are
limited in that the questionnaire was only tested in the
present study.

## Organization of the Dissertation

This dissertation is composed of 6 chapters. Chapter
I is the introduction to the dissertation. The review of

the literature is presented in Chapter II. Chapter III is
the conceptual framework that was developed and then used
as the basis for this study. Chapter IV is a description
of the method that was used to obtain the findings that are
discussed in Chapter V. The dissertation ends with Chapter
VI, which is a succinct review of the earlier chapters and
the pertinent conclusions that can be drawn based on this
study.

# C H A P T E R  I I
## REVIEW OF THE LITERATURE

### Introduction

The purpose of this chapter is to provide a review of
the literature pertaining to the phenomenon of job satis-
faction. After a working definition of this phenomenon is
presented, a review of the major theoretical approaches to
understanding job satisfaction will be discussed. This
chapter will also consider the rationale for utilizing a
multidimensional rather than a unidimensional approach to
the study of job satisfaction. A summary of the literature
pertaining to the dimensions of job satisfaction included
in this study will follow.

### Job Satisfaction Defined

While over 3,300 articles have been published on job
satisfaction (Locke, 1976), Lawler (1973) concludes that
"relatively little is known about the determinants and con-
sequences of [job] satisfaction" (p. 61). Several factors
contribute to this dichotomy. First, within the literature
there still is not a generally accepted definition of job
satisfaction. Furthermore, while some authors study job

satisfaction in relation to the employee, others study it in relation to employers' needs and values. Mumford (1972) has described job satisfaction as "the degree of 'fit' between what an organization requires of its employees and what the employees are seeking from the firm" (p. 5).

For the purpose of this study, job satisfaction will be used in the context that Locke (1976) defines this phenomenon. He states that job satisfaction is "the appraisal of one's job as attaining or allowing the attainment of one's important job values, providing these values are congruent with or help fulfill one's basic needs" (p. 1319). The two crucial components of this definition are needs and values. Locke states that "values refer to what one considers beneficial, whereas needs are the conditions actually required for one's well-being" (p. 1342).

## Theories of Job Satisfaction

Theories of job satisfaction can be categorized as: content theories, which describe the factors that contribute to job satisfaction; or process theories, which focus on how those factors or conditions influence the phenomenon. The primary content theories are: (a) the two-factor or motivation-hygiene theory (Herzberg, Mauser & Synderman, 1959); (b) the need-hierarchy theory (Maslow,

1954); (c) the existence, relatedness and growth theory
(Alderfer, 1972); and (d) the achievement-motivation theory
(McClelland, 1961). These theories are in fact needs
theories that are applicable to job satisfaction. The
primary aim of the content theories is to identify precise-
ly "which factors 'cause' satisfaction or dissatisfaction"
(Landy, 1978, p. 537).

## Content Theories

The motivation-hygiene theory. As a result of
their work with engineers and accountants, Herzberg et al.
(1959) have identified five intrinsic motivators (the work
itself, achievement, recognition, advancement and responsi-
bility) that are the primary determinants of job satisfac-
tion. These factors produce job satisfaction and motivate
the worker to be a high producer. "Herzberg stresses that
the only way to provide these [factors] is by changing the
job itself, which he terms job enrichment" (Siegel & Lane,
1982, p.394). More specifically, the particular factors of
responsibility, advancement, and the work itself, are re-
ported to most contribute, on a long-term basis, to a sense
of satisfaction about work.

Job dissatisfaction has been found by Herzberg et al.
to be a result of five dissatisfiers (company administra-
tion and policy, supervision, salary, interpersonal rela-

tions and working conditions) that are extrinsic to the
job.  These factors are identified as the hygiene factors.
Unlike the situation with motivation factors, the need to
satisfy hygiene factors can periodically resurface and
become greater while producing only short-term changes in
job attitudes (Herzberg, 1966, p. 74).

It is important to note that Herzberg et al. do not
consider job satisfaction and dissatisfaction as being at
opposite ends of the same spectrum.  Rather, they are
viewed as independent factors associated with work, that
reflect different systems of human needs.  Herzberg (1974)
reports that

> . . . motivators are the factors that meet
man's need for psychological growth. . . . These
factors are concerned with the job content - the
work itself.  The hygiene factors are concerned
with the job environment - conditions and treat-
ment surrounding the work. . . . Their underlying
dynamic is the avoidance of pain within the work
environment.  The motivators are concerned with
using people well and when combined with a good
hygiene program, with treating people well, the
result will be motivated performance.  (p. 98)

Succinctly, these two sets of factors are seen as respon-
ding to different human needs: the motivators to one's need
for psychological growth and development; and the hygiene
factors to the individual's biological needs.  Lack of job
satisfaction is not synonymous with job dissatisfaction.
Rather it is termed by Herzberg et al. as "no satisfaction"
(p. 67).  Similarly, a lack of job dissatisfaction results

in "no dissatisfaction" (p. 67), not job satisfaction.

The research of several authors (Myers, 1964; Saleh, 1964) provides further support for Herzberg's theory. The importance placed on intrinsic factors and job content is a significant part of Herzberg's theory (Locke, 1976; Mumford, 1972). "This contribution stems from his stress on the importance of psychological growth as a precondition of job satisfaction and his showing that such growth stems from the work itself" (Locke, 1976, p. 1318).

However, the literature also contains much criticism of Herzberg's theory (Ewen, Smith, Hulin & Locke, 1976; Lawler, 1973; Locke, 1976; Vroom, 1964). The primary emphasis of these authors' criticism is on the rigidity and the oversimplification of Herzberg et al.'s two-factor classification model. Lawler points out that "at the same time a person can be very satisfied and dissatisfied" (p. 70). Locke contends that Herzberg et al. fail to link man's physical needs to growth needs.

Ewen et al. (1976) have tested several hypotheses of the motivation-hygiene theory using the following variables: the work itself and promotions (intrinsic variables); and pay (extrinsic variable). Their results reveal that satisfiers and dissatisfiers are not unrelated factors. The intrinsic variables (satisfiers) can influence both satisfaction and dissatisfaction. The effect of the

extrinsic variable (dissatisfiers) seems to depend on an interaction with intrinsic factors (pp. 64-65).

Need-hierarchy theory. Maslow (1954) identifies five levels of basic human needs, with the physiological needs being at the lowest level, and safety, belongingness and love, esteem, and self-actualization needs as being successively higher in the need hierarchy. Figure 1

```
 /\       <-- self-actualization
/  \      <-- esteem
/    \     <-- belongingness and love
/      \    <-- safety
/_____\   <-- physiological
```
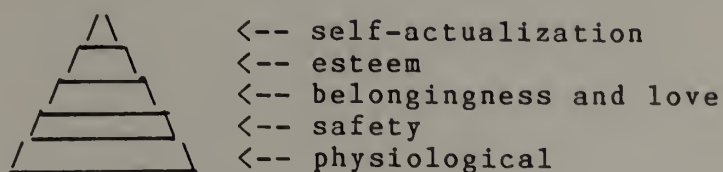
Figure 1. Maslow's needs-hierarchy

depicts this arrangement. Most desires are seen in response to the needs of the individual as a whole organism. Only the physiological needs respond to separate components (biologically based requisites of the individual). This theory "is a dynamic one in that man is seen as a wanting being who constantly strives for the fulfillment of needs in an ever expanding need system" (Mumford, 1972, p. 66). These needs operate primarily on the unconscious level.

Maslow proposes that "basic human needs are organized into a hierarchy of relative prepotency" (p. 38). The individual's lowest unsatisfied need serves as a motivator until it is satisfied, after which the next higher unmet need becomes the motivator, and so on. Maslow reports that the higher the need level, the greater the ability of the

individual to delay gratification in fulfilling that need.
While two need levels can be operating simultaneously, "the
lower-level need is considered to be the more powerful
motivator of behavior" (Siegel & Lane, 1982, p. 246). De-
pending on individual differences, the order of the hier-
archy can change, with some needs becoming relatively more
or less important.

This theory becomes especially relevant to job satis-
faction when the higher level esteem needs are examined, as
they are often the most unfulfilled in today's businesses.
Two types of esteem needs are presented in Maslow's theory:

> These are, first, the desire for strength, for
> achievement, for adequacy, for mastery and com-
> petence, for confidence in the face of the world,
> and for independence and freedom. Second, we
> have what we may call the desire for reputation
> or prestige . . . status, fame and glory, domi-
> nance, recognition, attention, importance, dignity
> or appearance. (Maslow, 1954, p. 45)

By self-actualization, Maslow is referring to the in-
diidual's need to maximize potentials. The striving is to
become all that one is capable of being. It is important
to note that few jobs provide the opportunity for self-
actualization (Siegel & Lane, 1982). As the higher level
needs in the hierarchy are considered, the probability of
satisfaction occurring decreases.

Maslow's theory views human needs as operating within
a broad context. Preconditions, such as the basic human
freedoms, are prerequisites for the satisfaction of basic

needs. Functioning at the same time is an interrelated, complementary hierarchy of cognitive needs: the need to know and understand, find meaning, process information and establish value systems. Maslow also recognizes that humans have aesthetic needs.

Existence, relatedness and growth theory. The existence, relatedness and growth theory (Alderfer, 1972) also arranges human needs in a hierarchical framework. The three levels of primary needs identified are existence, relatedness and growth needs. While primary needs are considered innate, Alderfer reserves judgement as to whether they are biological in origin (p. 7). The term "need" encompasses human desire, satisfaction and frustration.

The existence needs focus on the individual's concrete material requisites which aim toward homeostasis. Relatedness needs concentrate on the individual's social interactions. Due to growth needs, the individual feels motivated to be productive in the work environment and to maximize potentials. "A person experiences a greater sense of wholeness and fullness as a human being by satisfying growth needs" (p. 12).

This theory explains satisfaction in terms of the reality that exists for an individual and the perceptions that the individual has about that reality. The less satisfying a particular need level is, the more the individual

wants it, and the more important the lower levels become.
Conversely, the more satisfying a level of needs is, the
more important the higher levels become to the person.
Needs progress from a concrete quality to a more abstract
context. Different levels of needs can be operating simul-
taneously. "The assumption implied in the satisfaction
progression mechanism is that a person has more energy a-
vailable for the more personal and less certain aspects of
living if he has obtained gratification in the more
concrete areas" (p. 17).

Achievement-motivation theory. In his achievement
motivation theory McClelland (1961) identifies the need to
achieve as a motivating factor in human behavior. By con-
sciously or unconsciously arousing in male college students
the achievement motive, which McClelland considers to be
important to men in American culture, he reports that sub-
sequent fantasy behavior pertaining to work is believed to
be influenced. "Inducing achievement motivation increases
in all types of subjects thoughts of doing well with re-
spect to some standard of good performance, of being
blocked in the attempt to achieve, of trying various means
of achieving, and of reacting with joy, or sadness to the
results of one's efforts" (p. 43).

The n achievement score, based on the number of
achievement related fantasies that subjects describe in

their subsequent fantasy stories, reflects the individual's level of concern for achievement. McClelland suggests that people with high <u>n</u> achievement scores perform better when there is the possibility that their achievement needs can be satisfied. In fact, such people appear to look for opportunities to achieve and avoid experiences where a-chievement is unlikely. McClelland has used his achieve-ment-motivation theory to explain periods of economic growth and decline, economic growth in developing coun-tries, and success in competitive organizations.

Comparison of Content Theories. When the above content theories are compared, a two level hierarchy of human needs and motivations emerges (Lawler, 1973; Siegel & Lane, 1982). At the lower level are: Herzberg et al.'s need to avoid pain (hygiene factors); Maslow's physiolog-ical and safety needs; and Alderfer's existence and re-latedness needs. At the higher level are: Herzberg's need for psychological growth (motivators); Maslow's esteem and self-actualization needs; Alderfer's growth needs; and McClelland's need for achievement.

## Process Theories

The process theories of job satisfaction attempt to identify the causal relationships between variables and job satisfaction. These theories not only identify which vari-

ables, or groups of variables, influence job satisfaction, but moreso, how the process evolves (Locke, 1976). The process theories to be presented are: (a) expectancy theory (Lawler, 1973; Vroom, 1964); (b) inequity theory of social exchange (Adams, 1965); (c) discrepancy models (Lawler, 1973; Locke, 1976; Mumford, 1972); and (d) opponent process theory (Landy, 1978).

Expectancy theory. Expectancy theory is, in of itself, a process theory of motivation. According to Vroom's (1964) formulation of this theory, "the selection of a course of action reflects the anticipated consequences of that action" (Siegel & Lane, 1982, p. 256). In any decision making situation, an individual has preferences regarding expected outcomes. Vroom refers to these preferences as valences, which can be positive if desirable, or negative if undesirable. The strength of the valence is based on the individual's expectations regarding how satisfying the outcomes will be.

In relating the expectancy theory of motivation to job satisfaction, Vroom states that "job satisfaction, as used in the literature of industrial psychology, is the conceptual equivalent of the valance of the job or work role to the person performing it" (Vroom, 1964, p. 101). Both individual personality factors and variables associated with the work role influence employees' views about

job satisfaction. Vroom identifies six major determinants
of job satisfaction which relate to the work role: "(1)
supervision, (2) the work group, (3) job content, (4)
wages, (5) promotional opportunities, and (6) hours of
work" (p. 105).

Other authors utilize dynamics of expectancy theory
in their approaches to job satisfaction. Locke (1976)
identifies expectancy theory's role in explaining job
satisfaction by his emphasizing the potential, albeit
indirect, influence of an individual's expectations on
attitudes toward phenomena such as job satisfaction.
Lawler's (1973) expectancy model, which is based on Vroom's
theory, assigns a positive or negative valence to alter-
native outcomes of a situation. Individuals have expec-
tations regarding whether their efforts will lead to per-
formance which will result in those outcomes. "In any
situation, the actions a person chooses to take are deter-
mined by the expectancies and the preferences that the
person has at the time" (Lawler, 1973, p. 49). Alderfer
(1972) relates expectancy theory to job satisfaction by
describing it as one part of a need satisfaction model of
job attitudes, the other part being need theory.

Inequity theory. Adam's (1965) inequity theory
in social exchange, while it is not currently being applied
directly to research studies of job satisfaction, does

serve as the basis for later work in this field.  This
theory states that individuals perceive a ratio of their
job inputs to job outcomes.  This ratio is then compared to
the ratio of others, in order for the individual to deter-
mine if there is inequity.  When an employee perceives that
there is inequity in the employer-employee relationship,
job dissatisfaction will result.

> In short, the presence of inequity will motivate
> [the] person to achieve equity or to reduce in-
> equity, and the strength of motivation to do so
> will vary directly with the magnitude of inequity
> experienced.  (Adams, 1965, p. 283)

Discrepancy models of job satisfaction.  Discrep-
ancy models of job satisfaction provide the major portion
of theoretical knowledge regarding the dynamics explaining
this phenomenon.  Several such theoretical approaches exist
(Kuhlen, 1963; Lawler, 1973; Locke, 1976; Mumford, 1972),
each of which views the process in a different manner.
Yet, all of the discrepancy models share the view that job
satisfaction is based on the employee's evaluation as to
whether desired aspects of work are available on the job.

The facet satisfaction model.  In Lawler's (1973)
model of facet satisfaction, correlated factors associated
with a job are grouped into facets.  His work has focused
on the following factors: job content; interpersonal fac-
tors (supervision and co-workers); and extrinsic rewards
(pay and promotion).  The employees evaluate whether the

perceptions of what they should gain from the job equal the reality of the situation. Perceived equity (which Lawler bases on Adam's inequity theory) results in satisfaction.

In essence, Lawler draws upon both inequity theory and general concepts of discrepancy theory to develop his model:

> Both theories stress the importance of a person's perceived outcomes, along with the relationship of these outcomes to a second perception. In discrepancy theory, the second perception is what the outcomes should be or what the person wants the outcomes to be; in equity theory, the second perception is what a person's perceived inputs are in relation to other people's inputs and outcomes. (Lawler, 1973, p. 73)

The model of facet satisfaction emphasizes the discrepancy between what the employee feels should be gained from the job and perceptions regarding what is actually received. The most influential factors on an individual's perceptions of what rewards the job should offer are the personal inputs that the employee believes are being brought to the job, such as skills, abilities, knowledge and performance. In addition, other factors also influence this evaluation: perceived job demands; job conditions; and beliefs regarding how one's job rewards compare to those of other people. Thus, for example, it takes more compensation to satisfy the employee with perceived high job inputs than low inputs.

Lawler favors a multidimensional approach to job

satisfaction rather than a global approach. "This model is
intended to be applicable to understanding what determines
a person's satisfaction with any facet of the job" (p. 74).
While he does compute weighted scores for each facet inclu-
ded in his study, depending on the level of importance and
the perceived satisfaction of the particular facet, Lawler
does acknowledge that this may not be necessary. In real
life situations "satisfaction scores themselves seem to
take importance into account" (p. 74). Research shows that
the job facets which are generally most important to peo-
ple, namely: pay; promotion; job security; job content; and
supervisory style, are the areas yielding the highest
levels of dissatisfaction (p. 80).

Kuhlen's discrepancy model. In Kuhlen's (1963)
research, job satisfaction is defined as:

. . . a function of the discrepancy between
personal needs and perceived potential of [the]
occupation for satisfying needs, particularly
among those for whom occupation constitutes a
major source of satisfaction . . . and in the in-
stance of occupationally relevant needs, such as
need achievement. (p. 3)

Kuhlen's findings indicate that men display higher achieve-
ment needs than women, and that they view their careers as
being a central part of their lives.

Locke's discrepancy theory. Locke's (1976) dis-
crepancy theory presents the most comprehensive definition
of job satisfaction. He defines job satisfaction as "the

appraisal of one's job as attaining or allowing the attain-
ment of one's important job values, providing these values
are congruent with or help to fulfill one's basic needs"
(p. 1319). Job satisfaction is dependent upon the relative
importance of a job value to an individual. The individual
evaluates whether there is a discrepancy between what is
wanted and what is actually gained from the job.

A focus of Locke's discussion is on the differenti-
ation between needs and values. Needs are described as
being innate, unrelated to personal desire, and common to
all people; while values are defined as learned, dependent
on personal desire and relative to the individual. "While
his needs confront man with the requirement of action, his
values determine his actual choices and emotional reac-
tions" (p. 1304).

Thus, Locke's theory of job satisfaction takes into
account any perceived discrepancy regarding a valued aspect
of work and the relative importance of that job factor (p.
1304). He concurs with Lawler (1973) that weighting job
factors is unnecessary, as the individual does this automa-
tically in judging how important various aspect of work
are. Job satisfaction is viewed by Locke "as a function of
value-percept discrepancy and importance" (p. 1305).

Locke identifies "events" and "agents" which are the
determinants of job satisfaction. The events are: (a) the

work, which includes "the work itself, amount, smoothness, achievement, and variety"; and (b) rewards, which include "promotion, responsibility, money, and verbal recognition" (p. 1325). The agents are: (a) the "self," which includes the employee's self-image and level of self-esteem; and (b) "others," which includes the company or other companies (p. 1325). Research in support of this theory emphasizes that the more highly valued a condition is, the greater the cor- relation will be with job satisfaction (Hackman & Lawler, 1971; Smith, Kendall & Hulin, 1969).

Mumford's model. The discrepancy model proposed by Mumford (1972) considers job satisfaction "in terms of the degree of `fit' between what an organization requires of its employees and what the employees are seeking" (p. 5). From the perspective of the employee, job satisfaction consists of individual needs being met in the following five areas: knowledge needs; psychological needs; needs for an equitable effort-reward bargain; ethical needs; and task needs. It is important to recognize that Mumford's work is the only extensive study specifically focusing on the job satisfaction of computer specialists.

Knowledge needs refer to the employee's need to have skills, abilities and knowledge utilized on the job to an acceptable level. Also included is the need for the em- ployer to provide opportunities for continuing education,

if so desired. Mumford bases her identification of psycho-
logical needs on the satisfiers and disssatisfiers des-
cribed in Herzberg et al.'s (1959) motivation-hygiene
theory, with some modifications. Mumford states that a
satisfying job should fulfill some, if not all, of the
following psychological needs: self development; recogn-
ition; status; advancement; responsibility; pleasant rela-
tionships with fellow workers; job security; an employer
with an acceptable reputation; and the opportunities to
fulfill family and social needs.

The effort-reward bargain specifically refers to
appropriate pay, along with just controls and procedures
imposed by the employer. The individual's ethical needs
pertaining to work focus on employment with an organization
whose values are consistent with the employee's. Finally,
the employee has task needs which specifically relate to
job content: the need for work that provides variety; goal
setting with appropriate feedback; and clearly stated tasks
that permit autonomy.

Job satisfaction for the employee is dependent upon
the "fit between individual needs, expectations and aspira-
tions in work and the individual's work experience" (p.
185), thus categorizing the approach as a discrepancy
model. Furthermore, Mumford recognizes that the individual
employee's needs operate within the framework of organiza-

tional needs and restrictions. She looks beyond job satisfaction to other factors necessary for a healthy and growing organization. Effective relationships are "the fit between organizational needs . . . and the ability and motivation of the employee to meet these needs" (p. 185). Organizational flexibility refers to "the fit between environmental demands and the ability of the organization to respond to these," and organizational development, to "the fit between the amount and kind of required adaptation and the availability of resources within the organization to enable it to adapt successfully in the short and long-term" (p. 185).

The Minnesota Satisfaction Questionnaire. The Minnesota Satisfaction Questionnaire (Carlson et al., 1962; Weiss et al., 1967) approaches job satisfaction somewhat like Mumford's discrepancy model. This tool looks for the fit between job satisfaction, which is the employee's perception of work adjustment, and job satisfactoriness, which is the employer's opinion toward the employee's work adjustment. "Work adjustment is thus an equilibrium type concept" (Carlson et al., 1962, p. 6) which considers employee and employer needs. The 20 job scales established for the Minnesota Satisfaction Questionnaire are: ability utilization, achievement, activity, advancement, authority, company policies and practices, compensation, co-workers,

creativity, independence, moral values, recognition, re-
sponsibility, security, social service, social status, su-
pervision-human relations, supervision-technical, variety,
and working conditions.

Opponent process theory. The final theory to be
reviewed is the opponent process theory (Landy, 1978). It
is based on the premise that job satisfaction or dissatis-
faction arouses affective responses. The theory deduces
that any emotional response to one's work is countered by
the opposite affect in order for the individual to regain
equilibrium. It is the opponent process that tends to be-
come increasingly stronger and to last longer than the ori-
ginal response.

This theory stresses the need to periodically ques-
tion employees in order to gain an accurate measure of
their current level of job satisfaction. Landy notes that
the timing between the questioning of employees and parti-
cular reward events in the work situation influences re-
sults, as these rewards serve as stimuli. In addition, the
frequency of a reward in the work place affects how that
reward is perceived by employees in terms of job satisfac-
tion.

Similar to Herzberg, Landy notes that extrinsic fac-
tors can produce dissatisfaction after their termination
and intrinsic factors can produce satisfaction after their

termination (Landy, 1978, p. 542). Positive work experiences that employees remember tend to be related to intrinsic job factors and negative experiences tend to relate to extrinsic factors.

## Conclusions Regarding Job Satisfaction Theories

The above discussion of theoretical approaches to job satisfaction points out an important feature of the topic. Not only is there no single theory which adequately explains the phenomenon; there is no single group of theories that does this. Neither content nor process theories fully describe the dynamics that contribute to an individual's attitude toward the job. Yet, each theory does shed some light on these dynamics. How content and process theories can be used together to formulate a conceptual model of job satisfaction is discussed in Chapter III.

## A Multidimensional Approach To Job Satisfaction

Should job satisfaction be evaluated using a unidimensional or a multidimensional approach? Several authors (McCormick & Ilgen, 1980; Portigal, 1976; Weaver, 1980) report that the use of a global measurement to assess job satisfaction has only some value in establishing an individual's overall feeling toward the job. This approach might

be useful if the intent of a particular study is to describe the general relationship between job satisfaction and another phenomenon, such as turnover. In addition, unidimensional measures can be used to compare overall levels of satisfaction with a specific aspect of a job (Weaver, 1980). However, the consensus appears to be that the use of global unidimensional measurements is limited.

Since the earliest studies on job satisfaction, such as Hoppock's research in 1935, the significance of using a multidimensional approach has been recognized (Locke, 1976). Mumford (1972) summarizes the position of several authors (Lawler, 1981; Locke, 1976; McCormick & Ilgen, 1980; Weaver, 1980) when she concludes that

> . . . any researcher tackling this subject must consider a large number of factors contained in an individual job, in the situation in which he works, in his personal environment outside of work, and relate these to his attitudes towards his job. (pp. 67-68)

While several theories have been described which contribute to an understanding of job satisfaction, "there appear to be no all-embracing theories of job satisfaction, and work on the subject has been focused on certain factors thought to be related to feelings of satisfaction or dissatisfaction in work" (Mumford, 1972, p.4). Locke (1976) reports that since the historical Hawthorne studies at Western Electric in 1927, which examined the relationship between physical aspects of the working environment and

worker fatigue and productivity, there have been over 3,300 studies on job satisfaction.

The literature relating to employee turnover identifies job satisfaction and its components as "intervening variables" between employee turnover and the multiple variables that have been associated with turnover (Martin, 1979; Price, 1977).  Several authors (Atchison & Lefferts, 1972; Martin, 1979; Mobley, 1982; Mumford, 1972) have stated that job satisfaction has a high inverse correlation with turnover.  Thus, in presenting a review of the variables associated with job satisfaction, both the turnover literature and the literature specifically regarding job satisfaction must be examined.

McCormick and Ilgen (1980) state that there "is a set of dimensions common to most jobs that is sufficient to describe most of the predictable variance in job satisfaction . . . [which] varies roughly from five to twenty job dimensions" (p. 303).  Just as no theory includes all of the concepts relevant to an understanding of job satisfaction, no theory addresses all of the same variables when studying this phenomenon.  This study does not attempt to examine each variable mentioned in the literature.  Instead, only those job dimensions that pertain to the population of computer engineers being studied will be presented.  These dimensions have been chosen as a result of:

(1) their significance in the literature; (2) interviews with human resource professionals both in and outside of the participating organization and (3) meetings with non-participating engineers. The following is a summary of the job dimensions being considered in this study.

## Pay

Historically, the relationship between pay and job satisfaction has been underestimated in the literature (Lawler, 1973, 1981; Siegel & Lane, 1982). Research has focused on how discrepancy and inequity theories explain individuals' perceptions of their pay level. Traditionally, pay has been viewed as satisfying lower level needs (Lawler, 1981). Mumford's (1972) findings on computer specialists support this view, as pay was given a low priority by her sample. "It has been taken that salaries were perceived as adequate and had been supplanted by needs which were less well catered for" (Mumford, 1972, p. 99). Furthermore, based on interviews at the participating organization, pay does not appear to be among the most highly valued job factors.

However, Lawler (1981) reports that 50% or more of the employees in recent studies rank pay as a highly valued job factor. Two instruments which measure job satisfaction, the Job Descriptive Index (Smith, Kendall & Hulin,

1969) and the U.S. Survey of Working Conditions (Portigal, 1976) recognize pay as an important job dimension. Many authors (Dalton & Todor, 1979; Martin, 1979; Mobley, 1982; Porter & Steers, 1973; Price, 1977) have all concluded that satisfaction with pay negatively correlates with the rate of turnover.

## The Work Itself

The importance of the work itself to the employee can not be underestimated and is addressed in several ways in the literature. Which job factors each author has included in this category varies. For the software product development engineers being studied this topic includes work that is interesting, original and provides opportunities to build "winning" products.

Herzberg (1974) identifies the opportunity to do interesting work as an important aspect of job content. In a survey by the Survey Research Center (cited in Work In America, 1973) of 1533 American workers, interesting work was ranked as the most important aspect of the job. Herzberg et al. (1959) recognize the contribution of the nature of the work itself to job satisfaction. This factor is among the motivators in the motivation-hygiene theory. The Job Diagnostic Survey (Hackman & Oldham, 1975) identifies aspects of this job dimension in terms of skill variety, task identity, task significance and meaningful work.

Mumford (1972) hypothesizes that the work itself is a primary source of job satisfaction, a finding which is common to professional groups. Her research supports this, as overall, "the task contract [the nature of work] was the most important factor in [the] level of job satisfaction" (p. 201). A recent survey of high technology recruitment strategies was conducted by the Newspaper Advertising Bureau (McLean, 1984). The findings show that interesting work was ranked as one of the three most important aspects of the job to computer professionals. Further support for this is found in The Soul Of A New Machine (Kidder, 1982) in which the author concludes that for computer engineers "the most important thing is for the work to be interesting" (p. 62).

Research (Dalton & Todor, 1979; Porter & Steers, 1973) suggests that turnover and routinization (or lack of interesting work) are positively related, while Price (1977) concludes that the two variables are only probably related. Pollack (1983) notes that menial, boring work can result in voluntary employee turnover.

The importance to an employee of having the opportunity to do original work takes the above dynamic a step further. Mumford has stressed that the characteristics of creativity and innovation are associated with computer work. In the Minnesota Satisfaction Questionnaire Weiss et

al. (1967) also notes the importance of creativity to wor-
kers. Of the intrinsic job factors cited in the literature,
Locke (1976) identifies the level of mental challenge as
being the most crucial. The U.S. Survey of Working Con-
ditions (Portigal, 1976) also recognizes the value of chal-
lenging work. Interviews at the organization participating
in this study indicate that computer engineers not only
desire interesting work, but moreso, highly value the time
spent on original projects.

While little mention is made in the literature about
the opportunity to build "winning" products as a specific
variable associated with job satisfaction, it is relevant
to the present study. It can be seen as an extension of
the two preceding job dimensions, as it epitomizes the
highest level of achievement in this pioneering industry.
Again, based on interviews at the participating organiza-
tion, it is believed that the population under study seems
to thrive on participation in developing new products. In
the literature, only Mumford's study of computer special-
ists recognizes this particular need.

> A major source of satisfaction in the task was
> the visibility of the end product. . . . Thus, 50
> percent of programmers spoke of the satisfaction
> of "getting successful output from a program,"
> while 50 per cent of the systems analysts spoke
> of the pleasure of "seeing a project in success-
> ful operation." Work was therefore seen as im-
> portant and meaningful. (Mumford, 1972, p. 201)

The literature does emphasize the worker's need to: (1) a-

chieve (Herzberg et al., 1959; Locke, 1976; Maslow, 1954; McClelland, 1961; Weiss et al., 1967; (2) develop onself professionally (Alderfer, 1972; Mumford, 1973); and (3) gain personal status (Lawler, 1973; Locke, 1976; Maslow, 1954; Mumford, 1972; Weiss et al., 1967) which, in this professional, are attained through opportunities to build "winning" products.

## Job Security

Maier and Verser (1982) report that in the early work on the relationship between job security and job satisfaction, the former was ranked as the second highest priority to employees. In Work In America (1973) job security was ranked as the seventh most important aspect of work of the 25 job dimensions studied. In more recent studies, such as Mumford's (1972), this variable is classified as a low priority need to programmers in six of eight firms, and to system analysts in all eight firms studied. Further support for Mumford's findings can be found in the Hay Associates (1982) report which identifies job security as a minor concern to computer professionals. With a reported low unemployment rate for engineers (2.4% for 1982, as reported by Pollack, 1983), it is understandable that this population would have a low concern for job security. Lawler (1973) and Weiss et al. (1967) also recognize the

role of job security to the individual's perceived level of job satisfaction.

## Opportunities to Gain State-Of-The-Art Training

Herzberg et al. (1959) and Herzberg (1974) stress the individual's need to grow psychologically and to increase skills as being necessary for an enriching job. Focusing on engineers, Pollack (1983) reports that without the opportunity to expand and update skills, engineers in high technology may have out of date training within five years after beginning their careers. According to Pollack this may contribute to significant numbers of engineers leaving their profession.

Mumford (1972) highlights this point as her findings show that the most important psychological need of her sample of computer specialists was "to achieve breadth of learning . . . [and] to increase particular areas of specialist knowledge" (p. 190). Further support for the value of this job dimension is found in Work In America (1973) in which the opportunity to develop special abilities was ranked as the sixth most important aspect of work of the 25 dimensions studied.

## Who One Works With

Working relationships are reported by Mumford (1972)

as being important to systems analysts, whose work involves social interaction with clients, but unimportant to the computer programmers in her study. Of those for whom this variable was important, all were satisfied with their working relationships. The literature varies regarding to what degree higher levels of positive working relationships yield lower turnover rates. Martin (1979) reports a direct correlation between these two factors, while others (Mobley, 1982; Price, 1977) agree, yet stress the effect of additional variables on this relationship. The U.S. Survey of Working Conditions (Portigal, 1976) and the Job Descriptive Index (Smith, Kendall & Hulin, 1969) both address the employee's relationships with co-workers.

"Who one works with" can refer to several categories of people in the employee's working environment. For example, in his examination of employees' working relationships, Locke (1976) considers "agents" (p. 1325) which include supervisors, co-workers and subordinates. Focusing on relationships with supervisors, Mobley (1982) concludes that supervisory style conceivably could have an impact on the quit-stay decision. Mumford's (1972) sample was generally satisfied with supervisory relationships, although more supervision was sought by many of the computer specialists. "The supervisor was viewed as a resource person or enabler, whose function was to help the programmer or

systems analyst to perform his job more effectively" (p. 195). While recognizing a relationship between job satisfaction and working relationships, the literature is vague in this area.

## Opportunities for Promotion

Locke (1976) views satisfaction with promotion opportunity as being based on multiple criteria, including the individual's desire to increase income, gain more responsibility, and to grow psychologically. In Mumford's (1972) work, while the need for responsibility was ranked as the second highest psychological priority, for 50% of those studied, the desire for a promotion remained a long-term, rather than a short-term goal. "Promotion within the data processing hierarchy was quite rapid and people wished to gain experience and consolidate their own position before moving on to a higher job" (Mumford, p. 85). Promotions were primarily sought within one's department, rather than higher up in the management structure. As Mumford notes:

> Advancement as an end itself had been given a
> low priority in the hierarchy of needs, but
> promotion as a means of securing responsibil-
> ity was sought after by a considerable number
> of people, although by no means as many as one
> would expect to find in a more upwardly striving
> group. (p. 85)

Promotion can be seen as a material form of recognition for a job well done. Locke and Mumford

recognize the need for recognition, but their research also
includes verbal recognition in this category. Other
authors (Herzberg et al., 1959; Lawler, 1973; Vroom, 1964;
Weiss et al., 1967) identify a relationship between promo-
tion and job satisfaction. Price (1977) has concluded that
there is a probable relationship between low levels of
turnover and high opportunities for upward mobility. Mar-
tin's (1979) conflicting results regarding this relation-
ship are attributed to the influence of external factors,
such as the state of the labor market.

## Authority to Get The Job Done

Several authors (Herzberg, 1974; Lawler, 1976; Paul,
Robertson & Herzberg, 1969) relate increased employee au-
thority in making decisions and in getting a job done to
increased job satisfaction. Herzberg (1974) identifies
three "ingredients" (p. 101) of a good job, namely freedom
to set one's schedule, control of financial resources, and
having the authority to communicate directly with necessary
parties. Lawler emphasizes the importance of having the
authority to set one's goals and the means to achieve these
goals. In Paul et al.'s study of design engineers, increa-
sed authority along with looser supervisory style resulted
in a 16 to 21% increase on job reaction surveys related to
job attitude and satisfaction. Herzberg et al. (1959) also

recognize the employee's need for authority in the categor-
ization of responsibility as a satisfier. Maslow (1954)
terms this esteem need as independence and freedom, while
Hackman and Oldham (1975) in the Job Diagnostic Survey
refer to it as autonomy.

However, there is a lack of consensus in the litera-
ture regarding the relationship between authority and job
satisfaction. Mumford's (1972) study reveals a dichotomy
as her sample "approved of personal control over work
methods, but liked the security of formal management con-
trol over the end product [which] suggests that this kind
of procedural mix provides specialist staff with freedom
and security at one and the same time" (p. 195). Similar-
ly, while responsibility was the second most important
pyschological need, "progammers, in particular, said that
they were given responsibility for the work of others when
they would have preferred not to have had this" (p. 84).

Organ and Greene's (1981) study of engineers and
scientists indicates that formalization in management
structure results in alienation and a reduction in satis-
faction of one's potential. Hall (cited in Organ and
Greene, 1981) notes that formalization can facilitate the
work of these professionals by providing them with clear
definitions of the communication and coordination networks
of the organization. Dalton and Todor (1979), Mobley
(1982) and Price (1977) report a probable inverse

relationship between turnover and centralization of deci-
sion making, yet could find no empirical support for this.

## Knowledge of Management's Goals and Objectives

Mumford's (1972) work identifies the relationship be-
tween job satisfaction and "the need for the philosophy and
values of the employing organization . . . to broadly fit
with the individual's own set of values" (p. 196). "Systems
analysts in five firms and programmers in one spoke of
their need to work for an employer whose image and status
in the community was high," (Mumford, 1972, p. 91) and in
fact, in the sample there was a good fit between employee
and employer values.

In Herzberg et al.'s (1959) work, company administra-
tion and policy is characterized as a dissatisfier.  Locke
(1976) recognizes that job dissatisfaction can result when
the individual perceives the job role as being in conflict
with management's policies.  Commitment to one's values and
goals appears to outweigh the individual's commitment to
the organization.  Mumford's sample did not identify com-
mitment to the organization as an important factor.  The
Hay Associates (1982) conclude that a majority of the human
resource professionals in the high technology industry
state that "loyalty and commitment . . . are a thing of the
past" (p. 6) for computer professionals.

## Having Enough Help, Equipment and Information To Get A Job Done

Pollack's (1983) work focuses on the current trends among high technology engineers. The high incidence of these employees leaving the profession is possibly attributed to reports that much of their time is devoted to menial tasks that impede their getting a job done. In Work In America (1973) having enough help and equipment to get the job done was the second most important aspect of work identified, and having enough information ranked third.

Working conditions can facilitate or hinder job performance. Herzberg et al. (1959) note that working conditions can contribute to job dissatisfaction. Barnowe, Mangione and Quinn (cited in Locke, 1976) support the view that having adequate equipment to accomplish a goal is valued by employees. The U.S. Survey of Working Conditions (Portigal, 1976) recognizes the value of resource adequacy. In his review of the literature, Locke concludes that "physical working conditions . . . unless they are extremely good or bad, are usually taken for granted by most employees" (p. 1324).

Information required in order to complete a task is transferred in one of two ways: (a) through instrumental communication, which is "information directly related to role performance" (Price, 1977, p. 4), i.e. feedback, or

(b) through formal communication, i.e., policies and directives from management. Dalton and Todor (1979) report an inverse relationship between turnover and instrumental communication. Several authors (Hackman & Oldham, 1975; Herzberg, 1974; Lawler, 1976; Locke, 1976; and Mumford, 1972) stress the importance of appropriate feedback to employees. In Mumford's (1972) study recognition was only the third most important psychological need of the sample. She explains this by categorizing recognition as a lower level need in the context of Maslow's theory, thus allowing it to be superceded by needs higher in the hierarchy.

## Demographic Factors

Within the literature demographic factors have been identified which may influence job satisfaction and turnover behaviors. This grouping of variables has in common a strong relationship with the individual's person-situation gestalt. In some cases, trends appear that explain the association between these factors and job satisfaction. In other cases, the findings are vague or inconsistent.

Several authors (Saleh & Otis, 1964; Siegal & Lane, 1982; Weaver, 1980) report positive correlations between age and job satisfaction. Numerous authors (Hill & Miller, 1981; Mobley, 1982; Price, 1977) have reported a negative relationship between turnover and the age of the employee.

Mumford (1972) identifies only a few correlations between aspects of job satisfaction and demographic factors. By grouping age and marital status together, she has found that older, married employees are concerned with self development, responsibility and company image, while younger, unmarried employees want recognition and interesting work. A paucity of literature was found specifically relating to marital and family status and job satisfaction or turnover. Mobley (1982) reports that Muchinsky and Tuttle note that "there is a positive relationship between family responsibility and turnover, but it is moderated by whether the employee is the primary or secondary wage earner" (p. 108).

The findings are consistent regarding the relationship between the employee's length of service and the rate of turnover or commitment to the organization, both of which can be reflections of job satisfaction. Several authors (Mobley, 1982; O'Reilly & Caldwell, 1981; Pettman, 1975; Porter & Steers, 1973; Price, 1977) have reported that there is a negative relationship between turnover and length of service. More specifically, the shorter the tenure, the higher the rate of turnover. Mumford (1972) reports that increased length of service results in stronger ties to the organization.

Weaver (1980) reports a positive relationship between the level of employee's pay and their level of job satis-

faction. Research pertaining to other demographic factors is less consistent in the literature. Concerning the source of job referral, Mobley (1982) only tentatively concludes that employees who were originally informally referred to the organization may have a lower rate of turnover than those who were recruited through formal referral sources. No similar research specifically on job satisfaction was available.

The findings relating to one's gender are inconsistent. Weaver (1980) and Portigal (1976) report that there are no consistent differences in levels of job satisfaction between men and women. However, Hulin and Smith's (1976) results from a study conducted at four plants, show that women were less satisfied than men in three of those settings. Similarly, the conflicting findings regarding the relationship between sex and turnover imply that "sex probably interacts with other variables" (Mobley, 1982, p. 98). Smith's (1979) sample of 2,000 civil service vacancies yields little support that sex, alone, is a predictor of turnover.

There are further contradictions in the literature when researchers study the relationship between the employee's level of education and the perceived level of job satisfaction. Klein and Mahrer (1966), who reviewed the literature in this area, attribute the differences in findings

to the differences in reference groups that employees compare themselves to. In his discussion of nationwide surveys spanning over two decades, Weaver (1980) notes that from 1958 to 1964 there was either no correlation or a negative correlation between these variables, and that from 1969 to 1978, a trend appeared that showed increasing job satisfaction among more highly educated employees. Interestingly, Price (1977) reports that more educated employees, as well as those with higher levels of professionalism, usually experience greater rates of turnover than individuals with less education. Bartol's (1979) findings on 250 members of a national association of computer specialists contradict Price, as professionalism was seen to be negatively correlated with turnover.

## Special factors

Up to this point, particular job dimensions and demographic factors have been discussed in relation to job satisfaction. In addition, several special factors warrant consideration as they are applicable to the population being studied. These are: burnout; stress; use of skills, knowledge and abilities (SKAMs); intent to quit or transfer; and hobbies.

Edelwich (1980) explains the phenomenon of burnout in terms of the discrepancy theory. When an individual's ex-

pectations at work do not meet the reality, burnout can re-
sult. Edelwich defines five stages of burnout: enthusiasm,
stagnation, frustration, apathy and intervention, which are
discussed in terms of employees in the helping professions
and can also apply to employees universally.

While there are several precise definitions of
stress, Holt (1982) in his review of the literature chooses
an encompassing one, defining stress as "a general term of
negative evaluation for a state of upset or its precipi-
tant" (p. 421). Seyle (1974) defines stress in terms of
its potentially positive or negative aspects. Job dis-
satisfaction can be seen as a psychological result of
occupational stress. Although there are contradictions in
the literature regarding the relationship between job sat-
isfaction and the morbidity rates for particular diseases,
"on the whole job satisfaction is evidently relevant to OS
[occupational stress] and its pathogenic effect" (Holt,
1982, p. 430). In addition, job dissatisfaction may result
in the increased incidence of counterproductive behavior
and accidents.

In his work on enriching the content of a job, Lawler
(1976) establishes that in order for a worker to be motiva-
ted to perform, to be satisfied with a job and to experi-
ence feelings of accomplishment from the job, the worker
must feel that valued skills are being appropriately used.

Of the five dimensions of work studied by Mumford (1972),
the single most important was the task contract, which,
among other things, considers how much individuals perceive
that their skills, abilities, and knowledge are being
applied.

> New specialist groups, such as computer personnel,
> who are associated with a recent and complex tech-
> nology and whose skills are a scarce and valuable
> commodity, are likely to be particularly concerned
> that their knowledge is put to proper use. (Mumford,
> 1972, p. 189)

As mentioned earlier, job satisfaction is described
in the literature as an intervening variable in the turn-
over phenomenon. Aspects of job satisfaction have been
measured to determine how accurately they predict turnover
rates. If we accept the concept that turnover can be
viewed as a reflection of job dissatisfaction, then the
factor which is the strongest predictor of turnover must be
considered. Porter and Steers (1973) report that the em-
ployee's "expressed intentions concerning future partici-
pation [in the organization] may be an even better predic-
tor" (p. 153) of turnover than the variables already
described. Mobley (1982) concurs with this finding and
states that periodic assessment of intent to quit/transfer
is a good diagnostic tool for predicting rates of turnover.
According to Waters and Roach (1979) the first two years of
employment are crucial in terms of this predictive value.

The literature does not address the particular rela-

tionship between an employee's hobbies and the level of
satisfaction with a specific job.  However, interviews at
the participating organization give the impression that
engineers whose leisure interests are in the computer tech-
nology field are more committed to their jobs and more
satisfied with their work.  Mobley (1982) concludes that
"the more similar job requirements and vocational interests
are, the lower the turnover rate is" (p. 99).

Based on an understanding of the different theoreti-
cal approaches explaining job satisfaction and the impor-
tant dimensions that need to be considered, a framework
for examining perceived levels of job satisfaction among
software product development engineers can be formulated.
Such a process will be presented in the next chapter.


## Chapter Summary

Based on the above theoretical approaches to job satis-
faction and the review of the job dimensions which contri-
bute to job satisfaction, nine themes can been identified
that best explain this phenomenon in reference to the
specific population being studied.  These are:

1.  Pay

2.  The Work Itself

3.  Job Security

4.  Opportunities to Gain State-Of-The- Art Training

5.  Who One Works With

6.  Opportunities For Promotion

7.  Authority To Get The Job Done

8.  Knowledge Of Management's Goals and Objectives

9.  Having Enough Help, Equipment and Information To
    Get The Job Done

In addition, demographic factors conceivably play a role in the individual's perceived level of job satisfaction. These are:

| | |
|---|---|
| 1.  Age | 6.  Level of Education |
| 2.  Sex | 7.  Level of Pay |
| 3.  Marital Status | 8.  Length of Service |
| 4.  Number of Children | 9.  Last Promotion |
| 5.  Job Referral Source | 10.  Employment Status of Spouse |

Several special factors are believed to be particularly relevant to this population of high-in-demand, low-in-supply software product development engineers.  These are:

| | |
|---|---|
| 1.  Level of Burnout | 4. Intent to Transfer |
| 2.  Level of Stress | 5. Hobbies |
| 3.  Intent to Quit | 6. Use of Skills, Abilities and Knowledge |

Drawing from these themes and factors, a conceptual framework can be developed and an original instrument designed to examine perceived levels of job satisfaction among software product development engineers at a particular

organization.  In Chapter III this conceptual framework,
along with the development of the instrumentation will be
presented.

# C H A P T E R   I I I
## CONCEPTUAL FRAMEWORK

### Introduction

.

The purpose of this chapter is to conceptualize and
organize the many possible dimensions that contribute to
job satisfaction among software product development engi-
neers.  As has been indicated in the literature, there
continues to be debate regarding which job dimensions are
valued by employees.  For example, Lawler (1981) points out
that while pay traditionally has been viewed as a relative-
ly low level value to employees, recent studies indicate
that workers rank it as a highly valued job factor.  How-
ever, in Mumford's (1972) work, pay is of a low priority to
the computer specialists studied.

Similarly, early research on job satisfaction shows
that job security has been ranked as an important job value
to workers (Maier and Verser, 1982), yet recent studies
(Hay Associates, 1982; Mumford, 1972) indicate the oppo-
site.  The employee's desire for promotion also reveals a
dichotomy.  While computer specialists work in a fast
growth industry where personal advancement would appear to
be highly valued, Mumford (1972) reports that these employ-
ees seek promotions less frequently than would be expected.

Furthermore, the literature review also reveals that different groups of employees value different aspects of work and have different perceived levels of job satisfaction. For example, Mumford's (1972) results show that working relationships are important to systems analysts, yet unimportant to computer programmers. She also reports that older, married employees are concerned with self-development, responsibility, and company image, while younger, unmarried employees want recognition and interesting work.

Some researchers (Portigal, 1976; Weaver, 1980) report that there are no consistent differences in levels of job satisfaction between women and men. However, in Hulin and Smith's (1976) study, women were less satisfied than men. Differences in perceived levels of job satisfaction due to the worker's level of education appear to relate to differences in reference groups that employees compare themselves to (Klein and Mahrer, 1966) or to a trend toward more educated workers being more satisfied (Weaver, 1980).

Undergirding the following conceptual framework towards an understanding of job satisfaction among software product development engineers is Locke's (1976) discrepancy theory of job satisfaction. As discussed in the review of the literature, this theory focuses on the discrepancy between what valued aspects of work individuals want and

what they perceive themselves as actually receiving on the
job. Locke presents general factors influencing job satis-
faction such as the work itself, rewards, employee self-
image, and the company. Locke emphasizes that human values
should be examined, as opposed to needs, when considering
job satisfaction. This is particularly relevant to the
development of the instrumentation which is used in this
study, as the questionnaire identifies both the aspects of
work this population of engineers most values (through a
rank ordering of job dimensions) and to what extent the
participants perceive opportunities to actually attain
these values at work (through multiple choice questions).

Locke's discrepancy theory alone does not adequately
explain the job satisfaction of this population as it fails
to specifically focus on the issue central to this study,
"Which job dimensions are most valued by software product
development engineers?" As such, the development of a
questionnaire specific to this population becomes of para-
mount concern. This study, thus, has a dual purpose: (a)
the development of a preliminary instrument for the exam-
ination of job satisfaction among software product develop-
ment engineers; and (b) the presentation of the results
from an important employer of these engineers.

What are the valued aspects of work that need to be
examined when studying this population of software engi-

neers?  The selection of these job dimensions involves a
two-step process.  First, the body of knowledge in content
and process theories provides a foundation for this selec-
tion.  Stemming from the review of the literature in the
preceding chapter, a summary of 9 themes of job dimensions
related to job satisfaction was presented.  The second step
is a modification of these themes to form a set of job
dimensions specific to the computer engineers being studied
at the participating organization.  This modification pro-
cess is based upon this author's observations at the parti-
cipating organization and interviews with: (a) human
resource professionals both in and outside of that organi-
zation; and (b) nonparticipating engineers.  Specific
theoretical and practical justification will be presented
in the following discussion to support the inclusion of
each job dimension considered in this study and in the
instrumentation.

## Characteristics Of Computer Engineers

In order to better understand the job factors that are
most valued by software product development engineers, it
is important to gain an apppreciation of who they are.  The
literature and this author's personal observations of high
level computer engineers provide some insight.  It is nec-

essary to keep in mind that the demand for software product development engineers far exceeds the supply. The independent works of the Hay Associates (1982) and Pollack (1983) show that this trend will continue. Furthermore, these engineers are very well aware of the employment opportunities that are available to them. Even while employed, they tend to constantly read the classified ads to keep abreast of salaries, trends in high technology and engineer recruitment practices (McLean, 1984).

> They are also oriented to high risk. They enjoy working for a fast growing company even though they realize that fast growth means high risk and high pressure. They would rather trade some job security for the opportunity to work on products which are at the cutting edge of technology. (Hay Associates, 1982, p. 3)

In light of the high demand for their skills, the rapid pace of the industry, and the creative nature of the work itself, it is understandable that these professionals quickly gain significant power and status. Thus, they may view themselves as not having "to conform to conventional office mores and . . . [being] allowed a freedom of intellect and behavior which would not be tolerated in the older established sections of industry" (Mumford, 1972, p. 70). Tracy Kidder (1982) reports in Soul of a New Machine, "Dreams of pure freedom were not uncommon. For those who had such fantasies, the best job imaginable would allow them to try to build the unattainable, the perfect compu-

ter" (p. 67). Based on the above observations, this author contends that these engineers are not only very aware of their desires, but are also in a strategic position to demand job satisfaction.

## Rationale For The Selection Of Items

As indicated above, job dimensions can be selected which specifically address the values that focus on job satisfaction among software product development engineers at the participating organization. The following discussion will provide the rationale for the inclusion of the job dimensions considered in this study.

Interesting work - original work - building winning products. In beginning this discussion, it should be recalled that the literature review indicates that intrinsic aspects of work are overall the most valued aspects of work to employees. More specifically, work that is interesting and challenging is the most important aspect of the job to employees in general (Herzberg; 1974; Work in America, 1973) and to computer specialists in particular (Kidder, 1982; McLean, 1984; Mumford, 1972). This finding gains further credence in light of the belief by management at the participating organization that turnover increases when these engineers are involved in the "maintenance" phase of a project. As discussed by Pollack

(1983), it is during the maintenance phase that work tends to be less interesting.

In the literature review it was seen that the value to the employee of opportunities to do interesting and original work stem from similar psychological growth needs. Closely related in the field of high technology is the opportunity to build winning products. It is the contention of this author that software product development engineers, due to the research and development nature of their work, not only value interesting work, but thrive on opportunities to do original work. In the computer industry, the prestige and financial returns come from being on the leading edge.

Locke's (1976) work recognizes the value of mentally challenging work. The value of opportunities to do original work and to build winning products is further supported by Herzberg et al. (1959). Maslow's (1954) inclusion of the need for achievement and McClelland's (1961) focus on the motivating influence of achievement needs on human behavior also take this into account. The necessity of being on the leading edge, which is gained through building winning products, cannot be overstated in the fast-paced, innovative industry of high technology.

When examining the intrinsic aspects of work associated with psychological growth and self-development, as

they contribute to job satisfaction among this specific
population, it is not sufficient to focus simply on inter-
esting work.  Such an examination must also include oppor-
tunities to do "original work  and to "build winning
products."

　　State-of-the-art training in engineering.  As has
been substanstiated in the literature review, the opportun-
ity to gain state-of-the-art training in one's field is re-
lated to the employee's self-development values and a de-
sire to increase specialist skills.  Several authors
(Herzberg, 1974; Herzberg et al., 1959; Mumford, 1972)
recognize the employee's desire to grow psychologically and
to expand job related skills, abilities and knowledge.
Maslow's (1954) esteem needs include the desire for
strength in terms of feelings of adequacy, mastery and
competence.  In the field of job satisfaction, this neces-
sitates further training.  Pollack (1982) has noted how
rapidly high technology professionals can become outdated
in their skills.

　　Prior to the initiation of this study the partici-
pating organization, recognizing the above employee values,
had in fact announced a significant in-house, ongoing
training program in software engineering.  Such action de-
monstrated an increased and sanctioned commitment by the
organization to state-of-the-art training for its employ-

ees.  Based on this commitment, it is appropriate to con-
sider this job dimension as an important job value.

Job security.  Job security is consistently ad-
dressed in the literature on job satisfaction and warrants
consideration in this study.  While early research (Maier
and Verser, 1982) categorizes this job dimension as highly
valued to workers, recent studies in the high technology
industry (Hay Associates, 1982; Mumford, 1972) show that
job security is becoming less important.  Not only is the
overall unemployment rate low for the type of engineer
participating in this study (Pollack, 1983), but the
availability of such jobs in the vicinity of the partici-
pating organization has been increasing.  It is crucial to
any researcher concerned with job satisfaction, turnover
and employment trends in high technology to keep abreast of
these software engineers' perceptions regarding the secur-
ity of their jobs.

Authority to get a job done.  Increased authority
at work generally has been related to increased levels of
job satisfaction (Herzberg, 1974; Lawler, 1976; Paul,
Robertson and Herzberg, 1969).  Maslow (1954) recognizes
the individual's need to have independence and freedom in
order to gain a sense of self esteem.  The nature of the
work presents an interesting contrast.  While the person-
ality of the computer engineer might suggest a desire for

independence (Kidder, 1982; Mumford, 1972), these profes-
sionals often work in teams in order to solve problems.
Furthermore, being the manager of such a team does not
necessarily imply increased authority. Mumford's findings
support the ambivalence on the part of these employees re-
garding accepting positions of authority. In order to
provide further data to help clarify the value of authority
on the job to computer engineers, this job dimension war-
rants inclusion in the present study.

     Knowledge of management's goals and objectives.
The job dimension "knowledge of management's goals and
objectives" is being considered in this study primarily due
to its place as a recurrent theme in the literature (Herz-
berg et al., 1959; Locke, 1976; Mumford, 1972). The gen-
eral consensus is that commitment to one's own philosophies
and goals outweighs the employee's concern with company
practices and policies (Hay Associates, 1982; Mumford,
1972). An aim then of this study is to determine whether
the participating engineers' views support the research to
date.

     Pay. Earlier discussion has highlighted that the
literature provides conflicting results regarding the ex-
tent to which pay is valued by employees. Mumford (1972)
supports the more traditional view that pay satisfies lower
level needs. However, Lawler (1981) reports that the value

of financial compensation is quite important to workers.
In relating theoretical knowledge and previous research to
the present study, it should be noted that the participa-
ting organization is not known to be an industry leader
when it comes to pay.  Interviews with nonparticipating
engineers, reveal similar conflicting views regarding the
importance of salary.  Due to this controversy, it is
significant that "pay" be included as a job dimension in
this study.

Promotion.  Promotion is well discussed in the
literature on job satisfaction (Herzberg et al., 1959;
Lawler, 1973; Locke, 1976; Mumford, 1972; Vroom, 1964;
Weiss et al., 1967) and turnover (Martin, 1979; Price,
1977).  The value of opportunities for advancement parti-
cularly in the field of high technology raises some in-
teresting considerations.  It should be recalled that
Mumford's (1972) findings reveal that computer specialists
desire promotion less frequently than would be expected in
a rapid growth industry.  Opportunities for upward mobility
are generally readily available for computer engineers in
the expanding high technology market.  Conceivably, due to
this accessibility, the value of promotion is somewhat
taken for granted.  Research of the nature of this study
must include "promotion" in the set of job dimensions of
value to software product development engineers, in light

of these trends that appear to be present in the high
technology industry.

Who one works with. According to the literature,
the importance of working relationships to the employee ap-
pears to depend on the nature of the work (Mumford, 1972).
For example, in Mumford's sample, systems analysts whose
work involves client contact reported that working rela-
tionships were important, yet programmers did not. The
latter group is more similar to the participants in this
study. However, at the participating organization software
product development engineers customarily work in project
teams. A single individual's performance influences all
team members. Thus, "who one works with" can play a
greater role in these engineers' perceptions regarding job
satisfaction than seen in Mumford's study.

Having enough help, equipment and information to
get a job done. The job dimension "having enough help,
equipment and information to get a job done" covers three
related aspects of work which are part of a satisfying job
(Hackman & Oldham, 1975; Herzberg, 1974; Herzberg et al.,
1959; Lawler, 1976; Pollack, 1983; Work in America,
1973). Yet, as indicated in the literature, these are
often taken for granted at the work place (Locke, 1976;
Mumford, 1972). Due to the high ranking of these job
dimensions (second and third most important to employees)

in <u>Work in America</u> (1973), they have been included in
this study. Furthermore, in light of the research and de-
velopment nature of the work of software product develop-
ment engineers, it is believed that these variables are
required in order to conceptualize, design and produce a
working model of a pioneering idea.

## Demographic Factors

Demographic factors are included in this study as
they reflect individual differences in job satisfaction
patterns (<u>Work in America</u>, 1973). Although the fin-
dings in the literature are not consistent, the research of
several authors (Hill & Miller, 1981; Hulin & Smith, 1976;
Mobley, 1982; Mumford, 1972; O'Reilly & Caldwell, 1981;
Pettman, 1975; Porter & Steers, 1973; Portigal, 1976;
Price, 1977; Saleh & Otis, 1964; Siegal & Lane, 1982;
Smith, 1979; Weaver, 1980) addresses the influence of
demographic factors on the job satisfaction of the popula-
tions studied.

For this study standard demographic factors as pre-
sented in Dillman (1978) have been selected for inclusion.
These are: sex; marital status; number of children; level
of education; and level of pay. While the employment
status of the employee's spouse is not specifically focused
on in the literature, it is included here in order to

determine whether there are differences in patterns of job

satisfaction depending on whether there is a second income

in the family. By including in the study information re-

garding when employees received their last promotion, an

attempt is made to determine whether promotion is function-

ing as an enhancer of job satisfaction. This information

is interesting in terms of Mumford's (1972) report that

computer specialists seek promotions less frequently than

expected.

Two other demographic factors taken primarily from

the turnover literature are also included. Findings con-

sistently show that the employee's length of service with

the organization negatively correlates with voluntary

turnover patterns (Mobley, 1982; Mumford, 1972; O'Reilly &

Caldwell, 1981; Pettman, 1975; Porter & Steers, 1973;

Price, 1977) which can be a reflection of job satisfaction.

While there is only a paucity of research (Mobley, 1982)

pertaining to the relationship between the employee's job

referral source and the level of job satisfacion, this area

is a major concern to the industry due to the vast amount

of money and effort expended on recruitment strategies.

Additional demographic factors are not included, as the

population under study either has no or so few members in

those categories, which would result in statistically in-

significant results or a breach of the participants' con-

fidentiality. To summarize, the ten demographic factors being included in this study are:

-age                          -level of education

-sex                          -level of pay

-marital status               -length of service

-number of children          -last promotion

-job referral source         -employment status of
                              spouse

## Special Factors

Six factors which are particularly relevant to the population of software product development engineers at the participating organization have also been selected for inclusion in this study. They are:

-level of burnout            -intent to transfer

-level of stress             -hobbies

-intent to quit              -use of skills, abili-
                             ties and knowledge

Due to the research and development nature of the work of the group under study, this author suggests that the dynamics of stress and burnout have a crucial impact on perceived levels of job satisfaction. The literature review provides further support for this position (Edelwich, 1980; Holt, 1982; Seyle, 1974). This is complicated by the high-in-demand, low-in-supply employment market. These engineers are well aware of the availability of alternative

employment settings if the stress on the job becomes too
great. Information regarding employees' hobbies is in-
cluded based upon the strong belief by management at the
participating organization that computer engineers whose
hobbies involve electronics are more satisfied with their
work.

This author has chosen to include in this study
information regarding the level at which employees' skills,
abilities and knowledge are utilized for two reasons. The
importance of this factor is substantiated in the litera-
ture (Lawler, 1976; Mumford, 1972; Weiss et al., 1967). In
light of Pollack's (1983) report that computer engineers
are dissatisfied with the amount of menial work that they
are required to do, it is suggested that opportunities to
utilize skills, abilities and knowledge will be important
to software product development engineers. In addition to
the study of the employee's intent to transfer or quit as
discussed in the literature (Porter & Steers, 1973; Waters
& Roach, 1979), these specific variables are of strategic
concern to the participating organization. This is due to
its need to employ a great number of these high-in-demand,
low-in-supply engineers.


## Summary

Based on the above discussion, a framework can be sum-

marized which provides a conceptualization and an organiza-
tion of the many factors that contribute to job satisfac-
tion among software product development engineers at a
specific employer. Eleven job dimensions have been iden-
tified which warrant inclusion in the consideration of
these employees' perceived levels of satisfaction with
their jobs. In addition, several demographic and special
factors have been identified which can influence the
population's patterns of job satisfaction.

## Development Of Hypotheses

Based on a discrepancy approach, the conceptual
framework can be used to determine to what extent the above
job dimensions are actualized at the participating organi-
zation and which are the most and least valued by the par-
ticipants in the study. A general premise of this
dissertation is that it is possible to design an instrument
specifically to measure job satisfaction among software
product development engineers in a particular company. It
is also suggested that these engineers will have distinc-
tive patterns of job satisfaction. The design of the
instrument for this study, a computerized questionnaire,
stems from the discrepancy approach. The questionnaire
focuses both on the participant's perceived levels of

opportunity to attain valued aspects of work and how they
rank these job dimensions.

Stemming from the rationale for the selection of job
dimensions included in this study, it is suggested that
some of the factors will be more valued by the participants
than others. Due to the significant importance of intrin-
sic aspects of the work itself to this population, it
appears that opportunities to do original work and to build
winning products will be among the most valued. It is the
belief of this author that high level computer engineers
have needs beyond mere work interest and strive for innova-
tion and creativity in a pioneering sense. Without state-
of-the-art training in engineering, the preceding values
cannot be attained. Thus, it is suggested that such
training will also be highly valued by this population.
These same job dimensions should be the hardest to satisfy
as they are so crucial to the attainment of prestige and
mobility in the industry. In addition, doing original
work, building winning products and participating in state-
of-the-art training programs are the exciting and gratify-
ing parts of the job, as opposed to the maintenance phases
of the work.

Based on the recent literature and current market de-
mands, it is proposed that job security will be a relative-
ly low priority to the software product development engi-

neers, as will knowledge of management's goals and objec-
tives.  If employees are dissatisfied with either of these
aspects of work, they can quickly find another employer who
would be more amenable.  Due to the ambivalence on the part
of computer specialists regarding their desire for in-
creased authority, authority to get a job done will also be
a low priority job value.

This author concurs with Mumford's (1972) view that
pay is a lower level priority of computer specialists.  Pay
is not expected to rank among the most highly satisfied
aspects of work because, as the basic needs regarding pay
are satisfied, the participants aspire to higher values.
However, due to pay's lower level of importance, it will be
relatively easy to satisfy the population's concerns in
this area.

The research and development nature of the partici-
pants' work mandates that the workers be given sufficient
authority to be innovative in order to get their jobs done.
This generally occurs early on and throughout these engi-
neers' careers.  As such, having enough authority to get a
job done will be among the most available job dimensions to
this population.  In addition, as this job factor is not
expected to be ranked among the most highly valued, it will
be easier to satisfy.

The job dimension, "who one works with," takes into

consideration the employees' working relationships with co-
workers, supervisors and subordinates.  In light of the
informal network of interpersonal communication at the par-
ticipating organization and the emphasis on team efforts,
the participants will perceive that they have frequent op-
portunities for satisfying working relationships.  The
demographic and special factors previously mentioned will
influence how participants rank valued job dimensions and
their perceived levels of opportunity to attain those as-
pects of work.

Culminating from the preceeding discussion of job
dimensions to be included in this study and anticipated
patterns of job satisfaction among software product de-
velopment engineers, the following hypotheses are pre-
sented:

1. Depending on the demographic and special factors
   studied, there will be no significant differences
   in the software product development engineers'
   perceived extents of opportunity to attain the 11
   job dimensions associated with job satisfaction.

2. Software product development engineers, due to
   the high demand and strategic need for their
   skills, and the nature of the work environment
   at the participating organization, will perceive
   the greatest opportunities to attain the following
   job dimensions: "good pay;" "having enough author-
   ity to get a job done;" and "who one works with."

3. The participating engineers will perceive the
   least opportunities to: "build winning products;"

do "original work;" and gain "state-of-the-art
training in engineering."

4. Software product development engineers, being
   high-in-demand and low-in-supply in the pio-
   neering industry of computer technology, will
   most highly value job related issues concerning
   opportunities to: "build winning products;" do
   "original work;" and gain "state-of-the-art
   training in engineering."

5. Software product development engineers, due to
   the design of their jobs and the high demand
   for their skills, will least value: "job secur-
   ity;" "having enough authority to get a job
   done;" and "knowledge of management's goals and
   objectives."

6. Depending on the demographic and special factors
   studied, participants will report no significant
   differences in their rankings of the 11 dimensions
   associated with job satisfaction.

# C H A P T E R   I V

## METHOD

The purpose of this localized study is to identify
the factors that most impact the perceived levels of job
satisfaction among software product development engineers
who are employed at the participating organization.  The
following chapter will detail how this goal was accom-
plished.

## Setting

The participating organization is a Fortune 100 Com-
pany and is one of the largest producers of computer hard-
ware and software.  While having offices or manufacturing
plants in several states and countries, the software re-
search and development activities are primarily confined to
one geographic location.  For reasons of confidentiality,
the participating corporation will be referred to as
Fleming, Inc., and the software research and development
division that participated in this study will be referred
to as MATT.

MATT employes 151 software product development engi-
neers whose primary mission is to develop software that is
compatible with the organization's hardware.  Employees of

MATT are domiciled at one of two locations that are within ten miles of each other. Regardless of location, these engineers share primary hardware and are managed by the same executive management team.

MATT is situated near the Massachusetts – New Hampshire border and is within a fifty mile radius of Boston, and even nearer to Routes 128 and 495. This geographic area is where the majority of the high technology firms in Massachusetts and New Hampshire are situated. As a result, job opportunities with other companies are available without MATT employees needing to relocate themselves and their families geographically.

## Subjects

The total population of software product development engineers (151) employed at MATT were invited to participate in this study. The population was identified by personnel records and based solely upon job titles. Only individuals employed at the engineer level and active in product development or in managing such individuals were included. No additional factors (e.g., sex, race, length of service, etc.) were used in the selection process.

The computerized questionnaire developed for this study was electronically distributed to the total popu-

lation (N = 151) of software product development engineers at Fleming, Inc. A total of 104 individuals completed the questionnaire, representing a 69% rate of return.

The respondents were composed of: 82 men, 17 women and 5 individuals who either chose not to indicate their gender, or due to a malfunction of the software, experienced difficulty in correctly registering their response to this question. The average age of the respondents was 30.9 years of age, with the youngest member being 21, and the oldest being 53. The mode age response was 26 years. Almost 60% of the respondents were married, most without children, and 41% had spouses who work full-time outside of the home. Another 31% reported having never been married. Regarding the level of education: 46% had a bachelor's degree; 24% had completed some graduate work; and 23% had a graduate degree. Thus, overall the population was primarily composed of college educated, married men, about 31 years of age, many with working spouses and no children.

## Instrumentation

A computerized questionnaire was developed for this study. A copyrighted software program was designed to both run the questionnaire and compile the data sheet. Appendix I is a paper and pencil version of the computerized ques-

tionnaire used in this study.

The rationale for using a computerized questionnaire was based upon the type of professionals who participated in this study and their accustomed mode of communication at their place of work. More precisely, where other populations might be more comfortable using a paper and pencil to send a letter or to perform some other writing or drawing task, the participants in this study commonly do these same activities via their computer terminals. Furthermore, the participating company's organizational development manager strongly believed that the use of a computerized questionnaire would enhance the subjects' interest in completing such a voluntary task.

## The Questionnaire's Design

To test the hypotheses for this study, multiple choice and rank ordered questions were used. The rationale for the inclusion of each job dimension in the questionnaire has already been discussed in Chapter III. For each rank ordered job dimension there was a corresponding multiple choice question. The reason for this was in order to: (1) identify how important each job dimension was; and then (2) identify to what extent the participants perceived having the opportunity to achieve that valued aspect of work. The remaining questions were included as a means to

ascertain demographic and other specialized information about the participants.

## Pretests

Two pretests were held to assure the clarity of the questions and to test the software developed to administer the questionnaire. For the first pretest, a paper and pencil version of the questionnaire was used solely to determine the clarity of each of the questions included in the study. Twenty-five individuals, 10 engineers not associated with MATT and 15 other people, were used for this initial pretest of the questions. No statistical analyses were conducted on this group as several questions required redesign.

Once this was achieved, a second pretest was conducted in which nine engineering managers employed at MATT completed the computerized version of the questionnaire. No significant "bugs" were found in either the software program or in the questions during this second pretest. The data compiled from the second pretest was used to run the SPSS files that had been created for the later statistical analysis of the actual data.

One modification of the tabulation sheet was necessary to permit the electronic transfer of the data from a VAX computer at the participating organization to a CYBER

computer at the University of Massachusetts where the statistical analysis was conducted. A column of zeros had to be inserted to compensate for the Cyber's method of reading data starting with the second column. This procedure did not alter participants' responses in any way. No analysis of the second pretest was done due to the small number of people who took it and as several of them purposely answered some questions incorrectly in order to test the software program.

## Administration of the Questionnaire

The administration of the questionnaire was done electronically. A two-step, log-on process was used for the purpose of confidentiality. Through the organization's electronic mail system, participants were sent a letter from management that introduced the questionnaire. A copy of the cover letter appears with the questionnaire in Appendix I. It should be noted that all participants had their own terminals and routinely access the electronic mail system usually at least once a day.

The computer program was available to the participants over a 7-day period. Within the cover letter, an access code to take the questionnaire was given. By typing this exact code into the computer, the participants were

able to access the computer file that contained the questionnaire. The multiple choice questions appeared on the terminal's screen one at a time and the next question appeared once the present one was answered. If the respondents did not desire to answer any question, they could press the return button on their keyboard and the next question would appear.

The rank ordering was the last question on the questionnaire. First, all eleven variables included in the study were listed and respondents were requested to choose the most important variable. Once done, the remaining ten variables were displayed on the screen and the participants were asked to choose the one variable that was most important to them. This process continued until only two choices were left. Once one of these last two variables was chosen, the remaining variable automatically was identified as the respondent's eleventh choice.

The program used to run the questionnaire generated a file to store the tabulated responses of the participants. Only completed runs of the questionnaire were saved on this program. Thus, no record was kept of the responses of those individuals who did not complete the total questionnaire. The data was electronically transferred to the Cyber computer at the University of Massachusetts the evening of the seventh day.

## Reliability Of The Instrument

The reliability coefficient of the instrument was
.83, using Cronbach's Coefficient Alpha. This suggests:
(a) that there was little error operating in the measure-
ment instrument; (b) that responses were not random; and
(c) that questions were clear and well administered. Sta-
tistically, this signifies that the questionnaire is a
reliable instrument and that its administration and the
responses by the participants were stable. Furthermore,
the reliability coefficient is a lower bound estimate in-
dicating what parallel forms of administration would
provide.

## Limitations of the Instrumentation

The questionnaire was available to the participants
to take at their convenience over a seven-day period. The
program failed to run several times when participants tried
to complete the questionnaire via computer terminals in
their homes. Due to a miscommunication, the program was
not accessible during the weekend which separated the ini-
tial day that the questionnaire went on-line and the sub-
sequent four days prior to it being taken off-line. A
question pertaining to level of pay during the previous

year had to be discarded, as it requested information for the wrong year.

As earlier noted, the cover letter provided an access code to enter the program that ran the questionnaire. All participants used exactly the same access code. This was done as a method of assuring the confidentiality of the participants. It must be recalled that those who participated in the study have expertise in both the hardware used to run the questionnaire and in software design.

It became apparent while the questionnaire was on-line that it was conceivable that confidentiality could be threatened. This was due to an independent security system in the computer that traces and logs all activities that occur on the computer system. This possible issue regarding confidentiality was addressed by management, after a conversation with this author, through a letter to the participants in the study. A copy of the letter that was sent out to contend with this problem appears in Appendix II. It should be noted that this letter was sent to the participants electronically. After this letter was sent to all participants, thirty more individuals then chose to complete the questionnaire. To what extent these individuals chose to complete the questionnaire due to this issue being addressed is not known.

As far as this researcher and members of the partici-

pating organization know, ours was pioneering work in using a computerized questionnaire. All possible means to guarantee confidentiality were thought to be covered. The manner of accessing the questionnaire was not believed to allow for any breach of confidentiality and in reality no such concerns ever materialized.

## Methods of Data Analysis

The data collected through the questionnaire was analyzed using several statistical techniques available through the Statistical Package for the Social Sciences (SPSS). The analysis of Hypothesis 1, which focuses on whether demographic and special factors significantly contributed to the participants' perceived opportunities to attain valued aspects of work, was a two-phased process. First, a factor analysis was performed in order to reduce the 11 items that may have contributed to job satisfaction. More precisely, a J-factor analysis (maximum likelihood method of estimation) with orthogonal rotation was used on SPSS due to the exploratory nature of the study.

This process provided general underlying constructs which best explain the overall data gathered in this study and also set a framework for testing the hypotheses. For each factor a score (sum) was computed based on the parti-

cipants' responses to the questions which comprised that factor. The responses to the demographic and special factor questions were recoded for dummy variables.

The second phase was a step-wise multiple regression. The sum for each factor identified in the factor analysis functioned as the dependent variable, and the demographic and special factors as the independent variables. This information described the relationship between demographic or special factors, and the factor analysis variables.

In order to analyze the data pertaining to hypotheses 2 and 3, which address to what extent the participants perceived opportunities to attain valued job dimensions, simple frequency distributions with mean responses and standard deviations were computed. This process served to identify which job dimensions the participants perceived the greatest and the least extents of opportunity to attain. The same procedures were used to analyze the data relating to hypotheses 4 and 5, which focus on rank ordering of the 11 job dimensions being studied.

The analysis of hypothesis 6, which determines whether demographic and special factors significantly contributed to the participants' rank ordering of job dimensions, utilized the Mann-Whitney U Test. This test was chosen as it determines whether the rank orderings of the 11 job dimenisons were random or the same for the independent var-

iables, namely the demographic and special factors. The dependent variable in each case was a job dimension (e.g., "good pay," "original work," "interesting work"). If the null hypothesis is accepted there is no difference in rankings based on the demographic or special factors being analyzed.

The Mann-Whitney procedure requires that the data pertaining to the independent variable be divided into two distinct groups, rather than the four or five choices provided for in the questionnaire. For each demographic and special factor tested the multiple choice options were divided into two groups as follows.

For the demographic factor sex, participants were identified as either male or female. Age was divided into two groups, those participants who were: (a) 30 years of age or younger; or (b) 31 years of age or older. Marital status was divided into: (a) married participants; or (b) those who were never married, or those who were separated, divorced, or widowed. For each of the five age categories of children (under five years of age, 5-13, 14-18, 19-23, over 23) the number of children that participants had was either: (a) no children in the category; or (b) one or more children in the category.

Participants were either referred to the organization by: (a) a friend, relative or teacher; or (b) through a

newspaper or journal advertisement, employment agency, company recruiter, call or visit to the organization, or a college recruiting program. For level of education, the two groupings were: (a) some college education or less; or (b) a BA degree or more. For length of service, the respondents were either in the : (a) two years of tenure or less group; or (b) the greater than two years of service group. Last promotion occurred: (a) within less than the past year; or (b) one year ago or greater. Spouses were identified as either working: (a) full-time; or (b) part-time or not at all.

A similar procedure was followed to prepare the special factors to be analyzed using the Mann-Whitney U Test. Level of burnout was divided into: (a) the large or very large extent level; or (b) the moderate extent or less level. Similarly, level of stress was either: (a) some of the time or less; or (b) much of the time or more. Intent to quit or transfer was grouped according to the participants' plans to: (a) quit or transfer within two years or less; or (b) remain more than two years.

Hobby groupings were divided in two ways. In the first version, hobbies were either: (a) electronics related; or (b) outdoor recreational, arts and theater, reading, listening to music, watching movies/television, sports or no hobby. In the second version, hobbies were

either: (a) outdoor recreational or other sports activi-

ties; or (b) the other choices listed above. The intent in

carrying out the first analysis was to determine whether a

trend, seen at another division of the participating organ-

ization towards lower rates of turnover among engineers

with electronics related hobbies, was significant at this

division. For the second analysis the aim was to identify

whether the easy access to outdoor recreational activities

provided by the location of the participating organization

made a significant difference in results. Regarding the

final special factor, utilization of skills, abilities, and

knowledge was analyzed according to whether SKAMS were

used: (a) 90% or more of the time; or (b) 80% or less of

the time.

## Chapter Summary

A computerized questionnaire was electronically dis-

tributed to 151 software product development engineers at

the participating organization. The purpose was to identi-

fy the factors that most impact their perceived levels of

job satisfaction. A total of 104 individuals completed the

questionnaire representing a rate of return greater than

69%. The reliability of the instrument was .83, using

Cronbach's Coefficient Alpha. Six hypotheses were tested

to determine: (a) the participants' perceived levels of opportunity to attain eleven job dimensions; (b) their rankings of these job dimensions; and (c) the influence of demographic and special factors on the findings.

# C H A P T E R   V

## RESULTS AND DISCUSSION

### Introduction

The purpose of this chapter is to present and discuss the results of the data analysis.  The six hypotheses tested focused on either how the participants rank ordered the 11 job dimensions or to what extent they perceived that they were satisfied with these dimensions.  To reiterate, the 11 job dimensions included in this study were:

1. Building winning products
2. Good pay
3. Interesting work
4. Job security
5. Original work
6. Opportunities to gain state-of-the-
   art training in engineering
7. Who one works with
8. Opportunities for promotion
9. Having enough authority to get a job done
   objectives
10. Knowledge of management's goals and objectives
11. Having enough help, equipment and in-
    formation to get a job done

The first three hypotheses focused on how the software product development engineers perceived opportunities to attain the above job dimensions. A factor analysis, presented in Hypothesis 1, provided general underlying constructs that explain the overall data. How demographic and special factors influenced the participants' patterns of satisfaction with these underlying constructs was also examined. Hypotheses 2 and 3 examined what specific job dimensions the participants were the most and least satisfied with.

The remaining hypotheses examined how the participants rank ordered the job dimensions (Hypotheses 4 and 5) and whether demographic and special factors significantly influenced the rankings. The chapter concludes with the limitations of the study and a chapter summary.

## The Data Analysis

### Hypothesis 1

Depending on the demographic and special factors studied, there will be no significant differences in the software product development engineers' perceived extents of opportunity to attain the 11 job dimensions associated with job satisfaction.

The data analysis begins with a factor analysis as such a technique provides underlying constructs which can explain the overall data. Through such a process, the 11

job dimensions associated with job satisfaction were re-
duced to factors with meaningful patterns.  Table 1 dis-
plays the factor loadings.

|                                          | Factors |         |         |
| Job Dimensions                           | 1       | 2       | 3       |
| --- | --- | --- | --- |
| Building Winning Products                | .45277  | .18691  | .28880  |
| Good Pay                                 | .24252  | .41577  | -.14110 |
| Interesting Work                         | .52862  | .19947  | .11393  |
| Job Security                             | .16365  | .01194  | .98594  |
| Opportunities for Original Work          | .96806  | .05605  | .05701  |
| State-Of-The-Art Training                | .04993  | .50762  | .09275  |
| Relationships With Co-workers            | .21727  | .26733  | .11472  |
| Opportunities for Promotion              | .04179  | .50990  | .23812  |
| Authority To Get A Job Done              | .31176  | .08242  | .03472  |
| Knowledge of Management's Goals and Objectives | .08160 | .82597 | .07763  |
| Having Enough Help, Info & Equip to Get A Job Done | .39130 | .47913 | .20642 |
| Chi Square with 25  D.F. = 33.7441       |         |         |         |

Table 1.  Factor Loadings.

The J-factor (maximum likelihood method of estima-
tion) analysis with orthogonal rotation was chosen as an
exploratory approach to assess the existence of underlying
factors for the observed data.  It yielded a three factor
model.  Using the chi square goodness of fit test, the
factors were found to fit the hypothetical model at the
level of significance of $p = .113$ which is greater than

the .05 level. Thus, the factor analysis lends evidence to the construct validity of the questionnaire, indicating that there were underlying traits being reliably measured.

Once the factor analysis was completed, a step-wise multiple regression was carried out in order to test hypothesis 1. A computed score (sum) for each factor was used as the dependent variable, and the demographic and special factors as the independent variables. The demographic and special factors included in the study were:

Demographic factors-

| | |
|---|---|
| -age | -level of education |
| -sex | -level of pay |
| -marital status | -length of service |
| -number of children | -last promotion |
| -job referral source | -employment status of spouse |

Special factors-

| | |
|---|---|
| -level of burnout | -intent to transfer |
| -level of stress | -hobbies |
| -intent to quit | -use of skills, abilities and knowledge |

As discussed in Chapter 4, each independent variable was divided into two groups (e.g., for age: 30 years or less; or 31 years or more). T- tests determined whether there was a significant difference between the group means. Tables 2,3 and 4 display the significant two-tailed probabil-

ities for the t-tests (p < .05) for each of the three
factors.

Factor A. Factor A was composed of the following
job dimensions: "building winning products;" "interesting
work;" "original work;" and "authority to get a job done."
In a general sense, these dimensions of work focus on ac-
tual job tasks. They reflect the research and develop-
ment nature of the software product development engineer's
work, namely to create a product that is on the leading
edge. Having the "authority to get a job done" assists the
employee in accomplishing such pioneering work. As pro-
posed in the conceptual model, "building winning products,"
"original work" and "interesting work" all stem from self-
development values. Factor A can thus be seen as an
intrinsic job factor in an industry which experiences con-
stant technological innovation and challenge.

The results pertaining to Factor A are presented in

| Demographic or Special factor | N | df | Mean score | Two-tailed probability |
|---|---|---|---|---|
| Stress | | | | |
|   -never or some of time | 56 | | 10.6429 | |
|   -much or all of time | 48 | 93.8 | 9.5208 | .049 |
| How much spouse works | | | | |
|   -half time or more | 50 | | 9.5200 | |
|   -quarter time or less | 54 | 102. | 10.6852 | .041 |
| Last promotion | | | | |
|   -within last year | 39 | | 9.3077 | |
|   -more than one year | 65 | 90.5 | 10.6154 | .026 |

Table 2. Factor A t-tests.

Table 2. Participants whose spouses worked at least half time perceived greater opportunities to experience Factor A values than did those whose spouses worked less, or those who were never married. Conceivably, due to a second income in the family, these engineers felt less concern for basic needs such as pay, promotion and job security, and thus focused more on intrinsic job dimensions. Engineers who received a job promotion in the past year also reported greater opportunities to attain this intrinsic job factor. In their new positions these engineers may have envisioned themselves as having more "authority to get a job done," more opportunity to do "interesting and original work," and a better chance to "build winning products."

Participants who reported higher levels of stress also perceived greater opportunities to achieve the intrinsic job values included in Factor A. Stress can be viewed as a motivator which encourages employees to achieve. An implication is that in stress management and other interventions a clear delineation must be made between positive and negative stressors. In this way, positive stressors can be used to facilitate employees to take opportunities to do "interesting" and "original work," to exert their "authority to get a job done" and to "build winnning products."

Factor B. Factor B was composed of: "good pay;" "promotion;" "having enough help, equipment, and informa-

tion to get a job done;" "knowledge of management's goals and objectives;" "opportunities to gain state-of-the-art training in engineering;" and "who one works with." These job dimensions are all extrinsic to the job and are either benefits from doing the work or factors that enhance the work process. "Pay" and "promotion" are traditional extrinsic rewards. The remaining job dimensions are "tools" which facilitate the accomplishment of job tasks.

By having the support of coworkers and the necessary help, equipment and information, the employee can better achieve management's goals and objectives. Having knowledge of management's goals and objectives assists employees in understanding the direction and scope of their work. Their exposure to state-of-the-art training, in an industry which is producing and experiencing rapid technological growth, is crucial.

The results pertaining to Factor B are displayed in Table 3. Participants who were promoted within the previous year perceived greater opportunities to experience Factor B values than did those who were never promoted or who were promoted one or more years ago. Conceivably, the experience of being recently promoted serves as a stimulus for perceptions of increased opportunity to attain Factor B values, especially within the first year after a promotion.

| Demographic or special factor | N | df | Mean score | Two-tailed probability |
|---|---|---|---|---|
| Intent to quit | | | | |
| -staying 2+ yrs. | 74 | | 15.5541 | |
| -leaving < 2 yrs. | 30 | 46.0 | 17.5667 | .008 |
| Intent to transfer | | | | |
| -staying 2+ yrs. | 49 | | 15.1224 | |
| -stay 2 or less yrs. | 55 | 101. | 17.0364 | .005 |
| Last promotion | | | | |
| -promoted within 1 yr. | 39 | | 14.9487 | |
| -promoted 1 yr. or more | 65 | 97.5 | 16.8462 | .004 |

Table 3.  Factor B t-tests.

The separate findings regarding "intent to transfer" and "intent to quit" warrant attention.  Fifty-five engineers (or nearly 62% of the participants) reported plans to transfer in two or less years.  Based on the results of the t- test, these engineers perceived fewer opportunities to experience the extrinsic Factor B values than did those engineers who reported plans to remain at their current place of work longer.  Similarly, 32% of the participants reported plans to quit the organization in two or less years.  These same engineers perceived fewer opportunities to attain extrinsic job values.

These results indicate that the job dimensions included in Factor B played a significant role in the stay-transfer-quit decision-making process.  Inadequate opportunities for "good pay," "promotion," "state-of- the-art training in engineering," "knowledge of management's goals and objectives," and "having enough help, equipment

and information to get a job done" all contributed to these strategic engineers' reported intent to leave their division or the organization. As both "intent to transfer" and "intent to quit" yielded similar results, the strong internal validity of the questionnaire and of these particular questions is demonstrated.

Factor C. Factor C was composed of the single job dimension "job security." Of interest, when various factor analysis models (two, four and six factor) were tried, this job dimension also remained alone. Several demographic factors (Table 4) influenced the employees' sense of job security. Participants who were: 31 or older; who had less than a bachelor's degree; who had at least one child in the 14 to 18 age category; who have been with the organization for more than two years; or whose spouse worked at least half- time, all perceived fewer opportunities for job security than did their counterparts.

Those with less formal education might have felt more threatened by peers with more formal education in this rapidly advancing industry. The participants who had children in the 14 to 18 age group conceivably were feeling pressured to remain in the same geographical area due to the formal and informal desires of their adolescent children. It must be noted that there were only seven respondents in this category. As only one participant reported having

| Demographic or special factor | N | df | Mean score | Two-tailed probability |
|---|---|---|---|---|
| Length of service | | | | |
| -two or less yrs. | 31 | | 1.9355 | |
| -more than 2 yrs. | 73 | 83.0 | 2.4247 | .003 |
| Amount spouse works | | | | |
| -half-time or more | 50 | | 2.4600 | |
| -quarter-time or less | 54 | 97.8 | 2.1111 | .044 |
| Age | | | | |
| -30 or less | 54 | | 2.0370 | |
| -31 or older | 50 | 90.3 | 2.5400 | .004 |
| Level of education | | | | |
| -less than BA degree | 7 | | 3.0000 | |
| -BA degree or more | 97 | 6.7 | 2.2268 | .025 |
| Children 14 to 18 yrs. | | | | |
| -none | 97 | | 2.2268 | |
| -1 or more children | 7 | 7.0 | 3.0000 | .025 |
| Level of burnout | | | | |
| -high level | 17 | | 2.7059 | |
| -low level | 87 | 20.2 | 2.1954 | .029 |

Table 4. Factor C t-tests.

children older than 18, the impact of having college-aged children on the empoyee's sense of job security is not known. The older employees and those who had more tenure might have perceived less job security as they were witnessing a major organizational redesign at the participating company. This included job freezes, job realignments and a recent loss of presitge in the industry for the participating organization.

Of the 6 special factors tested in this study, only the "level of burnout" significantly influenced perceived job security. Participants who reported higher levels of burnout perceived having less job security. What is not known is to what degree these engineers were projecting

their high sense of burnout onto their underlying desire to leave the organization.

To summarize the findings of Hypothesis 1, participants whose spouses worked half-time or more, who were promoted in the past year, or who reported higher levels of stress also perceived greater opportunities to attain the intrinsic job values included in this study. Those who were promoted in the last year also perceived greater opportunities to attain the extrinsic job dimensions studied. Fewer opportunities to experience the extrinsic job dimensions were reported by the participating engineers who planned to transfer or quit in two years or less. Several demographic factors significantly contributed to the participants' reports of fewer opportunities to attain job security. Regarding special factors, only the level of burnout significantly influenced perceived job security.

Therefore, the null hypothesis is rejected. There were significant differences in the participants' perceived extents of opportunity to attain the 11 job dimensions, depending on some of the demographic and special factors. The following two hypotheses examine the data in a more specific way. Moving beyond general constructs, the analysis will now focus on the participants' perceptions regarding the job dimensions they had the greatest and the least opportunities to attain.

## Hypothesis 2

Software product development engineers, due to
the high demand and strategic need for their
skills, and the nature of the work environment
at the participating organization, will perceive
the greatest opportunities to attain the following
job dimensions: "good pay;" "having enough authority
to get a job done;" and "who one works with."

The data analysis pertaining to Hypothesis 2 is a
simple frequency distribution presentation. Eleven ques-
tions were designed to identify to what extent the partici-
pants were satisfied with their opportunities to gain each
of the 11 job dimensions. Each extent question offered
five multiple choice responses:

      1. To a very large extent

      2. To a large extent

      3. To a moderate extent

      4. To a small extent

      5. To no extent

Table 5 displays the frequency distributions and mean re-
sponses of the participants' perceived levels of oppor-
tunity to attain the various job dimensions. The 11 job
dimensions are placed in Table 5 in order of numerically
increasing mean response values. Therefore, the job di-
mensions which the participants perceived the greatest
levels of opportunity to attain are placed first.

Of the 11 job dimensions, the participanting engi-
neers reported the greatest opportunity to attain positive

working relationships ("who one works with").  This finding
supports the prediction of Hypothesis 2.  The findings re-
veal that the engineers perceived having the next highest
levels of opportunity to do "interesting work" and to
attain "job security."  They were not as satisfied with
their level of "pay" nor with their extent of "authority to

| Numeric Responses: | 1 | 2 | 3 | 4 | 5 | $\overline{X}$ | SD |
|---|---|---|---|---|---|---|---|
| Who one works with | 21 | 51 | 28 | 2 | 5 | 2.16 | .837 |
| Interesting work | 18 | 50 | 25 | 10 | 0 | 2.26 | .863 |
| Job security | 19 | 47 | 29 | 8 | 1 | 2.28 | .886 |
| Enough help, info & equip to get a job done | 17 | 40 | 33 | 14 | 0 | 2.42 | .921 |
| Original work | 19 | 36 | 29 | 13 | 5 | 2.50 | 1.09 |
| Good Pay | 6 | 55 | 26 | 10 | 6 | 2.56 | .957 |
| Enough authority to get job done | 4 | 47 | 38 | 13 | 1 | 2.61 | .795 |
| Opportunities for promotion | 4 | 33 | 43 | 18 | 3 | 2.83 | .873 |
| State-of-the-art training in eng. | 9 | 27 | 38 | 26 | 4 | 2.89 | 1.00 |
| Building winning products | 11 | 29 | 33 | 17 | 12 | 2.90 | 1.16 |
| Knowing management's goals & objectives | 1 | 23 | 28 | 40 | 10 | 3.40 | 1.11 |

Table 5:  Frequency Distributions & Means for Extents of
Opportunity to Attain Job Dimensions.

get a job done," as had been hypothesized. The mean re-
sponse for the preceding two job dimensions were sixth
and seventh highest, respectively.

As discussed in the conceptual model, the high level
of opportunity to experience positive relationships with
co-workers ("who one works with") reflects the employees'
satisfaction with the less rigid forms of interpersonal
communication common to high technology organizations. It
is suggested that the participants liked whom they worked
with and the social atmosphere of their work environment.
The data supports Mumford's (1972) finding that employees
who felt that this aspect of work was important were also
satisfied with their opportunities for pleasant social re-
lationships.

The findings regarding "good pay" warrant examina-
tion. The fact that the participants did not perceive
greater opportunities to get a satisfying level of pay may
reflect the earlier stated position of the participating
organization. This corporation is known not to be an in-
dustry leader when it comes to compensation. However, the
data does not suggest that the employee's basic need for
pay, in the context of Maslow's (1954) lower level needs,
was not being satisfied. Fifty-nine percent of the par-
ticipants categorized their level of satisfaction with pay
as either high or very high.

The relatively low level of perceived opportunity to attain the job dimension "having enough authority to get a job done" may have been a reflection of the content of the question. Freedom to alter directives, as stated in the question, may have been too specific a measure of authority at work.

The engineers' reports regarding "job security," while contradictory to the hypothesis, are understandable in terms of the high-in-demand, low-in-supply nature of the current employment market. However, the findings pertaining to "interesting work" are less easily explained. It was the view of this author that it would be very difficult to satisfy high technology engineers' desire to do enough "interesting work." This was based on Pollack's (1983) report that many of them leave the profession due to the number of mundane activities required of them.

Hypothesis 2 was only correct in terms of positive working relationships ("who one works with"). The participants' high levels of perceived opportunity to do "interesting work" and to gain "job security" were contradictory to the hypothesis. The engineers reported that they were not as highly satisfied as had been hypothesized with opportunities for "good pay" and for having the "authority to get a job done."

Hypothesis 3

The participating engineers will perceive the
least opportunities to: "build winning products;"
do "original work;" and gain "state-of-the-art
training in engineering."

Table 5 displays the frequency distributions and mean
responses of the participants' perceived levels of opportu-
nity to attain the various job dimensions. The engineers
were least satisfied with their opportunities to gain know-
ledge of management's goals and objectives," to "build win-
ning products," and to gain "state-of-the-art training."
Two of the job dimensions hypothesized to be in this cate-
gory actually were.

Approximately 29% of the participants reported having
a small or no extent of opportunity to participate in
"building winning products" or to gain "state-of-the-art
training in engineering." It should be recalled that these
job dimensions were hypothesized to be difficult to attain
due to their emphasis on hard to satisfy values related to
intrinsic job characteristics. These include: achievement,
the need to increase one's skills and abilities, and self
development (Herzberg, 1974; Herzberg et al., 1959; Maslow,
1954; Mumford, 1972; Pollack, 1983). These job dimensions
reflect the essence of the software product development en-
gineer's work: to have the necessary skills, abilities and
knowledge to build winning products.

Management at the participating organization was aware

that these engineers were not adequately satisfied with the opportunities for continuing education, as a more comprehensive training program had already been designed prior to the initiation of this study. The participants' report of a low level of satisfaction with their opportunities to "build winning products" might be of concern to the participating organization. However, it is important to remember that this job dimension epitomizes the "icing on the cake," as it approaches Maslow's (1954) concept of self-actualization.

The remaining job dimensions related to Hypothesis 3 are "original work" and "knowledge of management's goals and objectives." "Original work" was not among the three job dimensions which the participants were least satisfied with. Overall, 53.9% of the participants were satisfied with their opportunities to do "original work" to a large or very large extent.

The participants were less satisfied than predicted with their opportunities to gain "knowledge of management's goals and objectives." Forty-nine percent of the participants perceived only a small or no extent of opportunity to attain this job dimension. Therefore, of all the job dimensions tested, the respondents were least satisfied with the amount of knowledge they held concerning management's goals and objectives. As will be seen in Hypothesis 5,

this finding is not of primary concern due to this job di-
mension's equally low ranking in terms of its importance.

Thus, Hypothesis 3 is accepted in terms of "building
winning products" and "state-of-the-art training in engi-
neering," yet not in terms of "original work." The re-
maining hypotheses examine how the participants rank or-
dered the 11 job dimensions and factors which contributed
to the results.

## Hypothesis 4

Software product development engineers, being
high-in-demand and low-in-supply in the pio-
neering industry of computer technology, will
most highly value job related issues concerning
opportunities to "build winning products;" to
do "original work;" and to gain "state-of-the-
art training in engineering."

On the questionnaire developed for this study, the
participating engineers were asked to rank order the 11 job
dimensions. Table 6 displays the simple frequency distri-
butions of their responses to this question. In Table 7
mean responses are listed, beginning with the job dimen-
sions which the participants ranked as being the most im-
portant to them.

Overwhelmingly, the respondents ranked "interesting
work" as the single most important job dimension. Sixty-
three of the 104 subjects (60.6%) identified this job di-
mension as their first choice. The participants did not

Choices

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Building Winning Products | 10 | 13 | 8 | 15 | 11 | 7 | 9 | 10 | 11 | 6 | 4 |
| Good Pay | 5 | 16 | 14 | 23 | 10 | 12 | 8 | 3 | 8 | 2 | 3 |
| Interesting Work | 63 | 14 | 14 | 3 | 5 | 5 | -- | -- | -- | -- | -- |
| Job Security | 2 | 4 | 11 | 6 | 7 | 11 | 9 | 5 | 14 | 15 | 20 |
| Original Work | 3 | 18 | 8 | 7 | 7 | 8 | 15 | 12 | 12 | 8 | 6 |
| State of Art Training in Engineering | 4 | 7 | 7 | 9 | 10 | 11 | 11 | 7 | 6 | 15 | 17 |
| Who one works with | 7 | 12 | 16 | 16 | 5 | 12 | 10 | 11 | 3 | 5 | 7 |
| Promotion | 4 | 3 | 7 | 6 | 13 | 10 | 13 | 14 | 16 | 14 | 4 |
| Authority to Get a Job Done | -- | 4 | 8 | 7 | 8 | 7 | 11 | 15 | 14 | 11 | 19 |
| Knowledge of Management's Goals & Objs. | 1 | -- | 5 | 6 | 11 | 10 | 6 | 13 | 10 | 19 | 23 |
| Enough Help, Info & Equip to Get Job Done | 5 | 13 | 6 | 6 | 17 | 11 | 12 | 14 | 10 | 9 | 1 |

Table 6. Simple Frequency Distributions of Participants' Rankings of the 11 Job Dimension.

rate any other job dimension so highly. They ranked "good pay" as the second most important aspect of work, and "who one works with," as the third.

The data in Table 7 clearly indicates that "interesting work" was the most important dimension of work to the engineers in this study. This finding gains further credence in light of the report by management at the participating organization that turnover increases while these engineers are involved in the "maintenance" phase of a project. As earlier discussed, it is during the mainte-

|  | Mean | SD |
|---|---|---|
| Interesting Work | 1.923 | 1.439 |
| Good Pay | 4.788 | 2.522 |
| Who one work with | 5.308 | 2.900 |
| Building Winning Products | 5.413 | 2.971 |
| Enough Help, Info & Equip to Get Job Done | 5.875 | 2.705 |
| Original Work | 6.043 | 2.987 |
| Promotion | 6.837 | 2.630 |
| State-Of-Art-Training in Engineering | 6.875 | 3.115 |
| Job Security | 7.375 | 3.025 |
| Authority to Get a Job Done | 7.538 | 2.741 |
| Knowledge of Management's Goals & Objs. | 8.019 | 2.622 |

Table 7. Mean Responses of Rank Ordered Job Dimensions.

nance phase that work tends to be more mundane (Pollack, 1983).

In Hypothesis 4, it had been predicted that "original," not "interesting work" would be one of the three most valued aspects of work to the population. Due to the research and development focus of the participants' jobs, this author expected that "interesting work," by itself, would not be enough to satisfy these engineers. Rather, it was hypothesized that due to the prestige and financial

returns of being on the leading edge, "original work" would be more highly valued. However, the results indicate that "original work" was only ranked as the sixth most valued job dimension. This finding is important as a major component of these engineers' work is devoted to creating new and original products.

The high ranking of "interesting work" supports: (a) Herzberg et al.'s (1959) identification of the work itself as an intrinsic motivator (satisfier); (b) Herzberg's (1974) identification of interesting work as an important aspect of job content; (c) the National Advertising Bureau's (as cited in McLean, 1984) ranking of interesting work as a highly valued job dimension to high technology engineers; (d) Mumford's (1972) finding that the nature of the work was the most significant determinant of job satisfaction; and (e) Locke's (1976) classification of mental challenge as a crucial aspect of job content. Furthermore, several authors (Dalton & Todor, 1979; Pollack, 1983; Porter & Steers, 1973) reported a relationship between menial work and turnover.

The results of this study show that "interesting work" was not necessarily "original work," and that it was the former which was more important to the participants. This finding becomes particularly relevant when the job design of these high-in-demand, low-in-supply engineers is

being considered. Through redesigning different tasks of the job, the level of interesting work can be enhanced to better assure continued job satisfaction.

The participants' high ranking of "good pay" as the second most important aspect of work, while it was not hypothesized to be so highly valued, supports the work of Lawler (1981), rather than Mumford (1972). This is note- worthy in light of Mumford's research having been conducted on computer personnel. For the software product develop- ment engineers who participated in this study, pay was im- portant. Several explanations for this are possible.

First, the participating organization is not known to be an industry leader when it comes to pay. Secondly, there has been a recent increase in the number of high technology companies in the locale of the participating organization. A result of this is increased local competi- tion for personnel. Conceivably, the participants in this study are aware of their opportunities to change employers without geographically relocating their homes and families. While the literature does not provide a consensus regarding pay's role in terms of job satisfaction, pay still is gen- erally considered a part of the decision-making process re- garding job selection. As a result of the present findings and those discussed earlier in Hypotheses 1 and 2, it is apparent: (a) that pay was highly valued; (b) that the

participants reported that they were generally satisfied with their level of pay; but (c) that pay was contributing the engineers' decision to either transfer or quit.

The participants ranked the job dimension "who one works with" as being highly valued (overall third), which was not expected. The literature was inconclusive in this area. In Mumford's (1972) work, where this issue was addressed, working relationships were not found to be important to the portion of her sample (computer programmers) who were somewhat similar to the participants in this study. One explanation for the finding in this study might be that the engineers at the participating organization work in project teams. The impact of a single individual's poor or outstanding performance affects all team members. Thus, "who one works with" can simultaneously be an enhancer or a hindrance in one's own work related pursuits.

It was hypothesized that the participating engineers would highly value having the opportunity to "build winning products." This was due to the emphasis on psychological growth needs of the employee, which can be satisfied by the intrinsic returns of the job. The results of the study show that the hypothesis was incorrect in relation to this job dimension. It should be noted that the participants did rank "building winning products" as their fourth most valued aspect of work. In the fast-paced high technology

industry, where the prestige and the money come from building winning products, it was expected that this job dimension would have been among the three most highly valued.

The desire to gain ongoing "state-of-the-art training in engineering" was hypothesized to be important based on reports in the literature that employees want to grow psychologically in their jobs and to increase their skills (Herzberg et al., 1959; Herzberg, 1974; Maslow, 1954; Mumford, 1972; Pollack, 1983). The findings of this study contradict these researchers, as the participants ranked this dimension of work only as eighth in importance. Prior to this study being conducted, management at the participating organization had announced a significant in-house training program in engineering. In light of this increased and sanctioned commitment by the organization to ongoing education, and thus the anticipated fulfillment of this value, the participants' perceived values may have shifted in their own hierarchies.

Based on the results of this study, Hypothesis 4 is rejected. In light of the findings and the overwhelming identification of "interesting work" as the single most important job dimension to this population, several implications for job enrichment can be presented.

High-in-demand, low-in-supply product development

engineers need to be rewarded for all of the interesting work that they do, not just for the original work which results in winning products. Jobs need to be redesigned to maximize the employee's ongoing perception of interesting work, which would be further enhanced by distributing rewards throughout the cycle of a project, such as also during the maintenance phase. While traditional forms of rewards (e.g., pay and promotion) certainly must be considered, it is the view of this author that more creative and flexible reward systems would facilitate job enrichment.

## Hypothesis 5

> Software product development engineers, due to the design of their jobs and the high demand for their skills, will least value: "job security;" "having enough authority to get a job done;" and "knowledge of management's goals and objectives."

The participants' rankings of the 11 job dimensions are presented in Table 6, and their mean responses, in Table 7. The findings reveal that the participants ranked "knowledge of management's goals and objectives" as the least important job dimension. Twenty-three respondents (22.1%) ranked this variable as their eleventh choice. They ranked "having enough authority to get a job done" as the second least valued job dimension and "job security," as the third. These findings are consistent with the pre-

dictions made in Hypothesis 5. In light of the conceptual model presented in Chapter III, the present employment conditions for these professionals, and the vicinity where the participating organization is located, there are several points that need to be considered.

The participants' low ranking of "knowledge of management's goals and objectives" supports the reports in the literature that commitment to one's own values outweighs identification with organizational goals (Hay Associates, 1982; Mumford, 1972). As high technology engineers are currently in such great demand, they have the luxury of moving to another company if they feel that they are not adequately informed of management's goals and objectives, or if they disagree with the philosophy of the organization.

The recent increase in the number of high technology companies located in the vicinity of the participating organization may be resulting in an increased availability of local jobs. This could find the participants with a decreased need for a sense of job security. The high demand for the type of professionals who participated in the study also may have played a role. The data supports Mumford's (1972) findings and Pollack's (1983) report regarding the low unemployment rate for engineers. Conceivably, as increasing numbers of these professionals become available,

job security will become a more valued job dimension to
this population.

Several points warrant mention when examining the low
ranking of the job dimension "having enough authority to
get a job done." Due to the rapid pace of the high tech-
nology industry, computer specialists are often given con-
siderable authority and responsibility early on in their
careers (Kidder, 1982; Mumford, 1972). Mumford's work
identified that the level of authority was often greater
than desired. The findings in this study suggest that
these product development engineers would rather be doing
the actual work than being responsible for the work of
others. Based on the results of the data analysis, Hypo-
thesis 5 is accepted in terms of all three job dimensions
tested.

## Hypothesis 6

> Depending on the demographic and special factors
> studied, participants will report no significant
> differences in their rankings of the 11 dimensions
> associated with job satisfaction.

Hypothesis 6 focused on patterns of the participants'
rankings of the 11 job dimensions depending on demographic
and special factors. To reiterate, the demographic factors
addressed were:

-age                          -level of education

-sex                          -level of pay

<pre>
        -marital status          -length of service

        -number of children      -last promotion

        -job referral source     -employment status
          .                         of spouse
</pre>

The special factors were:

<pre>
        -level of burnout        -intent to transfer

        -level of stress         -hobbies

        -intent to quit          -use of skills, abilities
                                    and knowledge
</pre>

The Mann-Whitney U Test was chosen to test this hypothesis. The procedure required that the data pertaining to the independent variable (demographic or special factor) be divided into two distinct groups. These groupings were presented earlier in Chapter 4. For each independent variable a two-tailed corrected probability was computed. Table 8 displays the results of the probabilities which were statistically significant ($p < .05$). The Mann-Whitney U test is nondirectional and only demonstrates differences in group means.

The central finding for Hypothesis 6 was that all ten demographic factors analyzed in this study were found to be significant in influencing the participant's rankings of several of the eleven job dimensions. While this finding is a rejection of the null hypothesis, the results do not display any strong implications regarding these

| Independent<br>Variable | Dependent<br>Variable | Two-tailed<br>Probability |
|---|---|---|
| sex | original work | .0140 |
| sex | who one works with | .0114 |
| sex | having enough help, info<br>& equip to get job done | .0055 |
| children under<br>5 years old | having enough help, info<br>& equip to get job done | .0180 |
| children from<br>5 to 13 years | building winning<br>products | .0001 |
| age | building winning<br>products | .0121 |
| age | state-of-the-art<br>training | .0180 |
| level of<br>burnout | authority to get<br>a job done | .0102 |
| level of<br>stress | authority to get<br>a job done | .0266 |
| intent to transfer | building winning<br>products | .0138 |
| intent to transfer | authority to get<br>a job done | .0296 |
| last promotion | building winning<br>products | .0332 |
| length of service<br>at MATT | good pay | .0157 |
| length of service<br>at MATT | promotion oppor-<br>tunities | .0318 |
| length of service<br>at MATT | authority to get<br>a job done | .0300 |
| how utilized are<br>SKAMs | Building winning<br>products | .0438 |

Table 8. Corrected Two-tailed Probability from
Mann-Whitney U Test.

several job dimensions. The demographic factors "sex,"
"age," and "having children aged 13 years or less" made a
significant difference in how participants ranked the im-
portance of the following job dimensions: "building winning
products," "original work," "opportunities to gain state-of

the-art training in engineering" and "having enough help, equipment and information to get a job done." These job dimensions all focus on self-development and achievement related values. "Having enough help, equipment and information to get a job done" and "opportunities to gain state-of-the-art training in engineering" can impact the worker's ability to "build winning products" and do "original work."

The participants' "length of service" did make a significant difference in how they ranked "good pay," "promotion" and "having enough authority to get a job done." All of these job dimensions are associated with issues of seniority, as they provide an avenue for both potential rewards and the motivation for increased tenure. The participants' "last promotion" influenced how they ranked "building winning products." Whether this signifies that promotions are a reward for or benefit from building winning products is not known at this time.

The majority of the special factors had a statistically significant role in contributing to the participants' rankings of various job dimensions. For example, both the levels of "stress" and "burnout" influenced how participants ranked the job dimension "having enough authority to get a job done." Conceivably, these findings reflect frustration in achieving one's own personal goals at work.

"Intent to transfer" contributed to the ranking of "having enough authority to get a job done" and "building winning products." These results suggest that people intend to transfer from this research and development setting to another division of the organization due to their frustration with either their opportunities to build winning products or because they did not perceive having enough authority to get a job done. It needs to be noted that 62% of the respondents reported that they intend to transfer within the next two years.

To what extent the participants perceived that their skills, abilities and knowledge (SKAMs) were being utilized had a statistically significant impact upon their ranking of the job dimension "building winning products." This is particularly important due to the high ranking participants gave to "building winning products." This finding is supported by Lawler's (1976) research which showed that in order to experience feelings of accomplishment from the job, the worker must feel that valued SKAMs are being utilized.

Hobbies made no statistical difference in any of the rankings. Of interest is that a manufacturing division of the participating organization places importance on whether or not prospective engineering employees have an electronics or computer related hobby. The managers at that divi-

sion believe that such individuals have a greater probabil-
ity for longer tenure. At least at the division where this
study was conducted this was not the case for their re-
search and development engineers.

Thus, the null hypothesis is rejected. Ten of a
possible 17 demographic or special factors significantly
influenced the rankings. Such occurrences took place 16
times out of a possible 187 times. Not all job dimensions
were affected by these demographic and special factors.
There were no significant correlations with "interesting
work," "job security" or "knowledge of management's goals
and objectives." Most important to note is that the par-
ticipants' demographic background and special information
did not significantly impact how they ranked the overall
most valued job dimension, "interesting work."

## Limitations

The findings of this study are statistically relevant
only to the software product development engineers employed
at the participating organization. How the findings are or
are not consistent with those of other high technology or
other professions is not known. Similarly, how the fin-
dings of this localized study would compare to similar
studies at other software research and development divi-

sions is not known.  The reliability and validity of the questionnaire are limited in that the questionnaire was only pre-tested and tested in the present study.

The data regarding level of pay had to be discarded. The question was incorrectly stated and resulted in the participants being confused about how to properly respond. The respondents were asked to indicate their income before taxes for 1982 rather than 1983.  This problem did not show up in the pretest as the question was accurately stated when the pretest was conducted (December, 1982).  When the actual study was done (January, 1983), it was impossible to know whether the participants gave financial information for 1982 or 1983.  In fact, eight participants did not answer this question, perhaps due to this ambiguity or due to their reluctance to share salary information.

### Chapter Summary

A factor analysis revealed that three underlying constructs best explained the data gathered for this study. The constructs were: (a) an intrinsic job factor ("building winning products," "interesting work," "original work," and "authority to get a job done"); (b) an extrinsic factor ("good pay," "promotion," "having enough help, equipment, and information to get a job done," "knowledge of manage-

ment's goals and objectives," "opportunities to gain state-of-the-art training in engineering," and "who one works with"); and (c) job security. Several demographic and special factors were found to significantly influence the engineers' patterns of job satisfaction with these factors (Hypothesis 1).

Higher levels of stress were significantly correlated with the participants' reports of greater opportunities to experience the intrinsic job dimensions. This suggests that stress may have been serving as a motivator for self-development. Those engineers who planned to transfer or quit in 2 years or less reported fewer opportunities to attain the extrinsic job dimensions.

It was hypothesized (Hypothesis 2) that the engineers would perceive the greatest opportunities to attain the following job dimensions: "good pay;" "having enough authority to get a job done;" and "who one works with." The findings indicate that they were satisfied with the working relationships at the participating organization. However, the engineers did not perceive high levels of opportunity to get "good pay" or to use their "authority to get a job done." Rather, they were more highly satisfied with their opportunities to do "interesting work" and to have "job security."

It was hypothesized (Hypothesis 3) that these engi-

neers would perceive the fewest opportunities to attain the
job dimensions most closely identified with hard to reach,
self development values. These were: "building winning
proucts;" "original work;" and "state-of-the-art training
in engineering." The hypothesis was accepted regarding
"building winning products" and "state-of-the-art training
in engineering." However, the participants were least sat-
isfied with the amount of knowledge they were given of
"management's goals and objectives."

Not only did this study focus on the participating
engineers' patterns and perceived levels of satisfaction
with the 11 job dimensions, but it also addressed how much
they valued these aspects of work. The same job dimensions
which were hypothesized to be the most difficult to attain
were also hypothesized to be the most valued (Hypothesis
4). Instead, the participants most valued their opportu-
nities to do "interesting work," to have a satisfying level
of "pay," and to have positive working relationships ("who
one works with.") These findings suggest that the par-
ticipants' values were more consistent with employees in
general and were not specific to their profession.

As was hypothesized (Hypothesis 5), the participants
least valued the following job dimensions: "job security,"
"having enough authority to get a job done," and "knowledge
of management's goals and objectives." Overall, demograph-

ic and special factors statistically contributed only to
the rankings of the dimensions in 8.5% of the cases (Hypo-
thesis 6). The participants' demographic background and
special information did not significantly impact how they
ranked the overall most valued job dimension, "interesting
work."

# C H A P T E R   V I

## SUMMARY

### Introduction

The purpose of this study was to identify factors
that influenced perceived levels of job satisfaction among
software development engineers (SDE).  This study was based
on the premise that a computerized questionnaire could be
designed to measure job satisfaction.  The innovative use
of computers for questionnaire administration can signifi-
cantly expedite data collection and analysis.

There are more than 3,300 articles published on job
satisfaction (Locke, 1976), yet no study focuses on the job
satisfaction of SDE.  While Mumford's (1972) research ex-
amined the job-person fit for computer specialists and sys-
tems analysts, she did not specifically address SDE.  The
decision to study this strategic population was a result of
the present and forcasted needs for these critical high
technology professionals.  Currently, the demand for such
engineers far exceeds their supply (Mclean, 1984; Pollack,
1983).  The Massachusetts High Technology Council (1982)
forecasted that by 1985 the need for high technology pro-
fessionals is expected to increase by 28% in the Massa-
chusetts area alone.

The rationale for using a computerized questionnaire was based upon the type of professionals who participated in this study and their accustomed mode of communication, via a computer network, at their work stations. The use of a computerized questionnaire should enhance the subjects' interest in completing such a voluntary task. While a specific computer program was developed to administer this questionnaire, the software has subsequently been redesigned to run virtually any questionnaire, test or programmed text. In addition, the revised software has been designed for users who may have little or no knowledge of computers.

Through a study of the literature and interviews with human resource specialists, 11 job satisfaction dimensions were identified and factor analyzed. It was predicted that job dimensions related to self-development values (e.g., opportunities to do original work, build winning products, and to gain state-of-the-art training) would be most important to SDE. Extrinsic factors (e.g., job security and knowledge of management's goals and objectives) would be viewed as less important. Specific issues of job satisfaction, while less predictable, suggest that SDE would feel well paid, be satisfied with co-worker relationships and would perceive having enough authority to get their jobs done. Simultaneously, it was expected that they would feel

a greater need for self-development.

## Methodology

### Sample

The total population of software development engi-
neers (N=151) employed at a software research and develop-
ment division of a Fortune 100 company was invited to take
the questionnaire.  The population was identified by
personnel records and selected solely based upon job clas-
sification.  The survey was conducted over a seven-day
period during which time 104 engineers completed the
questionnaire, representing a return rate of 69%.

### Procedure and Instrumentation

Stemming from Locke's (1976) discrepancy theory, a
questionnaire was designed to assess what job dimensions
were the most and least valued by the participants, and to
what extent they perceived opportunities for satisfaction
in these areas.  Based on the many factors discussed in the
literature which contribute to job satisfaction, and inter-
views with human resource professionals and computer engi-
neers, 11 job dimensions were selected for inclusion in the
study.  They were:  building winning products; good pay;
interesting work; job security; original work; opportuni-

ities for state-of-the-art training in engineering; who one
works with; opportunities for promotion; having enough au-
thority to get a job done; knowledge of management's goals
and objectives; and having enough help, equipment and
information to get a job done.  In addition, several demo-
graphic factors were identified which were believed to
influence the participants' patterns of job satisfaction.

The participants were asked to rank order the 11 job
satisfaction dimensions in a computerized questionnaire.
For each job satisfaction item there was a corresponding
multiple choice question which asked how able the indivi-
dual was to actually attain that aspect of work in the
company.  Using Cronbach's Coefficient Alpha, the ques-
tionnaire had an internal reliability of .85.

## Administration of the Questionnaire

The administration of the questionnaire was done
electronically.  A two-step, log-on process was used for
the purpose of confidentiality.  Through the organization's
electronic mail system, participants were sent a letter
from management that provided the code to access the ques-
tionnaire on their computer terminals.  The multiple choice
questions appeared on the terminal's screen one at a time.
In the rank ordered question, all 11 job satisfaction
dimensions studied were listed and respondents were

requested to choose the most important one. Then, the re-
maining ten dimensions were displayed on the screen and the
participants were asked to choose the one that was most
important to them. This process continued until only two
choices were left. Once one of these two dimensions was
chosen, the remaining one automatically was identified as
the respondent's final choice.

The program generated a file to store the tabulated
responses. This data was electronically transferred to a
second computer for immediate data analysis. The final re-
sults of the analysis were presented to management three
days after the data collection process had been completed.

## Data Analysis

The data were first factor analyzed and then t-tests
were performed to identify any relationships between demo-
graphic factors and the 11 job dimensions. Simple fre-
quency distributions were computed in order to determine
which job dimensions the participants valued the most and
the least, and which job dimensions they were most and
least satisfied with at work.

## Results

The results are presented in the Tables 9 and 10.

Three distinct factors were identified that best explained
the data, as displayed in Table 9. Table 10 displays how
the participants ranked the 11 job dimensions and their
corresponding levels of satisfaction with these dimensions.
The most highly valued aspects of work are presented in
descending order in Table 10.

| Factor 1 | Loadings |
|---|---|
| Opportunities for Original Work | .96806 |
| Interesting Work | .52862 |
| Building Winning Products | .45277 |
| Authority To Get A Job Done | .31176 |

| Factor 2 | |
|---|---|
| Knowledge of Management's Goals and Objectives | .82597 |
| Opportunities for Promotion | .50990 |
| State-Of-The-Art Training | .50762 |
| Having Enough Help, Info & Equip to Get A Job Done | .47913 |
| Good Pay | .41577 |
| Relationships With Co-workers | .26733 |

| Factor 3 | |
|---|---|
| Job Security | .98594 |

Table 9. The Loadings of the Job
Dimensions by Factor

## Discussion

Factor 1 was comprised of intrinsic job dimensions.

Factor 2 was comprised of extrinsic dimensions. Job secur-
ity was the single item in Factor 3.

The correlation between higher levels of stress and
reports of greater opportunities to experience the intrin-
sic job factor (p = .049) suggests that stress may have

| | Rankings of Job Dimensions | | Levels of Satisfaction Job Dimensions | |
|---|---|---|---|---|
| | $\overline{X}$ | SD | $\overline{X}$ | SD |
| Interesting Work | 1.92 | 1.44 | 2.26 | .86 |
| Good Pay | 4.79 | 2.52 | 2.56 | .96 |
| Who one work with | 5.31 | 2.90 | 2.16 | .84 |
| Building Winning Products | 5.41 | 2.97 | 2.90 | 1.2 |
| Enough Help, Info & Equip to Get Job Done | 5.87 | 2.70 | 2.42 | .92 |
| Original Work | 6.04 | 2.99 | 2.50 | 1.1 |
| Promotion | 6.84 | 2.63 | 2.83 | .88 |
| State-Of-Art-Training in Engineering | 6.87 | 3.11 | 2.89 | 1.0 |
| Job Security | 7.37 | 3.02 | 2.28 | .89 |
| Authority to Get a Job Done | 7.54 | 2.74 | 2.61 | .80 |
| Knowledge of Management's Goals & Objs. | 8.02 | 2.62 | 3.40 | 1.1 |

Table 10. Job Dimensions – Rankings and
Satisfaction Levels

been serving as a motivator for self-development for the
SDE. In addition, those who were promoted in the past year
also reported greater opportunities to attain the intrinsic
job factor (p = .026). In their new positions they may
have envisioned themselves as having more "authority to get
a job done," more opportunity to do "interesting and ori-
ginal work," and a better chance to "build winning pro-
ducts."

The extrinsic factor played a significant role in the
quit-stay decision-making process for the SDE. Nearly 62%
reported plans to transfer to another division and 32% re-
ported plans to quit the organization, in two years or
less. These groups perceived fewer opportunities to exper-
ience the extrinsic job factor than did their counterparts
(p = .005, p = .008, respectively). Thus, perceived inade-
quate opportunities for: good pay; promotion; knowledge of
management's goals and objectives; enough help, equipment
and information to get a job done; and state-of-the-art
training, all contributed to these strategic engineers'
intent to leave their division or the organization.

Overwhelmingly, the SDE valued "interesting work" as
the single most important job dimension. Nearly 61% iden-
tified this job dimension as their first choice. This re-
searcher had expected that "interesting work" by itself
would not be enough to satisfy these engineers. Rather, it

was hypothesized that due to the prestige and financial returns of being on the leading edge, "original work" would be more highly valued. However, the results showed that "original work" was only ranked as the sixth most valued job dimension. This finding is important as a major component of the SDE's work is devoted to creating original products. Not only did the SDE highly value interesting work, but they also reported that the company's R&D environment provided enough opportunity in this area.

Contrary to the hypothesis the SDE did perceive at least adequate opportunities to attain job dimensions identified with self-development values. Seventy-one percent of them reported having at least moderate opportunities to build winning products or to gain state-of-the-art training in engineering. In addition, 54% of them were satisfied with their opportunities to do "original work," to a large or very large extent. These dimensions reflect the essence of the SDE's work. They need to have the necessary skills, abilities and knowledge to build original and winning products, which are on the leading edge.

The findings highlight the value of positive working relationships to the SDE. Not only did they report that relationships with co-workers were important to them, but they also perceived being satisfied with this area. The high level of opportunity to experience positive working

relationships reflected the employees' satisfaction with the less rigid forms of interpersonal communication common to this high tech organization.

As was hypothesized, the SDE least valued the following job dimensions: "job security," "having enough authority to get a job done," and "knowledge of management's goals and objectives." Their low ranking of "knowledge of management's goals and objectives" indicates their commitment to their own values as opposed to organizational goals. The low ranking of job security reflects the current market conditions for such types of professionals. The findings suggest that the SDE would rather be doing the actual work than being responsible for the work of others.

The data did reveal some inconsistencies regarding pay. The findings indicated: (a) that pay was valued; (b) that the SDE reported that they were generally satisfied with their level of pay; but (c) that pay was contributing to their decision to either transfer or quit. This finding suggests that the SDE's values were more consistent with employees in general and were not specific to their profession.

Most of the above findings cannot be directly tied to the literature, due to the pioneering nature of this research. Presently, there is little empirical research on this specific population. However, several points can be

made. The data do support Mumford's (1972) finding that employees valued positive working relationships. The report of "interesting work" as the single most valued job dimension supports the research of several authors (Herzberg, 1954; Herzberg et al., 1959; Locke, 1976; McLean, 1984; Mumford, 1972). The high ranking of "good pay" is consistent with work of Lawler (1981) rather than Mumford (1972). The low ranking of "knowledge of management's goals and objectives" supports the reports in the literature that commitment to one's own values outweighs identification with organizational goals (Hay Associates, 1982; Mumford, 1972). The data regarding the SDE's low ranking of "job security" are consistent with Mumford's (1972) research and Pollack's (1983) report of the low unemployment rate for engineers.

The findings of this study are limited as the questionnaire was administered at only one organization, although a Fortune 100 Company. How the results would compare to the SDE at other high tech organizations is not known. The reliability and validity of the instrument are limited as it was only tested in the present study. The return rate of 69% conceivably could have been raised by increasing the time period during which the questionnaire was made available to participants.

The computerized questionniare proved to be an inno-

vative approach to data collection. Feedback from the
participants was overwhelmingly positive. They "enjoyed"
this "novel" method. In addition, the time required for
questionnaire administration and data transfer was dras-
tically reduced. As there was no manual transfer of data,
the possibility of error in data transfer was eliminated.

## Future Orientation

Repeated use of the computerized questionnaire de-
signed for this study can provide organizations with the
information required in order to develop retention strat-
egies and project turnover rates. Periodic retests of the
population, along with survey administration at other divi-
sions of the participating organization and at other high
technology companies, can provide insight into industry
trends. The innovative nature of the computerized ques-
tionnaire lends to further research on the impact of such a
medium for data collection.

## Summary

The purpose of this study was to identify factors
that influenced perceived levels of job satisfaction among
software development engineers. The effect of demographic

factors on patterns of job satisfaction was also assessed.
The computerized questionnaire developed for this study had
an internal reliability of .85 and more than 69% of the
population completed it.

The results revealed that three factors best ex-
plained the job satisfaction patterns: an intrinsic factor;
an extrinsic factor; and the work dimension, job security.
Higher levels of stress correlated with perceived greater
opportunities to experience the intrinsic factor, sugges-
ting that stress was serving as a motivator. The extrinsic
factor played a significant role in the quit-stay decision-
making process. The SDE reported satisfaction with their
level of opportunity to attain self-devlopment values.
They most valued "interesting work." The data revealed
some inconsistencies regarding the importance of pay to the
software product development engineers who participated in
this study.

# BIBLIOGRAPHY

Adams, J. A.  Inequity in social exchange.  In L. Berkowitz (Ed.), <u>Advances in experimental social psychology</u> (Vol. 2.).  New York: Academic Press, 1965.

Alderfer, C. P.  <u>Existence, relatedness and growth: Human needs in organizational settings</u>. New York: The Free Press, 1972.

Atchison, T. J., & Lefferts, E. A.  The prediction of turn-over using Herzberg's job satisfaction technique.  <u>Personnel Psychology</u>, 1972, <u>25</u>, 53-64.

Bartol, K. M.  Professionalism as a predictor of organiza-tional commitment, role stress, and turnover: A multidi-mensional approach.  <u>Academy of Management Journal</u>, 1979, <u>22</u> (4), 815-821.

Carlson, R. E., Dawis, R. V., England, G. W., & Lofquist, L. H.  <u>Minnesota studies in vocational rehabilitation: xiii.  The measurement of employment satisfaction</u>. Minnesota: University of Minnesota, Industrial Relations Center, 1962.

Dalton, D. R., & Todor, W. D.  Turnover turned over: An ex-panded and positive perspective.  <u>Academy of Management Review</u>, 1979, <u>4</u>(2), 225-235.

Dillman, D. A.  <u>Mail and telephone surveys: The total design method</u>.  New York: John Wiley and Sons, 1978.

Edelwich, J.  <u>Burnout: Stages of disillusionment in the helping professions</u>.  New York: Human Services Press, 1980.

Ewen, R. B., Smith, P. C., Hulin, C., & Locke, E. A.  An empirical test of the Herzberg two-factor theory.  In M. M. Gruneberg (Ed.), <u>Job satisfaction: A reader</u> (Chap. 4). New York: John Wiley and Sons, 1976.

Hackman, J. R., & Lawler, E. E.  Employee reactions to job characteristics.  <u>Journal of Applied Psychology</u>, 1971, <u>55</u>, 259-286.

Hackman, J. R., & Oldham, G. R.  Development of the job
    diagnostic survey.  Journal of Applied Psychology, 1975,
    60(2), 159-170.

Hay Associates Organizational Strategy Group.  Survey of
    human resource concerns in the New England high technol-
    ogy industry.  Boston: Author, 1982.

Herzberg, F.  Work and the nature of man.  New York: The
    World Publishing Company, 1966.

Herzberg, F.  The wise old Turk.  Harvard Business Review,
    1974, 74507, 97-107.

Herzberg, F., Mausner, B., & Snyderman, B.  The motivation
    to work (2nd ed.).  New York: John Wiley & Sons, 1959.

Hill, R. E., & Miller, E. L.  Job change and the middle
    seasons of a man's life.  Academy of Management Journal,
    1981, 24(1), 114-127.

Holt, R. R.  Occupational stress.  In L. Goldberger & S.
    Breznitz (Eds.), Handbook of stress: Theoretical and
    clinical aspects (Chap. 25).  New York: The Free Press,
    1982.

Hulin, C. L., & Blood, M. R.  Job enlargement, individual
    differences and worker responses.  Psychological Bul-
    letin, 1968, 69, 41-55.

Hulin, C. L., & Smith, P.C.  Sex differences in job satis-
    faction. In M. Gruneberg (Ed.), Job satisfaction: A
    reader (Chap. 15).  New York: John Wiley and Sons, 1976.

Kidder, J. T.  The soul of a new machine.  New York: Avon
    Books, 1982.

Klein, S. M., & Mahrer, J. R.  Educational level and satis-
    faction with pay.  Personnel Psychology, 1966, 19,
    195-208.

Kuhlen, R. G.  Needs, perceived need satisfaction opportun-
    ities, and satisfaction with occupation.  Journal of
    Applied Psychology, 1963, 47(1), 56-64.

Landy, F. J.  An opponent process theory of job satisfact-
    ion.  Journal of Applied Psychology, 1978, 63(5),
    533- 547.

Lawler, E. E.  Motivation in work organizations. Monter-

rey, Ca.: Brooks/Cole Publishers, 1973.

Lawler, E. E. Job design and employee motivation. In M. Gruneberg (Ed.), Job satisfaction: A reader (chap. 6). New York: John Wiley and Sons, 1976.

Lawler, E. E. Pay and organizational development. Reading, Ma.: Addison-Wesley Publishing Company, Inc., 1981.

Locke, E. A. The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), Handbook of industrial and organizational psychology (Chap. 30). Chicago: Rand McNally College Publishing, 1976.

Maier, N. F., & Verser, G. C. Psychology in industrial organizations (5th ed.). Boston: Houghton Mifflin Company, 1982.

Martin, T. N. A contextual model of employee turnover intentions. Academy of Management Journal, 1979, 22(2), 313-324.

Maslow, A. H. Motivation and personality. New York: Harper & Row Publishers, Inc., 1954.

Massachusetts High Technology Council. Results of 1982 survey of human resource needs. Boston: Author, 1982.

McClelland, D. C. The achieving society. Princeton, N.J.: D. Van Nostrand Company, Inc., 1961.

McCormick, E. J., & Ilgen, D. Industrial psychology (7th ed.). Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1980

McLean, R. A. The search for trends. The Boston Globe, March 7, 1984, p. 37.

Mobley, W. H. Employee turnover: Causes, consequences and control. Reading, Ma.: Addison-Wesley Publishing Company, 1982.

Mumford, E. Job satisfaction: A study of computer specialists. London: Longman Group Limited, 1972.

Myers, M. S. Who are your motivated workers? Harvard Business Review, 1964, 42, 73-88.

O'Reilly, C. A., & Caldwell, D. F. The commitment and job tenure of new employees: Some evidence of postdecisional justification. Administrative Science Quarterly, 1981,

<u>26</u>, 597-616.

Organ, D. W, & Greene, C. N.  The effects of formalization on professional involvement: A compensatory approach. <u>Administrative Quarterly</u>, 1981, <u>26</u>, 237-252.

Paul, W. J., Robertson, K. B., & Herzberg, F.  Job enrichment pays off.  <u>Harvard Business Review</u>, 1969, <u>69209</u>, 93-110.

Pettman, B. O.  External and personal determinants of labor turnover.  In B. O. Pettman (Ed.), <u>Labor turnover and retention</u> (chap. 2).  New York: John Wiley and Sons, 1975.

Pollack, A.  Engineers: A dropout problem for the U. S. <u>The New York Times</u>, March 27, 1983, Section 12, pp. 1; 12-15.

Porter, L. W., & Steers, R. M.  Organizational, work, and personal factors in employee turnover and absenteeism. <u>Psychological Bulletin</u>, 1973, <u>80</u>(2), 151-176.

Portigal, A. H.  <u>Towards the measurement of work satisfaction</u>.  Paris: The Organization for Economic Cooperation and Development, 1976.

Price, J. L.  <u>The study of turnover</u>.  Ames: The Iowa State University Press, 1977.

Saleh, S. D.  A study of attitude change in the pre-retirement period.  <u>Journal of Applied Psychology</u>, 1964, <u>48</u>, 310-312.

Saleh, S. D., & Otis, J. L.  Age and level of job satisfaction.  <u>Personnel Psychology</u>, 1964, <u>17</u>, 425-430.

Seyle, H. A.  <u>Stress without distress</u>.  Philadelphia: Lippincott, 1974.

Siegel, L., & Lane, I. M.  <u>Personnel and organizational psychology</u>.  Homewood, Il: Richard D. Irwin, Inc., 1982.

Smith, C. B.  Influence of internal opportunity structure and sex of worker on turnover patterns.  <u>Administrative Science Quarterly</u>, 1979, <u>24</u>, 362-379.

Smith, P. C., Kendall, L. M., & Hulin, C. L.  <u>The measurement of satisfaction in work and retirement</u>.  Chicago:

Rand McNally, 1969.

Vroom, V. H.  Work and motivation.  New York: John Wiley and Sons, 1964.

Waters, L. K., & Roach, D.  Job satisfaction, behavioral intention, and absenteeism as predictors of turnover.  Personnel Psychology, 1979, 32, 393-397.

Weaver, C. N.  Job satisfaction in the United States in the 1970's.  Journal of Applied Psychology, 1980, 65(3), 364-367.

Weiss, D. J., Dawis, R. B., England, G. W., & Lofquist, L. H.  Minnesota studies in vocational rehabilitation: xxii.  Manual for the Minnesota Satisfaction Questionnaire.  Minneapolis: University of Minnesota, Industrial Relations Center, 1967.

Work in America.  Cambridge, Ma.: The MIT Press, 1973.

APPENDICES

# Appendix 1

The Questionnaire

I enthusiastically request your participation in the

MATT Engineering Satisfaction Survey

The survey is on-line for your convenience.  To
participate:

        SET HOST     ACCOUNT NAME
        USERNAME     SURVEY
        PASSWORD     ASK

I am enthusiastic about this project because it is ground-
breaking in several ways:

    Engineer job satisfaction is a virtually unexplored
    research area

    Using electronic media as a channel of distribution
    and collection for survey research is a FIRST

    The data collected allows us to build your perspective
    into the Management Strategy

The statistical analysis of the data collected will be re-
ported to (name of the division's top manager) and his Man-
agement Team.  If you are interested, a copy of the report
will be made available to you as well.

The survey was developed by Rick Riesenberg, U. Mass.,
Amherst, and the data collected will be used as part of his
doctoral dissertation.

The survey will take you 6-12 minutes to complete; comple-
tion of the survey constitutes your consent to participate
in the project.

Your participation is both needed and valued.

Again, SET HOST ACCOUNT NAME, USERNAME SURVEY, PASSWORD ASK

Thank you for your cooperation.

Pat,   MATT Consultant

What is your present age in years? _____

What is your sex?

        1. MALE
        2. FEMALE

What is your current marital status?

        1. NEVER MARRIED
        2. MARRIED
        3. DIVORCED
        4. SEPARATED
        5. WIDOWED

If married, how much does your spouse work outside of the home?

        1. FULL-TIME
        2. HALF-TIME
        3. QUARTER-TIME
        4. NOT AT ALL
        5. I'M NOT MARRIED

How many children do you have in each of the following age groups?

        Number of Children

        _____ UNDER 5 YEARS
        _____ 5 TO 13
        _____ 14 TO 18
        _____ 19 TO 23
        _____ OVER 23 YEARS

Which is the highest level of education that you have completed?

        1. SOME HIGH SCHOOL
        2. COMPLETED HIGH SCHOOL
        3. SOME COLLEGE
        4. COMPLETED COLLEGE (major) _____
        5. SOME GRADUATE WORK
        6. A GRADUATE DEGREE
             (specify degree and major)_____

How did you learn of your first job at Fleming?

       1. ADVERTISEMENT IN NEWSPAPER
       2. ADVERTISEMENT IN JOURNAL
       3. EMPLOYMENT AGENCY
       4. FRIEND, RELATIVE OR TEACHER
       5. COMPANY RECRUITER
       6. CALLED OR VISITED FLEMING
       7. COLLEGE RECRUITING PROGRAM

What was your approximate income, before taxes, in 1982?

       1. 15,000 TO 19,999
       2. 20,000 TO 24,999
       3. 25,000 TO 29,999
       4. 30,000 TO 34,999
       5. 35,000 TO 39,999
       6. 40,000 TO 44,999
       7. 45,000 TO 49,999
       8. 50,000 TO 54,999
       9. 55,000 TO 59,999
     10. 60,000 OR MORE

Within what period was your last promotion?

       1. PAST THREE MONTHS
       2. 4 TO 7 MONTHS AGO
       3. 8 TO 11 MONTHS AGO
       4. 12 TO 15 MONTHS AGO
       5. 16 OR MORE MONTHS AGO
       6. NEVER

How long have you been employed by Fleming?

       1. LESS THAN ONE YEAR
       2. ONE TO TWO YEARS
       3. THREE TO SIX YEARS
       4. SEVEN TO TEN YEARS
       5. MORE THAN TEN YEARS

How often do you have the opportunity to do original work at MATT?

       1. CONTINUOUSLY
       2. FREQUENTLY
       3. OCCASIONALLY
       4. VERY RARELY
       5. NEVER

When you receive a directive to do something, to what
   extent do you have the freedom to alter it?

   1. TO A VERY LARGE EXTENT
   2. TO A LARGE EXTENT
   3. TO A MODERATE EXTENT
   4. TO A SMALL EXTENT
   5. TO NO EXTENT

To what extent do you get enough help, equipment and infor-
   mation to get your job done?

   1. TO A VERY LARGE EXTENT
   2. TO A LARGE EXTENT
   3. TO A MODERATE EXTENT
   4. TO A SMALL EXTENT
   5. TO NO EXTENT

How much longer do you expect to remain working for
   Fleming?

   1. FIVE OR MORE YEARS
   2. FOUR YEARS
   3. TWO YEARS
   4. ONE YEAR
   5. LESS THAN ONE YEAR

To what extent do you feel that your job at MATT is secure?

   1. TO A VERY LARGE EXTENT
   2. TO A LARGE EXTENT
   3. TO A MODERATE EXTENT
   4. TO A SMALL EXTENT
   5. TO NO EXTENT

How satisfied are you with your present rate of pay?

   1. VERY SATISFIED
   2. SATISFIED
   3. NEUTRAL
   4. DISSATISFIED
   5. VERY DISSATISFIED

How satisfying are your relationships with your co-workers?

   1. TO A VERY LARGE EXTENT
   2. TO A LARGE EXTENT
   3. TO A MODERATE EXTENT
   4. TO A SMALL EXENT
   5. TO NO EXTENT

To what extent does your job provide opportunities for in-
teresting work?

     1. TO A VERY LARGE EXTENT
     2. TO A LARGE EXTENT
     3. TO A MODERATE EXTENT
     4. TO A SMALL EXTENT
     5. TO NO EXTENT

How often do you experience stress as a result of your work
  at MATT?
     1. NEVER
     2. SOME OF THE TIME
     3. MUCH OF THE TIME
     4. ALL OF THE TIME

How satisfied  are you with your present job?

     1. VERY SATISFIED
     2. SATISFIED
     3. NEUTRAL
     4. DISSATISFIED
     5. VERY DISSATISFIED

To what extent do you feel that your skills, abilities and
  knowledge are presently being utilized in your job?

     1. 100 PERCENT
     2. 90 PERCENT
     3. 80 PERCENT
     4. 70 PERCENT OR LESS

To what extent do you feel that Fleming offers you oppor-
  tunities for promotion?

     1. TO A VERY LARGE EXTENT
     2. TO A LARGE EXTENT
     3. TO A MODERATE EXTENT
     4. TO A SMALL EXTENT
     5. TO NO EXTENT

How much longer do you expect to continue working at MATT?

     1. FIVE OR MORE YEARS
     2. FOUR YEARS
     3. TWO YEARS
     4. ONE YEAR
     5. LESS THAN ONE YEARS

To what extent does Fleming offer you the opportunity to
gain ongoing "state-of-the-art" training in engineering?

            1. TO A VERY LARGE EXTENT
            2. TO A LARGE EXTENT
            3. TO A MODERATE EXTENT
            4. TO A SMALL EXTENT
            5. TO NO EXTENT


To what extent do the pressures of your job spill over into
your private life?

            1. TO A VERY LARGE EXTENT
            2. TO A LARGE EXTENT
            3. TO A MODERATE EXTENT
            4. TO A SMALL EXTENT
            5. TO NO EXTENT

Which area below best describes your favorite hobby?

            1. OUTDOOR RECREATIONAL
            2. ARTS AND THEATRE
            3. READING, LISTENING TO MUSIC
                 OR WATCHING MOVIES/TELEVISION
            4. ELECTRONICS AND COMPUTERS
            5. SPORTS ACTIVITIES
            6. NO HOBBY

How aware are you of management's goals and objectives at
MATT?

            1. TO A VERY LARGE EXTENT
            2. TO A LARGE EXTENT
            3. TO A MODERATE EXTENT
            4. TO A SMALL EXTENT
            5. TO NO EXTENT

To what extent have you had the opportunity to participate
in building "winning" products at MATT?

            1. TO A VERY LARGE EXTENT
            2. TO A LARGE EXTENT
            3. TO A MODERATE EXTENT
            4. TO A SMALL EXTENT
            5. TO NO EXTENT

153

"Burnout" has been described as a situation in which
    individuals feel tired, apathetic and not creative.
    Based on this definition, how "burnt-out" are you?

                    1. TO A VERY LARGE EXTENT
                    2. TO A LARGE EXTENT
                    3. TO A MODERATE EXTENT
                    4. TO A SMALL EXTENT
                    5. TO NO EXTENT

(Continued)

Listed below are eleven areas that relate to work.  Please
indicate which area is the most important, second most im-
portant, etc. by responding to the prompts.  To restart
this question, type R in response to the prompt.

☐   MOST IMPORTANT

☐   SECOND
    MOST IMPORTANT

☐   THIRD
    MOST IMPORTANT

1.  Building "winning"
    products
2.  Good pay
3.  Interesting work
4.  Job security
5.  Original work
6.  Opportunities to gain
    state-of-the-art
    training in engineering
7.  Who you work with
8.  Opportunities for
    promotion
9.  Having enough authority
    to get a job done
10. knowledge of
    management's goals
    objectives
11. Having enough help,
    equipment & information
    to get a job done

☐   FOURTH
    MOST IMPORTANT

☐   FIFTH
    MOST IMPORTANT

☐   SIXTH
    MOST IMPORTANT

☐   SEVENTH
    MOST IMPORTANT

☐   EIGHTH
    MOST IMPORTANT

☐   NINTH
    MOST IMPORTANT

☐   TENTH
    MOST IMPORTANT

COMPUTERIZED VERSION OF QUESTIONNAIRE COPYRIGHTED
OCTOBER, 1983
by Rick Riesenberg and Tom Kopec

## Appendix 2

Follow-up Letter

Subj: Survey Reminder

If you have not yet taken the survey, I would appreciate
your participation.

I intend to take the survey account down Tuesday, Jan. 17
at 5:00 pm.

Many of you have expressed concern over anonymity because
of the remote log-in record.  I became aware of the record
when it was too late for ME to understand what could be
done about it; I assure you that I will make no attempt to
match log-in with responses (I do not have the time to do
it nor does it add value to the data).  Also, my career
depends upon my ability to keep confidences; "I haven't
sold my soul for England, I don't intend to sell it for
Wales."

The final report will automatically be sent to those who
have requested it and I will provide you another oppor-
tunity to order it when it is completed (about three
weeks).

Thank you for your feedback.  It is a virtual gold-mine of
information.

Thanks for your cooperation in this project.


Pat