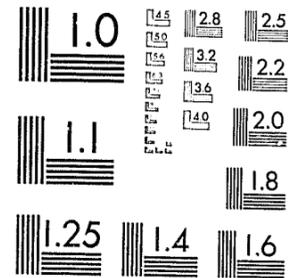


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United States Department of Justice  
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3/7/83

A Handbook for Human-Resource Planning  
in Criminal Justice Agencies

Volume III  
Human-Resource Planning Guide: Part 1  
Vicki W. Schneider  
Jack R. Greene

86369/42



School of Criminal Justice  
Michigan State University  
August, 1982

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A HANDBOOK FOR HUMAN-RESOURCE PLANNING  
IN CRIMINAL JUSTICE AGENCIES

VOLUME III  
HUMAN-RESOURCE PLANNING GUIDE: PART 1

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The Michigan State University Human-Resource Planning Development Project is partially supported by Grant Number 80-MU-AX-004 awarded by the Office of Criminal Justice Education and Training, Law Enforcement Assistance Administration, U.S. Department of Justice, under the Omnibus Crime Control and Safe Streets Act, as amended. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

## ACKNOWLEDGEMENTS

The materials in this Handbook reflect the contributions of many individuals. Gary W. Cordner provided important conceptual help during the writing of Volume I and Robert Trojanowicz offered timely advice and review of the project's direction as it unfolded. Tim Bynum offered characteristically sound advice and helpful suggestions throughout the course of the project. During the first year of the project, Mike Donahue, Robert Smith and Gary Sonke provided assistance in helping to conceptualize the outline of the Handbook and to pull together information. Some of Robert Smith's material is found in Volume I and in the first part of Volume II; some material developed by Mike Donahue appears in Volume III; and material developed by Gary Sonke formed the basis for some of the items appearing in the surveys. Maryellen Geyer painstakingly typed the many drafts and the final version of the Handbook manuscript. She also served as project secretary in a highly efficient and characteristically professional manner. Betsy McGuire provided timely assistance in editing some of the materials, in checking sources, and in coordinating the printing of the Handbook. Katherine McCracken of the Social Science Research Bureau of the College of Social Science at Michigan State University provided editorial assistance for this and other project publications. Her assistance has greatly improved the volumes.

We particularly acknowledge the assistance given by Price Foster, Jean Moore, and Irv Slott of LEAA/OCJET. Price Foster awarded the grant and helped to frame its purposes and objectives. Irv Slott provided timely suggestions and advice when it came time to update the project objectives and design. Jean Moore is owed special thanks and recognition. She acted as project monitor and was a constant source of help and assistance. At many points during the course of the project her help and professional advice kept us on track. Working with her was a distinct pleasure.

Victor Strecher of Sam Houston State University and Frank Sistrunk of the University of South Florida, both of whom were project directors of companion manpower planning grants awarded by OCJET, offered vital assistance and advice throughout the research phase of the project. Frank Sistrunk additionally and tirelessly reviewed portions of the Handbook manuscript and made numerous helpful suggestions for changes and additions.

We also acknowledge and give special thanks to several individuals from criminal justice agencies who reviewed portions of the draft manuscript. These individuals invested substantial time and effort reviewing materials and offering suggestions for change. Their advice has markedly improved the final draft of the Handbook. Reviewers from criminal justice agencies included James Bannon and Ronald Vasiloff of the Detroit Police Department, Donald Willis of the Michigan Department of Civil Service, Abraham Takahashi of the Michigan State Police, Max Durbin of the Flint Police Department,

James McMillan and Gary Higgins of the Jacksonville Police Department, William Kime of the Michigan Department of Correction, James Ball of the Florida Department of Correction, and Leonard Territo of the University of South Florida. Ralph Lewis from Florida International University also reviewed materials and offered suggestions.

To these named individuals and to the many more not named who provided advice and other forms of help we offer our sincere gratitude.

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August 1982

## EXECUTIVE SUMMARY

Criminal justice agencies usually allocate 80 percent or more of their resources to meeting personnel costs. Criminal justice is thus a labor-intensive field, with productivity vitally dependent on the efficient and effective employment of personnel. Human-resource planning can be an effective managerial tool for helping administrators reach decisions about how most efficiently and effectively to acquire and to employ personnel. Additionally, some aspects of human-resource planning are particularly useful in helping management to identify, to diagnose, and eventually to solve personnel problems.

This executive summary provides a brief overview of the contents and objectives of the Human-Resource Planning Handbook prepared by the School of Criminal Justice at Michigan State University. The Handbook describes numerous human-resource planning and analytical techniques useful in criminal justice agencies, gives directions for their use, and provides examples of their application in criminal justice agencies. Also, special techniques are provided to assist management in identifying, diagnosing, and eventually resolving personnel problems. The Handbook is designed to offer the criminal justice manager, personnel administrator, and planner a self-instruction guide on how to implement more effective means of planning for the agency's personnel component.

One way of visualizing the purposes and objectives behind the Human-Resource Planning Handbook is to consider the principal kinds of managerial questions that it attempts to provide answers for. A few of these questions are:

1. How can an agency examine what its personnel needs are?  
How can these needs be substantiated or documented?
2. How can an agency validly determine and define the jobs required to achieve missions, goals, and objectives?  
How can it determine whether job descriptions validly reflect the nature of work currently done in the agency?
3. How can an agency assess its current employees? How can it determine what kinds of employees should be hired (prior experience, education, training, skills, etc.)? How can employment qualifications be identified and substantiated or validated?
4. How can an agency assess its key personnel practices (for example, recruiting, selecting, training, and assigning personnel? What are the effects of these personnel practices on the agency's ability to maintain a stable supply of qualified personnel to fill the agency's jobs? What effects do current personnel practices have on employees' morale, employees' performance, and employees' attitudes?
5. How can an agency go about identifying and diagnosing personnel-related problems? What kinds of personnel

problems confront the agency? What are the causes of these problems? What kinds of effects do these problems have on agency productivity (efficiency and effectiveness)?

6. What kinds of analytical techniques are available to agency managers and planners who wish to diagnose not only existing personnel problems but also want to anticipate future personnel problems?
7. How can an agency go about identifying the major constraints posed by budget and outside decision makers that circumscribe the agency's ability to acquire needed personnel? How can an agency go about determining whether any of these constraints are manipulable--removing them as constraints in acquiring and assigning needed personnel?

The Handbook variously deals with these and other prime questions facing administrators charged with managing personnel. However, the Handbook is not prescriptive in the sense that specific solutions are prescribed for specific kinds of human-resource problems facing the agency. For important reasons that are pointed out in Volume I and in the first part of Volume II, the choice of a solution to any given personnel problem is properly the responsibility of agency management. Identifying viable solutions for problems such as turnover, or insufficient staffing, or poor employee performance must be done by management working within the constraints faced by the agency.

Nonetheless, the Handbook, its techniques for problem diagnosis, and its explanations of other human-resource planning techniques, can help point personnel administrators and planners toward discovering a range of viable solutions for agency personnel problems.

Development of the planning handbook was supported with funds from the U.S. Department of Justice (LEAA) and was conducted in two phases. Phase I assessed criminal justice agencies' current capability and need of human-resource planning. Phase II, building on this assessment, focused on the development of an extensive handbook that would assist criminal justice agencies more fully to implement and to utilize human-resource planning techniques.

#### THE HANDBOOK

The Handbook is presented in three volumes (bound in eight parts for convenience in handling and use). A comprehensive index to the contents of these three volumes follows the executive summary. Used in conjunction with the index, the Handbook has been designed to allow managers and planners to choose those portions that are of most interest or are most needed.

VOLUME I of the Handbook provides an introduction to human-resource planning in agencies--what it is, how it is carried out, and how it can help the agency manager. The material in this volume is written to be of interest alike to agency top management, to agency personnel administrators, and to agency planners. One principal objective of Volume I is for managers and planners to acquire a common overview about the definition, purposes, and uses of human-resource

planning in agencies. When managers and planners do not share such a basic understanding, planning tends not to be fully or appropriately utilized.

VOLUME II is bound in four parts and presents a means for comprehensively identifying and diagnosing personnel problems. It is designed to be of primary interest to agency personnel administrators and planners. Problem diagnosis is a very crucial and very practical part of human-resource planning. It is crucial because without good diagnosis, solutions to personnel problems cannot be adequately planned. It is practical because it focuses on what every manager spends most of his or her time doing--identifying and dealing with conditions that negatively affect the agency's ability to meet its goals and objectives.

Practical tools are presented to help personnel administrators and planners conduct two types of diagnoses. The first type is an overall assessment of agency human resources--a general stocktaking whereby the agency takes an overall look at its organizational climate, its personnel practices, and its ability to acquire, to develop, and to employ personnel. Three ready-for-use diagnostic surveys are provided with directions: 1. an Organizational Climate Survey, 2. a Personnel Practices Survey, and 3. an Environmental Factors Questionnaire. Analysis of results from administering these surveys will provide administrators with an overview of the agency's strengths and weaknesses regarding its personnel processes and its ability to identify and to deal with internal and external factors that affect its acquisition and use of personnel. This becomes essential background information for

later attempts to identify and to solve specific personnel-related problems.

The second type of diagnostic tool presented is a step-by-step procedure that can be followed to diagnose specific personnel problems more pointedly. For example, the agency may have identified turnover, or an inability to attract qualified personnel, or poor performance by employees as problems needing special attention. Comprehensive diagnoses of the causes and effects of problems such as these is crucial if effective solutions to them are to be found. The diagnostic model provided offers a way of marshalling key agency thinkers and key information for diagnosing problems and for eventually finding solutions.

VOLUME III is bound in two parts and is a resource guide intended primarily for use by agency personnel administrators and planners engaged in the more technical aspects of personnel administration and human-resource planning. Techniques such as job analysis, forecasting, selection validation, performance measurement (to name a few) are discussed. A common format is used throughout in presenting these techniques. First, the nature of the techniques and its prime uses are presented. This is followed by a consideration of the major technical and other supports required if the technique is to be used. Special attention is paid to factors that will limit an agency's ability to use a given technique, and alternatives are presented for these situations.

## BASIC DESIGN-FEATURES OF THE HANDBOOK

**A COMPREHENSIVE INDEX:** Few users will have the time or the need to use all the material in these volumes and do everything that is recommended. A comprehensive index or catalogue of materials to be found in all of the volumes is provided. Agency administrators and planners may use this index or menu-system as a means of quickly finding the portions of the Handbook that will be of most help.

**SELF-ADMINISTRATION:** The materials have been written to optimize self-administration and self-learning, and to minimize the need for outside help. For example, the diagnostic surveys found in Volume II have been designed for administration and analysis in house. Of course, some concepts or techniques will remain difficult to grasp and will require additional reading or the use of consultants. For example, job analysis techniques discussed in Volume III are very complex and are generally out of the reach of most agencies to apply themselves without the help of outside experts. Nonetheless, the objective has been to maximize as much as possible an agency's ability to do human-resource planning using in-house resources.

**PROBLEM-FOCUSED APPROACH TO PLANNING:** With the exception of some of the sections of Volume I where many of the general concepts and ideas about human-resource planning are discussed, the Handbook is designed to help managers and planners identify and diagnose concrete personnel problems (e.g., turnover, poor employee performance, inability to attract qualified personnel, EEO and Affirmative Action suits, and so forth). The emphasis, therefore, is on dealing with specific problems

as opposed to discussing human-resource planning from a conceptual point of view alone.

**VARYING LEVELS OF "BUY-IN":** Agencies differ in their need for and their ability to undertake human-resource planning. Agency size, environmental constraints, money, technical expertise, and the nature of human-resource problems confronted by an agency all affect the level of planning needed and possible. Where possible, Handbook materials have been written to provide alternative levels and options in the use of planning-related analytical techniques. Thus, there are options presented--different levels and kinds of analytical activities possible. Managers and planners are free to buy in at the level deemed most feasible and valuable.

**OUTSIDE CONSULTANTS:** The handbook material, besides helping agencies become more informed about what can be done in-house, helps identify conditions under which outside help is needed, what should be expected of this outside help, and whom or what to look for. One central purpose has been to provide agencies with the information necessary to become more intelligent and critical consumers of work done by outside consultants. Sometimes, agencies have not been able to sufficiently direct consultants about what is needed or wanted. This has frequently been the case, for example, when agencies sought outside help in validating selection and promotional practices, or when conducting job analyses.

## WHAT IS HUMAN-RESOURCE PLANNING?

In the most general terms possible, human-resource planning is the process of determining what an agency needs to do to ensure that it has the right number and kinds of people doing the right jobs, and doing those jobs well. To accomplish this, human-resource planning is composed of two distinct yet related activities. The first activity is called WORK FORCE PLANNING, while the second is labeled STAFFING-NEEDS PLANNING.

Workforce planning analyzes the agency's need for personnel--how many and what types of people. It also analyzes the required missions of the agency, determining the kinds of jobs that need to be done, and what qualifications people who hold these jobs need. Workforce planning is crucial, for without it agency management has little firm basis on which to justify the number and kinds of personnel hired or how they are hired, assigned, and employed.

Staffing-needs planning focuses on the various personnel administrative actions involved in acquiring, developing, and assigning agency personnel. The processes and policies associated with personnel administration (e.g., recruitment, selection, training, assignment, job design, compensation, and so forth) are closely tied to human-resource planning because personnel administrative actions put human-resource plans into operation. Just as there is a need to determine what kinds and how many people are needed (workforce planning), there is a need to determine and to plan the personnel actions required to acquire, to develop, and to employ personnel (staffing-needs planning).

Human-resource planning encourages and helps direct agency managers to take a "comprehensive" approach to personnel management and to the diagnosis of personnel problems. Factors affecting the need for and the availability of agency personnel are highly inter-related. So, too, the numerous steps in the personnel administrative process are interrelated and interdependent. Human-resource planning techniques help managers and personnel administrators to consider these factors in a more interrelated and systematic way.

#### WHY ENGAGE IN HUMAN-RESOURCE PLANNING?

Anticipating future requirements for manpower in the agency and forecasting future supplies of manpower are crucial to effective personnel management. Likewise, crime trends, budget forecasts, trends in the economy, population trends and the like greatly affect the need for personnel, and they also influence the availability of personnel. Thus, knowledge of current environmental conditions and impending changes in these conditions is vital to planning agency personnel policy. Current agency personnel policies in the areas of recruitment, selection, training, and so forth, produce certain kinds of results today that may or may not be appropriate or satisfactory in the future. Knowledge of both current results and likely future results produced by agency personnel administrative practice is, thus, also important. Planning-related analytical techniques provide the agency manager with powerful tools not only to analyze present conditions and effects, but also to anticipate future conditions and effects.

Besides making forecasts, human-resource planning also focuses on diagnosing personnel problems. A problem of poor agency performance or inadequate performance occasioned by insufficient, unqualified, or poorly utilized personnel requires agency managers first to diagnose the nature of and causes of the problem, and then to plan solutions. Several planning-related analytical techniques can help the manager in both of these endeavors. Additionally, human-resource planning not only helps to diagnose current personnel problems, but also to anticipate the emergence of personnel problems.

The kinds of personnel problems that will arise in an agency are numerous, and the combination of problems nearly infinite. So too, the causes of personnel problems will vary greatly from organization to organization. When we speak of personnel problems, we include conditions such as high turnover, poor employee performance, insufficient personnel, unqualified personnel, poorly trained employees, charges of discrimination in hiring and promotion, inability to attract qualified job applicants, constraints in assigning, reassigning, and promoting employees, and so forth. The numerous analytical techniques and tools described in the Handbook provide a basis for diagnosing the nature and causes of such problems and help identify and weigh potential solutions to them.

TABLE OF CONTENTS

VOLUME I: AN INTRODUCTION TO AGENCY HUMAN-RESOURCE PLANNING

DEFINITIONS, VARIETIES, AND PURPOSES OF PLANNING ..... 3

    Processes Related to Planning ..... 6

    Steps in Planning and Difficulties in Taking Them ..... 8

    Limited Rational Planning ..... 12

    Goals and Problems ..... 12

    Problem-Oriented Planning ..... 13

    Forecasting, Generating, and Testing Alternatives ..... 17

    Reactive, Active, and Comprehensive Planning ..... 20

    Alternative Planning Contexts ..... 21

    Summary ..... 25

HUMAN-RESOURCE PLANNING AND RELATED CONCEPTS ..... 27

    Defining Human-Resource Planning ..... 29

    Human-Resource Planning and Management ..... 33

    Organizational Human-Resource Planning ..... 35

    Applications of Organizational Human-Resource Planning ..... 40

    Realities of Organizational Human-Resource Planning ..... 43

    Starting Points for Organizational Human-Resource Planning ..... 46

    Summary ..... 51

VOLUME I (CONTINUED)

HUMAN-RESOURCE DATA AND INFORMATION .....	52
General Notions about Data	53
Types of Data for Criminal Justice Organizational Human-Resource Planning	56
Environmental Data	61
Organizational Data	64
Work Load Data	64
Job-Focused Data	71
Employee Data	72
Performance Data	78
SUMMARY .....	82

VOLUME II, PART 1:  
DIAGNOSING HUMAN-RESOURCE PROBLEMS

PROBLEMS AND PROBLEM FORMULATION .....	1
Problem Diagnosis	2
Picturing the Diagnosis Process	8
How Much of a Problem is the Problem?	9
Setting Priorities for Full-Scale Problem Diagnosis	12
Diagnosing Current Problems and Forecasting Problems	15
Symptoms versus Problems	17
Organizational Development and Human-Resource Problem Diagnosis	21
Problem Diagnosis and Canned Solutions	22

VOLUME II, PART 1 (CONTINUED)

General versus Problem-Focused Diagnosis	24
Diagnosis as Auditing or as Assessment	27
Sources of Agency Human-Resource Problems	30
Environmental Sources of Problems	31
Organizational Sources of Problems	33
Employee Sources of Problems	34
THE ROLE OF INFORMATION IN PROBLEM DIAGNOSIS .....	35
Basic Information for Manpower-Problem Diagnosis	40
Factually-Based versus Evaluative Information	42
Distinguishing Factual from Evaluative Information	43
Opinion-Based Information	44
Information about Priorities for Change	45
Descriptive, Evaluative, Prescriptive Information	47
Gathering Diagnostic Information	56
RELATING INFORMATION REQUIREMENTS TO THE BASIC DIAGNOSTIC MODEL .....	58
SUMMARY .....	62

VOLUME II, PART 2, SECTION A:  
ORGANIZATIONAL CLIMATE SURVEY

RATIONALE AND DESCRIPTION .....	70
The Information Goal of the Climate Survey	71
Kinds of Employees and Kinds of Information	71
Levels of Questions	72

VOLUME II, PART 2, SECTION A (CONTINUED)

Commitment to Using Climate-Survey Information	74
Climate Surveys Yield Perceptual Information	75
Ways of Interpreting Climate-Survey Findings	76
Kinds of Information Provided by a Climate Survey	78
Threats to Getting the Right Information	79
Organization and Issues Raised in the Climate Survey	84
DIRECTIONS FOR ADMINISTRATION OF THE ORGANIZATIONAL CLIMATE SURVEY ..	85
Basic Steps in Survey Administration	85
Adapting the Climate Survey to a Particular Agency	89
General Points about Survey Administration	89
ORGANIZATIONAL CLIMATE SURVEY .....	93
Directions	93
Key Terms	93
Respondent Background Information	94
Missions, Goals, Objectives	97
Jobs, Tasks, Roles	99
Job Knowledge and Skills	102
Manning Levels	104
Recruitment	106
Selection	108
Training and Development	110
Assignment/Reassignment	113
Promotion/Demotion	116

VOLUME II, PART 2, SECTION A (CONTINUED)

Employee Performance Appraisal	118
Employee Discipline	122
Compensation	125
Employee Retention	127
Employee and Union Relations	129
Supervision	133
Equal Employment Opportunity/Affirmative Action	137
Motivation and Job Satisfaction	139
INTERPRETING RESPONSES .....	141
Overview of Analysis and Interpretation	141
Analysts and Interpreters	146
Issues of Importance in Survey Analyses	147
Question Valence	148
Finding Variation and Looking for Associations	150
Grouped Questions within Sections	153
Analyzing Responses in the Seventeen Survey Categories	154
ANALYZING CLIMATE SURVEY RESPONSES FOR PURPOSES OF PROBLEM IDENTIFICATION .....	196
Analysis of Responses across Survey Sections	197
The Process: Cross Tabulations	198
Uses of and Limitations to Climate Survey Analysis	203
Additional Guides for Analyzing Climate Survey Information	204

VOLUME II, PART 2, SECTION B:  
PERSONNEL PRACTICES SURVEY

ORGANIZATION OF THE PERSONNEL PRACTICES SURVEY .....	206
WHO SHOULD FILL THE SURVEY OUT .....	208
ANALYSIS OF SURVEY FINDINGS .....	210
SECTION 1: PERSONNEL POLICY DEVELOPMENT AND IMPLEMENTATION .....	215
SECTION 2: SPECIFIC PERSONNEL PRACTICES .....	230
Missions and Goals .....	230
Jobs, Tasks, and Roles .....	243
Recruitment .....	255
Selection .....	267
Training .....	277
Compensation .....	293
Discipline .....	301
Supervision .....	307
Retention .....	311
Assignment .....	317
Equal Employment Opportunities .....	320
Unions and Collective Bargaining .....	328
Performance Appraisal .....	337

VOLUME II, PART 2, SECTION C:  
ENVIRONMENTAL FACTORS QUESTIONNAIRE

GENERAL CONSIDERATIONS AND CRITICAL ISSUES .....	347
ENVIRONMENTAL SURVEY: ADMINISTRATION AND ANALYSIS .....	352
Completing the Survey .....	353
Accuracy and Objectivity .....	354
Regularly Administer the Environmental Survey .....	357
Analysis across Categories .....	357
THE GENERAL NATURE OF THE ENVIRONMENT .....	358
Political Interactions .....	358
Environmental Climate .....	359
Experience in Actual Interaction .....	360
Anticipation .....	360
Agency Monitoring Responsibility .....	361
Authority for Decisions .....	362
Sources of Knowledge and Competition .....	362
SECTION 1: GENERAL ENVIRONMENT MONITORING AND AWARENESS .....	365
SECTION 2: SPECIAL ENVIRONMENT MONITORING .....	374
SECTION 3: FORMAL RELATIONSHIPS, INCLUDING BOUNDARY-SPANNING ROLES .....	389
SECTION 4: GENERAL AGENCY RELATIONSHIPS .....	393
SECTION 5: AGENCY IDENTIFICATION OF ENVIRONMENTAL SUPPORT, COMPETITION, AND STRAIN .....	401

VOLUME II, PART 3:

COMBINING RESULTS OF THE THREE DIAGNOSTIC SURVEYS

GENERAL POINTS ABOUT COMBINING INFORMATION ..... 415  
 ALTERNATIVE WAYS OF VIEWING THE COMBINING PROCESS ..... 417  
 COMBINING CLIMATE AND PERSONNEL PRACTICE SURVEY RESULTS ..... 419  
 ADDING INFORMATION FROM THE ENVIRONMENTAL FACTORS QUESTIONNAIRE .. 426  
 EXAMINING THE RELATIONSHIPS AMONG AREAS OF PERSONNEL PRACTICE .... 429  
 SUMMARY ..... 430

VOLUME II, PART 4:

A PROCEDURE FOR PROBLEM DIAGNOSIS

A GENERAL MODEL FOR PROBLEM DIAGNOSIS ..... 431  
     The Detailed Problem-Diagnostic Model ..... 435  
 PROBLEM DIAGNOSIS AND HUMAN-RESOURCE PLANNING ..... 440  
     Prioritizing Problems ..... 444  
 SECURING INFORMATION ON CONDITIONS, EFFECTS, AND CAUSES ..... 447  
     Step 1: Identifying and Describing the Condition ..... 447  
     Step 2: Identifying and Weighing Effects ..... 450  
     Step 3: Identifying and Assessing Causes ..... 453  
     Weighing Effects and Causes ..... 455  
     Effects ..... 456  
     Causes ..... 461  
 SOURCES AND TYPES OF DIAGNOSTIC INFORMATION ..... 465  
     Information about Cause and Effect ..... 468

VOLUME II, PART 4 (CONTINUED)

Sources of Information ..... 470  
 Data Storage Formats ..... 472  
 Diagnostic Surveys as a Source of Information ..... 473  
 GROUP PROBLEM DIAGNOSIS ..... 474  
     Group Composition ..... 475  
     Basic Steps in Organizing Group Problem Diagnosis ..... 477  
     Applying Group Processes to Figure 2 ..... 481  
     Moving Beyond Diagnosis ..... 482

VOLUME II, PART 5:

THE DIAGNOSIS OF HUMAN-RESOURCE PROBLEMS: AN EXAMPLE

DESCRIPTION OF THE STATE DEPARTMENT OF CORRECTION ..... 486  
 PROBLEM IDENTIFICATION ..... 491  
     Step 1: Examining Existing Information ..... 495  
     Step 2: Assembling the "Nominal Group" ..... 504  
     Step 3: Group Consideration of Conditions ..... 509  
     Step 4: Defining the Condition ..... 517  
     Step 5: Identifying Effects ..... 523  
     Step 6: Assessing Effects ..... 530  
     Step 7: Identifying Causes ..... 532  
     Step 8: Summary View ..... 539  
 CONCLUSIONS ..... 541

VOLUME III

HUMAN-RESOURCE PLANNING GUIDE: PART I

AN INTRODUCTION TO THE HUMAN-RESOURCE PLANNING GUIDE

WHO WILL USE VOLUME III? ..... 1  
ORGANIZATION OF VOLUME III ..... 4

AGENCY-BASED RESEARCH

RESEARCH IN CRIMINAL JUSTICE AGENCIES ..... 12  
KINDS OF RESEARCH IN AGENCY SETTINGS ..... 18  
THE ROLE OF THE ANALYST ..... 26  
SUMMARY ..... 31

AN INTRODUCTION TO RESEARCH METHODS FOR  
HUMAN-RESOURCE PLANNING

DATA AND INFORMATION ..... 36  
MEASUREMENT ..... 37  
    Nominal Scales ..... 42  
    Ordinal Scales ..... 43  
    Interval Scales ..... 44  
    Ratio Scales ..... 45  
    Sources of Measurement Error ..... 48  
OPERATIONALIZING DATA ..... 49  
    Why Be Concerned with Concepts and Referents? ..... 54  
    Operational Definitions for Criminal Justice  
    Human-Resource Data ..... 55

Missions and Goals ..... 57  
Crime Data ..... 59  
Economic and Budget Conditions ..... 64  
Population Characteristics ..... 64  
Public and Political Values ..... 72  
Work-Load Data ..... 74  
Job-Focused Data ..... 79  
Employee-Focused Data ..... 80  
Performance Data ..... 82  
Systems Data ..... 86  
METHODS OF DATA COLLECTION ..... 91  
    The Questionnaire ..... 91  
    The Interview ..... 116  
    Observation ..... 123  
    Document Studies ..... 127  
    Comparison of Data Collection Techniques ..... 128  
APPROPRIATE METHODS FOR COLLECTING HUMAN-RESOURCE DATA ..... 131  
CONSTRAINTS TO DATA COLLECTION ..... 136  
VALIDITY AND RELIABILITY ..... 140  
    Validity ..... 141  
    Reliability ..... 145  
    Validity and Reliability of Data-Collection Methods ..... 150  
SAMPLING ..... 156  
    Sampling Methods ..... 162

Probability Sampling Techniques	163
Nonprobability Sampling Techniques	167
RESEARCH DESIGN IN HUMAN-RESOURCE PLANNING .....	171
Descriptive Research	171
Causal-Comparative Research	175
Experimental Research	177
ANALYZING HUMAN-RESOURCE DATA .....	188
Description in Human-Resource Data Analysis	189
EXAMINING RELATIONSHIPS AMONG AND BETWEEN VARIABLES .....	202
SUMMARY .....	207

VOLUME III

HUMAN-RESOURCE PLANNING GUIDE: PART 2

PERSONNEL SELECTION

SELECTION PROCEDURES .....	218
APPLICATION BLANK .....	218
PRELIMINARY INTERVIEW .....	226
REFERENCE CHECKS .....	227
INTERVIEWS .....	228
PHYSICAL EXAMINATIONS .....	233
SELECTION TESTS .....	235
SELECTION TEST CONSTRUCTION .....	235
GENERAL CONSTRAINTS AND CAPABILITIES OF SELECTION TESTS .....	239
TYPES OF SELECTION TESTS .....	240

INTERPRETING TEST SCORES .....	256
SUMMARY .....	258
LOCATING TEST INFORMATION .....	259

PERFORMANCE EVALUATION

METHODS OF EVALUATING JOB PERFORMANCE .....	269
Graphic Rating Scale	272
NUMERICAL MANIPULATION OF CATEGORICAL AND GRAPHIC SCALES .....	278
Critical-Incident Method	284
Ranking Scales	286
Paired Comparisons	289
Forced Distribution Method	292
Checklists	293
Essay Form	294
Forced-Choice Method	294
Field Reviews	296
Assessment Centers	297
Behaviorally Anchored Rating Scales (BARS)	303
APPRAISAL RATING ERRORS .....	305
CONSIDERATIONS FOR SELECTING A TECHNIQUE .....	307
SUMMARY .....	308

## JOB ANALYSIS

THE ANALYSIS PROCESS OF JOB ANALYSIS: HOW TO OBTAIN JOB INFORMATION .....	318
Questionnaires .....	318
Daily Diaries .....	327
Observation .....	328
The Interview .....	328
CONDUCTING JOB ANALYSIS: SOME CONSIDERATIONS .....	333
METHODS OF JOB ANALYSIS .....	336
Functional Job Analysis .....	336
Task and Knowledge Checklists .....	343
Ability Requirement Scales .....	350
The Critical-Incident Technique .....	351
The Position-Analysis Questionnaire .....	354
Task Inventories .....	357
The Job Element .....	366
METHODS OF JOB EVALUATION .....	371
Nonquantitative Job-Evaluation Methods .....	372
Quantitative Methods .....	374
SUMMARY .....	402

## MANPOWER FORECASTING

ORGANIZATIONAL UNCERTAINTY AND ENVIRONMENTAL CONSTRAINTS .....	409
THE ROLE AND FUNCTION OF MANPOWER FORECASTING .....	411
MANPOWER ESTIMATES AND PROJECTIONS: SOME NECESSARY DISTINCTIONS .....	413
FORECASTING SUPPLY AND DEMAND .....	419
MODELS AND MANPOWER FORECASTING .....	421
FORECASTING DEMAND: MODELS AND TECHNIQUES .....	424
OPINION-BASED OR JUDGMENTAL FORECASTING OF MANPOWER DEMAND ...	432
JUDGMENTAL TECHNIQUES: RULES OF THUMB AND REPLACEMENT CHARTS	436
FORECASTING MANPOWER DEMAND: THE USE OF STATISTICAL TECHNIQUES .....	438
EXTRAPOLATIONS: MARKOV CHAINS AND MOVING AVERAGES .....	441
REGRESSION ANALYSIS AND FORECASTING MANPOWER DEMAND .....	445
ECONOMETRIC MODELS AND MANPOWER FORECASTING .....	449
APPLICATIONS OF MANPOWER DEMAND FORECASTING IN CRIMINAL JUSTICE .....	453
FORECASTING SUPPLY: MODELS AND TECHNIQUES .....	467
CURRENT RESOURCE ANALYSIS .....	470
CHANGE-IN-LABOR-FORCE ANALYSIS .....	474
TURNOVER ANALYSIS .....	475
RELATING MANPOWER SUPPLY TO MANPOWER DEMAND .....	483
SUMMARY .....	483
BIBLIOGRAPHY .....	491
SOURCES OF CRIMINAL JUSTICE DATA RELATED TO HUMAN-RESOURCE PLANNING .....	523

VOLUME III  
AN INTRODUCTION TO THE HUMAN-RESOURCE PLANNING GUIDE

The Human Resource Planning Guide, Volume III, is primarily intended as a supplement to the materials contained in Volumes I and II. As a supplement, the guide focuses on the major technical aspects of conducting human-resource research in criminal justice agencies. The objective has been to write about the chief research issues--job analysis, forecasting, selection validation, etc.--confronted when conducting human-resource analyses in criminal justice agencies, as well as about various generalized research issues--for example, sampling, reliability and validity of measurement, type of data used in planning research--confronted when conducting any agency-based research. It is not the intent that Volume III necessarily be read from cover to cover. Instead, we expect that agency planners, analysts, and administrators will use the volume as a reference guide, referring to sections when needed and using materials selectively.

In approaching the issue of conducting human-resource planning and analysis activities in criminal justice agencies, the materials contained in Volumes I through III of the report have stressed making criminal justice agency planners, analysts, and managers somewhat less dependent on others for conducting research within the agency. The materials in Volume I appropriately focused on the conceptual requirements for understanding human-resource problems in the agency context.

Volume II, through the use of climate, personnel-practices, and environmental surveys, as well as through the problem-diagnosis model presented, provides ready tools for agencies to use to monitor and to analyze their particular human-resource problems. Volume III continues in this approach by collecting together various human-resource analytical and planning techniques and discussing the various aspects of agency-based human-resource research.

In general, a common format is used in presenting the materials in Volume III. Specific analytic techniques related to human-resource planning are presented together with their prime uses. Each description is followed by a consideration of the major technical and other supports required if the technique is to be employed. In this regard, special attention is paid to factors that will limit the agency's ability to use a particular technique; and, where appropriate, alternatives in use are presented and discussed. The particular limitations of the techniques themselves are also discussed, and additional reference materials are identified for the reader.

Beyond describing these analytic techniques, agency personnel administering them need information about conducting research, identifying and defining available data, assessing the reliability and validity of measurement and of the findings obtained, and selecting an appropriate research methodology for examining issues of acquiring and employing human resources in criminal justice agencies. Volume III explores particular research and methodological issues by providing the reader with a concise description of what data are and how research

is designed, as well as methods of data analysis and interpretation. These discussions are meant to help clarify some of the issues raised in the discussions of the use of individual human-resource analytic techniques and to provide agency personnel with a basis for assessing research conducted by others.

The materials covered in Volume III are not exhaustive of the research process nor of the available techniques associated with human-resource planning and analysis. Techniques continually arise in the research literature, and the process of conducting research in all of its many manifestations is well beyond the scope of a single volume of this nature. So, conscious choices have been made--choices that have identified techniques currently in use and research issues of prime importance. What is intended in Volume III is the development of "in-house" research expertise appropriate to the needs of your agency, and the identification of the more generalized human-resource planning and analytic techniques your agency is likely to confront. By creating better consumers of agency-based human-resource research, it is the intention of Volume III to improve on existing skills of agency personnel and to provide a reference guide to human-resource analysis and planning.

#### WHO WILL USE VOLUME III?

As indicated above, Volume III is primarily directed toward agency personnel administrators and planners engaged directly in the more technical aspects of personnel administration and human-resource analysis. For these people the information contained in Volume III

should be viewed as supplementary to their professional training, and as a resource guide for up-dating their professional expertise. The materials contained in Volume III, however, are not usable only by personnel administrators and planners. Top executives in an agency may also use the resource guide as a source of information about the quality of findings reported to them by consultants or by research staff within the agency. Understanding the quality of the data produced from a particular analytic technique may aid the administrator in the assessment of the usefulness of these data for resolving agency problems. Further, the top executive, as an active "consumer" of research findings, may be in a better position to evaluate conflicting findings produced through differing research methods, design differences, and measurement differences. This research-consumer orientation is also an integral part of Volume III.

#### ORGANIZATION OF VOLUME III

Volume III is divided into six major sections and an accompanying bibliography. Each section represents a discrete set of interests in conducting human-resource analysis in criminal justice agencies. Yet, the sections are interrelated in that discussions in one section often are applicable to discussions in other sections. This is particularly the case with the more generalized treatments of research methods and techniques. Each of the major sections in Volume III is briefly described below.

Section I - Agency-Based Research: Research conducted in action settings, such as those found in criminal justice agencies, normally

takes on the characteristics of applied research. Applied research is distinguished from basic research in a number of ways, including the nature of the questions asked, the research procedures used, the time and cost constraints, and the purposes the information generated through such analysis is put to. This section describes the differences between agency-based policy research and basic research, normally associated with research institutes or universities. The purpose of the section is to identify and to describe the specific constraints the agency puts on the research process and to explore the context of research in criminal justice agency settings. The materials in this section help illustrate the dynamic nature of criminal justice agency human-resource analysis, and should sensitize those conducting such research to the particular characteristics of this form of social analysis.

#### An Introduction to Research Methods for Human-Resource Planning:

This section explores the issue of criminal justice human-resource data definition, data collection, research design and analysis. For data definition, the section examines the various sources of human-resource data in criminal justice agencies and in the environments of these agencies. Particular attention is devoted to describing the meanings of data, operational definitions of data, the reliability and validity of data, and the sources of error in collecting criminal justice human-resource data.

This section also explores the collection and analysis of human-resource data by examining such issues as types of criminal justice

human-resource data (e.g., environmental, organizational, employee-focused, and job-focused), alternative means of collecting human-resource data (observation, survey, document review, and interview), data-collection techniques, and data needs for human-resource planning.

Also included in these considerations are methodological issues in the collection and analysis of human-resource data in criminal justice. Among the issues discussed are the validity and reliability of data and of measurement, sampling techniques, research design, and analysis.

Personnel Selection. Shifting from the more generalized considerations of agency-based research, data collection, and data analysis, this section focuses on various techniques for selecting personnel, and particularly on the techniques' validity and reliability. Various personnel-selection techniques, screening devices, and testing procedures are presented, as well as a consideration of the appropriateness of these various procedures and techniques for selecting personnel in criminal justice.

Of particular concern in this section are the selection measures used in various techniques and the data obtained. Standardized testing procedures are also discussed, as is the job relevance of current techniques.

Performance Evaluation. Related to the selection measures considered above, this section examines performance evaluation in criminal justice. Techniques of performance evaluation are discussed, their strengths and weaknesses considered, and their relevance to accurately evaluating employee performance. The performance evaluation

techniques examined include the graphic rating scale, the critical-incident method, ranking scales, the paired comparison method, and several others. Their contributions to identifying potential human-resource problem areas are also discussed.

Job Analysis. In criminal justice personnel administration, the issue of the job relevance of selection, evaluation, and promotional procedures has been an increasingly important topic gaining the attention of the courts, civil service systems, and personnel administrators. In this section we consider job-task analysis as a concept and as a set of techniques applied to criminal justice agency settings. Included in the section are discussions on how information on jobs is obtained and methods of conducting job-task analyses, including functional job analysis, ability requirement scales, critical-incident techniques, the position-analysis questionnaire, task inventories, and the job-element method.

Following a discussion of job-task analysis is a discussion of job evaluation, or the process of comparing jobs within an agency. Considered in this section are such job-evaluation methods as the job-ranking method, the paired-comparison method, job-classification methods, the points-rating method, the factor-comparison method, the guide-chart profile method, the time-span-of-discretion technique, and the decision-band method. Each of these techniques for evaluating jobs in an agency are considered and their relative advantages and disadvantages discussed.

As job-task analysis and job evaluation are critical components in any human-resource analytic design, the information contained in this

section will be of particular use to planners and administrators either contemplating or currently involved in evaluating and analyzing jobs in criminal justice agencies.

Manpower Forecasting. The methods and procedures of forecasting, projecting, and estimating the supply of and demand for criminal justice human resources are the subject of this section. Included in the discussion are the various methods of predicting needed criminal justice manpower--rules of thumb, prediction models, estimation procedures. Also of concern here is the estimation of available supply, including the use of Markov Chain analysis to estimate changes in the work force, turnover, and replacement analyses, and estimates of absenteeism. The materials in this section lay the foundation for agency-based predictions about human-resource demand and use, to help insure that the agency has the kinds of people it needs doing things in which they are most productive. These materials will also provide the agency planner and administrator with alternative techniques of estimation and prediction that can be adapted to particular agency settings.

Selected References. The final section of Volume III lists selected references under the six major subheadings previously described. The citations are reported for future reference and for elaborative purposes. As was indicated in the introduction of this section, the specification of all pertinent materials is beyond the scope of a single undertaking. The materials covered in Volume III represent the most salient topics in criminal justice human-resource diagnosis, analysis, and planning. The references in this section

extend the agency planner's or analyst's available list of resources for working with and analyzing criminal justice human-resource problems.

## AGENCY-BASED RESEARCH

Research conducted in action settings, such as those found in criminal justice agencies, is often affected by such factors as the agency's internal and external environment, including the political and social conditions confronted by the agency. A growing body of literature focused on the differences between traditional research and agency-based research has outlined the distinctions in the form, intent, and outcome of these research strategies. Also, an increasing use of analysis in agencies has resulted in the more extensive use of a specialist, the policy analyst or evaluation researcher, as a source of decision-making information.

The kinds of analysis, their similarities and differences, and the individuals conducting such analyses are the subjects of this section of Volume III. The intent of this section is to discuss the role of analysis in decision making in criminal justice agencies, the differences between traditional research and agency-focused research conducted in criminal justice, the identification of various forms of agency-based research, and the consideration of the role of the analyst in policy making in criminal justice. This section will provide the reader with an overview of agency-based research and its utility for decision making and policy making in criminal justice, especially human-resource policy making.

## RESEARCH IN CRIMINAL JUSTICE AGENCIES

In criminal justice agencies, one of the primary reasons analysis and research are being stressed is that they are expected to contribute to the quality of decisions made. That is, it is assumed that as analysis and research in agencies improve, so will the amount and quality of information reaching decision makers. This, in turn, will improve the rational basis of the decisions made. By rational decision making we mean the use of fact in the decision-making process. Analysis and research in criminal justice agencies are thought to improve the quality of known facts and thereby improve the basis upon which decisions are made.

Rational decision making also embodies a set of procedures used in making decisions. The essential elements of the rational decision-making approach are:

1. The specification of clear and unambiguous goals and objectives for the agency and the criteria by which the agency will be able to assess whether or not these goals and objectives are being accomplished.
2. The identification of the alternative approaches by which the organization's goals and objectives can be accomplished.
3. The establishment of evaluation criteria for the assessment of each alternative approach to goal achievement.
4. The development of valid and reliable measurements for the criteria used to assess the achievement of goals.
5. The selection of a means of goal achievement through analysis conducted with measures and criteria based on an identified decision-making rule.

The rational model of decision making is obviously highly dependent on the quality of information generated through research and evaluation. Further, this approach to agency-based decision making generally ignores or excludes other sources of input in the decision-making process. For example, in the rational model such considerations as political influence, emotional or value-laden approaches to reaching decisions, or decision precedents (tradition) in the agency are generally excluded. Instead, the rational model might be described as "efficiency" oriented, attempting to minimize input or the expenditure of resources, while maximizing output or the services produced.

The rational model of decision making has great appeal, particularly in recent years as resources for public service agencies, including those in criminal justice, have dwindled. One consequence of limited resources in criminal justice has been the emphasis put on efficiency and rationality in management decisions. Despite the appeal associated with rationalism, there are clear limitations placed on its use. The limitations associated with the rational model have been summarized by Downs<sup>1</sup> as follows:

1. Each decision maker can devote only a limited amount of time to decision making.
2. Each decision maker can mentally weigh and consider only a limited amount of information at one time.
3. The functions of most officials require them to become involved in more activities than they can consider simultaneously; hence they must normally focus their attention on only part of their major concerns, while the rest remain latent.

4. The amount of information initially available to every decision maker about each problem is only a small fraction of all the information potentially available on the subject.
5. Additional information bearing on any particular problem can usually be procured, but the cost of procurement and utilization may rise rapidly as the amount of data increases.
6. Important aspects of many problems involve information that cannot be procured at all, especially concerning future events; hence many decisions must be made in the face of some ineradicable uncertainty.

The limitations imposed on the rational decision-making model stem from incomplete or inaccessible information, from the costs of time and money in generating information, from the practical limitations of human cognition (in ability to handle alternatives and information), and from the value conflicts that confront agency decision makers-- conflicts incapable of being resolved through the use of fact alone. Cumulatively, these limitations severely restrict the adoption of the purely rational approach, but they do not obviate its use.

Herbert Simon, a noted researcher on decision making, recognizing the limitations inherent in the rational perspective, characterized decision making as conforming to bounded rationality.<sup>2</sup> Bounded rationality was meant to convey the idea that there were limits to the achievement of a purely rational (fact-oriented) process. "Bounded rationality is the procedure for making the best decision under conditions of limited knowledge."<sup>3</sup> Hence, the decision maker selects a course of action from a limited choice of alternatives and evaluates that course of action not in relation to all others but in relation to a satisfactory solution criterion. Rather than maximizing

the choice of the one best solution, the decision maker "satisfices," selecting a solution that satisfies the immediate problem at hand. The distinction between rationality in its classic form and bounded rationality in its more limited form is a clear recognition of the dynamics of organizational and administrative life that demand that action be taken generally before all available evidence can be made available to the decision maker. In the instance of bounded rationality, information is brought to bear on a problem to help minimize administrative uncertainty. In each approach, however, the purpose of information use, and hence analysis through agency-based research, is to improve the quality of decisions made.

In addition to identifying types of decision making in criminal justice agencies, there are a number of other distinctions that can be made between agency-based and traditional research. These distinctions generally arise from the agency setting, the purpose of the research, and the uses to which the information produced from agency research is put.

Agency-based research, unlike traditional forms of research, is primarily intended for immediate use. The results of agency impact assessments, social assessments, or evaluations are intended to be used to influence programming. The criterion of use or usefulness of agency-based research carries with it the idea that the results must be practicable to the agency. Results with no direct policy or programming implications, while possibly of theoretical interest, may be of little value or application to an agency grappling with a

particular problem. The consumer of the research (the agency) has an investment in its outcome, and desires results useful to solving problems. Agency-based research must keep the use criterion constantly in mind.

Agency-based research is generally focused on questions that are not determined by the researcher per se, but from the consumer of the research, the agency. In this regard, the agency exercises great influence in the determination of the research question, the way in which the study will be approached, and the coordination of the research effort. Traditional research approaches have generally left the determination of the research questions and direction of inquiry to the researcher. By contrast, agency-based research allows the consumer of the research the determination of the direction, content, and form of the research conducted.

A third distinction between more traditional forms of research and that conducted in agency settings is related to the question of the establishment of criteria for assessing success or failure of agency programming. In traditional approaches, the criteria for assessing success or failure are determined by the researcher, and are generally based on "objective" criteria. In agency settings the judgmental nature of the criteria may vary to a greater extent than for other settings primarily because of the multiple actors involved (agency administrators, middle managers, and line personnel), the vagueness of certain goals and objectives (e.g., preventing crime or rehabilitating offenders), and the dynamics of the agency's environment. These factors may

influence the way in which criteria for success or failure are ultimately determined and evaluated.

Last, and related to the above concern, is the dynamic nature of agency-based research. Agencies represent action settings, where programs are implemented and assessed. The dynamics of the human interactions, the interactions with the agency and its external environment, and the agency's clientele all require that the research be adapted to nonstandard conditions. Further, the agency requirement that information produced be timely and relevant to current problems imposes an additional constraint on research conducted.

While there are numerous differences between agency-based research and the research conducted by research institutes and universities, there are important similarities that cannot be overlooked. Research design, appropriate methodology, valid and reliable measurement, well-thought-out and clearly framed analysis and clearly and succinctly written summaries are common to all forms of respectable research. A discussion of these general research requirements is presented in other sections of this volume. The selection of these general topics and their discussion in this volume is predicated on the recognition that research in any setting, be it laboratory or agency, must be conducted with sufficient rigor to assure that the findings be valid. Without validity in findings, the efforts expended in agency-based research will be meaningless to the policy or decision maker and to the agency.

## KINDS OF RESEARCH IN AGENCY SETTINGS

Research and analysis in agency settings can contribute to numerous organizational activities and functions. While we generally see analysis and research as a process covering many aspects of agency functioning, we might also consider research as a function-specific activity. Analysis and research in agencies can contribute to at least four major organizational undertakings: planning, program development, implementation, and evaluation.<sup>4</sup> Each of these processes and research activities will be briefly considered below.

Planning: Much of the grist for planning is the result of research and analysis conducted by the agency. Research for planning typically includes the analysis of (1) organizational goals and objectives, (2) existing conditions that may indicate gaps in the attainment of goals and objectives, and (3) fiscal, human, and material resources necessary to reduce such gaps. Research on the nature of the work done by the agency, the types and kinds of agency employees (including their preferences in work, their skills, and the like), and the agency's environmental constraints and contingencies might be included in planning research as well.

Planning, as we have also seen in Volume II, might result in organizational stock-taking, whereby the agency examines its current supply of and demand for human resources. Other forms of research for planning might include some form of goal analysis, where the agency examines its goal premises, or assesses its ability to achieve intended ends. Document searches for agency mandates, the review of enabling

legislation, and the like, while preparatory for planning exercises, are not normally associated with research, yet they involve a substantial amount of analytical activity and are crucial for the planning process.

Other research services supportive of the planning process are fact-finding and social accounting.<sup>5</sup> Fact-finding involves the identification of sources of information associated with the planning exercises and the determination of relevant planning data. Fact finding might involve such things as literature searches of studies and published reports on a particular problem, say police response time, or correctional classification systems; the review of official sources of information about target populations such as the census; the contacting of "experts" from within and without the agency to gain information from them about a problem or planning area (use of the delphi technique discussed in Volume II might be considered in this part of the planning and fact-finding process); or the contacting of other community organizations and agencies that might have information on the particular topic under consideration. Fact-finding then, as an analytic technique for planning, involves agency-based research.

In addition to fact-finding, social accounting is a form of agency-based research.<sup>6</sup> Social accounting involves the determination of "what the organization, community, or society is like at the moment, where it has been, and where it appears to be going."<sup>7</sup> Social accounting might involve the surveying of a particular clientele or community segment about needed services, or it might result in the conducting of

a census in a particular region. In each instance, social accounting is focused on determining existing conditions, one of the cornerstones of the planning process.

Program Development: Research for program development is typically associated with two forms of analysis: the analysis of social problems and the analysis of social impact. Each of these is associated with the development of programming, and each normally is done before programs are put into action. These forms of analysis are associated with determining the need for and the likely impact of the program under consideration. In our rational model, previously identified, these forms of analysis fall under the analysis of alternative strategies for attaining goals. Social-problem analysis is a research process focused on identifying the underlying "causes" of problems confronting the agency and methods for resolving these problems. This analysis is typically associated with research and development in industry, where new products are being developed and tested before their manufacture. In criminal justice, social-problem analysis might include determining levels of victimization in various sections of a city and designing patrol strategies to cope with differences in community victimization. In the "medical model" of correctional treatment, social-problem analysis typically has been individually and clinically centered, attempting to isolate the "causes" of deviant behavior in the individual and then treating the identified causes.

In contrast to social-problem analysis with its exclusive focus on underlying cause and effect, social-impact analysis focuses almost

exclusively on the consequences of particular courses of action. Social-impact analysis, then, is prospective, attempting to predict the intended and unintended consequences of particular agency actions. Social-impact analysis, using our examples of patrol strategy and victimization, might involve the assessment of the impact of changing patrol strategies to conform with victimization patterns. Included might be assessments of the impact of the changes on the public, the police organization, and the individual patrol officers. By analyzing the presumed consequences of implementing a particular policy, the agency has the advantage of reconsidering policies before they are implemented.

Implementation: Research on implementation is generally recent, although in one sense implementation assessments are a category of formative evaluation procedures. Implementation assessments attempt to accomplish a number of objectives. First, before the initiation of a particular project, an implementation assessment might pose the question: Does this agency have the institutional means to embark on this policy option? By this is meant: Does the agency have the fiscal, political, and human resources necessary adequately to implement the program as it is intended? Secondly, implementation assessments follow the development of projects, noting when the project deviates from the prescribed plan and equally noting how the project develops. Such a process analysis has been labeled a formative evaluation where the project is assessed while in process and the information obtained is used to guide the future development of the project.

Finally, implementation assessments provide foundation for the agency to answer the question: Was the project carried out as intended?. As we will see below, this is an important question because if we cannot determine that the project plan was implemented, we cannot determine whether the project was a success or failure.

Evaluation: Perhaps the form of research most often associated with agencies is evaluation research. As a research process, evaluation "establishes clear and specific criteria for success. It collects evidence systematically from a representative sample of concern. It usually translates the evidence into quantitative terms . . . and it compares it with the criteria that were set. It then draws conclusions about the effectiveness, the merit, and the success of the phenomenon under study."<sup>8</sup>

Evaluation research has typically been associated with the assessment of effects or outcomes. Did the patrol strategy reduce victimization? Does the correctional treatment program reduce recidivism? These kinds of questions are typical of evaluative issues. Through the application of research methodology, recognizing the distinctions between traditional and agency-based research discussed above, evaluation analyses seek to identify the causal implications of a project. This information tells the manager whether or not a program is having its intended consequences.

Information collected from traditional effects-oriented evaluation projects afford some test of the program and, too, provide for an

assessment of whether or not the program worked. Evaluation can also help develop base-line agency information for examining longer-term effects of criminal justice programs. For example, many criminal justice projects are evaluated within a year of implementation. This is often done to provide the manager with some feedback about program success or failure. Unfortunately, many of the projects undertaken in criminal justice don't necessarily have effects that can be identified in a year's time. In many instances this absence of palpable effect is due to the complexity of the changes that have to be made in the behaviors being affected by these projects. Individual rehabilitation or reductions in recidivism, for instance, have often required much longer time periods to materialize. The information collected at interim evaluation stages, however, can ultimately be useful as it can go toward establishing the pattern of behavior. As a consequence, evaluation studies can and do provide systematic base-line data for assessing projects over time.

Evaluation research in criminal justice agencies has often been conducted rather unsystematically. Historically, evaluation efforts were tacked onto projects either as afterthoughts or as a granting agency's requirements. As a consequence, the information collected from such studies has not been particularly useful. For evaluation information to be useful to the agency, there are a number of requirements. These requirements help insure that the information finally obtained will be valid and useful to the agency. The first requirement

is recognizing that evaluation is not something that is done entirely after the project is implemented. Evaluation research should begin when other analyses of the project are taking place. For example, earlier we discussed the fact-finding and social-accounting contributions of analysis to planning. The information collected from such analyses also should be made part of the final evaluation effort. This is because such information may determine the cause-and-effect relationships underlying the project and their ability to be accomplished. Similarly, social-problem analyses and social-impact analyses provide crucial information for the final determination of what effects the project did or did not have.

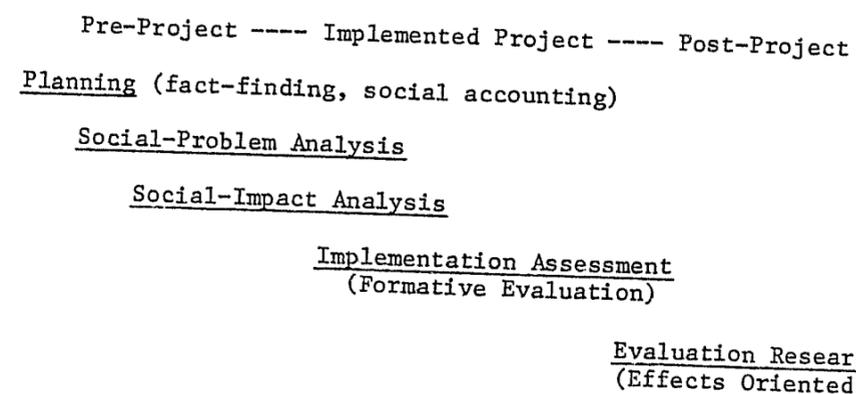
The second important requirement for competent evaluation is the recognition that the evaluation must have access to programming personnel and field operations. Quite often the selective interpretations of those putting projects into practice have a significant influence on the direction of the project, including its outcomes. Evaluation staff must, therefore, interact with the programming and operational staff to capture this type of information. This type of staff assessment corresponds to our discussion of implementation assessment.

Finally, evaluation staff, when actively engaged in an evaluation, should not have other organizational responsibilities. Too often evaluation staff are conducting other analyses in the agency, while also being responsible for line functions. Sufficient time and money must be devoted to quality evaluation. Without such a commitment from the agency administrator, evaluation studies can be hastily done and lose quality.

The role of evaluation research in criminal justice agency decision and policy making has only recently been expanded. Traditional approaches were exclusively informal assessments of the merits of a program. This approach was succeeded by pseudo-evaluations in which the appearance of systematic study covered up sloppy analysis. In recent years evaluation research in agencies has improved, and so too has the amount and kind of information made available to decision makers. Continued efforts in evaluation in criminal justice agencies will no doubt enhance organizational policy making and the use of human resources to carry out organizational goals and objectives. Figure 1 represents the relationships between the various forms of analysis discussed in this section.

FIGURE 1

VARIOUS FORMS OF AGENCY-BASED RESEARCH  
AND WHEN THEY ARE DONE



## THE ROLE OF THE ANALYST

Typically agency analysts have been viewed in a limited role, that of conducting "value-free" research, calculating the costs and benefits of programs, and bringing "scientific inquiry" to bear on agency problems. While policy analysts do engage in many of these activities, the scope of their involvement in the policy-making and decision-making process is much larger than previously thought.

In addition to providing an analysis, policy analysts influence policy in three fundamental ways. First, as adjunct staff to decision makers, policy analysts shape the decision premises of decision makers. In shaping decision premises, policy analysts fulfill an enlightenment function,<sup>9</sup> synthesizing much analytical information and helping to shape the decision maker's outlook on a particular problem. Often, where the long-term relationship between the analyst and decision maker is stable, this is done in a subtle manner. Examples of such relationships between analyst and decision maker include advisors to presidents and cabinet members who fulfill such analytic and opinion-shaping roles. The same type of relationships are found in agencies where managers seek information from their trusted and informed advisors.

Secondly, policy analysts often truncate or reduce the range of policy options considered by the decision maker. This channeling function of the analyst generally appears when the decision maker has asked that a particular course of action be assessed by the analyst. At some later date the analyst appears with an assessment of the program-- an assessment considering the "more important" implications of the project.

These "more important" implications are, in large measure, determined solely by the analyst, and questions are not generally raised about the assumptions that lead to one set of options being given more or less importance. In these instances the policy analyst's own biases begin to creep into the decision-making process, and these biases receive very little review.<sup>10</sup> For example, an analyst with a particular bias toward the use of a particular patrol strategy, say saturation patrol, may select that strategy chiefly on the basis of his or her own biases and much less on the basis of some "objective analysis." Similarly, an analyst with a particular correctional philosophy may focus on options consistent with the philosophy and not on those outside of it. Some analysts may respond by advocating an institutional policy stance while others, though looking at similar institutions, may tend to advocate community-based corrections.

Besides the obvious favorite policies of analysts, biases include the analyst's ideology, beliefs about centralized or decentralized agency structure, or social and political beliefs about crime and punishment. These biases must be brought into the review of the decision maker so as to preclude individual preference being proffered as "objective" science.

The final way the policy analyst affects decisions is through the results of the research undertaken. While subjectivity and objectivity are important to research, other considerations are equally important. The timeliness of the research, its applicability to the agency, and its ability to be implemented by the agency may all make one analyst's

results more useful to the agency than another's. Furthermore, the analyst's technical competence and his or her ability to conduct a methodologically appropriate analysis are important in establishing the credibility of the analysis and the research conducted. This credibility is the stock-in-trade the analyst uses in influencing policy in agencies. Where the credibility of the analyst is high, the research is more likely to be believed, and utilized by the agency; where credibility is low, use and implementation of research results are less likely.

In addition to the policy analyst's ability to influence the decision-making process through affecting decision premises, channeling decision options, and producing credible results, the analyst can assume different roles in the policy-making process that yield different types of information through different approaches. Peter W. House<sup>11</sup> has considered the various roles of the analyst and their corresponding behaviors, and his conclusions are outlined in Figure 2.

FIGURE 2  
ROLES AND BEHAVIORS OF ANALYSTS

Type of Policy Analyst	Public Policy Problem	Motivation	Approach	Relevant Training
1. Scientist	Theoretic	Search for theory, regularities, "truth"	Scientific method, objectivity, pure analysis [sic]	Basic research methods, canons of social science research
2. Professional	Design	Improvement of policy and policy-making	Utilization of knowledge, strategic	Strategic; benefit-cost analysis; queueing, simulation, decision analysis
3. Political	Value maximization	Advocacy of policy position	Rhetoric	Gathering "useful" evidence; "effective" presentation
4. Administrative	Application	Effective and efficient policy implementation	Strategic, managerial	Strategic; same as professional with stress on those talents useful in implementation
5. Personal	Contention	Concern for policy impacts on life	Mixed	Use of many models and techniques from other approaches; sophisticated

Source: Peter W. House, The Art of Public Policy Analysis, Sage Publications, Beverly Hills, CA, 1982, p. 22.

As shown in Figure 2, the policy analyst can fulfill at least five types of roles: scientific, professional, political, administrative, and personnel. Each of these roles requires that the analyst focus on different aspects of the policy problem, vary the research approach and the methods used, alter the research according to the underlying motivation for originally addressing the problem, and acquire the particular skills necessary to conduct the analysis. For example, as shown in Figure 2, the scientific analyst is primarily concerned with theoretic problems, and motivated by the search for theory. The scientist applies scientific method generally acquired through graduate training to the problem encountered.

In contrast to the scientist, the professional analyst is more concerned with issues of design and the improvement of policy making. The professional, as a result, is more likely to use rather than to produce knowledge, and to be focused on very specific scientific applications, such as cost-benefit analysis.

The political analyst differs from both the scientist and the professional in the application of analysis and in its motivation. As indicated in Figure 2, the political analyst focuses almost exclusively on values, is much more likely to be an advocate rather than a dispassionate reporter of "the facts," and is likely to use rhetoric in place of scientific method.

Finally, the administrative and the personnel policy analyst focus on issues of application and contention, respectively. The administrative analyst is managerial where the personnel analyst is more

likely to have a broader social-impact orientation. The orientations also differ in the research tools used and in the types of training generally required (see Figure 2).

From our brief consideration of Figure 2 and the preceding materials, it is clear that policy analysts in agency settings have great influence in shaping policy options and function in numerous roles, each differing in focus, intent, and form. Such understanding of the policy analyst's role in developing criminal justice human-resource policy can assist the agency administrator in evaluating the results obtained from a particular analyst, as well as assessing the appropriate mix of skills and orientations needed for analysis of particular agency problems.

#### SUMMARY

This section of Volume III has considered three interrelated issues: the role of analysis in agency problem solving, the various forms of analysis undertaken in criminal justice agencies, and the multiple roles of the policy analyst in shaping and developing policy options in criminal justice decision making. It has also been the purpose of this section to discuss the attributes of policy and agency-based research that distinguish it from other forms of research. Such considerations as the timeliness of the research conducted, the client-orientedness of agency-based research, and the judgmental quality of the determination of success and failure of criminal justice programs have been discussed.

The materials that follow are focused on policy analysis and improving the types of analysis conducted on human-resource problems in criminal justice agencies. By improving this analysis and the use of particular techniques in human-resource research, this volume's purpose is to provide the basis for competent analysis of human resources in criminal justice.

## NOTES

## AGENCY-BASED RESEARCH

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3. Kurt Finsterbusch and Annabelle Bender Motz, Social Research for Policy Decisions, Wadsworth Publishing Co., Belmont, CA, 1980, p. 26.
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6. Ibid.
7. Ibid, p. 13.
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AN INTRODUCTION TO RESEARCH METHODS  
FOR HUMAN-RESOURCE PLANNING

Data and information are essential to the planning process, and specifically to the human-resource planning process. What particular types or kinds of data depend on the planning questions being raised, and/or the type of planning being done. Volume II provided several survey mechanisms for gathering data about personnel problems. From the data and information generated by completing those questionnaires and also from reading the narratives accompanying each questionnaire, you should be beginning to get an idea of the important personnel problems facing your organization. Now you may want to secure additional data to understand and to monitor that problem more completely.

This part of Volume III is about methods of data collection, but it is not written with the idea that it will be read "from cover to cover." Instead, you are encouraged to refer to those data-gathering techniques, analysis procedures, or data sources that, given the problem you have defined, are most appropriate. Each section of this chapter gives an explanation of a technique, concept, or procedure together with a discussion of its advantages and disadvantages when used. Several examples of how these techniques, concepts, or procedures can be used for analyzing agency problems are also presented.

We begin with a discussion of "data" and "information," making an important distinction between the two. Then the concept of measurement and measurement scales are defined. Following this, types of

data for criminal-justice manpower planning, their operational definitions, modes of data collection, and methods of data collection for human-resource planning are discussed. This information is followed by a discussion of the basis of research, including the importance of reliability and validity, sampling, research design, and statistical analysis to data collection and analysis.

#### DATA AND INFORMATION

The terms "data" and "information" are not synonymous. Data are not necessarily information and information includes something more than data. Data may be best thought of as "representing objective, external realities" such as the number of arrests in a day, or the number of traffic citations issued in a week. Data are facts.<sup>1</sup> Thus, data are a record of specific, observable characteristics and events that have sufficient impact on a situation to be noteworthy. Data are meaningless without some point of reference. Once data or facts are placed in some meaningful context, they are transformed into information. Information is the "description of the relationship of any such characteristic or event to human goals or business purposes."<sup>2</sup> Information is used to control progress toward goals and objectives.

Completing the surveys in Volume II will have generated quite a lot of data or facts about your organization. However, unless these facts are understood, relevant to important organizational goals or, for example, personnel problems, they will be of little use. Once understood in some context, data become information. A component of transforming data into a significant context is the process of

collecting data and establishing a set of rules for using these data. This constitutes a measurement procedure. The purpose of data collection is to produce trustworthy evidence that is relevant to the questions being asked. The purpose of the accompanying rules is to facilitate using data in making specific statements about the characteristics of the phenomenon to which the data are believed to be relevant. In the section below we begin to consider the measurement process, how data are obtained through measurements, and the implications of data measurement for human-resource information.

#### MEASUREMENT

Measurement is the process of determining the value, either qualitative or quantitative, of a particular attribute (for example, age) for a particular unit of analysis (for example, people). Measurement is not limited to numerical or quantitative specification, but can be qualitative as well. Qualitative attributes have labels or names (not numbers) assigned to their respective categories (for example, sex: male and female), whereas an attribute measured by numbers is considered quantitative (for example, age in number of years).

Qualitative variables could include such variables as eye color, religious preference, or political affiliation. Qualitative categories are used quite extensively in observational studies. Researchers arrange data into qualitative categories, and give each category a name to distinguish it from other categories. The categories of qualitative variables can be labeled with numbers instead of names, but the numbers have no properties of the number system in

that they cannot be added, subtracted, divided, or multiplied. The only numerical operation that may be conducted on qualitative variables is calculation of the frequency or percentage in each category.<sup>3</sup> Table 1 represents the comparison of two qualitative variables.

TABLE 1  
COMPARISON OF QUALITATIVE VARIABLES

<u>Party Preference</u>	<u>Socio-Religious Group</u>					
	<u>White Protestants</u>		<u>White Catholics</u>		<u>Jews</u>	
	<u>No.</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>
Democrat	(235)	37.7	(274)	57.2	(32)	66.7
Republican	(249)	39.9	(92)	19.2	(1)	2.1
Other	(140)	22.4	(113)	23.6	(15)	31.2
Total	(624)	100.0	(479)	100.0	(48)	100.0

Source: Rosenberg, Morris, The Logic of Survey Analysis, Basic Books, New York, 1978, p. 253.

Other examples of qualitative classifications using numerical designations include social security numbers, driver's license numbers, or telephone numbers.<sup>4</sup>

What is measured? Indicators of the properties of objects are measured. "Objects" include simple concrete "things" like people, automobiles, or books, as well as more abstract "things" like attitudes, or "peer pressures." Properties are characteristics of objects. For example, a person's physical properties may be stated as his/her height,

weight, or posture; his/her psychological properties may include attitudes or intelligence; and his/her social properties may include leadership ability, class affiliation, or status. These and other properties can be the subject of measurement in a research study. In actuality, objects or properties are not really measured, but the indicators of the properties or objects are.

For example, a person's educational level, a property, can be measured through indicators like the number of years of his/her formal schooling. One year through eight years could be taken to represent an elementary school education; nine through twelve a high school education. Respondents to a questionnaire would be asked to indicate the number of years of school they completed. From this their educational level could be measured.<sup>5</sup>

In this example, measurement is the matching of an attribute (educational level) of an object (an individual) with an appropriate value (years of school completed). Three basic concepts can be used to define measurement more clearly--numerals, assignments, and relations of correspondence.

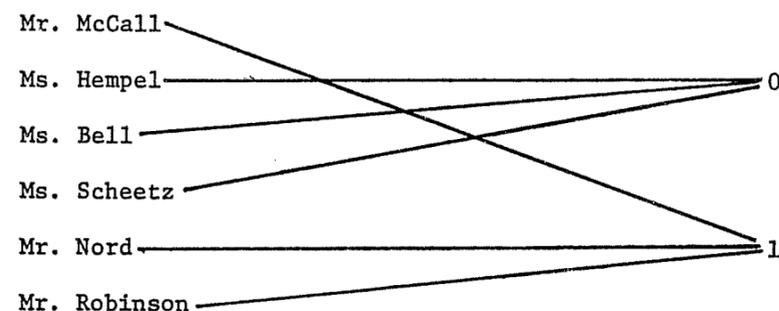
A numeral is a symbol in the form of 1, 2, 3, ... or I, II, III, .... It does not have any quantitative meaning unless such is attached to it. Numerals can be used to label objects such as police cars, correctional officer badges, individuals, or events. Numerals given quantitative meaning become numbers, and can then be used in mathematical and statistical analysis to describe, to explain, or to predict. New information about the objects or events being measured

is generated through statistical analysis and mathematical manipulations performed on numbers.<sup>6</sup>

Measurement, defined by the term assignment, means mapping. Numbers or numerals are mapped onto objects or events. For example, assume a law-enforcement agency is conducting a study of persons who apply for employment. The point of interest concerns the male-to-female applicant ratio. An individual could observe individuals as they complete the application forms and tabulate them according to sex. This process is one of matching the observed physical properties of applicants (the domain) onto a sexual classification (the range). For description purposes in this example, the rule of correspondence, as shown in Figure 1, becomes: if the object in the domain appears to be female, assign to "0"; if male, assign to "1."<sup>7</sup>

FIGURE 1

RULE OF CORRESPONDENCE  
MATCHING THE DOMAIN WITH THE RANGE



Source: William C. Emory, Business Research Methods, Richard Irwin, Inc., Homewood, Illinois, 1976, p. 111.

Rules of correspondence are the third concept used to define measurement. The rule explains how numerals or numbers are to be assigned to objects or events. A rule might say: "Assign the numerals 1 through 15 to management systems according to the degree of participatory management by employees. If the system is very participatory, let the number 15 be assigned to it. If a management system does not involve any employee participation, let the number one be assigned to it. The rule of correspondence, then, defines how the numerical (quantitative) assignments will later be interpreted."<sup>8</sup>

There are distinct levels of measurement for different indicators of properties. As stated previously, properties are measured by certain indicators. After the indicators are observed, numbers are substituted for the values of the indicators, and then statistical and mathematical operations are executed. The numerical structure that substitutes indicators must be similar, in its relations and operations, to the structure of indicators: This, in turn, leads to a distinction among different ways of measuring, and the mathematical and statistical operations permissible on a given set of numbers are dependent on the level of measurement attained.<sup>9</sup>

Measurement level of scale classification utilizes the characteristics of the real-number system, and scale conceptualization is based on the three concepts described in Figure 2.

FIGURE 2  
THREE CONCEPTS OF MEASUREMENT SCALE

1. ORDER: Numbers are ordered. One number is greater than, less than, or equal to another number.
2. DISTANCE: Differences between numbers are ordered. The difference between any pair of numbers is greater than, less than, or equal to the difference between any other pair of numbers.
3. ORIGIN: The number series has a unique origin indicated by the number zero.

Source: William C. Emory, Business Research Methods,  
Richard Irwin, Inc., Homewood, Ill., 1976, p. 112.

The scales are listed and described in ascending order of power, in that the "stronger" scale retains all the qualities of the "weaker" scales as well as retains qualities unique to itself. Therefore, the ratio scale, the strongest scale, implies all the operations of the nominal, ordinal, and interval scales in addition to those that are unique to itself.

#### Nominal Scales

A nominal scale consists of two or more categories, into which objects or individuals are classified. The basic requirement for a nominal scale is the capacity to distinguish two or more categories relevant to the attribute being considered, and specify criteria for placing objects in one or another category. The relationship between one category and another is limited to a difference between each other; there is no implication the one category is greater than or less than another category. The main decision revolves around whether a

given object, individual, or response belongs in a given category or does not.

The counting of members in each group is the only possible arithmetic operation when a nominal scale is used. Any number of separate groups, provided the groups are mutually exclusive and collectively exhaustive, can be classified in a nominal scale. Classifications of individuals by sex, national origin, or religious preference all constitute a nominal scale.

Nominal scales are useful for descriptive studies, where the study objective is to describe relationships between two characteristics, rather than on specifying causal relationships. These scales are widely used when data are being classified according to major subgroups of the population, e.g., age, sex, or exposure to a certain experience.<sup>10</sup>

#### Ordinal Scales

The relative position of objects or individuals with respect to a characteristic, with no implication as to the distance between positions, can be defined through an ordinal scale. The basic requirement for an ordinal scale is the capacity to determine, for each individual or object being measured, whether one object has more of an attribute in question than another object, or the same amount, or less. The order of positions can be determined, and this assumes that each object can be placed at a specific point with respect to the attribute in question. When an ordinal scale is used, it is possible to state that: If "a" is greater than "b" and "b" is greater than "c,"

then "a" is greater than "c." Yet, just how much greater than or less than cannot be stated. For example, a police supervisor may be asked to rank shift members on their ability to communicate with members of minority groups. The shift commander is likely to rank first the officer with the best ability, next the one with the next best ability, and so on until all officers are ranked. Determinations of "greater than" and "less than" are possible, but not how much greater than or less than.<sup>11</sup>

Examples of regularly used ordinal scales include opinion and preference scales. A scale could resemble the following:

- \_\_\_\_\_ Strongly like
- \_\_\_\_\_ Like somewhat
- \_\_\_\_\_ Indifferent
- \_\_\_\_\_ Dislike somewhat
- \_\_\_\_\_ Strongly dislike

#### Interval Scales

Positions are arranged according to degrees of more or less and the units or intervals of measurement are equal on an interval scale. Thus, the distance between the positions labeled "1" and "2" on a scale is equal to the distance between positions "2" and "3." The Fahrenheit and centigrade thermometers are excellent examples of interval scales. Fifty degrees is exactly 10 degrees warmer than 40 degrees and 10 degrees cooler than 60 degrees. In addition, 50 degrees on one centigrade scale equals 50 degrees on any other correctly calibrated centigrade scale. In both temperature scales, the zero-degree does not mean zero in the sense of there being no temperature. This forbids any statement that 50 degrees centigrade

is twice as warm as 25 degrees because there is no absolute zero point. Yet, it is possible to express differences in scale values using multiples. For example, a temperature rise from 50 degrees to 70 degrees is twice the rise from 50 degrees to 60 degrees.<sup>12</sup>

#### Ratio Scales

A ratio scale has all the characteristics of an interval scale, besides containing an absolute zero point. Such assertions as, "A is twice as heavy as B," or "I spent half what you did," are justified under a ratio scale. The ratio scale represents the actual amounts of a variable; weight, height, distance, and area are examples.<sup>13</sup>

In summary, the following two charts are presented. The scales are listed in ascending order, with each subsequent scale entailing the properties of the scale previous to it, plus some additional characteristics. The nominal, or lowest scale, merely provides a means of classifying objects or events, while the ratio or highest scale can permit classifying, ordering, and establishing distance and unique origin, as shown in Figure 3. The chart in Figure 4 is useful because it provides examples of each level of measurement as well as their characteristics.

FIGURE 3  
SCALES

<u>Type of Scale</u>	<u>Characteristics of Scale</u>	<u>Basic Empirical Operation</u>
Nominal	No order, distance, or origin	Determination of equality
Ordinal	Order, but no distance or unique origin	Determination of greater or lesser values
Interval	Both order and distance, but no unique origin	Determination of equality of intervals or differences
Ratio	Order, distance, and unique origin	Determination of equality of ratios

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Source: William C. Emory, Business Research Methods, Richard Irwin, Inc., Homewood, Ill., 1976, p. 113.

FIGURE 4  
LEVELS OF MEASUREMENT

<u>Level</u>	<u>Variable Properties Allow You to:</u>	<u>Illustration</u>	<u>Examples</u>																														
Nominal	Classify	<table style="margin-left: auto; margin-right: auto;"> <tr> <td>Russian</td> <td>Finnish</td> <td>Norwegian</td> </tr> <tr> <td>Igor</td> <td>Sinnika</td> <td>Olaf</td> </tr> </table>	Russian	Finnish	Norwegian	Igor	Sinnika	Olaf	Ethnicity, race, region, sex, marital status, occupation, group affiliation																								
Russian	Finnish	Norwegian																															
Igor	Sinnika	Olaf																															
Ordinal	Classify, order	<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>Lower</td> <td></td> <td>Upper</td> <td></td> </tr> <tr> <td>Lower</td> <td>Middle</td> <td>Middle</td> <td>Middle</td> <td>Upper</td> </tr> <tr> <td>Class</td> <td>Class</td> <td>Class</td> <td>Class</td> <td>Class</td> </tr> </table>		Lower		Upper		Lower	Middle	Middle	Middle	Upper	Class	Class	Class	Class	Class	Class, socioeconomic standing, formal education															
	Lower		Upper																														
Lower	Middle	Middle	Middle	Upper																													
Class	Class	Class	Class	Class																													
Interval	Classify, order, set standard units of distance	<table style="margin-left: auto; margin-right: auto;"> <tr> <td>1000</td> <td>500</td> <td></td> <td>500</td> <td>1000</td> <td>1500</td> <td>2000</td> </tr> <tr> <td>B.C.</td> <td>B.C.</td> <td>0</td> <td>A.D.</td> <td>A.D.</td> <td>A.D.</td> <td>A.D.</td> </tr> </table>	1000	500		500	1000	1500	2000	B.C.	B.C.	0	A.D.	A.D.	A.D.	A.D.	Biblical time, Fahrenheit temperature																
1000	500		500	1000	1500	2000																											
B.C.	B.C.	0	A.D.	A.D.	A.D.	A.D.																											
Ratio	Classify, order, set standard units of distance, locate absolute zero	<table style="margin-left: auto; margin-right: auto;"> <tr> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZERO</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>(True)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	0										ZERO										(True)										Income, age, weight, distance
0																																	
ZERO																																	
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Source: K. R. Hoover, The Elements of Social Scientific Thinking, 2nd ed., Martin's Press, New York, 1980, p. 96.

### Sources of Measurement Error

Ideally, a study should be designed and controlled for unambiguous, precise measurement of the attribute of interest. There are several sources of potential error that can hinder an ideal study. It is important to recognize and to try to eliminate or neutralize such errors.

For example, assume that a law-enforcement agency is conducting a survey of the residents of the city. The objective of the study is to determine the public's opinion about police performance. Ideally, any variation in scores among the respondents should reflect the differences in their opinions about police performance. Attitudes toward the agency as an employer, as a client-oriented and service-oriented organization, or as a progressive agency would be accurately expressed. Yet, four sources of error could contaminate the results. The first is the opinion colored by the respondent's background characteristics. Examples could include employment status, ethnic-group membership or social class. Less obvious sources of respondent bias include a respondent's fatigue, boredom, or other personal factors that limits his/her ability to respond accurately and fully.

A second source of error is situational factors that put the respondent in a stressful situation that may seriously affect his/her responses to questions. In an interview, for example, a respondent may be concerned about anonymity, or be constantly interrupted by a third party present during the interview.

A third source of error is the measurer. The interviewer can distort responses by rewording or reordering questions. Certain

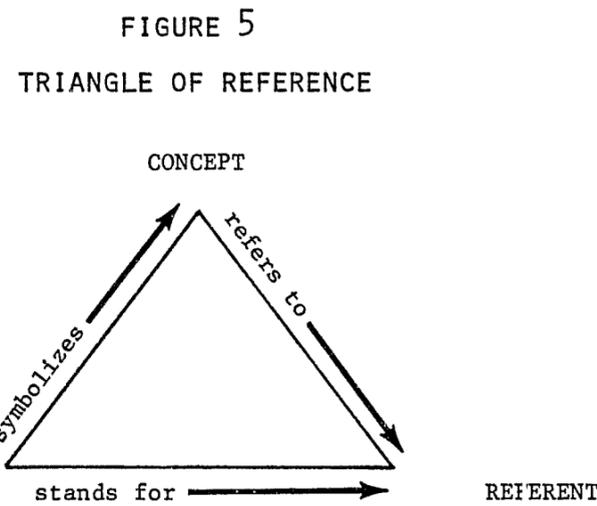
replies may be encouraged through unconsciously prompted smiles or nods. Too, careless mechanical processing, checking a wrong response, or failing to record full replies can distort findings.

A fourth source of error is the measurement instrument, and this in two major ways. First, it may be too confusing and ambiguous, using complex words beyond a respondent's comprehension. Leading questions, ambiguous meanings, mechanical defects such as inadequate space for replies, response-choice omissions, and poor printing are problems that can arise from faulty instruments. A second type of deficiency in an instrument is its not fully exploring all potentially important issues relevant to the question under study.<sup>14</sup>

### OPERATIONALIZING DATA

Besides looking at the concept of measurement, we should look at operational definitions for concepts before pursuing specific types of criminal-justice human-resource planning data and their definitions. Data collection, remember, should be conducted in order to achieve some specifically stated objective, whether to define a personnel problem more clearly, to resolve a problem, or for some other reason. Specifying what data are to be collected includes identifying the guiding concepts of the study as well as defining those concepts operationally (putting a variable in a form that permits some kind of measurement). Concepts are ideas or mental images about the real world. Ogden and Richards graphically portray the idea of "concepts" in their "triangle of reference" shown in Figure 5 below. The structure of a concept consists of three components. First is the idea or mental image that one has of some activity or phenomenon in the real world. Second is the referent or the actual phenomenon

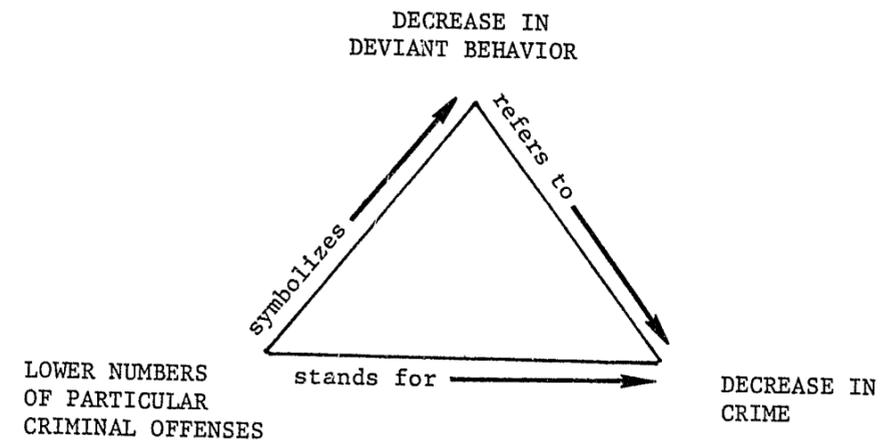
to which the idea refers; and third is the term or symbol used to communicate the idea to others. Therefore, an idea refers to some aspect of reality embodied in a referent. Then the idea is symbolized by a term, and the term stands for the referent. A concept is an idea linked to a referent by means of a term.<sup>15</sup>



Source: C. K. Ogden and I. A. Richards, The Meaning of Meaning, Harcourt, Brace, Jovanovich, Inc., New York, 1948, p. 11.

Data are connected to this "triangle of reference." They are recorded observations of referents. Concepts are measured by using data. For example, the headings in the above diagram can be changed as in Figure 6 to read as follows:

FIGURE 6  
ADAPTED TRIANGLE OF REFERENCE



Adapted from: C. K. Ogden and I. A. Richards, The Meaning of Meaning, Harcourt, Brace, Jovanovich, Inc., New York, 1948, p. 11.

The general concept or idea is a decrease in deviant behavior. This refers to a decrease in crime, the referent, which is, in turn, measured by lower numbers of particular criminal offenses, the term.

Concepts are categorized into variables and then into indicators. A simple concept will have only one indicator or referent, while complex or complicated concepts will have multiple indicators or referents. For example, take the concept of police officer performance. It has been measured with multiple indicators such as arrests made, numbers of citizen complaints, tardiness to work, or willingness to work overtime. Data are measures of indicators, and in cases of complex variables, they must be combined with other data to form a measure of a guiding concept.

An operational definition specifies the procedures for an analyst's identifying or reproducing the referents of a concept. An operationally defined variable must specify some operation or measurement of that variable that can be obtained by a systematic procedure. If this is done correctly, the operational variable and the measurement indicated can be done accurately with available resources.<sup>16</sup>

There are two kinds of operational definitions, identifying and generating. An identifying definition specifies the referents of the concept in empirical form allowing the phenomenon referred to by the concept to be recognized whenever and wherever it exists.<sup>17</sup> For example, larceny includes the theft of property or articles of value without use of force and violence, excluding fraud, embezzlement, con games, etc. This is an identifying definition of the condition of larceny, and aided by this definition, someone not previously able to recognize larceny could now recognize it.

A generating operational definition defines the mental or physical manipulations that allow referents to concepts to be reproduced, which in turn enables us to recognize the phenomenon to which the concept refers.<sup>18</sup> For example, an attitude is a disposition, a tendency to behave in a specific manner in reaction to certain situations. Attitudes are manifested in verbal or behavioral actions. In order to determine the existence of certain attitudes, it is necessary to create situations that will produce their manifestations. If attitudes of police toward racial prejudices or tolerance is the topic, it will be appropriate to ask the police officers to indicate

their agreement or disagreement with an inventory of items, each one describing a hypothetical interracial situation. The inventory would be a generating operational definition of the concept "racial attitude."

Opinions, attitudes, roles, and values require generating definitions. For example, if one were interested in looking at what role or roles police officers perceive themselves in (law enforcer, crime preventer, or order maintainer), it might be useful to ask the officers what they spend most of their time doing at work. This could include responding to a domestic disturbance, conducting routine preventive patrol, answering calls for service regarding criminal law breaking, writing reports, or performing administrative duties.

From the above discussions we might summarize that data represent definitions of phenomena according to rules of correspondence, where numbers or labels have been assigned for identification and for future interpretation. These data are nominal, ordinal, interval, or ratio in nature (referring to the particular scale on which they are measured), and as we will see later on, the selection of the level of measure will affect the particular statistical analysis available and the kind of information generated through data collection. Finally, we indicated that data are subject to distortions from respondent bias, administrative problems such as in how the data are gathered, and analytical problems such as in how the data are prepared for analysis. These latter problems will be explored in more detail in future sections of this volume.

#### Why Be Concerned with Concepts and Referents?

The relationship of concepts to terms and referents is critical for analysis of organizational and personnel problems because the relationships among the three determine the quality of the information produced. Poor conceptualization results in ambiguous referents of phenomena being selected, and these poor referents once analyzed distort our understanding of the concept. Similarly, ambiguous terminology leads to both poor conceptualization and an uncertainty about what the term stands for. Such uncertainty necessarily complicates analysis and understanding. For example, job dissatisfaction as a term and as a concept is problematic. On the one hand, the term refers to a host of possible referents: poor morale, absenteeism, poor-quality work. On the other hand, the conceptualization of job dissatisfaction as a consequence of rising worker expectations, poor measurement, or general lack of interest in work has yet to be clearly or definitively identified. Such shifting and ambiguous definitions and conceptualizations make the resulting measurement and analysis of this important organizational and personnel issue problematic. Our previous discussions in this section have attempted to shed some light on these measurements and conceptualization issues to alert organizational planners, managers, and analysts to the importance of concept determination, specification, and corresponding measurement. In the next section we expand on this discussion by considering operationalizing data in criminal justice agencies.

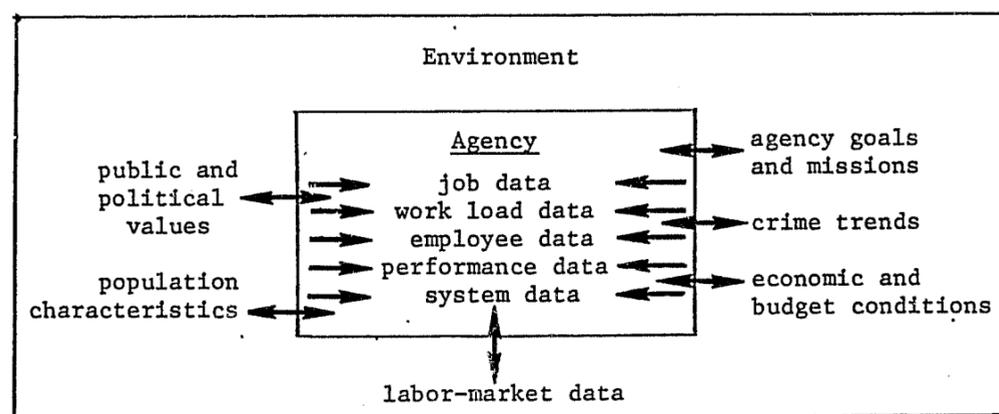
#### Operational Definitions for Criminal Justice Human-Resource Data

Now that the basic concepts of data, information, measurement, and developing operational definitions have been explained, we can turn to types of data specific to criminal-justice human-resource planning. As previously stated, data are meaningless without some point of reference. Data or facts have little value until they are put into some meaningful context. The operationalized definitions assigned to certain data largely determine the informational content of that data. For example, police response time could either be conceived as the interval between the time when the complaint call is received at the police station and the time the officer arrives on the scene, or it could be conceived as the interval between the time when the responding officer receives the call from the dispatcher and the time he/she arrives on the scene. In each case the method of data collection and analysis could be similar, but the data would not contain the same information. The first way would define response time as longer than the second.

Also, how data are operationally defined can reflect what data are collected, as well as what methods of collection and analysis are used. For example, if we operationalize response time as time noted in dispatch records, we collect the data through a search of those records. On the other hand, if we operationalize response time as citizen perception of time to response, we collect these data through surveys. In such a situation, both the data-collection method and the meaning of response time are very different because of differences in the operationalizing of the concept "response time."

Volume I briefly discussed the most important types of data for criminal justice human-resource planning. At that point only minor attention was given to operationally defining these data. Environmental data and organizational data are the major types of data for human-resource planning. Under the heading of environmental data, the following categories are included: agency missions and goals, crime trends, economic and budget conditions, population characteristics, public and political values, and labor-market conditions. These types of data concern conditions and forces that are largely external to the agency itself. However, for human-resource planning these kinds of data are very important. Organizational data concerns conditions internal to the organization. Data on work loads, jobs, employees, performance, and systems are included under this heading. Figure 7 depicts these types of data.

FIGURE 7  
TYPES OF DATA FOR CRIMINAL JUSTICE  
MANPOWER PLANNING



A more detailed description of criminal justice manpower planning data is contained in Volumes I and II. The following are operational definitions for those data categories described in Volume I. Two key sourcebooks were used in formulating these definitions. First, the Statistical Abstract of the United States National Data Book and Guide to Sources; and second, the Sourcebook of Criminal Justice Statistics--1980, provided the majority of the formal definitions used.

#### Missions and Goals

Data about the agency's missions and goals are usually qualitative and subjectively grounded. It is the responsibility of agencies to develop and to state their missions and goals so that they may be defined operationally for planning and evaluation purposes. While there is not any definitive way to state objectives and goals, there are several guidelines that can aid an agency in formulating goals and missions. Goals should be acceptable to organizational members; the agency should make every effort possible to ensure that employees have some input or involvement in formulating the goals and that some consensus is reached about their final form.

Goal clarity or a precise statement of purpose will help people understand their intent. Vaguely stated goals are hard to achieve and to evaluate. In addition, goal achievement should be evaluated so as to establish accountability. The term accountability refers to the determination of whether an organization is doing what it is supposed to do. If goals are developed that are attainable and measurable, evaluation procedures will provide a means for establishing accountability.<sup>19</sup>

Many police departments include as their general goals:

- a. Protection of life and property in the city.
- b. Prevention of crimes.
- c. Preservation of the public peace.
- d. Arrest of law violators and assembling competent evidence of the alleged violation.

The terms underscored would require some operational definitions attached to them so that their attainment can be measured. For example, take d, "arrest of law violators and assembling competent evidence of the alleged violation." Arrest could be operationally defined as "taking a person into custody for the purpose of charging him or her with a criminal offense." "Law violators" and "alleged violation" could be operationally defined using state, local, and national laws and ordinances, while "competent evidence" could be defined as evidence adequate to convince a judicial officer that there is sufficient cause to hold an accused for trial. Once these critical terms have been defined, they need to have indicators attached to them so they can be measured. "Arrests" and "competent evidence" can be measured by computing the number of arrests made and the percentage of those arrests in which the evidence was sufficient to hold an accused for trial. "Law violators" and "alleged violation" can be measured according to the number of people charged with breaking a state, local, or national law and the number of violations recorded in a given period of time, respectively. Once these terms have been operationally defined and appropriate indicators stated, the agency can determine its success or failure at reaching this goal. Overall,

each goal should have operational definitions and indicators specified so that the agency can evaluate itself on the basis of the goals.

#### Crime Data

There are two standard approaches taken to determine the extent of crime. The FBI's Uniform Crime Reports contain monthly and annual reports from law-enforcement agencies throughout the United States. The National Crime Survey and the Bureau of the Census have conducted criminal victimization studies yielding reports on present types of crimes, the frequency of victimization, the characteristics of victims, and victim-offender relationships.

There are several deficiencies in the Uniform Crime Reports that should be recognized by agencies if they plan to emphasize or to use these data for planning purposes. The reliability of a set of statistics rests on the competence of the agency collecting it. Unsophisticated methods of data collection will produce questionable estimates of criminal incidences. Police departments vary in their degree of expertise in collecting and assembling crime information. Better law-enforcement record-keeping practices and capabilities are more likely to produce more accurate crime statistics. A study by Sagi and Wellford found that increases in the numbers of civilian employees (assigned record-keeping duties) in police departments between 1958 and 1964 were associated with increases in reported crime. Departments that have employees trained in research methods who are responsible for gathering and analyzing crime data will be more likely to produce more reliable, valid crime statistics<sup>20</sup> than those who do not employ such personnel.

**CONTINUED**

**1 OF 7**

Many citizens fail to report crimes because they think the police can do little about it, or because they have a generally negative view of police as incompetent or uninterested, or they may not know how to report a crime. Finally, much crime goes unreported because the victim may himself or herself be involved in other crimes that might be discovered if he or she were to report the offense in question. For example, a person would probably not report an auto stolen if it contained stolen goods. Thus, reported crime data seriously underestimate crime rates. According to one estimate by Skogan (1976), there is three times as much crime as shows up in police records.<sup>21</sup>

Another limitation of the Uniform Crime Reports is the vast discretion of police officers and police departments in recording criminal acts. A study by Black (1970) showed that police records of incidents are dependent on several factors, such as perceived seriousness of the crime, the deference of the complainant toward the officer, and the relationship between the suspect and the victim.<sup>22</sup> Police sometimes overlook crimes out of personal self-interest; filling out forms and interrogating victims are time-consuming tasks and can become burdensome near the end of a tour of duty. So, crime data are often products of a police officer's disposition and energy, which vary daily and may be totally unrelated to whether the crimes took place.<sup>23</sup>

Administrators utilizing "unwritten departmental policy" can command that certain violations be overlooked. For example, a department may not arrest minor drug traffickers on the assumption that such arrests may frighten off the drug dealers the police want to

apprehend. Sometimes a more efficient police department appears to uncover more crimes. A low response-time rate to a scene can result in the complainant leaving or the offender departing, which leads to the incident's being categorized as unfounded. Yet, efficient police forces, those arriving more quickly at crime scenes, find more reportable crime. And research has shown that faster police response-time rates are associated with greater chances of police noting, founding, and clearing the crimes. Official crime statistics are highly dependent on police and citizen decisions to report crime. In addition to these shortcomings of the Uniform Crime Reports there are a number of associated methodological problems. First, reports are submitted voluntarily by most departments and the data vary in accuracy and completeness. Although the FBI does not guarantee accuracy and completeness in the reports, all reports are arithmetically checked for "reasonableness." There is only one crime classification given for each criminal event, even when multiple offenses have been committed during the crime. If a crime involves a murder, rape, and robbery, it will be classified as the most serious crime involved--murder--and the rape and robbery would not be recorded.<sup>24</sup>

The number of offenses listed is different depending on the specific crime classification.<sup>25</sup> For example, assaults are counted separately. If someone enters a bar and assaults six patrons, it is recorded as six assaults. However, for property crimes, each operation is a single operation. If someone enters a store and robs six patrons, it will be recorded as one robbery.

Few victimless crimes and white-collar crimes are included in the UCR. Finally, using different size population bases to construct crime rates on can cause different perceptions of the seriousness of a particular crime. For instance, a robbery rate of 200 per 100,000 persons may be viewed as more serious than an identical rate of 20 per 10,000, and a rate of 2 per 1,000 could be viewed as no problem whatsoever.<sup>26</sup>

As a response to the deficiencies of official crime statistics, researchers developed victimization surveys in the mid-1960s. The Census Bureau, in conjunction with the Law Enforcement Assistance Administration, conducted surveys in 26 large American cities. The advantages of the victimization survey are important to agencies using statistics for planning purposes. Many people do not report crime because of the time inconveniences it presents. In victimization surveys, respondents were personally interviewed in a few minutes at their homes. Thus, the victims had a little inconvenience of only a few minutes. The reliability of properly conducted victimization surveys is fairly high. Therefore, the data generated can be used to compare crime rates in several areas. The Census Bureau uses highly trained and monitored interviewers for their surveys, and the questionnaires are checked for incompleteness and inconsistencies. "Crimes" are classified by a computer programmed to recognize the elements that constitute certain crimes. For example, some of the questions include: Was there a theft? Was a weapon used? Was there an injury? Although the information given by respondents was subject

to error, its classification was handled more objectively. The computer analyzes the respondent's response patterns and then records those combinations of answers that constitute a crime.<sup>27</sup>

The problems associated with victimization surveys deal with sampling and response error. It is very expensive to get a sufficiently large random sample to justify generalizing to an entire population. Another difficulty is that of representativeness of the sample. The interviews, conducted in homes, tend to exclude nonresident visitors who are victims of crime. Much of the ghetto crime involving male and youth victimization goes unreported.

Response error in victimization surveys has to do with respondents' giving incorrect responses either because of dishonesty or because of loss of recall. Interviewer cuing also affects response rates. Whether or not crimes are mentioned by respondents may depend on the facial expression, rephrasing of questions, and general demeanor of those asking the questions.<sup>28</sup>

Overall, surveys do produce a more exact crime count than do law-enforcement reports. They are the most sensitive measure of the amount of crime, especially of those crimes the public fears the most, crimes of violence and property offenses. In the context of human-resource planning, an agency that bases its personnel needs partly on the UCR or victimization surveys should be aware of the advantages and limitations of each. The crime data each presents may be inaccurate because of problems stated above. Operational definitions of crime in your jurisdiction may differ from those used in the UCR or

victimization surveys. Before your agency uses any data from these sources for comparison or other purposes, it is a good idea to refer to the section in the reports or surveys that explain to the reader the operational definitions used.<sup>29</sup>

#### Economic and Budget Conditions

Data pertaining to these categories can be operationalized through use of the official budgets of the local government and criminal justice agency. City ordinances, state laws, and specific accounting procedures will affect the operational definitions of economic and budget data. For example, in some areas "general revenues" may include all revenues from taxes as well as grant appropriations from the state and federal government and income from operations. Other localities may limit the definition of "general" revenues to only those collected specifically by local taxes.

A percentage of the general revenues are allocated to specific local agencies. Criminal justice agencies receive allocations from either local governments, state governments, or both. For operationalizing these data, it is a good idea to check local and state laws for specific definitions and for consistency from year to year.

#### Population Characteristics

Criminal justice human-resource planning is the process of getting the right kinds and numbers of employees for your agency. The population your agency serves will have an impact on this process. This impact is related to what types of individuals are available for

recruiting into the agency as well as the types of services demanded by the population. For example, a predominantly middle-class neighborhood might request other types of police services than does a lower-class neighborhood. The particular socio-demographic characteristics of a population that would be most important to human-resource planning include the population's racial composition, mobility, status, living arrangements, educational levels, income levels, employment (or unemployment) status, and age composition.

An agency could either collect its own data about these characteristics or it could use information supplied by the U.S. Department of Commerce, Bureau of the Census, which collects these types of data every ten years. If an agency decides to collect its own data, the operational definitions supplied by the Census Bureau and listed below in Figure 8 could be used by the agency.

FIGURE 8  
OPERATIONAL DEFINITION OF RACE

Race: "Race" data are usually obtained through self-enumeration. Thus data will be self-classified by people according to the race with which they identify themselves. Data could include categories of White, Black, Other (to include Mexican, Puerto Rican, etc.). This "other" depends on what region in the United States the agency is in.

Source: U.S. Bureau of the Census, Statistical Abstracts of the United States: 1979, (100 edition), Government Printing Office, Washington, 1979, p. 3

The human-resource planner might be interested in knowing how transient the population is. Mobility status or migration is usually measured as in Figure 9 by the ratio of nonmovers to movers.

FIGURE 9  
OPERATIONAL DEFINITIONS FOR  
MOBILITY STATUS OR MIGRATION

Non-movers are all persons who were living in same housing unit at the end of a specific period as at the beginning of a specific period (specified dates given by agency).

Movers are all persons who were living in different housing at the end of a specific period from that in which they were living at the beginning of a specific period.

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Source: U.S. Bureau of the Census, Statistical Abstracts of the United States: 1979 (100 edition), Government Printing Office, Washington, 1979, p. 3.

The Bureau of the Census categorizes living arrangements as in Figure 10 into "household," "group quarters," "family," or "housing unit." The people who reside in these different types of "arrangements" could require different services, which in turn could subsequently affect how certain kinds and numbers of employees are deployed throughout the community.

FIGURE 10  
OPERATIONAL DEFINITIONS  
FOR LIVING ARRANGEMENTS

A "household" comprises all persons who occupy a house, apartment, group of rooms, or a room that constitutes separate living quarters. It can include related family members and all unrelated lodgers, foster children, wards, or employees sharing the housing unit. All persons who do not live in a "household" (as defined above) live in "group quarters". They may be institutionalized, e.g., under care or custody of hospital or rest homes or college dormitories.

An operational definition for "family" is a group of two or more persons related by blood, marriage, or adoption and residing together in a household.

A "housing unit" can be defined as a group of rooms or single room occupied or intended for occupancy as separate living quarters and there is either a (1) direct access from the outside or through a common hall, or (2) complete kitchen facilities for the exclusive use of occupants.

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Source: U.S. Bureau of the Census, Statistical Abstracts of the United States: 1979 (100 edition), Government Printing Office, Washington, 1979, p. 3.

In addition to the operational definitions of population characteristics used by the U.S. Census Bureau, a number of police and correctional projects have independently defined population characteristics for their particular needs. For example the High-Impact Anti-Crime Program in Worcester, Massachusetts, was interested in describing the living arrangements of the community's population. "Living arrangements" was characterized by several headings: persons under 18 living with both parents, female-headed households below the poverty level, and owner-occupied housing.<sup>30</sup> In this case respondents could respond in more than one category. In other words the categories are not mutually exclusive and exhaustive. For example, a household could be headed by a female who also is a homeowner. The operational definitions of "living arrangements" used by the High-Impact Anti-Crime Program were slightly different from those of the Census Bureau. Your agency should determine which operational definition is most relevant to your purposes. The final version of a definition could be a combination of several others or an original.

In addition to data about living arrangements, the educational levels of the population could be important to a planner when local recruiting is a priority of the department. Data on education can be operationalized by the following categories:

Elementary School: includes grades 1 through 8.

High School: includes grades 9 through 12.

College: includes junior and community colleges, regular 4-year colleges, and graduate and professional schools.<sup>31</sup>

The Worcester Crime-Impact Study distributed a questionnaire that asked respondents to indicate the amount of education they had completed as well as their current involvement in any educational programs, as shown in Figure 11.

FIGURE 11

OPERATIONAL DEFINITIONS FOR EDUCATIONAL LEVELS -  
THE WORCESTER CRIME IMPACT STUDY

1. Highest level of education completed?
  - high school (or G.E.D. certificate)
  - some college but did not graduate
  - graduated from technical school or junior college
  - graduated from college (B.A., B.S., etc.)
  - some graduate work
  - graduate degree
2. Are you currently enrolled in any courses?  yes  no  
If yes, specify. \_\_\_\_\_
3. If yes, are you working toward a degree?  yes  no  
\_\_\_\_\_

Source: J. M. Tien, R. C. Larson, An Evaluation of the Worcester Crime Impact Program, The Committee. Cambridge, Massachusetts, 1975, p. A-4.

The High-Impact Study subsequently analyzed this data and calculated median school years completed by adults and the percentage of adults completing college. Different values were assigned to each definition to determine a "high," "average," or "low" for each as shown in Figure 12.

FIGURE 12

OPERATIONAL DEFINITIONS FOR EDUCATIONAL LEVELS -  
THE HIGH-IMPACT ANTI-CRIME STUDY

<u>Factors &amp; Indicators Examined</u>	<u>Definition of Values Assigned</u>
III. Educational Level	
A. Median school years completed by adults	A. 1. <u>High</u> = 11.5 years completed and higher 2. <u>Average</u> = between 10.5 and 11.5 years 3. <u>Low</u> = <10.5 years completed
B. Percentage of adults completing college	B. 1. <u>High</u> = 12% or more completing college 2. <u>Average</u> = between 8% and 12% completing college 3. <u>Low</u> = <8% adults completing college.

Source: F. Chelimsky, High-Impact Anti-Crime Program, Vol. II, National Level Evaluation, Final Report, Government Printing Office, Washington, 1976, p. 130.

Income (another population characteristic of possible interest) can be measured using numerous operational definitions. The Bureau of the Census has a great deal of information and definitions that can be applied to measuring income. The Bureau of the Census defines personal income as shown in Figure 13.

FIGURE 13

## OPERATIONAL DEFINITIONS FOR PERSONAL INCOME

Personal income is defined as current income received by persons from all sources minus contributions for social insurance. It includes transfers of payment from the government and business, such as social security benefits.

Disposable Personal Income is personal income less personal tax and non-tax payments. It is the income available to persons for spending and saving. Personal tax and non-tax payments are tax payments by persons not chargeable to business expense. Personal taxes include income, estate and gift, and personal property taxes. Non-tax payments include fines, donations, tuition and fees to schools, and passport fees.

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Source: U.S. Bureau of the Census, Statistical Abstracts of the United States: 1979, Government Printing Office, Washington, 1979, p. 434.

Questionnaires that include a section on income usually ask the respondent to indicate which income bracket he or she falls into--for example, less than \$2,000, \$2,000 to \$3,999, \$4,000 to \$6,999, \$7,000 to \$9,999, \$10,000 to \$14,999, \$15,000 to \$24,999, and \$25,000 and over.<sup>32</sup>

There have been a number of population factors that have been associated with the volume and type of crime committed in cities throughout the United States. Included in these factors are the unemployment and age characteristics of a community. You may well wish to examine your community's unemployment rates and age distribution because they can affect the types and numbers of employees hired in your agency. Figure 14 shows employment characteristics as defined by the U.S. Census Bureau.

FIGURE 14

OPERATIONAL DEFINITIONS  
FOR EMPLOYMENT CHARACTERISTICS

"Employed persons" are citizens who, during the reference week, did any work for pay or profit, or worked 15 hours or more as unpaid workers in a family enterprise. Also included are persons who were not working but had jobs or business from which they were temporarily absent (illness, vacation, etc.).

"Unemployed persons" are all citizens who had no employment during the referenced week, who made specific efforts to find a job within the previous four weeks (applying directly to an employer or employment agency), and who were available for work during that week.

Full-Time Employment is considered working 35 hours or more in a week.

Part-Time Employment is working less than 35 hours a week.

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Source: U.S. Bureau of the Census, Statistical Abstracts of the United States: 1979, (100 edition), Government Printing Office, Washington, 1979, p. 390.

These definitions of employment might be used to determine changes in employment in your community and the relationships between such change in employment and changes in rates and patterns. Also, determining those employed and unemployed might be useful in assessing future recruitment programs.

Age characteristics of a particular jurisdiction are also important as descriptors of both potential violators and potential employees. Information about age is usually presented in the form of age brackets: for example, 15 to 19 years, 20 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, and 65 years and over. A police

department might want to deploy more officers in the juvenile division if certain crime rates are associated with people between the ages of 15 and 19. The departments could utilize their knowledge of the age distribution of their community for personnel allocation.

#### Public and Political Values

Data on public and political values are usually collected through opinion polls in which individuals are either asked to rank the importance of certain issues or to indicate their "satisfaction" with certain public agencies or community leaders. Data are operationalized through specific questions that respondents are asked. In the Kansas City Preventive Patrol Experiment, for example, data on citizens' and businessmen's attitudes toward police were operationalized by using the topics shown in Figure 15.

FIGURE 15  
CITIZEN AND BUSINESS  
ATTITUDES TOWARD THE POLICE

<u>Citizens' Attitudes Toward Police</u>	<u>Businessmen's Attitudes Toward Police</u>
Need for more neighborhood police officers.	Safety of neighborhood.
Need for more police officers in the entire city.	Crime in neighborhood as compared to previous years.
Perception of time neighborhood officers spend on car patrol.	Effectiveness of Kansas City police fighting crime.
Preference for amount of time police should patrol.	Relationship between the police and businessmen in the neighborhood.
Perceived amount of time police spend on aggressive patrol.	Reputation of police in neighborhood.

Figure 15 (continued)

Amount of time community prefers police spend on aggressive patrol.	Reputation of Kansas City police.
Perception of neighborhood police-community relations.	Respect for neighborhood police.
Perception of neighborhood police officers reputation.	Number of police needed in neighborhood.
Reputation of Kansas City police officers.	Number of police needed in Kansas City.
Respect for neighborhood police.	Amount of time spent by police in car patrol activities.
Effectiveness of neighborhood officers in fighting crime.	Amount of time that should be spent by police in car patrol activities.
Effectiveness of Kansas City police in fighting crime.	Satisfaction with police investigation.
Police treatment of whites.	Satisfaction with courtesy and concern during an investigation.
Police treatment of minorities.	Amount of time spent by police questioning and searching.
Harassment by neighborhood police officers.	Amount of time police should spend questioning and searching.
Harassment of Kansas City police officers.	
Change in neighborhood police officers.	
Satisfaction with police service.	
Neighbors' respect for neighborhood officers.	
Attitude of officer citizen spoke to most.	
Demeanor of officer citizen spoke to most.	
Characteristics of the encounter.	
Satisfaction with encounter.	
Response time evaluation.	
Citizen general satisfaction with police.	

Source: G. L. Kelling, T. Pate, D. Dieckman, and C. Brown, Kansas City Preventive Patrol Experiment, A Summary Report, The Police Foundation, Washington, 1974, pp. 32, 34, 35.

To obtain data on these and other issues, respondents can be asked to indicate their "satisfaction" or "feeling of safety" in something like the following way.

How satisfied were you with the way the police dispatcher handled the call for service?

_____ very satisfied	_____ slightly dissatisfied
_____ moderately satisfied	_____ moderately dissatisfied
_____ slightly satisfied	_____ very dissatisfied

How satisfied were you with the time it took for the police car to arrive?

_____ very satisfied	_____ slightly dissatisfied
_____ moderately satisfied	_____ moderately dissatisfied
_____ slightly satisfied	_____ very dissatisfied

Source: G. L. Kelling, T. Pate, D. Dieckman, and C. Brown, Kansas City Preventive Patrol Experiment, A Summary Report, The Police Foundation, Washington, 1974, p. 53.

#### Work-Load Data

For human-resource planning, certain information about the organization is crucial. An agency should be aware of the kinds and numbers of people at present employed, as well as how they are being deployed. Measuring work loads of employees is a good method to use in determining how employees are spending their time and can aid in planning future personnel allocations. Volume I presents sample work-load measures for law enforcement, corrections, and court agencies. The following in Figure 16 is a reiteration of those measures. The general definition is presented on the left, and on the right are the specific indicators that could be used.

FIGURE 16  
WORK-LOAD MEASURES FOR LAW ENFORCEMENT,  
CORRECTIONS AND COURT AGENCIES

<u>Law Enforcement</u>	
<u>General</u>	<u>Specific</u>
Calls for service	Index crimes Nonindex crimes Emergency services Complaints
Arrests	By patrol By detectives
Traffic accidents	Property damage only Personal injury or death
Traffic citations	
Juvenile contacts	Detentions Number of juveniles
Court man hours	
Administrative duties	Taking reports
<u>Courts</u>	
Criminal proceedings	Cases filed Arraignments Pretrial motions Contested court trials Jury trials Bench time
Civil proceedings	Cases filed Pretrial motions Jury trials Bench trials
Juvenile proceedings	Referrals Petitions Adjudicatory stage Dispositional stage

Corrections

New inmate intakes                      According to charge  
    According to sentence  
    Classified as high risk,  
    medium risk, or low risk

Inmate man-days

Inmate disciplinary cases                Involving criminal charges  
    Involving prison rules

Fixed post security requirements

Additional operational definitions for work loads of law-enforcement personnel could be stated as in Figure 17.

## FIGURE 17

OPERATIONAL DEFINITIONS FOR  
WORK LOADS OF LAW ENFORCEMENT PERSONNEL

Writing stolen auto reports	Handling past burglaries
Writing robbery reports	Handling abandoned autos
Writing missing-person reports	Handling illegal parking complaints
Handling motor vehicle accidents	Handling disorderly males
Handling noise complaints	Handling domestic disputes
Handling notifications	Handling victims of unarmed robbery
Handling disorderly females	Assisting motorists
Handling down and out drunks	Doing mail duty
Standing by stolen autos	Doing clerical duty (inside jobs)
Doing ambulance duty	Answering assist-ambulance calls
Transporting papers	Dispersing groups of noisy juveniles
Transporting WPD officials	Getting information at crime scenes
Responding to fire alarms	
Questioning rape victims	
Writing larceny reports	
Writing burglary reports	

Source: J. M. Tien, R. C. Larson, An Evaluation of the Worcester Crime Impact Program, The Committee, Cambridge, Massachusetts, 1975, p. A-8.

Several of these definitions are stated in very broad terms. This could affect the accuracy of data collected. For example, in the previous list, "assisting motorists" was a category. "Assisting motorists" could range from merely telephoning a wrecker to taking a motorist to a service station for gasoline. The time required to do each might be quite different--it is likely to take more of an officer's time to escort the motorists to the service station than to telephone the wrecker. Thus the work-load data for "assisting motorists" may not yield good estimates of time spent on each work unit. To remedy this, specific headings could be used. For example, in the previous list "report writing" is divided into several categories: "robbery," "auto theft," "larceny," "burglary," and "missing persons." The work load or time for each may vary; and with specific headings, these work-load differences can be captured and compared.

In Figure 18 from the San Diego Community Police Study, work loads were operationally defined and categorized by function.

FIGURE 18

## OPERATIONAL DEFINITIONS OF WORK LOADS BY FUNCTION

<u>Enforcing the Law (Traditional)</u>	<u>Maintaining Social Order</u>
Protecting property	Cultivating informants
Keeping streets safe	Controlling militants
Apprehending criminals	Enforcing moral standards
Keeping the peace	Controlling hippies
	Conducting field interrogations
<u>Providing Social Services</u>	
Counseling troubled people	
Helping people solve their problems	
Being the guardian of citizen's rights	
Meeting the public	

Source: J. E. Boydston and M. E. Sherry, San Diego Community Profile Final Report, The Police Foundation, Washington, 1975, p. 57.

The Flint Foot Patrol Study, because of its priority of improving community relations, defined work loads to emphasize communicating with citizens and working with them, as shown in Figure 19.

FIGURE 19

FLINT FOOT PATROL STUDY  
OPERATIONAL DEFINITIONS OF WORK LOADS

- |  |   |
|--|---|
| 1. Patrolling, observing                                   | 7. Following up on juvenile contact sheets      |
| 2. Checking out complaints                                 | 8. Receiving complaints directly from citizens  |
| 3. Making security checks                                  | 9. Counseling citizens on crime preventing      |
| 4. Counseling or referring victims                         | 10. Working with community groups on prevention |
| 5. Counseling or referring potential offenders             | 11. Writing reports                             |
| 6. Counseling or referring families with juvenile problems | 12. Appearing in court                          |

Source: School of Criminal Justice, Michigan State University, Flint Foot Patrol Questionnaire, Evaluation of Flint, Michigan Foot Patrol Program, East Lansing, Michigan, MI, 1981, p. 1.

Any definition chosen for work loads should be relevant to your study purpose and agency characteristics. In constructing an operational definition, a researcher or analyst identifies all the referents that distinguish the variable to be operationalized. This is done either by direct observation, by using past research reports, or by inquiring of knowledgeable others. Once the referents are established, an analyst then must determine the units in which they will be measured so that an instrument can be constructed to yield data in a form appropriate to that measurement. This determination is based on the decision whether to use a nominal, ordinal, interval, or ratio scale. The scale determination specifies the number and definition of categories to be used in the instrument, which in turn measures the operationally defined variable.

Job-Focused Data

Jobs can be thought of as a collection of roles, tasks, and activities. As a consequence, job-focused data are usually described in some narrative form. One method for operationalizing job-focused data is through using job descriptions. Jobs can be described in quantitative as well as qualitative terms. Quantitative data might include information about the level of knowledge and skills required for particular jobs. For example, included in a job description could be the requirement of shooting scores at the 80 percent level, or of running a mile in ten minutes or less. A criminal justice agency could set the percentage of minority members of the agency to equal the percentage in the community. Or the agency could require all

personnel to complete certain forms of training or attain a particular level of education by a certain time. Training and levels of education could be operationalized by types--e.g., training in the use of firearms, knowledge of changes in state and federal law, knowledge of law, law and police discretion, or competence in report writing.

Job-focused data can be conceptualized in several ways. As stated above, these data relate to the roles, tasks, and activities of a particular job, but they can also be thought of as the skills and knowledge required to do the job. These are two separate but related kinds of data. In addition, there are job-related data that indicate what jobs are in an agency, and data that inform us what jobs should be or will be in the agency. Again, these are two separate but related kinds of job-focused data. Agencies exist in dynamic environments, and the roles, tasks, and activities of particular jobs often change in relation to the changing environment. Therefore, data that describe current jobs may be used inappropriately to imply what the jobs should be or will always be. Job analysis is something that, if done properly, can help to alleviate some of these problems, and can aid in avoiding misleading job descriptions. (Please refer to the section on job analysis in this volume for a more complete discussion.)

#### Employee-Focused Data

Employee-focused data deals with the characteristics of employees presently in an organization. Numbers and kinds of employees in an organization are a component of this category. Data on agency employees' age, sex, race, marital status, current assignment, and

previous assignment(s) can begin to give an analyst an idea of the characteristics of employees at various positions.

Number of agency employees does not yield much information in its aggregate form. It is much more meaningful if broken down into how many are assigned to various job classifications, how many are in each age bracket, or how many have had what kinds of job assignments in the agency.

An important aspect or component of employee-focused data is experience and skills of employees. It is important for agencies to have some information about the level of skills and knowledge of their employees. Developing a skills inventory list involves gathering information on the job-related experience, education, interests, hobbies, and other characteristics of all employees. Volume I lists examples of operational definitions of certain skills under the general categories "general skills" and "instrumental skills." Figure 20 shows self-explanatory data (operational definitions are inherent in their wording) that can be included in a skills inventory.

FIGURE 20  
SKILLS INVENTORY

Present assignment  
Date assigned  
Continuity of service (seniority date)  
Field of degree  
Level of educational attainment  
Special education  
Managerial/supervisory experience  
Career interests or aspirations  
Special skills or hobbies--language skill, avocational skills  
like flying, photography, astronomy, oceanography  
Work skills  
Performance evaluations

Source: G. A. Bassett and H. Y. Weatherbee, Personnel Systems and Data Management, American Management Association, 1971, p. 187.

Determining the skills data needed for an inventory or checklist will depend on the organization and its missions and goals, which in turn reflect on the nature and purpose of the jobs within it. Skills inventories are directly affected by the data and information produced through job analyses. After a job analysis is completed and necessary skills outlined, an analyst can begin to form a skills checklist.

Performance Data

Defining and operationalizing measures of performance by criminal justice agencies is quite difficult. This is due in part to the fact that such agencies are public agencies and their performance measures are dependent on people's values, which often differ. Despite this fact, performance data can to some extent be operationalized. Figure 21 lists on the left concepts of what might constitute performance in

criminal justice agencies, and on the right a corresponding example of how this concept could be operationally defined.

FIGURE 21  
PERFORMANCE CONCEPTS AND THE OPERATIONAL DEFINITIONS

<u>Performance Concept</u>	<u>Operational Definition</u>
1. Rehabilitation of offenders in corrections institutions	1. Levels of recidivism among released inmates
2. Secure incarceration of offenders in correctional institutions	2. Numbers of escapes and disturbances in the institution
3. Crime prevention by a law enforcement agency	3. The measurement of crime rates
4. Enforcing the law by a police department	4. Clearance rates by arrest or conviction

The operational definitions placed on performance data are in some ways dependent upon the goals and missions stated by the agency. An agency's goals and missions are statements about what the agency will do for its clientele, whether it be a community or a population of inmates. Thus, performance data and their operational definitions should coincide with the agency's stated missions and goals. Performance data can characterize the organization as a whole and can also describe activities of individual employees.

Aggregate assessments of agency performance might include numbers and types of clients served, number of requests for assistance, or number of crimes investigated, to name but a few. These measures are

usually examined in relation to some time frame. For example, a police agency might assess performance by examining the amount of services provided in the current year as compared to the previous one. A correctional agency might assess performance on the basis of changes in the number and types of inmates entering and released from the institution. In each case the aggregates tell us something about agency output but not necessarily anything about the quality of that output. For example, did the police agency provide more service at lower quality? Or did the correctional institution process more inmates but with less direct influence on inmate behavior? In neither case is the quality of performance examined through the use of aggregate work-load data.

In assessing agency performance, then, work-load and process information must be buttressed with some form of assessment of the quality of the work performed, as well as internal reviews of worker performance. Such quality-control measures provide a method for interpreting the aggregate work-load data.

Besides agency performance, the performance of individual police officers or correctional officers can be and is often monitored in agencies. Such things as the amount and type of work done, the presence or absence of client complaints, and the use of sick time or absenteeism are traditional measures of worker performance. Again, quantity and quality should be distinguished. Measures of the performance of police and correctional officers should include assessments of the quality of the work done. Often these qualitative

assessments are in the form of supervisory evaluation, and sometimes they are on the basis of client satisfaction with the service provided. In police agencies, for example, citizen satisfaction with services provided can be periodically collected for sectors of the city, individual beats, or for individual patrol officers. These assessments, coupled with such traditional quality control measures as complaints against the officer or disciplinary infractions, give some basis for evaluating quality. In correctional agencies, excessive ticket writing or over-reliance on formal control measures in maintaining order might be viewed as qualitatively different from other methods of seeking compliance. Also in corrections such measures as number of inmate grievances sustained against the correctional officer might be used to judge work quality.

As mentioned above, supervisory assessments of correctional and police officers more often than not are the primary basis for evaluating the quality of an officer. Supervisory personnel review reports written by these officers and directly supervise their work. It is then assumed that these same supervisory personnel are more likely to be in the best position to evaluate performance accurately. While such a presumption may be correct, there are other considerations that often intrude in the personnel evaluation process to complicate the assessment of employee performance. For example, quite often extremely high or extremely low supervisory assessments require that a detailed report accompany the assessment. The requirement of such a report can, and often does, inhibit such extreme assessment because

supervisors can be unwilling to make detailed individual assessments. Hence, the assessment of employee performance can tend to gravitate toward a mid-point. So, we find that in many such assessments almost all employees are evaluated as "average" or "above average," while few or none are evaluated as "excellent" or "poor."

In addition to the tendency for supervisors to settle on the middle range of scales in assessment, the role of supervisors in police and correctional agencies often precludes some of the assessments required. For example, in police agencies because of the unique supervisor/employee arrangement, a relationship of mutual dependence develops. In the correctional field such relationships might form around the security requirements of the institution or on the basis of shift identity. In both cases, the distinctions between those supervising and those supervised are less clear and, as a consequence, employee performance data are difficult to interpret from supervisory assessments. For an elaborated discussion of employee appraisal, the reader is referred to the section on appraisal in this volume.

#### Systems Data

In addition to organizational and individual-level performance data, the development of systems-level data might include providing a national information system on crime and criminals to the development of a data base that permits analyses of systems agencies and their processing of offenders and offenses. Examples of the former include the National Crime Information Center (NCIC), with its computerized search for answers to inquiries about fugitives, wanted

persons, stolen cars, and the like, and its computerized criminal history (CCH) files with their emphasis on offenders. These and similar system-wide information systems are what we mean by "systems data."

More relevant to our considerations of systems data are two other kinds of data bases, now being developed, that permit analysis of justice system functioning. Offender-Based Transaction Statistics (OBTS) is more nearly an information system designed to track arrested persons through the criminal justice system: they examine the individual's first encounter with the arresting officer through the final disposition of the case. OBTS not only assembles facts but retains them in a format that permits examination of the relationships between events throughout the criminal justice process. Figure 22 lists the more common data elements appearing as part of the OBTS systems.

FIGURE 22  
OBTS DATA ELEMENTS

#### IDENTIFICATION ELEMENTS

State Identification No.\*  
FBI No. \*  
State Record No.  
Sex  
Race  
Date of Birth

#### POLICE/PROSECUTOR ELEMENTS

Arresting Agency No.\*  
Sequence Letter  
Date of Arrest  
Charged Offense (Most Serious)  
Police Disposition  
Prosecutor Disposition  
Police/Prosecutor Disposition Date

\* Data element should be in data base at state level but is not required to be reported to LEAA in Comprehensive Data Systems Program.

Sentence Type  
Confinement--Prison (Years)  
Confinement--Jail (Days)  
Probation (Months)  
Type of Counsel

## LOWER CRIMINAL COURT ELEMENTS

Court Identification No.\*  
 Initial Appearance Date  
 Disposition Data  
 Charged Offense (Most Serious)  
 Lower Court Disposition  
 Release Action  
 Release Action Date  
 Final Charge (Most Serious)  
 Type of Charge  
 Plea (At Trial)  
 Type of Trial  
 Date of Sentence  
 Type of Sentence  
 Confinement Term (Days)  
 Probation Term (Months)  
 Type of Counsel

## COUNTY PROSECUTOR

Prosecutor Identification No.\*  
 Date of Filing  
 Type of Filing  
 Filing Procedure  
 Date of Arraignment  
 Charged Offense (Most Serious)  
 Initial Plea  
 Release Action  
 Release Action Date

## FELONY TRIAL ELEMENTS

Court Identification No.\*  
 Trial Date  
 Trial Type  
 Final Plea  
 Trial Ending/Disposition Date  
 Final Charge (Most Serious)  
 Type of Charge  
 Court Disposition  
 Sentence Date

## CORRECTIONS ELEMENTS

Agency Identifier\*  
 Receiving Agency  
 Date Received  
 Status  
 Date of Exit  
 Exit

\*Data element should be in data base at state level but is not required to be reported to LEAA in Comprehensive Data Systems Program.

Source: National Advisory Commission on Criminal Justice Standards and Goals, Advisory Task Force on Information Systems and Statistics, Criminal Justice System, U.S. Government Printing Office, Washington, D.C., 1973, p. 100-101.

An inspection of the data elements appearing in Figure 21 indicates that several basic kinds of questions can be answered through analysis of the data collected under the OBTS system. Among the most basic are questions about the various decisions reached at each stage (For example, do accused exit the system or continue to the next step?). What is to happen to the individual offender, and what time is involved? Manipulation of these data allows us to make statements about what happens either to certain types of offenders or with certain types of offenses as they are tracked through the system. We can also look at the response of the total system to crime, what happens at each stage, and where the bottlenecks are. Additional information that can be generated includes relationships between sentences and offenses and characteristics of offenders. And the frequency of guilty pleas, jury trials, and bench trials can be examined, controlling for type of offense and for characteristics of offenders. With the detail in the data collected through OBTS, important systems-level analyses are possible about which factors influence various alternative outcomes. Some questions that might be posed in a OBTS-type analysis include those found in Figure 23.

## FIGURE 23

## QUESTIONS IN AN OBTS-TYPE ANALYSIS

1. What is the direction of change in most serious charges, from arrest to disposition? What is the relationship between police charges and those pressed by the District Attorney? In what way would plea-bargaining be reflected in the charges? In what types of cases are the reductions most significant?

2. What are the most common release types? In what way do release status and amount of bond relate to charges and defendant types? What changes occur in release status throughout the process?
3. How does recidivism (defined as rearrest, or reconviction) relate to actions taken against that individual as recorded in previous OBTS cycles: Was he convicted in his previous case(s); incarcerated, treated, etc.?
4. What is the "attrition rate" of cases, at what phase? What types of crimes are most likely to drop out? (e.g., dismissals). How are these factors related to case loads at the agency?
5. Is there a clear and consistent interagency policy to put more resources in certain types of cases: for example, more police work, special prosecution, and speed trial directed into the handling of violent crimes, recidivists, major misdemeanors, etc.?

Source: S. Katzenelson, "Analysis of the Criminal Justice System with Offender Based Transaction Statistics (OBTS)" in Leonard Oberlander (ed.), Quantitative Tools for Criminal Justice, Planning, U.S. Department of Justice, Law Enforcement Assistance Administration, Washington, D.C., 1975, p. 83-89.

OBTS data come from individual component agencies of the criminal justice system (e.g., police, courts, corrections). Other systems-level data available to criminal justice agencies include the published reports of police and correctional agencies, the Uniform Crime Reports, and such court data as are available in local jurisdictions. These data are described in detail in Volume I.

Systems data can also be used in attempting to project personnel requirements for police and correctional agencies. The National Manpower Survey of the criminal justice system attempted to use systems-level data and that of population characteristics to forecast personnel

requirements in the various agencies studied. A more detailed description of the forecasting process, the data requirements, and the National Manpower Model are contained in the Forecasting section of this volume.

#### METHODS OF DATA COLLECTION

Data-collection instruments are used to standardize information and to produce trustworthy evidence relevant to questions being asked. For human-resource planning, data-collection instruments can be employed to enhance a manager's ability more adequately to define, to distinguish, and to describe manpower or personnel problems. The four basic types of data-collection instruments are the questionnaire, interview, observation, and document study.

##### The Questionnaire

The questionnaire is regarded as an impersonal technique of collecting data, generally being handed or mailed to a respondent for completion without aid from a second party. The first step in employing a questionnaire is to list specific objectives to be achieved by its use. The problem in question should be thought through in clear detail; needed information should be detailed; procedures for using the information gained need to be outlined; and how each item on the questionnaire contributes to meeting the specified objectives should be stated.

The entire goal or objective of the study must seem relevant to the respondent. The chief purpose of a cover letter accompanying a questionnaire is to clarify, to explain, and to justify the goals of

the study to the respondent. And all the questions must be relevant to the stated goals of the study. Before including an item in a questionnaire, decisions should be made about exactly how answers will be analyzed and how the data will be published or printed.

The relevance of each question to a particular respondent can be a problem when two or more populations are being surveyed by the same question, e.g., men and women, or citizens and non-citizens. Two or more different questionnaires can be employed for the respective populations; using multiple wording so that the respondent can pick the appropriate phrase (the one most easily understood), or employing contingency questions can remedy this situation.<sup>33</sup>

When writing a questionnaire, it is good practice to list some of the reasons why a respondent might fail to answer a question or give erroneous answers. Some possible problems and solutions include: First, a respondent may feel the questionnaire has no credibility, but is being used for purposes other than those stated. A well-written cover letter can help remedy this problem. It should include statements explaining and justifying the study to the respondent, and identifying the persons or organization conducting the study. Respondents should be assured that the questionnaire does not contain any right or wrong answers, and that their anonymity is guaranteed. Many police or corrections organizations witness low response rates because respondents' badge numbers are required on questionnaires. Respondents may feel their anonymity is lost, and thus not complete the questionnaire.

Second, a respondent may feel that the information may be used against him or her or is an invasion of privacy, and hence refuse to

answer some or all of the questions. When formulating a questionnaire, unnecessary sensitive questions should be limited or excluded altogether. Third, a respondent may refuse to cooperate because of being surveyed in a previous study and feeling "he/she has done his/her share." Also, respondents who are members of an ethnic minority may refuse to answer questions, feeling that they are being used as "guinea pigs." Survey saturation can become a major problem. Although sampling is an effort to ensure that the same person is not surveyed over and over again, it may be necessary to "sample around" particular respondents. Fourth, respondents may refuse to participate, feeling that their responses will reveal a lack of education or an appearance of stupidity.<sup>34</sup>

Questionnaire construction is very important in getting useful data for a manager. Double-barreled questions should be avoided; avoid including two or more questions in one. For example: "Does your department have a special recruitment policy for racial minorities and women?" A negative answer implies that the department recruits both groups. The respondent may be stymied on such a question. Questions including "and" or "or" should be checked to see whether they consist of two questions when only one answer is wanted.

The meaning of some words may be expected to be known to a certain group of individuals but not to others. For those not understanding such words, the questions appear unclear. Word meanings can vary with geographical area, age group, or subculture. Slang should be avoided in question wording. The best precaution is to pretest all questions for clearness to respondents.<sup>35</sup>

The difficulty of the words used, the degree of formality of the language, and the use of slang or colloquialisms are all concerns of question wording. Question wording can greatly affect the answers received. Constructing the shortest version that conveys what is intended is a general rule to follow when writing questionnaire items. Longer questions take up more of a respondent's time, thus contributing to his or her unwillingness to answer.

Questions should have specific answers and refer to concrete matters. Questions about age and about recent events are relatively concrete. Conversely, questions dealing with opinions and attitudes are not. Care must be taken in the wording of questions dealing with abstract matters. Questions should be very carefully worded to avoid biasing the respondent's answer by leading him/her and thus artificially increasing the probability of a particular response. For example, "Do you smoke?" rather than "You don't smoke, do you?" should be asked. Finally, negative questions should be minimized since they may be misread by many respondents. An overlooked negative word could result in a respondent answering a question that is opposite his/her real opinion.<sup>36</sup>

Question wording is not the only important component of questionnaire construction. Also important are the response categories accompanying the questions. Open-ended questions are those in which possible responses are not specified. Open-ended questions can be used when all possible answers are not known, or when the investigator wishes to see what respondents view as appropriate answer categories:

"What are the major problems confronting Madison County at the present time?" An open-ended question like this may elicit unanticipated responses. Open-ended questions also allow a respondent to answer adequately in as much detail as is appropriate, and offers the opportunity to clarify or to qualify, and to be creative and expressive in answering. However, the use of open-ended questions does entail some disadvantages and limitations. Such a question type ensures that all relevant information is included in sufficient detail, but cannot preclude the collection of large amounts of worthless or irrelevant information. Data can often not be standardized, thus making comparison or computing percentages difficult.

Open-ended questions are based on the idea that individuals can express their own feelings in writing. If respondents cannot, then an open-ended questionnaire is rendered useless. In addition, the broad nature of the questions may result in a respondent's being unable to understand the meaning of a question, and consequently failing to answer. Open-ended questions require time and effort to answer; a high refusal rate may result. Finally, more paper is required for open-ended questions because of the need for allotting space for answers. Thus, the questionnaire appears lengthy, and may discourage respondents who do not wish to take time.<sup>37</sup> Figure 24 consists of open-ended questions taken from several questionnaires.

FIGURE 24  
OPEN-ENDED QUESTIONS

In the space below, comment on the general quality of investigation done by the Detective Bureau.

---



---



---

What are the most significant problems with the Community Service Officer Program?

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What are the most significant problems within the Crime Prevention Unit?

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Source: J. M. Tien and R. C. Larson, An Evaluation of the Worcester Crime Impact Program, The Committee, Cambridge, Massachusetts, 1975, pp. 35 and 36.

Please describe the programs or policies briefly, or attach previously prepared descriptions. Include all LEAA-funded grants or contracts related to investigation and all anti-burglary and anti-robbery programs.

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Source: P. W. Greenwood, J. M. Chaiken, and J. Petersilia, The Criminal Investigation Process, D. C. Heathhand Company, Lexington, Massachusetts, 1977, p. 266.

Closed-ended questions require a respondent to select from one or more specific categories provided on the questionnaire. Answers are standard, and can be compared. Responses are easier to analyze than those from open-ended questions; time and money are saved. The respondent is clear about the meaning of the question (a respondent who is unsure about the meaning of the question can often tell from the answer categories what is expected), and including a category "don't know" in some cases will help reduce respondent frustration. It is often easier for a respondent to answer a question by choosing a category rather than having to formulate an original answer for an open-ended question.

Closed-ended questions do have several disadvantages. It is easy for a respondent, not knowing an answer or not having an opinion, to try to guess an answer or to answer randomly. The investigator should include a "don't know" category, unless he wishes to force answers as was done in the Climate Survey. A respondent may feel frustrated because the appropriate answer for his/her category is not provided; the respondent has no opportunity to clarify an answer. The question may have too many answer categories, making for a lengthy, cluttered questionnaire.

The form of a question is usually determined by the objective of the particular question. Response categories for open-ended questions consist of a blank space where respondents write their answers. Appropriate space must be given for a respondent's answer, and the investigator can control the answer length by the amount of space allotted.<sup>38</sup>

Response categories for closed-ended questions depend partially on whether the variable is nominal, ordinal, interval, or ratio. The basic rule in writing answer categories is to supply all possible answers, and to state them clearly and in an uncluttered fashion. Response categories for nominal questions with factual answers (as opposed to opinions) can be listed, providing each alternative a blank box to be checked, or a number to be circled.<sup>39</sup>

For example:

Check the appropriate blank

1. SEX: male X female \_\_\_\_\_

Check the appropriate box:

1. SEX: male [X] female [ ]

Circle the appropriate number

1. SEX: male ①; female 2

Source: K. D. Bailey, Methods of Social Research, The Free Press, New York, 1978, p. 108.

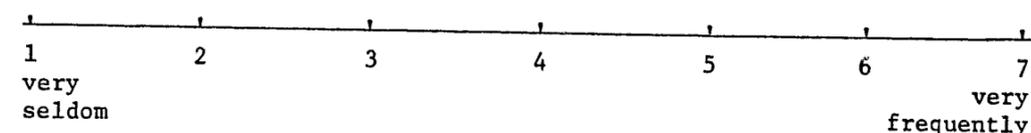
Ordinal categories must be defined by the investigator. Some commonly used scales are:

1. Strongly agree/agree/neutral/disagree/strongly disagree/  
unable to answer
2. Often/sometimes/almost never
3. Very important/important/somewhat important/not important/  
don't know

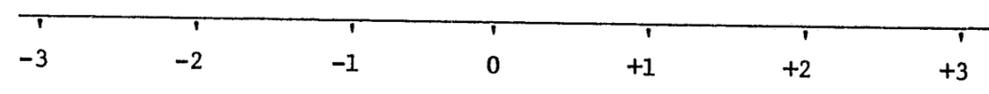
Source: K. D. Bailey, Methods of Social Research, The Free Press, New York, 1978, p. 113.

Each of these examples can be marked with all of the common types of response markings. Questions can be presented in a series so that the labels are only printed once for the entire series. However, categories can be repeated for every question.

Alternately, responses can be listed as a continuum with labels only at the extremes. For example:



Or "thermometer" categories:



Source: K. D. Bailey, Methods of Social Research, The Free Press, New York, 1978, p. 114.

Another response category format for ordinal variables is to present a list of topics and have the respondent rank-order them. For example:

The following are some of the problems faced by citizens of Wayne County. Please order them in terms of importance from 1 (most important) to 5 (least important).

- \_\_\_\_\_ smog
- \_\_\_\_\_ traffic
- \_\_\_\_\_ taxes
- \_\_\_\_\_ crime
- \_\_\_\_\_ drug addiction

Source: K. D. Bailey, Methods of Social Research, The Free Press, New York, 1978, p. 116.

Interval-scaled variables are generally continuous (not discrete) and will have a large number of response categories. Approximate as

well as exact values can be extracted with interally scaled variables.

Thus, even though a respondent may be sensitive about a certain subject, he/she may be willing to answer in approximations. For example:

What is your approximate annual income?

- \_\_\_\_\_ under \$5,000  
 \_\_\_\_\_ \$5,000 - \$7,499  
 \_\_\_\_\_ \$7,500 - \$9,999  
 \_\_\_\_\_ \$10,000 - \$14,999  
 \_\_\_\_\_ \$15,000 - \$19,999  
 \_\_\_\_\_ \$20,000 - \$24,999  
 \_\_\_\_\_ \$25,000 or more

Source: K. D. Bailey, Methods of Social Research, The Free Press, New York, 1978, p. 117.

The following are forms of closed-ended questions:

How valuable is the Crime Prevention Unit?

- very valuable  
 valuable  
 not very valuable  
 not at all valuable

About how many times in the last month have you received verbal abuse or insults from citizens?

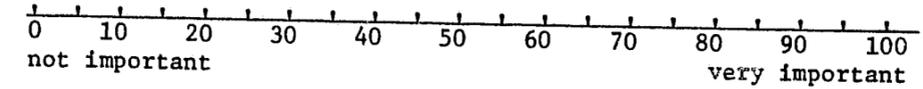
- 0 times  
 1-5 times  
 6-10 times  
 over 10 times

When you have complaints about your job, how often are your officials understanding and sympathetic?

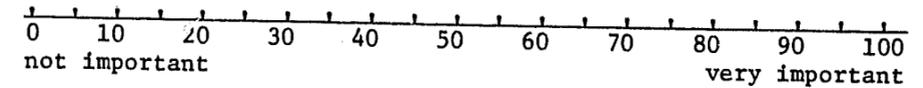
- very often  
 often  
 occasionally  
 hardly ever

Source: J. M Tien and R. C. Larson, An Evaluation of the Worcester Crime Impact Program, The Committee, Cambridge, Massachusetts, 1975, pp. 11, 35, and 36.

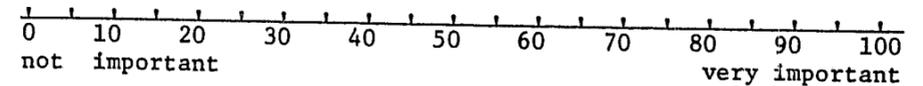
Roving patrol of the area is:



Suspect surveillance and conducting field interviews are:



Meeting the public to learn their needs and desires; to assist them as you can; and to encourage them to support the police are:



Source: J. E. Boydston and M. E. Sherry, San Diego Community Profile Final Report, The Police Foundation, Washington, 1975, p. A-7.

How is the quality of investigative units monitored? On each line, enter one of the following codes: 0 - Not used  
 1 - Minor importance  
 2 - Important  
 3 - Very important

- Supervisory review of investigator's reports, initiative, etc.  
 Audit (detailed follow-up investigation of randomly selected cases)  
 Arrest statistics  
 Clearance statistics  
 Caseload  
 Property recovered  
 Success in a major investigation  
 Prosecution or indictment statistics  
 Court conviction statistics  
 Other, specify \_\_\_\_\_

For each of the listed crime types, indicate the extent to which a representative of the local prosecutor's office would be involved in an investigation prior to an arrest. Enter the highest applicable code for each crime:

- 0 - Prosecutor never involved before an arrest
- 1 - Prosecutor sometimes advises on whether to arrest
- 2 - Prosecutor always advises on whether to arrest
- 3 - Prosecutor sometimes involved in investigation
- 4 - Prosecutor always involved in investigation
- 5 - Prosecutor has primary responsibility for the entire investigation

- Homicide
- Robbery
- Large theft or burglary
- Major drug case
- Official misconduct or corruption
- White-collar crime

Source: P. W. Greenwood, J. M. Chaiken, and J. Petersilia, The Criminal Investigation Process, D. C. Heath & Company, Lexington, Massachusetts, 1977, p. 260, 262.

In addition to question wording and response category format, question ordering is also an important component in questionnaire construction. It is a good idea to put sensitive questions and open-ended questions late in the questionnaires because open-ended questions require more thought and writing, and take longer to answer than fixed-alternative questions. Also, easily answered questions should be put first in the questionnaire. The first questions should be "nonthreatening" to the respondent, and have clear and distinct answer categories. Factual questions are generally asked first--e.g., age, gender, occupation, or education.

Questions should be put in a logical order. One such logical order could be ordering questions according to a time sequence. The "frame of reference" or objective of the questionnaire usually will define or determine what the logical order is to be followed. Questions can be varied by length and type to maintain the respondent's interest. Scaled items should be put either in a single group or divided. Again, the objectives of the questionnaire will have a bearing on this and the other issues of question ordering.<sup>40</sup>

The following questions were the first asked on a questionnaire distributed by the Rand Corporation in their nationwide study of criminal investigation procedures and policies in municipal and county police agencies in 1974.

GENERAL INFORMATION ABOUT YOUR POLICE DEPARTMENT OR LAW ENFORCEMENT AGENCY

1. Department's official name: \_\_\_\_\_
2. Geographical jurisdiction (name of city, town, county, or other jurisdiction): \_\_\_\_\_
3. Police chief or highest ranking career officer:
  - Name: \_\_\_\_\_
  - Title: \_\_\_\_\_
  - Address: \_\_\_\_\_
4. Person or organization to whom the person named in Question 3 reports:
  - Title: \_\_\_\_\_
  - Name: \_\_\_\_\_
  - Address: \_\_\_\_\_



6. Do any local prosecutors have their own investigative staff?
- Yes
- No.....Skip to Question 39
7. Are the investigators who are assigned to the prosecutor members of your department?
- Yes, all of them
- Yes, some of them
- No
8. What percentage of felony arrests are screened out or rejected by the prosecutor without drawing of an affidavit or formal complaint? (If data not available please check here  and record estimated percent below.)
- less than 5%
- 5 - 20%
- 20 - 50%
- 50 - 70%
- more than 70%

INVESTIGATIVE POLICIES, OPERATIONS, AND PROCEDURES

1. Does your department use evidence technicians who are sent to the crime scene?
- Yes.....How many are there?
- number of civilians
- number of sworn officers
- No

Source: P. W. Greenwood, J. M. Chaiken, and J. Petersilia, The Criminal Investigation Process, D.C. Heath & Company, Lexington, Massachusetts, 1977, pp. 257, 263, 266.

Once the questions have been written and an order decided upon, the remaining tasks consist of writing an introductory statement or cover letter, writing instructions to respondents, and pretesting.

The cover letter is used to justify the study to respondents. It should contain information identifying the persons or organization conducting the study, indicating why the study is important and should be conducted, telling why it is important for the respondent to complete the questionnaire, and finally assuring the respondent of anonymity and a confidential treatment of answers.<sup>42</sup> An example of a cover letter follows in Figure 25.

FIGURE 25  
SAMPLE COVER LETTER USED IN A SURVEY

March 27, 1974

We are writing to ask your cooperation in a nationwide study of criminal investigation procedures and policies in municipal and county police agencies. This study is being conducted by The Rand Corporation under a grant from the National Institute of Law Enforcement and Criminal Justice, the research and demonstration arm of LEAA.

One of the objectives of the study is to develop a comprehensive picture of investigative units, their organization, their procedures, and the special resources they use--such as computerized information files or mobile laboratory equipment. Your department can help us complete this important task by filling out and returning the enclosed questionnaire.

After the questionnaires are returned, we will select a few interested departments, varying in size, type of community, and organization, for special observation and collection of data. (Question 57 asks whether your department would be interested.) Through a combination of analysis of the questionnaire responses and the detailed studies of selected departments, we expect to produce new insights into the investigative function. We think these insights will provide guidance to you and other law enforcement officials on possible ways to improve your investigative effectiveness through organizational changes, additional training, and adoption of methods that have proved their worth elsewhere.

## Figure 25 - Cover Letter (continued)

We have made careful preparation, described in an attachment, to assure that all responses will be analyzed in strict confidence by a team having broad experience in the criminal justice system. We hope you will agree to participate by returning the enclosed post-card and indicating a completion date prior to April 15, 1974.

Sincerely,

Peter W. Greenwood and Sorrel Wildhorn  
Project Co-Directors

Encls.

Source: P. W. Greenwood, J. M. Chaiken, and J. Petersilia, The Criminal Investigation Process, D. C. Heath & Company, Lexington, Massachusetts, 1977, p. 271

Instructions for the questionnaire should be specific and typed in such a manner as to stand apart from the actual questions. They should be brief, but clear to the respondent. Examples of such instructions appear in Figure 26 and 27.

## FIGURE 26

## INSTRUCTIONS FOR A QUESTIONNAIRE

In the following subsections you will find questions that relate to your personal feelings or attitudes on a variety of subjects. Your answers will range from 0 to 100. When this range covers the spectrum of strongly negative to strongly positive positions, the midpoint (50) represents neutrality or indifference.

Indicate your answer by circling the appropriate point on the line.

The following is an example of an answer:

0	10	20	30	40	50	60	70	80	90	100
strongly				neutrality or					strongly	
negative				indifference					positive	

Please answer every question even if you are not sure about your opinion or have had only limited experience with the situation.

Source: J. M. Tien and R. C. Larson, An Evaluation of the Worcester Crime Impact Program, The Committee, Cambridge, Massachusetts, 1975.

## FIGURE 27

## INSTRUCTIONS FOR A QUESTIONNAIRE

## SURVEY INSTRUMENT FOR POLICE OFFICERS

This survey has been developed by Public Systems Evaluation, Inc. for the express purpose of facilitating the collection of information pertinent to the evaluation of the Worcester Crime Impact Program.

Do not put your name anywhere on the questionnaire. All responses are strictly anonymous. Your identity will never be known by anyone. ONLY PUBLIC SYSTEMS EVALUATION PERSONNEL WILL SEE THESE SURVEYS.

Please select the most appropriate answer to every question. Feel free to write or type comments in spaces between questions or in the margins. Your answers and comments may help to improve the Department and to make your job better.

After completing the questionnaire, place it in the envelope provided and drop it in the box marked "Public Systems Evaluation." Your cooperation is appreciated. Thank you.

Source: J. E. Boydston and M. E. Sherry, San Diego Community Profile Final Report, The Police Foundation, Washington, 1975, p. A-1.

Although pretesting is the final stage in questionnaire construction, it is one of the most important. The sample for a pretest can be a "captive audience" such as officer co-workers. These respondents should analyze the questionnaire for appropriate question wording, question order, redundant questions, missing questions, confusing response categories, and insufficient space to answer open-ended questions. The pretest should be administered in the same manner as the planned final study, and should be used to refine the questionnaire. In summary, Borg and Gall (1979) list eleven factors in questionnaire format, as shown in Figure 28, that should be addressed when constructing a questionnaire.

FIGURE 28

## IMPORTANT FACTORS IN QUESTIONNAIRE FORMAT

1. Make the questionnaire attractive, e.g., using colored ink or colored pages.
2. Organize and lay out questions so that the questionnaire is easy to complete.
3. Number questions and pages.
4. Put name and address of person to whom the form should be returned at the beginning and end.
5. Include brief, clear instructions, printed in bold type.
6. Use examples before any questions that might be confusing or difficult to understand.
7. Organize the questionnaire in some logical sequence.
8. Begin with a few interesting and nonthreatening questions.
9. Do not put important questions at the end of a long questionnaire.

10. Avoid using words like "questionnaire" or "checklist" on your form. Many people are prejudiced against these words.
11. Include enough information in the questionnaire so that questions are meaningful to the respondent.

Source: W. R. Borg and M. D. Gall, Educational Research, An Introduction, Longman, Inc., New York, 1979, p. 298.

Questions that are interesting and clearly relevant to the study will increase response rate. Length also affects response rate--hence, the questionnaire should be as short as possible, consistent with the study objectives. Questionnaires may be personally delivered, used during interviews, or mailed to respondents for completion. The mailed questionnaire saves money and time for the person or organization conducting the study. The questionnaire can be completed at the respondent's convenience, and assures more anonymity for the respondent than an interview or personally delivered questionnaire. Mailed questionnaires are particularly useful when questions demand a considered answer, or if the answer requires consulting documents. Biasing errors are reduced or avoided; there is no opportunity for an interviewer's presence to bias answers through voice inflection or facial expressions. Finally, a mailed questionnaire permits wider geographic contact with minimal costs. A postage stamp costs much less than travel costs for interviewers.

Mailed questionnaires should be limited to rather straightforward questions. The respondent will not have an interviewer present to

clarify any confusing statements; instructions and definitions must be clear enough to facilitate appropriate answering. There will be no opportunity for probing. The answers will have to be accepted as given.

In addition, the investigator has no control over who actually completes the questionnaire. There is no control over the respondent's environment; thus the individual intended by the investigator to fill out the questionnaire may in fact not be the person to complete it. Lastly, mailed questionnaires often result in low response rates. The typical response rate for the interview is about 95 percent, whereas for a mailed questionnaire it is often between 20 percent and 40 percent.<sup>43</sup>

The difficulty in securing an acceptable number of returned mailed questionnaires with adequate data may elicit the use of various strategies to enhance or to increase the response rate. The type of sponsorship can affect the number of completed questionnaires returned. A cover letter accompanying the questionnaire explaining sponsorship and the study's credibility is very important. Managers can also persuade respondents to participate through appealing to their good will and convincing them of the significance of the study.

The accompanying cover letter, an example of which is shown in Figure 29, can affect response rate. The letter should include the identity of the sponsor and a mailing address for returning the questionnaire. It is also important to include a stamped, self-addressed envelope. The use of follow-ups with mailed questionnaires is an effective method of increasing the

response rate. The first follow-up can be in the form of a postcard one week after the first mailing. The second follow-up can be a reminder letter, replacement questionnaire, and stamped, self-addressed envelope sent at the end of the third week. During the seventh week, for those not yet returning a completed questionnaire, a reminder letter sent certified mail can be used. However, it is important to remember that follow-up letters destroy somewhat the anonymity of respondents. Those not returning a questionnaire are identified for mailing purposes. Respondents must be assured in the follow-up letter that anonymity will be maintained.<sup>44</sup> Figure 30 rank-orders the various follow-up procedures discussed above.

## FIGURE 29

SAMPLE COVER LETTER AND POSTCARD  
FOR A MAILED QUESTIONNAIRE

Several weeks ago we sent you a questionnaire entitled "Survey of the Criminal Investigation Process in Municipal and County Police Departments," together with a postcard on which you could indicate whether or not your department planned to return a completed questionnaire.

To date, over 75 of the selected departments have indicated they will respond, and we have received many of their questionnaires. The variation in their answers to questions about the organization of investigative units, their procedures, and special equipment such as computerized files and laboratory equipment indicates that a complete response is needed for us to obtain a truly comprehensive picture.

However, we have not yet received your postcard, and we would appreciate it if you could indicate your plans by filling in the attached card. If your copy of the questionnaire has been misplaced, please call one of us collect, and we will be glad to mail you another one.

Sincerely,

Peter W. Greenwood  
Sorrel Wildhorn  
Project Co-Directors

Encl.

_____	
(name of law enforcement agency)	
<input type="checkbox"/>	will
respond to your questionnaire,	
<input type="checkbox"/>	will not
You may expect a response by ____/____/74.	
Signed _____	

Source: P. W. Greenwood, J. M. Chaiken, and J. Petersilia, The Criminal Investigation Process, D. C. Heath & Company, Lexington, Massachusetts, 1977, 275-276.

## FIGURE 30

## TIME SERIES ORDERING FOR MAILED QUESTIONNAIRES

<u>Mailing</u>	<u>Time</u>	<u>Average Response Rate</u>
1. First Mailing	Week 1	23.890%
2. Post Card Follow-up	Week 2	42.090%
3. First Replacement Questionnaire	Week 4	59.090%
4. Second Replacement by Certified Mail	Week 7	72.490%

Adapted from: Don A. Dillman, James A. Christensen, Edward H. Carpenter, and Ralph M. Braks, "Increasing Mail Questionnaire Response: A Four-State Comparison," American Sociological Review, Volume 39, October 1974, p. 755.

### The Interview

The steps taken when using an interview as a means of data collection are similar to those when using a questionnaire. The personal interview is a face-to-face impersonal role situation in which an interviewer asks respondents questions designed to obtain answers pertinent to the objectives of the study. The interview allows greater flexibility in the questioning process; the interviewer can determine the question wording, clarity, order, detail, and degree of probing for additional information. There is more control over the environment. Interviewers can ensure that respondents answer questions in the appropriate sequence and have some degree of privacy while answering questions.

The personal interview results in a higher response rate than the mailed questionnaire. Persons unable to read and write can still answer questions through an interview. Some people not wanting to write out their answers may be glad to discuss them verbally. An interviewer can also collect additional information about the respondent not obtainable through a mailed questionnaire. Personal characteristics and the environment of the respondent are examples of such information.<sup>45</sup>

Interviews as a means of collecting data also have several limitations. The costs are higher for interviews than mailed questionnaires. Interviewers must be selected, trained, and supervised. Travel costs will be incurred. The flexibility of an interview can promote a lack of standardization in the data-collection process due

to interviewer bias. Verbal cues, forms of nonverbal communication, or personal characteristics or traits of the interviewer and respondent can affect participants' responses. The interview often lacks anonymity, contrary to that provided by a mailed questionnaire. Respondents may feel threatened by the interviewer; respondents' names, addresses, and telephone numbers are generally known by the interviewers.<sup>46</sup>

There are three basic forms or types of interviews: the schedule-structured interview, nonschedule-structured interview, and non-scheduled interview. The most structured form is the schedule-structured interview. Question wording and sequence are fixed and identical for every respondent. This is done to ensure that variations between responses can be attributed to actual differences between responses rather than variations in the interview. This form of interview is based on three assumptions.

1. That for any research objective the respondents have a sufficiently common vocabulary so that it is possible to formulate questions which have the same meaning for each of them.
2. That it is possible to phrase all questions in the form that is equally meaningful to each respondent.
3. That if the meaning of each question is to be identical for each respondent, its context must be identical and, since all preceding questions constitute part of the contexts, the sequence of questions must be identical.<sup>47</sup>

The nonscheduled-structured interview takes place with respondents known to have been involved in a particular experience. It refers to situations that have been analyzed prior to the interview,

using an interview guide specifying topics related to the previously occurring situation. The nonschedule-structured interview focuses on subjective experiences concerning the specific situation under study. This type of interview allows the researcher to obtain details of personal reactions or specific emotions.<sup>48</sup>

The nonscheduled interview is the least structured type of interview. There is no prespecified set of questions, nor are questions asked in any certain sequence. Direction of the interview relies heavily on the respondent's answers. In addition, the interviewer has a great deal of freedom to probe and to raise specific questions relating to answers given by participants.<sup>49</sup>

The first step in the interviewing process is obtaining the cooperation of a respondent. Respondents need to feel that their interaction with the interviewer will be pleasant. The interviewer needs to establish a good rapport with the respondent at the outset of the interview. The respondent needs to view the study as being worthwhile, beneficial, and dealing with specific issues. The interviewer should also explain the procedures for selecting respondents, thus assuring the respondent that he/she was not "singled out" for questioning.<sup>50</sup>

Figure 31 is an excerpt from an introductory statement of an interview.

### FIGURE 31 INTRODUCTORY STATEMENT FOR AN INTERVIEW

One of the reasons for this survey is to learn what people in Worcester know about the Community Service Officer Program and how they feel about it. So, before I ask you any other questions, I would like to read you a job description for Community Service Officers so that you will be familiar with what they do.

Community Service Officers are civilian employees who have been trained at the Police Academy. Their purpose is to assist the Police Officers in the Crime Prevention Unit in giving presentations to schools and community organizations; to do premise surveys at the scene of previous breaks, suggesting ways of improving security there; enrolling citizens in Operation I.D., a plan to engrave all valuables with a number which is then filed at the Crime Prevention Unit; and performing other crime prevention duties such as making vacant house checks. They do not make arrests or carry weapons.

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Source: J. M. Tien and R. C. Larson, An Evaluation of the Worcester Crime Impact Program, The Committee, Cambridge, Massachusetts, 1975.

After an initial introduction, the interview should proceed, and certain techniques can be employed to ensure a smoothly conducted interview. The questionnaire should be followed, but can be used informally. The interview should be conducted in a casual informal environment where the respondent is relaxed and does not feel the interview is a "cross examination." Questions should be asked as they are worded and ordered on the questionnaire. Those questions that are misinterpreted or misunderstood should be repeated and clarified.

Probing is a method used to stimulate discussion and to obtain more information from a respondent. After a question is asked and if the respondent answers inadequately and the interviewer needs more information, probing can be used to obtain such information. Probing

can motivate the respondent to elaborate or to clarify an answer, or to focus the conversation on a particular topic of the interview. Generally, the less structured the interview, the more important probing becomes to elicit more information.<sup>51</sup>

The telephone interview is useful when time is a factor. These interviews can be conducted very quickly, at a low cost. Respondents in telephone interviews remain more anonymous than in personal interviews.

However, telephone interviews can pose sampling problems. Many people do not have telephones or have unlisted telephone numbers. The respondent can terminate the questioning very easily by hanging up the telephone, and the probability of this increases as the interview length increases. The telephone interview is inferior to the personal interview for an average, large-scale study, but can be useful for small surveys when time is important.<sup>52</sup>

Examples of introductory statements used during telephone interviews conducted during the Worcester Crime Impact Program are in Figure 32.

FIGURE 32

## INTRODUCTORY STATEMENT FOR A TELEPHONE INTERVIEW

(IF CLIENT'S NAME IS KNOWN, READ INTRODUCTION A. IF NO NAME OR ONLY LAST NAME IS KNOWN, READ INTRODUCTION B.)

(INTRODUCTION A:) May I speak to \_\_\_\_\_? (IF NOT AT HOME, ASK:) Do you know when he/she will be home? Good \_\_\_\_\_ M \_\_\_\_\_. My name is \_\_\_\_\_. I'm calling for Public Systems Evaluation in Cambridge, Massachusetts. We're a private research firm doing a survey on police services in Worcester. To help us complete this survey, we have checked city records which say that the police answered a call which they describe as a \_\_\_\_\_ which occurred on \_\_\_\_\_ at about \_\_\_\_\_. I need to speak to someone who spoke with the police who answered the call. Are you that person? (IF NO, ASK:) Can you tell me who that person is? (IF YES, CONTINUE:) I would like to ask you some questions about what happened during this incident. Your response will be held in complete confidence and results of the survey will be used to improve the quality of police services in Worcester. May I proceed?

(INTRODUCTION B:) (IF LAST NAME IS KNOWN, ASK:) Is this the \_\_\_\_\_ residence? (IF NOT, BEGIN:) Good \_\_\_\_\_. My name is \_\_\_\_\_. I'm calling for Public Systems Evaluation in Cambridge, Massachusetts. We're a private research firm doing a survey on police services in Worcester. May I speak to the person in your house who called for police assistance on \_\_\_\_\_ at about \_\_\_\_\_ because of \_\_\_\_\_? (REPEAT ABOVE FOR CLIENT IF HE/SHE IS NOT THE PERSON WHO ANSWERS THE PHONE. IF NOT AT HOME, ASK:) Do you know when he/she will be at home? (WHEN CLIENT IS REACHED, PROCEED AS IN INTRODUCTION A.)

Source: J. M. Tien and R. C. Larson, An Evaluation of the Worcester Crime Impact Program, The Committee, Cambridge, Massachusetts, 1975.

Note taking or tape recording are the usual methods for preserving information during an interview. Note taking provides readily accessible information, but can disrupt communication between interviewer and respondent. The interviewer must write answers of respondents, thus requiring time between questions. Respondents may feel uneasy about or be made uncomfortable by this situation.

Tape recorders reduce the tendency for interviewers to make an unconscious selection of data favoring their biases. Data can be analyzed and reanalyzed by replaying the tape recording. Minimal note taking is needed when using a tape recorder. However, respondents may be less willing to reveal their true feelings and opinions when being recorded than when notes alone are taken.<sup>53</sup>

In deciding which data-gathering tool is most appropriate for a particular study, several factors should be considered. Figure 33 ranks the personal interview, mailed questionnaire, and telephone interview with respect to certain criteria.

FIGURE 33

COMPARISON OF THE PERSONAL INTERVIEW  
MAILED QUESTIONNAIRE, AND TELEPHONE INTERVIEW

<u>Criteria</u>	<u>Personal Interview</u>	<u>Mail</u>	<u>Telephone</u>
Cost	High	Low	Moderate
Response rate	High	Low	High
Control of interview situation	High	Low	Moderate
Applicability to geographically dispersed populations	Moderate	High	Moderate
Applicability to heterogeneous populations	High	Low	High
Obtaining detailed information	High	Moderate	Moderate
Speed	Low	Low	High

Source: D. Nachmias and C. Nachmias, Research Methods in the Social Sciences, St. Martin's Press, New York, 1981, p. 202.

Observation

Data collection by observation can be used to describe the observed phenomena as they occur in their natural settings. It is the primary method for gathering data on nonverbal behavior. An observer on the scene can discern ongoing behavior as it occurs. Field notes provide a means of recording salient features of behavior. Observation allows the researcher to study a phenomenon (or group or individual) over a longer period of time than a questionnaire or interview allows.

Yet, the observer has little control over the environment in which the study is taking place. Measurement and quantification of data are hindered because most data are in the form of the observer's unquantified perceptions. Massive amounts of data are generated from an observer's field notes. Such data are often difficult to code or to categorize in any systematic fashion.

Observational studies should be limited to small studies. The in-depth nature of an observational study requires a longer period of time than an interview or questionnaire, and should be limited to a small number of subjects.<sup>54</sup> Observational studies tend to utilize minimal structure in the questions to be asked. Nonetheless, observational studies are classified by structure: the degree of structure in the environment, e.g., natural setting or laboratory; or degree of structure imposed on the observational environment by the researcher, e.g., counting frequencies of certain behaviors or merely recording whatever occurs. The following four-cell typology shown in Figure 34 explains this idea.

FIGURE 34  
OBSERVATIONAL STUDY CLASSIFIED BY STRUCTURE

<u>Degree of Structure Imposed on Setting by Observer</u>	<u>Degree of Structure of Observational Setting</u>	
	<u>Natural Setting</u>	<u>Artificial Laboratory</u>
Unstructured	Type: completely unstructured field study	Type: unstructured laboratory analysis
Structured	Type: structural field study	Type: completely structured laboratory observation

Source: K. D. Bailey, Methods of Social Research, The Free Press New York, 1978, p. 219.

Participant observation refers to those forms of research in which the investigator becomes actively involved in the situation under observation. The level of participation can be varied. The complete participant role is one where the observer is wholly concealed, the research objectives are not made known, and he/she attempts to become a member of the group under observation. Complete participation makes possible the study of groups that ordinarily do not reveal to outsiders certain aspects of their culture. The participant-as-observer role allows the researcher to make known his or her identity as a researcher to the group under study. Thus, problems associated with "role-pretending" are minimized. The participant-as-observer attempts to establish close relationships with members of the group who subsequently serve as informants and respondents.

Observations can be recorded in several different ways. Documentation can take the form of a diary or continuous notes as events occur.<sup>55</sup>

Figure 35 shows suggestions for taking field notes.

FIGURE 35  
SUGGESTIONS FOR TAKING FIELD NOTES

1. Record the notes as quickly as possible after observation, since the quantity of information forgotten is very slight over a short period of time but accelerates quickly as more time passes.
2. Writing stimulates thought, but dictating is acceptable if appropriate.
3. Typing field notes is preferable to handwriting because it is faster and easier to read.
4. Two copies of field notes should be made.

Source: K. D. Bailey, Methods of Social Research, The Free Press, New York, 1978, p. 225.

Notes should be taken daily and include topics of who, what, when, where, why, and how for particular occurrences. Descriptions, analytical ideas, and inferences, personal impressions, and notes for further information should be included in field notes.<sup>56</sup>

Participant observation can pose problems regarding the validity of the data. Research data may reflect the biases and characteristics of the observer rather than the observational variables that one seeks to measure. The presence of the observer can affect the behavior of

those being observed. Also, when those being observed learn the study purpose, they may react in ways not representative of their actual behavior. An observation will not be totally free of observer bias. Different observers bring to bear past experiences that cause differences in their perceptions and recording of events. Biases are more prevalent or have more bearing on a study when observers are asked to draw conclusions about specific observations. The best method to control observer bias is to check for bias during training when comparative data are available on all observers, and to eliminate observers whose data appear biased. In addition, two observers can be assigned to each situation. The combined records of two observers will provide more reliable data than will one observer.<sup>57</sup>

Another common problem with observational studies is the tendency for an observer to rate the person he is observing in the middle of a scale. This is called the error of central tendency. A rater may also rate most individuals at the high end of the scale. This is called the error of leniency. Frequently, an observer may form an early impression of the person being observed that will influence his ratings on all behavior involving the given individual. This is called the halo effect.

"Contamination" can occur often in observation studies. The most common source is the observer's knowledge about the performance of the subjects on one of the variables being studied on his/her observation of another variable. The knowledge of one aspect of the study may corrupt by contact the data recorded in another aspect of the study.<sup>58</sup>

#### Document Studies

Documents are written materials that contain information about a specific topic under study. Primary documents are eyewitness accounts written by individuals who experienced a particular event or behavior. The second type is secondary documents recorded by people who were not present on the scene but received the necessary information from others viewing the scene or in primary documents. Documents include such items as personal, business, or organizational records, printed mass media especially newspapers, journals, or magazines, or books.<sup>59</sup>

Document studies allow research on subjects the researcher has no physical access to. These studies are well suited for studying a topic over a long period. Larger samples can be used, and the cost of obtaining documents can be relatively low compared to using mailed questionnaires, interviews, or observation. However, when utilizing documents as a method of data collection, it is important to note that many documents may provide an incomplete account of the topic under study. In some cases data may not be in the specific form required by the researcher for his/her study. Documents differ quite widely with regard to their standardization of format. Finally, although one advantage of document studies is that comparisons can be made over a long period, often external events cause changes that affect a common unit of analysis. Comparisons made can be misleading unless appropriate corrections are made. A good example is the reduced buying power of the U.S. dollar using a comparison of average income in 1970 with that of 1980. It would appear on the surface that Americans in 1980 have much more buying power than their

counterparts of 1970. However, inflation requires that we devalue the buying power of the 1980 dollar compared to that of the 1970 dollar.<sup>60</sup>

Comparison of Data Collection Techniques

Figure 36 and 37 compare the four types of data collection methods with respect to several issues.

FIGURE 36  
COMPARISON OF QUESTIONNAIRE,  
INTERVIEW, DIRECT OBSERVATION, AND HARDWARE

1. least	Time Available		most
*secondary data	questionnaire	interview	direct observation hardware
2. least	Complexity of Phenomenon		most
secondary data	questionnaire	interview	direct observation hardware
3. small	Size of Population		large
direct observation hardware	interview	questionnaire	secondary data
4. concentrated	Spatial Distribution of Population		dispersed
direct observation hardware	interview	questionnaire	secondary data
5. low	Motivation of Population		high
direct observation hardware	interview	questionnaire	secondary data
6. low	Capacity of Population		high
direct observation	interview	hardware questionnaire	secondary data

\*Here the term secondary data is equated with document study.

Source: R. R. Mayer and E. Greenwood, The Design of Social Policy Research, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1980, p. 227.

FIGURE 37  
RELATION BETWEEN RELIABILITY,  
VALIDITY, AND TECHNIQUES OF OBSERVATION

LOW	*VALIDITY		HIGH
hardware secondary data complete observer	questionnaire	interview	complete parti- cipant
LOW	**RELIABILITY		HIGH
complete parti- cipant	interview	questionnaire	hardware secondary data complete ob- server
LOW	VALIDITY		HIGH
Paper-and-pencil tests	interview guide		low
closed-ended questions	open-ended questions		
HIGH	RELIABILITY		LOW

\*Validity is the degree to which an instrument measures what it purports.

\*\*Reliability is the degree to which repeated application of the same procedures under the same conditions will yield the same data.

Source: R. R. Mayer and E. Greenwood, The Design of Social Policy Research, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1980, pp. 230-231.

### APPROPRIATE METHODS FOR COLLECTING HUMAN-RESOURCE PLANNING DATA

In criminal justice human-resource planning, the key is to use the best available, appropriate, and affordable information as well as the methods commensurate for obtaining that information. Otherwise, personnel and human-resource planning decisions will be made with inadequate information.

Environmental data or those data external to the organization can be best collected through survey research methods or document studies. Most of the environment data, including those about economic and budget conditions, population characteristics, and labor-market conditions, are regularly collected by agencies designated for those tasks. When appropriate, criminal justice agencies should obtain these data from those specified agencies through document studies. Obtaining data from these sources will result in a savings of time and money for the criminal justice agency. The examples of local and national agencies that provide these kinds of data are:

The United States Chamber of Commerce  
Local Chamber of Commerce  
U.S. Department of Labor  
U.S. Bureau of the Census  
Federal Bureau of Investigation  
Advisory Commission on Intergovernmental Relations  
American Bar Association

In addition, data on economic and budget conditions within the agency can be collected with interviews and questionnaires. For example, different department or bureau chiefs can be interviewed or issued questionnaires about their anticipated budget requests for the

following year as well as forecasts of what budget allocations may be needed in future years.

Data about the agency's missions and goals can be collected through a document study of the agency's official policy statements and procedures manuals. Annual reports and some budget documents are another excellent source of data concerning an agency's missions and goals. In addition, individuals within the organization can be queried about their perceptions of what the agency's missions and goals are. Data of this sort can be gathered through the use of interviews and questionnaires.

Data and information on public and political values can be obtained by constructing a survey. Questionnaires can be distributed and interviews conducted to find out the public's opinions on crime, the agency's purpose and performance, as well as related political values. For example, a stratified sample of city residents could be taken, and then these individuals could complete a questionnaire structured to indicate their views on what areas of law enforcement (e.g., traffic, violent crime, victimless crime) should be the primary focus of the police department. Then the police department would have some idea of the services expected of them by the population they serve.

Generally, environmental data collection, in the context of criminal justice human-resource planning, results in descriptive data. These data are geared to discovering, defining, and measuring the extent of the environment's effect on an agency's human-resource planning problem(s). An organization should be viewed as an open system,

interacting with its environment, and environmental factors directly affect an agency's structure, functions, and processes. Environmental data such as that collected through the use of the environmental questionnaire in the previous volume describe for you the context in which your personnel and human-resource decisions are made. The open systems perspective, recognizing the constraints and contingencies imposed on your agency's decision making by the external environment, should be incorporated into the data-collection process. For a more complete examination of environmental issues the reader is referred to the environmental questionnaire and the accompanying narrative in Volume II.

Organizational data collection can be accomplished with all four collection methods. A document study can be performed by checking police or correctional officers' daily logs or reports to see what activities they were engaged in. An analyst can also interview criminal justice employees for data about the kind of work they do. Questionnaires can be distributed that inquire about work units performed in various categories, amount of time consumed for specific activities, and opinions concerning work loads. Finally, participant observation will provide a first-hand assessment of the amount and kind of work done by an agency. For example, a participant observer could ride with a police officer during a shift and record specific activities and amount of time devoted to each, thus providing an assessment of police work loads. Similarly, a participant observer could observe a correctional officer's work load by spending

a shift (or several shifts) with that officer. It is highly recommended that when gathering data on work loads several collection techniques be employed. When a system of "checks and balances" is used, the reliability and validity of the data collected is enhanced.

Job-focused data include job description and, moreover, specifications of what kinds of jobs are needed by an organization as well as about what types of individuals are needed to fill certain jobs. Data of this sort can be obtained in several ways. First, a document study that assesses particular job descriptions can be done. Specific job classifications require certain skills; these skills and other knowledge needed adequately to do a job should be included in a job description. In addition, present holders of certain positions can be queried, either by interview or questionnaire, for data concerning what skills and knowledge are necessary for those jobs. Finally, a participant observer can provide information about skills and knowledge for a job by observing an employee during work hours.

Employee-focused data can also be collected with the four collection techniques. Descriptive data concerning the number of employees in certain job classifications and their age and sex, as well as other personal data, can be obtained through official agency documents. Personnel offices usually maintain files on these types of data. Questionnaires and interviews can be used to get information regarding career preferences, skills, previous employment, and educational and training history.

Criminal justice agencies should maintain and periodically conduct performance evaluations of its employees. These performance evaluations indicate whether an agency is meeting its predetermined missions and goals through the activities of its employees. These documents of performance evaluations can be used to obtain data on an agency's performance. Performance data can also be gathered through questionnaires and interviews of employees. Through these survey research techniques actual performance issues can be dealt with, as well as opinions about performance levels.

Data and information about the practices and processes associated with the system can be obtained through evaluating the documents used by the personnel office--e.g., recruitment policy statements and procedures, application forms, selection tests, selection policy statements, training schedules, or promotion procedures. Employees of the personnel office, in addition to all employees, can be questioned through interviews and questionnaires as to their opinions regarding the performance of the personnel office.

Again, it is important that when more than one method of data collection can appropriately be employed, more than one should be used as the credibility of the data will be enhanced when more than one technique is used. The use of several techniques provides "checks and balances." For example, questionnaires can be distributed to employees about work loads for specific activities. To supplement and to promote credibility of information obtained from the questionnaires, interviews could be used. The interviews could

ask more detailed questions and with the use of probing provide more in-depth answers.

#### CONSTRAINTS TO DATA COLLECTION

Constraints can be defined as those factors or events that impede the criminal justice agency's ability to do human-resource planning comprehensively. Fiscal or budgetary considerations are probably the single most significant constraint.

Budget constraints are not unrelated to other constraints on the agency's capabilities for doing human-resource data collection. These constraints include (1) lack of in-house expertise and skills, (2) low-level or nonexistent training to do collection and analysis, (3) lack of time to devote to such activities, (4) level of perceived urgency regarding the identification of manpower problems, (5) lack of top-level administrative and executive support for manpower data collection and analysis, (6) lack of availability and/or accessibility to computer and other technology necessary for many types of analysis, (7) high standards of validity and reliability of the information that is collected and analyzed.

The lack of in-house skill and expertise to manage the collection of manpower information places an additional premium on cost or budget considerations. Collection, when properly done, requires considerable levels of skill and experience that probably won't be found in agencies that do not have previously established planning and research units. If so, the skills and capabilities must either be developed through training or through recruitment from the outside;

in either case, additional costs accrue. For agencies with built-in units capable of managing the task of collection, this is not, of course, a constraint but rather a capability.

As alluded to above, cost considerations are also directly related to the level of training required to conduct data collection. The level of training varies with the level of existing expertise and with the types of methods employed to collect the data. Document studies, such as an inspection of agency records or "looking things up" in the library, require comparatively low levels of expertise and thus training (provided that the data are in a usable form). The use of survey techniques such as the questionnaire and the interview require more training, but with the questionnaire often requiring considerably less than the interview. Again, the agency might choose to recruit this skill from the outside (e.g., a consulting agency) rather than to spend the time and money training in-house personnel. Even in an agency with a planning unit, hiring a consultant might be desirable if the magnitude of the problem to be identified requires complex and sophisticated methods of data collection. With quasi-experimental collection methods (discussed later in this section), few agencies will have the requisite skill in-house, and will face the choice between spending money for training personnel to conduct the research and hiring consultants to do it.

Time constraints (time the agency has to identify and solve the problem) are also an important consideration with regard to levels of skill and training and level of sophistication of the technique used,

simply by virtue of the fact that time is money. For example, it may prove more expensive to hire a consultant to collect and to analyze data on a particularly pressing personnel problem. However, the time required to develop in-house expertise to determine and to measure the problem might be long enough to warrant contracting with an outside consultant agency--especially if the problem is so critical that it must be resolved immediately.

Time constraints are in turn related to the perceived urgency of a personnel problem. For problems that are immediately critical (e.g., threatened police union strikes), the organization will focus more time, money, and activity on addressing and attempting to resolve them in the short run. Little care will be taken precisely to define and to describe the problem via intricate, complicated, and expensive data collection and analysis unless it is politically feasible to do so.

Another constraint related to budget considerations is the availability of computer and other technology to do manpower data collection and analysis. This is not to say, however, that criminal justice organizations without this capability cannot do human-resource planning. On the contrary, many types of collection and analysis can be done without this facility (e.g., regularized collection of pertinent data on employee job performance). Neither are sophisticated statistical techniques necessary to do analysis. We have pointed out early on that simple records inspection and information from survey questionnaires, for example, are given to analysis that can be as

simple or as complicated as the analyst wishes. The primary point with regard to technology as a constraint is that complicated but, without the assistance of some technology, precise problem description and measurement frequently take a long time. The function of the computer is to add precision and to reduce delay in formulating data-based problem statements for complex manpower issues. Obviously, an agency with available or accessible facilities or the budget to obtain them is in a better and more attractive position to undertake manpower data collection and analysis than one that is not.

Another factor that constrains an agency's capability to undertake collection and analysis is the level of reliability of the data needed. This is not unrelated to cost constraints. The more reliable the information needed, the more it will cost; thus there is a trade-off between reliability and costs. Entangled in this trade-off is the sense or degree of urgency presented by a particular personnel problem. The more urgent it is that the problem be resolved, the less likely that careful attention will be paid to reliability or costs--within some limits.

The last and probably most influential constraint on an agency's capacity to do data collection and analysis is the agency head's degree of support for such activity. As with the enterprise of planning generally, the chief executive's support of or hostility toward collection and analysis will at bottom determine whether it is done and done properly--all other things being equal. The agency executive is the one who can enthusiastically muster the resources, the time,

and the personnel to accomplish this task; he/she is also the one who can guide, coordinate and direct it--or discourage it if he/she so wishes.

### VALIDITY AND RELIABILITY

In criminal justice human-resource planning, it is important that data-collection procedures, whether pertaining to a particular personnel selection test, evaluation method, or job satisfaction questionnaire, be chosen on the basis of their anticipated validity and reliability. Validity asks the question: Has the researcher measured what he/she set out to measure? For example, when police productivity is measured by numbers of traffic tickets issued or number of arrest warrants served, the question of validity would become: Has the researcher properly or adequately measured police productivity using as indicators numbers of traffic tickets issued or number of arrest warrants served? Validity can also be defined as the degree to which a data-collection method or instrument reflects true differences among individuals on the characteristic being measured, and not constant or random errors. Reliability is defined as the degree to which a repeated application of the same procedures under the same conditions will yield the same data; or the consistency of the measurement. Reliability is concerned with the question: Will the same methods used by different people and/or at different times produce the same results? Will a questionnaire designed to measure the satisfaction of police officers with departmental policy indicate true satisfaction if administered at different points in

time? Reliability refers to consistency between independent measurements of the same phenomenon.<sup>61</sup>

### Validity

The definition of validity has two parts. The first part relates to whether the measuring instrument is actually measuring the concept in question or some other concept; and second, whether or not the concept is being measured accurately. There are several forms of validity or validation procedures. Face validity refers to the investigators' appraisal of what the content of the test measures. For example, if a test purports to measure report writing ability and if the questions appear to deal with relevant content in this area, the test can be said to have face validity. On the other hand, if a test is designed to measure citizen satisfaction with police traffic control but the questions deal with citizen fear of crime, the face validity of this test should be questioned. Face validity is really a subjective judgment made by an evaluator in determining that a particular test appears to cover the relevant content. It is partly a definitional or semantic judgment. Major problems with face validity appear when there is no consensus about the definition of the concept to be measured, the concept is multidimensional and consists of several sub-concepts, or the measure is complex and lengthy.

Content validity is the extent to which a sample of test questions represent the content that the test is designed to measure. Content validity is determined by defining in precise terms the specific universe or target population (or all members of a set of people,

events, or objects about which the research results are to be generalized) to be sampled, specifying certain research objectives, and describing specific sampling procedures to be used for developing test questions. For example, a selection test for correctional officers will have high content validity if the items covered on the test are representative, in type and proportion, of the content presented by the daily work. If test questions cover topics unrelated to correctional officers' work, or ignore certain important concepts, the content validity will be lower. An assessment of an instrument's content validity is made by an objective comparison of the test questions with the work content or skills they purport to measure. Test manuals usually describe the techniques used to arrive at a test's content validity.

Predictive validity refers to the measure's ability to predict future events; or the degree to which the predictions made by a test are confirmed by the later behavior of the respondents. In criminal justice human-resource planning, predictive validity is particularly important in selection tests because these tests are intended to "predict" which job applicants will do better than others at certain jobs. The method for determining predictive validity is to administer the test, examine the behavior that the test attempts to predict, and then correlate the behavior with the scores on the test.<sup>62</sup> For example, suppose a promotional examination for the rank of sergeant was designed to predict the success of a police officer as a first-line supervisor or sergeant. At the end of a specified period of time, say a year or 18 months, the test scores would be correlated

with a measure of performance. Thus, the performance measure or evaluation is called criterion measure. The correlation between the promotional examination for sergeant and performance evaluation provides a measure of the predictive validity of the promotional exam, or how far its prediction of the officer's success as a supervisor was borne out by later performance.

A police or correctional manager who wishes to assess the validity of a test in predicting a certain criterion should be aware of the concepts of base rate and cross-validation. The proportion of persons who meet the criterion out of the total number of people in the given population is called the base rate. For example, suppose that a corrections manager's project involves the use of a job satisfaction questionnaire to predict turnover rates among correctional officers. Suppose that the turnover rate is 5 percent of the particular population of correctional officers under study. In a sample of 100 officers it is likely that 5 will terminate their employment, and 95 will remain. With this base rate, it is possible to predict turnover correctly 95 percent of the time by predicting that everyone in the sample will remain employed.<sup>63</sup>

Cross-validation is used to determine the value of the prediction of a certain outcome by administering the same tests to a new sample drawn from the same population. Once a manager receives a measure of the "predictability" of the instrument, based on the procedures outlined above, he or she may want to recheck this value. This recheck can be done through cross-validation. In essence, the

same test is repeated several times, using different samples drawn from the same population. The results are then compared and checked for their accuracy of prediction.<sup>64</sup>

Concurrent validity is used to describe a measure that is valid for measuring a particular phenomenon at the same time or within a short interval of time. Concurrent validity is different from predictive validity; the distinction is based on whether the criterion measure is administered at the same time as a standardized test (concurrent) or later, after a period of several months or more (predictive). It is important to assess the adequacy of the criterion when evaluating a test's or instrument's concurrent validity. Sometimes a test will be validated against another test, not against a "real-life" criterion. It is of little value to know that one test of anxiety correlates highly with a criterion test of anxiety, unless the criterion test itself has been demonstrated to have significant construct or predictive validity. If the criterion is valid, it is assumed that the other test that correlates highly with it is also valid.<sup>65</sup> For example, a test with high concurrent validity could be important when dealing with anxieties police officers could have when faced with controlling a large crowd. Officers could be given tests to measure their amounts of anxiety elicited through interpersonal relations, then undergo training in dealing interpersonally with citizens, and after facing a citizen-encounter, have their anxiety level remeasured through the same test. Provided that the time elapse between tests was small, the degree of concurrent validity of the test could be assessed.

The extent to which a designated test can be shown to measure a hypothetical construct is called construct validity. Hypothetical constructs include such concepts as intelligence, anxiety, or creativity because they are not directly observable but are inferred on the basis of their observable effects on behavior. The question of construct validity is whether or not the operational definitions assigned to certain concepts actually measure or indicate their presence or absence. A test developer gathers evidence on construct validity by first forming hypotheses about the characteristics of persons who obtain high scores on the measure as opposed to those who have low scores.<sup>66</sup> For example, if a test developer wants to develop a test to measure job stress, how can he or she determine whether the test truly measures stress? One approach may be to administer the test to the occupational group ranked highest and the one ranked lowest on the American Psychological Association's list of high-stress occupations. If the test does differentiate the two groups, then the test developer has some evidence that the test measures the construct of stress. Other tests in police and correctional agencies for which construct validity is an important concern include the intelligence testing of entry-level personnel.

#### Reliability

The level of internal consistency or stability of a measuring device over time is called its reliability. The nature of the research for which a measure is to be used determines, to a great extent, the level of reliability expected from the instrument. If

the research project is one in which only small differences between groups are expected, a test of high reliability should be used. Conversely, if large samples are used and if the average test scores are expected to differ greatly, a test or measure of low reliability can be used with reasonable assurance that the test will discriminate adequately.<sup>67</sup> The reason a test of high reliability is required for the first instance and not the second is that when only small differences are likely to be uncovered, a test of low reliability may be too sketchy or incomplete to reveal these slight differences. For example, "take the idea of measuring the height of two samples of adult men using a rather crude measuring device, such as the span or the space from the tip of the thumb to the tip of the finger when extended. If the true mean or average difference in the height of the two groups is one-half inch, it is unlikely that this small difference will be detected using the span for measurement. The span is an unreliable measure; a person may not extend his hand the same length each time, and if more than one person does the measuring, not all hand spans are the same size, so the final measures will be inaccurate. However, if the true mean differences in the heights of the two groups is five inches, it is more likely that the shorter and taller groups will be accurately distinguishable using the span measurement because the difference between groups is relatively large."<sup>68</sup>

Test manuals usually include information about a test's reliability. However, if no such information appears, it can safely be

assumed that the reliability of the test is low. Many tests for reliability yield a number of subscores in addition to a total score. This is particularly prominent in intelligence and achievement tests where various subscores are presented in order to give a profile of the individual's performance in the various areas making up the test. A manager should use these subscores cautiously (unless reliability data on them are available) when deciding on a particular test to use. With available information on these subscores, a manager is likely to have a difficult time appraising the actual worth of the subscores. Usually all or most subscores will have lower reliabilities than the total test reliability.

Coefficients are usually used to express the reliability of a standardized test. A coefficient indicates the degree to which change in one variable is related to change or variation in another. Coefficients summarize the strength of association between variables and vary between -1 and +1. They indicate the direction of the relationship between two or more variables. A reliability coefficient reflects the extent to which a test is free of error variance. Error variance is defined as the sum of the chance differences between two persons which results from factors associated with a particular measurement.<sup>69</sup> Wording of the test, the person's mood on the day the test is administered, the ordering of the test, or the content that is used could be considered factors associated with a particular measurement. A reliability coefficient close to the value 1.00 indicates a test that is quite free of error variance and measures true differences among persons in the dimension assessed by the test.

There are four approaches commonly used to obtain reliability coefficients. The coefficient of internal consistency (sometimes called split-half or subdivided test reliability) is based on estimates of the internal consistency of a test, and this correlation can be used to estimate a test's internal consistency. First, the test whose reliability is to be calculated is administered to an appropriate sample. Then the test is split into two subsets, usually by placing all odd-numbered items in one subset and all even-numbered items in another subset. The scores of the two subsets are computed for each individual, and these two sets of scores are correlated. The split-half correlation only yields a reliability coefficient for one half of a test. Since reliability is related to the length of the test, the Spearman-Brown prophecy formula is used to make this correction.<sup>70</sup> (See the bibliography following this chapter for reference to statistical books that detail the computations of Spearman-Brown prophecy.)

Internal consistency also can be estimated through the method of rational equivalence. This method does not require the calculation of a correlation coefficient. Internal consistency is measured through an analysis of the individual test items. It requires a single administration of the test. Kuder-Richardson formulas are generally used to calculate test reliability for the method of rational equivalence.<sup>71</sup> (For more information on the Kuder-Richardson formulas 20 and 21 see "The Calculation of Test Reliability Coefficients Based Upon the Method of Rational Equivalence" which is referenced in the bibliography following this chapter.)

Whenever two or more parallel forms of a test are available, the coefficient of equivalence or alternate-form reliability is used to determine the reliability of a test. This method involves administering two parallel forms of a particular test to the same group of individuals and then correlating the scores obtained on the two forms, which, in turn, yields a reliability coefficient. The two forms of the test can be administered at scheduled intervals or at a single sitting. However, if the alternative forms are nearly identical, it is recommended that some interval be allowed between the administration of the forms. The interval period may reduce practice effects that can be a factor when the two tests are administered in a single sitting. Also, the reliability coefficient is usually lower for tests administered at intervals than for those done in a single sitting because in two separate administrations the setting can change as well as the state of mind of the individuals being tested. Despite the coefficient's being lower, it reflects the testing situation in most programs or projects better.<sup>72</sup>

The coefficient of stability or test-retest reliability is used when alternate forms of a test are not available or not possible to construct. This method includes administering the measure to a sample of individuals, waiting for a period of time, and then administering the same measure to the same sample once again. The scores of the two administrations are correlated or tested for their degree of association, thus determining the coefficient of stability. An important aspect of this method of assessing reliability is determining the correct period of delay between the two administrations of

the measure. If the retest occurs too quickly after the first test, respondents will recall their responses to many of the items. This will tend to produce an illusion of a high reliability coefficient. Yet, if the retest is delayed for too long, respondent's answers to some questions may change.<sup>73</sup>

Reliability coefficients that are based on administration procedures or different forms of a test at a single sitting exclude two sources of error that are present when single-test administration is not possible. First, individuals differ daily on many subtleties such as mood, fatigue, or attitude; and second, despite a tester's efforts to maintain standard testing procedures, when tests are given on different occasions, many small variations in the testing situation are likely to occur. For example, a test administrator may read the instructions more rapidly at one testing than the other or the lighting may differ during the two separate test administrations.<sup>74</sup>

#### Validity and Reliability of Data-Collection Methods

As we have seen in previous sections, the reliability and validity of a measure, test, or data-collection instrument determine in large measure the usefulness of the information obtained. So, the behavior and validity of methods of data collection should be evaluated for the particular research being undertaken. This assessment of the method's reliability and validity will help ensure that the resultant information can have the confidence of the analyst and policymaker.

While it is true that methods of data collection vary in their applicability to research settings, research objectives, and the

particular questions asked, some general observations about the reliability and validity of data-collection methods can be advanced. These generalizations about validity and reliability must of course be considered in relation to the research being conducted, and the time-frame for data collection and cost considerations, among other things. They are offered as general descriptions of the validity and reliability of measurement methods.

When the focus of study is human behavior, directly observing the behavior in question either as a participant or participant observer is generally considered to be more valid than other data-collection methods. The reason for this is that observation of the behavior according to previously established criteria is most likely to result in the "correct" behavior being observed--hence the validity of the method is improved. Using questionnaires or interviews to measure behavior can be confounded by a number of factors. Individuals may report only those behaviors that they personally enjoy, or they may simply not remember behaving in a particular manner. Such psychological factors as selective perception or selective retention may also influence respondents' recall of their behavior. For these reasons, observation is believed most valid to studies attempting to determine the particular behaviors of individuals.

As a data collection method, conducting interviews, particularly when the research interest is with the meanings individuals attach to events, is reliable and superior to questionnaire and observation. Interviews also provide the analysts the opportunity to

probe the respondent's answers and to help him or her clarify what particular meaning he or she attached to the event. Interviews, however, must be conducted with trained analysts, and should generally use standardized questions to avoid problems of reliability that will be discussed below.

For data-collection validity, questionnaires are the least able to replicate the behavior in question. That is, the use of the questionnaire is generally restricted to attitudinal and value assessments, or to a kind of assessment where the respondent is asked for factual information that is independently verifiable. Questionnaires are, perhaps, the least expensive of data-collection methods; and, as a consequence, they have grown in use within agencies. While questionnaires can and do provide useful and valid information, if the measurement of behavior is the ultimate desire, questionnaires are generally less valid; where information can be standardized and the actual behavior of individuals is less at issue, questionnaires can be very useful.

Standardization of data collection increases reliability. Standardization of measurement can include mechanical standardization, such as the monitoring of the cardio-vascular system by taking the measurement of blood pressure or the monitoring of temperature with calibrated instruments. In criminal justice, mechanical standardization might include taped dispatch records, the polygraph, or video recorders. These instruments measure behavior reliably in that little or no interpretation of the measurement is made by the machine, nor

does the machine interact with the object of study. Standardization of data-collection can also be included in interview and observational schedules, where the observer or the interviewer is trained about what behaviors to look for or what questions to ask, and then follows the schedule with each individual interviewed or observed. Standardization can also be built into questionnaires, as each individual is asked the same question.

As the interpretation of the measurement is removed in the mechanical applications, these methods tend to be most reliable. Where the interviewer or observer can be trained in measurement techniques, a high degree of reliability can be achieved. Interviews, by nature, entail a great amount of interaction between the interviewer and those interviewed. This is generally also the case for observational studies. In each case the likelihood of interviewer or observer bias entering the measurement process tends to reduce reliability. Lastly, questionnaires can generally be considered reliable in the same fashion as are mechanical methods of data collection, providing that the items on the questionnaire are unambiguous, capable of being understood by the study population, and clearly written. When such is the case, the reliability of questionnaires is presumed quite high.

Secondary data analysis as a method of data collection is subject to the same considerations of reliability and validity as described above for the observational, interview, and questionnaire methods. Secondary data analysis involves the use of data that were collected

for some other purpose than that of your current study. The issue of reliability focuses on how well the measurements were originally taken: Were the same questions used? were the measures standardized or unstandardized? or were the methods observational, questionnaire, or interview?--these are relevant questions to be asked. As for validity, by contrast, secondary data analysis is subject to great distortion and is considered less valid, in general, than other methods. In using secondary methods, it must be demonstrated that the data used are, indeed, measuring the behavior under consideration. While this is true for all methods, the demonstration of validity of secondary measures is generally more problematic as it is clear that the data were not originally collected for the purposes at hand.<sup>75</sup>

Figures 38 and 39 illustrate the relationship between reliability, validity, and the techniques of observation, and observational instruments.

FIGURE 38  
#1 RELATION BETWEEN VALIDITY  
RELIABILITY, AND TECHNIQUES OF OBSERVATION

LOW	VALIDITY			HIGH
hardware secondary data complete observer	questionnaire	interview	complete parti- cipant	
LOW	RELIABILITY			HIGH
complete parti- cipant	interview	questionnaire	hardware secondary data complete ob- server	

Source: R. R. Mayer and E. Greenwood, The Design of Social Policy Research, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1980, p. 230.

FIGURE 39  
#2 RELATIONS BETWEEN VALIDITY,  
RELIABILITY, AND OBSERVATIONAL INSTRUMENTS

LOW	VALIDITY		HIGH
paper-pencil tests closed-ended questions	interview guide open-ended questions	personal diary or log	
HIGH	RELIABILITY		LOW

Source: R. R. Mayer and E. Greenwood, The Design of Social Policy Research, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1980, p. 231.

**CONTINUED**

**2 OF 7**

## SAMPLING

The purpose of gathering and analyzing data is to learn something about a specified group of people. This can be accomplished by studying a small portion of a specified larger group. The larger group is called a population, and the smaller group that is actually studied is called a sample. The process of sampling involves selecting a given number of people from a defined population, as representative of that population.<sup>76</sup>

For human-resource planning there are many cases in which a criminal justice agency will not have to be concerned with using a sample of a specified group to gather data and information. This happens when a manager has the opportunity to obtain information from the entire population of interest. In a small organization, for example, if an administrator wanted information on employee attitudes about agency promotional policies, then a survey of all employees within the organization with a properly constructed questionnaire could be administered. In this case, selecting a sample would be unnecessary since all employees of the organization could be queried relatively easily.

However, there are many cases in which sampling is necessary to collect the data needed to identify and to describe existing personnel problems. Sampling permits the user to cut costs, to reduce manpower requirements, to gather information more quickly, and to obtain very comprehensive data. For example, if a police administrator is interested in developing and improving performance standards for

officers that satisfy the public or community expectations of performance, then public attitudes and opinions can be obtained through sampling a segment of the community since not everyone in the city can be asked to respond--that would be too costly and time consuming.

Further, in some instances sampling can actually give better estimates of the complete count than would a survey of every possible case. For example, the U.S. Census Bureau, which conducts the population census every ten years, has frequently stated that its results could be considered less accurate than ongoing sample research. This is because the population census uses large numbers of inexperienced interviewers who work with great amounts of data, which leads to many mechanical and clerical errors in the collection of data. Thus, a carefully designed sample survey may collect more reliable data than a census survey because certain sources of error can be more readily controlled when a small number of items are being examined.<sup>77</sup>

As defined above, sampling means selecting a given number of people from a defined population, as representative of that population. A target population or universe refers to an aggregation of person, objects, or events, called units of observation, to which the study findings are to apply.<sup>78</sup> A target population may be all members of a police department, all correctional workers at a correctional facility, all adults between the ages of 21 and 24 who are unemployed, or all adults below a certain income level.

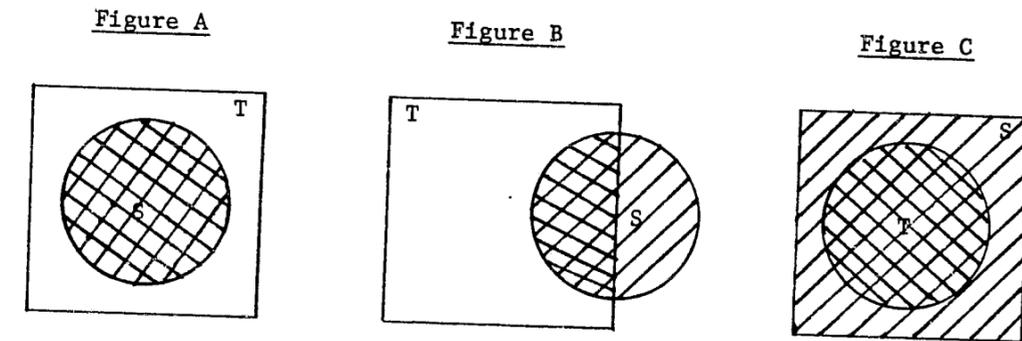
The advantage of drawing a sample from a target population is that it saves time and the expenses of studying an entire population.

When sampling is done properly, results obtained from the data collected and analyzed from the sample can be generalized to the entire target population. Surveying an entire population can be a very time-consuming task, and time in some instances is very important. Careful sampling can reduce the time it takes to collect data about a population, and will allow the researcher to infer certain things about the population based on findings from the sample.<sup>79</sup>

The first step in sampling is to define the target population. When the target population is inaccessible as an entity for observation, or is accessible but time and money are constraints, a sampling frame can be used to gather data about its members. A sampling frame is a natural aggregation of units the analyst has access to. The elements of a sampling frame are called sampling units. For example, in the case of the unemployed, the sampling frame could include applicants for all locally advertised job openings, recipients of unemployment benefits, or registrants at employment agencies. Sampling frames are used to gain access to target population.<sup>80</sup>

A study population is defined as those units that are a part of the target population and the sampling frame. The relationship between the sampling frame and target population is important for defining the study population, and this relationship can take any of three forms. First, the sampling frame can be contained within the target population. Second, the sampling frame can overlap the target population; and third, the sampling frame can be larger than and contain the target population. These three relationships are diagrammed in Figure 40.

FIGURE 40  
RELATIONSHIPS BETWEEN A TARGET POPULATION,  
SAMPLING FRAME, AND STUDY POPULATION



- T = Target population
- ⊙ S = Sampling frame
- ⊗ = Study population

Source: R. R. Mayer and E. Greenwood, The Design of Social Policy Research, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1980, p. 171.

The study population equals or is the sampling frame when the sampling frame is contained in the target population. An analyst can estimate the relationship between the study population and target population. To estimate any gap between the two populations, a special study can be undertaken in which a sampling frame is constructed of a representative portion of the target population.

When the sampling frame overlaps the target population, the study population is smaller than either the population or frame. A special pilot study can be conducted to estimate any differences between the study population and target population.

The study population is the target population when the sampling frame is larger than the target population. This situation provides the greatest accuracy because the target population can be completely enumerated, but also sustains the greatest costs in data collection since extra units, not part of the target population must be observed.<sup>81</sup>

Four steps are involved in designing a study population that will enable a manager to attain his/her research objective. First, the unit of observation to which the findings are to apply must be specified. The units are those persons, objects, or events that comprise the specific target population under study. Included in the specification procedure is an indication of the unit in terms of which data will be analyzed and which findings reported. For example, a manager may be measuring "organizational productivity" in which the unit of observation is the employee.

Second, the particular population or aggregation of units (or the study population) that is the subject of observation should be stated. The manager must identify the boundaries of the target population. This is accomplished through defining the target population and sampling frame. The boundaries of the sampling frame are determined by the characteristics of the persons, events, or objects listed in the frame.<sup>82</sup>

In addition, the boundaries of the target population, sampling frame, and study population can be expressed in three dimensions: temporal, spatial, and experiential. The specific period of time during which the population is observed is referred to as the temporal

dimension. The temporal dimension of the sampling frame may differ from the time of observation; thus it has an important bearing on the generalizability of the study findings.<sup>83</sup> For example, the nature of unemployment in 1980 is quite different from what it was in 1960 because of changes in the supply of jobs, level of education of job seekers, and the role of women.

The geographical area in which the population is located is called the spatial dimension. This could be either a neighborhood, city, county, or state, and can be expressed in observable, physical terms, such as census tracts, political jurisdictions, streets, or other man-made or natural demarcations.<sup>84</sup>

The experiential dimension of the population refers to the operational expression of the variable under study.<sup>85</sup> In analyzing unemployment, only those forms of unemployment relevant to the study should be the focus. For human-resource planning it would be appropriate to center on those persons registered for work at an employment agency.

Third, a manager should determine the procedures to be used in selecting the units for observation. When all members of the study population are to be observed, selection procedures are not required. However, in many studies only a portion of the population undergoes observation. In these circumstances, the manager must specify the procedures to be used in selecting the units to be observed. (Specific techniques will be discussed in the following section.)

Finally, the number of units to be observed must be specified. The analyst should try to increase the number of observations in order

to maximize the reliability of the findings, keeping in mind that the number of observations should be kept at a realistic number to minimize costs. Thus, in designing a study, a manager should strive to set the number of units to be observed at a level of acceptable reliability while at an affordable cost.<sup>86</sup>

#### Sampling Methods

There are two methods of sampling; those that yield probability samples and those that yield nonprobability samples. Probability samples are samples in which various "factors determine which elements from the population will be included in the sample, and determine this in such a way that it is theoretically possible to calculate the probability that any specific element in the population will become an element in the sample."<sup>87</sup> A probability sample assumes random sampling procedures.

Nonprobability samples are not drawn randomly. Since the probability that a person will be chosen is not known in a nonprobability sample, a researcher generally cannot claim that the sample is representative of the larger population; an investigator is limited in generalizing any findings beyond the specific sample studied. In addition, the sampling error or the degree of departure from representation is beyond estimation by the researchers. However, nonprobability sampling is much less expensive, less complicated, and may be done on the spur of the moment to take advantage of a "captive audience" without the statistical complexity of a probability sample. When managers have no desire to generalize their findings beyond the sample,

if the study is only a trial run or pilot study for a larger study, if the study is planned to be repeated at a later date, or if a manager is only interested in perfecting a questionnaire, a nonprobability sample may be quite adequate.<sup>88</sup>

#### Probability Sampling Techniques

Simple Random Sampling. A simple random sample is one in which all individuals in the defined population have an equal and independent chance of being selected as a member of the sample. The term independent means that the selection of one individual does not affect in any way the selection of any other individual. There are several techniques that can be used in simple random sampling. Suppose the research director of a large police department wishes to obtain a random sample of 100 patrol officers from a population of 972. First, the director would obtain a list of all patrol officers in the department and number each name. Then a table of random numbers could be used to draw a sample from the officer list. When using a random numbers table, the manager "randomly selects a row or column as a starting point, then selects all the numbers that follow in that row or column. If more numbers are needed, he or she proceeds to the next row or column until enough numbers have been selected to make up the desired sample size. The researcher may start at any random point in the table and select numbers from a column, row, or diagonally."<sup>89</sup>

For small populations, simple random sampling can be accomplished by placing a slip of paper with the name or identification number of

each individual in a box. Slips can be drawn from the box (replacing the slip after recording it), continuing until 100 different slips (officers) have finally been chosen.<sup>91</sup>

Cluster Sampling. The unit of sampling is not the individual but is a naturally occurring group of individuals in cluster sampling. This method of sampling is generally used when it is more practical to select groups of individuals than to select individuals from a defined population. For example, if the researcher is interested in studying the population of residents over 65 years of age in a city, cluster sampling could be used to obtain the sample. The city could be divided by census tracts, and the tracts to be sampled could be drawn at random. All individuals in the randomly defined tracts who meet the age requirement would be studied. The unit of sampling is the census tract, not the individual resident.<sup>91</sup>

Volunteer Samples. In some instances of criminal justice human-resource planning, research may need to be conducted with volunteer subjects. There has been extensive research done on the characteristics of volunteers, and their likelihood of being a biased sample of the target population. (For further information and results of these studies, the reader should refer to the bibliography accompanying this section.)

The degree to which using volunteers can bias research results depends on the nature of the specific study. When planning a study using volunteers, a researcher should keep the questions from Figure 41 in mind.

FIGURE 41

## RELEVANT QUESTIONS WHEN USING VOLUNTEER SUBJECTS

1. How relevant is this characteristic to the dependent and independent variables to be employed in my study?
2. If relevant, how would the difference between volunteers and nonvolunteers on this characteristic be likely to influence the research results?
3. Are any data available on my target population for checking whether these characteristics are present among the volunteers I will employ as subjects?

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Source: R. Rosenthal and R. L. Rosnow, The Volunteer Subject, John Wiley, New York, 1975, p. 198.

The knowledge of the researcher about the variables in the study will answer the first two questions. For answering the third question two methods are suggested. The exhaustive approach involves comparing all potential subjects on as many relevant variables as possible in which volunteers and nonvolunteers may differ. For example, suppose a researcher plans to ask for volunteers from a police department to participate in a study of client responses to different interview techniques used in career counseling, (such as directive versus non-directive counseling). Volunteers and nonvolunteers could differ on such characteristics as need for social approval, conformity, and authoritarianism, which, in turn, could affect response differences between volunteers and nonvolunteers. The researcher would first measure all officers on these variables by administering appropriate tests during roll call, then calling for volunteers, and comparing

the scores of volunteers and nonvolunteers to determine how the groups differ on these variables.<sup>92</sup>

With the nonexhaustive method, data on nonvolunteers are not available, but data on the willingness of individuals to volunteer are. For example, an investigator can compare the scores of easy-to-recruit volunteers and hard-to-recruit volunteers on a variable such as intelligence and then extrapolate to obtain an estimate of the intelligence of nonvolunteers in the target population.<sup>93</sup>

Rosenthal and Rosnow listed nine suggestions for increasing the rate of volunteering and reducing volunteer bias as shown in Figure 42.

FIGURE 42

SUGGESTIONS FOR INCREASING THE RATE OF VOLUNTEERING AND REDUCING VOLUNTEER BIAS

1. Make the appeal for volunteers as interesting as possible, keeping in mind the nature of the target population.
2. Make the appeal for volunteers as nonthreatening as possible so that potential volunteers will not be put off by unwarranted fears or fears of unfavorable evaluation.
3. Explicitly state the practical importance of the research for which volunteering is requested.
4. Explicitly state in what way the target population is particularly relevant to the research being conducted and the responsibility of potential volunteers to participate in research that has potential for benefiting others.
5. Have the request for volunteering made by a person of high status--as high as possible.

6. When possible, avoid research tasks that may be psychologically or biologically stressful.
7. When possible, communicate the normative nature of volunteerism response.
8. After a target population has been defined, an effort should be made to have someone known to that population make the appeal for volunteers. The request for volunteers itself may be more successful if a personalized appeal is made.
9. In situations where volunteering is regarded by the target population as normative, conditions of public commitment to volunteer may be more successful; where nonvolunteering is regarded as normative, conditions of private commitment may be more successful.

Source: R. Rosenthal and R. L. Rosnow, The Volunteer Subject, John Wiley, New York, 1975, p. 198.

Nonprobability Sampling Techniques

Convenience Sampling. A researcher chooses the closest available persons as respondents in convenience or accidental sampling. A common example is "captive audience" sampling--for example, using police academy classes or correctional trainees as questionnaire respondents. Time and money is saved at the cost of sampling accuracy.<sup>94</sup>

Quota Sampling. The nonprobability equivalent of stratified sampling is quota sampling. It requires that each stratum be represented in the same proportion as in the entire population. The researcher first decides what strata are relevant for the study--e.g., police lieutenants and captains for a study of career development. Then the researcher sets a quota for each stratum that is proportionate to its representation in the entire population. For example,

if a list of personnel in a police department showed that 8 percent are captains and 10 percent lieutenants, the researcher would want a sample reflecting these proportions. After the quota is set, quota sampling involves finding those persons with the requisite characteristic. Despite quota sampling's not being probabilistic, a researcher should still make an effort to keep from biasing selection and make sure that the sample is as generalizable and representative as possible.<sup>95</sup>

Purposive Sampling. In purposive sampling, the researcher uses his or her own judgment about which respondents to choose, or which are the most appropriate for the purposes of the study. An often-cited advantage of purposive sampling is that the researcher can use his or her skills and prior knowledge to choose respondents.<sup>96</sup>

Sample Size. When determining the appropriate sample size necessary to attain the objectives of a study, the general rule is to use the largest sample possible. The larger the sample size, the more generalizable the results are from the sample to the population; the mean and standard deviation of the sample is more likely to be representative of the population mean and standard deviation. However, financial and time restrictions may limit the number of individuals that can be studied. According to most authorities, for correlational studies it is generally desirable to have a minimum of 30 individuals; in causal-comparative, a minimum of 15 cases in each group to be compared; and in survey research, at least 100 individuals in each major subgroup, and 20 to 50 in each minor subgroup.

Larger samples are necessary when many uncontrolled variables are present. When it is impossible to control some important variables that could possibly affect the study results, a large sample allows an analyst to have some degree of confidence in the findings. The best solution is a large random sample because it ensures to some degree that the uncontrolled variables will themselves be operating randomly for different groups being studied and therefore will not have a systematic effect upon the results.

When small differences or small relationships are possible study results, a large sample should be employed. In addition, large samples are appropriate when groups must be broken into subgroups. A common mistake made by researchers is to select a sample that would be large enough for division into subgroups only if the subgroups are equally represented in the sample. If there is an unequal representation, there may not be a sufficient number of cases in some subgroups to do any statistical analysis. A solution to this problem is to use the stratified sampling technique with a large number of cases.

When the population is heterogeneous (as opposed to homogeneous) on the variables being studied, a large sample size is highly recommended. As a population becomes more variable, a large sample is necessary to ensure that persons having different amounts of the characteristics in question will be satisfactorily represented. Conversely, if every individual in a given population is exactly alike on a variable being studied, a sample of one would be sufficient.

Finally, a large sample size is warranted when reliable measures of the dependent variable are not available. Reliability of a measure refers to its capacity to yield similar scores on the same individual under different testing conditions or at different times. Less reliable measures have a larger error of measurement. For example, in an aptitude test with a reliability of .95 and with standard deviation of 10, there is about one chance in three that an individual's true score will differ by more than 2.2 points from the score actually obtained on the test. Conversely, if the reliability had been .50, there is the probability that the obtained score will differ from the true score by more than 7.1 points. A test with a reliability of .50 is a somewhat crude measure and may not provide a mechanism for detecting small differences because of its large error of measurement. Thus, in studies that must employ measures with low reliability, using a small sample size may not uncover small differences. As sample size increases, the chances of detecting small differences or slight relationships improves.<sup>97</sup>

Borg and Gall list seven mistakes often made in sampling as shown in Figure 43.

### FIGURE 43

#### COMMON MISTAKES MADE IN SAMPLING

1. Fails to define the accessible and target populations and to provide evidence of their similarity.
2. Uses a sample too small to permit statistical analysis of interesting subgroups.

3. Fails to use the stratified sampling technique when needed to obtain adequate samples of subgroups.
4. When using volunteer subjects, fails to determine how they differ from nonvolunteers and fails to consider these differences in interpreting the findings.
5. Changes the sampling procedure in order to make data collection more convenient for those involved.
6. Does not allow for attrition in selecting the sample size.
7. Selects a sample that is not appropriate for research project.

Source: W. R. Borg and M. O. Gall, Educational Research An Introduction, 3rd ed., Longman, Inc., New York, 1979, pp. 201-202.

#### RESEARCH DESIGN IN HUMAN-RESOURCE PLANNING

The data-collection techniques previously described (the mailed questionnaire, interview, observation, and document studies) have their own strengths and weaknesses, and may be used more appropriately for some studies and less so for others. This section will deal with the question of research design in conducting policy research in human-resource problem areas. Considerations of the degree of technological expertise required and the constraints imposed through the use of each method will also be discussed.

#### Descriptive Research

Descriptive research is primarily focused on determining "what is" for a particular period of time. In criminal justice a primary consideration in descriptive studies might be, "What are police

officer's attitudes toward reassignment policies?" or "How do correctional officers define the missions and goals of the correctional institution, custody, or treatment?" These questions do not seek information on cause-and-effect; rather, they describe current situations and events. Observational and survey methods have been used quite extensively in collecting descriptive data. Survey research involves collecting standardized information from all individuals in a sample. There are several types of survey studies that employ questionnaires and interviews as means of data collection.

The cross-sectional survey collects data from a single sample drawn from a predetermined population. For example, a law enforcement agency wanting to assess employees' attitudes towards minorities could draw a sample of members from each rank and distribute questionnaires to this sample. This would be a cross-sectional survey (if a sample was not drawn and all departmental personnel were questioned, it would be called a census).

Survey data can be used to describe how the total sample reacted to response alternatives for single questionnaire items. These are called marginal tabulations. Often opinions and attitudes are reported in this manner: 50 percent of the sample were in favor of a particular policy, 30 percent disagreed with it, and 20 percent were unsure or had no opinion.

In addition to descriptive data, surveys can be used to explore relationships among two or more variables. Questionnaire items can refer to past, present, or future phenomena as a means to explore

relationships between variables. Relationships explored through questionnaire items that relate to the same point in time are referred to as "time-bound associations." If the items are temporally ordered relative to each other, then the data analysis is referred to as "time-ordered association." For example, a criminal justice agency may want to investigate whether the amount of training or education in minority or interpersonal relations would result in more positive attitudes toward minorities. A sample of employees could be drawn, and they could be queried about their training experience and attitudes towards minorities.<sup>98</sup>

When data are collected at different points in time in order to study changes or explore time-ordered associations, a longitudinal survey is conducted. Longitudinal studies are somewhat superior in design to cross-sectional surveys because data are not distorted by the faulty recollection of respondents. Three longitudinal designs are used in survey research.

"In trend studies, a given general population is sampled at each data-collection point. The same individuals are not surveyed, but each sample represents the same population."<sup>99</sup> For example, if a manager wanted to study trends in the applicability of specific recruitment procedures in retaining personnel, each year a sample of selected job applicants could be selected. Each year questionnaires would be distributed to the sample selected, and the responses would be compared, year to year. The manager would then compare responses from year to year to determine what trends were present.

In cohort studies, a particular population is followed over a period of time.<sup>100</sup> For example, a law enforcement or corrections organization may want to study the promotion and turnover rates of a certain population of employees. In using a cohort study, new employees fresh out of the training academy could be sampled throughout the course of the survey. Members of an academy class could be listed, and at each data collection point, a sample could be randomly selected. Thus, although the population would remain the same, each year different individuals would be sampled.

In panel studies the researcher selects a sample at the outset of the study and then at each subsequent data-collection point, the same individuals are surveyed. The same individuals are studied over time; thus changes in specific individuals can be explored as well as reasons for their change. A major problem in panel studies is the possibility of loss of subjects. The longer the panel study, the greater the likelihood of a shrinking number of subjects.<sup>101</sup>

Descriptive research typically reports such statistics as frequency distributions, measures of central tendency (mean, median, mode) or percentiles in describing the behavior under consideration. For example, a study might conclude that 45 percent of the police officers surveyed felt that the police suffered from low morale and poor working conditions. Conversely, it might be stated that, on the average, correctional officers agreed that they had input into determining the security level of inmates. In each of the above, however, no assessment of cause-or-effect is made.

#### Causal-Comparative Research

The causal-comparative method is used to discover possible causes for a behavior pattern by comparing individuals in whom this pattern is present with similar subjects in whom it is absent or present to a lesser degree. Another name for this type of research method is ex post facto research, because causes are studied after they have supposedly had their effect on another variable. Furthermore, causal-comparative or ex post facto research generally has little control over how the independent variable is introduced.

This method is often used instead of an experimental method to test cause-and-effect relationships because many relationships do not permit experimental manipulation. The causal-comparative research design basically involves the study of individuals with a particular characteristic in comparison with others not exhibiting the same characteristics. As a research design, the causal-comparative approach can be thought of as at an intermediary position between the descriptive approach, previously described, and the experimental approach where control over the independent variable is exercised. A major limitation of the causal-comparative approach, however, is that while relationships among independent and dependent variables can be established, the direction or cause of the relationship cannot. (We cannot tell for sure what is causing what.)

For example, consider measuring the effects of a training exercise in criminal law on the number of prosecutable arrests subsequently made by police officers. Two groups might be selected: one having

had the training experience and one not having had it. Data about training experience and arrest rates are collected and analyzed, and differences between the two groups in prosecutable arrest rates are looked for. Causal-comparative research such as this is used quite extensively in criminal justice human-resource planning.

In correlational research, the correlation coefficient, a statistical tool, is used to compare a series of measurements taken on two different variables in order to determine the degree of relationship. Individuals are selected who vary on the measures or variables that are being studied. All members of a selected group are measured on both variables under study. Then a "correlation coefficient" is computed between the scores of all members on the two variables.

A correlation coefficient is used to express the degree of relationship between two variables in mathematical terms. When a relationship is perfectly positive (for each increment increase in one variable, there is a corresponding increase in the other), the correlation coefficient will be 1.00. If the relationship is perfectly negative, the coefficient will be -1.00. For a relationship that is positive, the coefficient will have a value between zero and 1.00, and between zero and -1.00 for a relationship that is negative. When no relationship exists, the coefficient will be zero. The coefficient correlation provides a precise way of stating the extent to which one variable is related to another.<sup>102</sup>

The correlational method can be used for prediction studies as well as for exploring relationships. Prediction studies are similar

to relationship studies because both compute correlations between a behavior pattern (the criterion) and variables thought to be related to the criterion. Yet, in prediction studies the other variables (predictor variables) are measured sometime before the occurrence of the criterion behavior. Prediction studies are concerned with maximizing the correlation between the criterion and predictor variables.<sup>103</sup> In human-resource planning, the correlational method is used in prediction studies dealing with using particular selection tests and performance evaluation forms. Overall, correlational studies attempt to ascertain whether two events--e.g., employee motivation and promotion--are related and in what direction (positive or negative), and to what extent they are related. For example, we might want to correlate prior motivation with subsequent promotion, predicting that those employees who are highly motivated will more often be promoted than those who are not highly motivated.

#### Experimental Research

Experimental research is used to establish cause-and-effect relationships between two or more variables. The distinguishing characteristics between experimental research and causal-comparative or ex post facto designs is the use of control groups, random assignment, and the researcher's control over the introduction of the independent or treatment variable. Experimental design involves the selection of a sample of subjects, random assignment of these subjects to experimental and control groups, the exposure of the experimental group to the treatment that is withheld from the control group, and

the evaluation of the two groups on the dependent variable (behavior to be changed).

A graphic representation of the true experimental design is presented in Figure 44 below. As can be seen, (R) represents the idea that subjects are assigned to either treatment or control groups randomly. The use of random assignment in the classic-experimental design assures that characteristics of subjects are likely to be equally represented in both groups. This equal representation of characteristics, in turn, assures that the particular attributes of subjects will not vary between groups, and that the results, once obtained, are not a consequence of individual subject differences, but rather a result of the treatment.

FIGURE 44  
TRUE EXPERIMENTAL DESIGN

R = random assignment  
X = treatment  
O = observation, measurement, or test

	Pre-Test $t_1$	Treatment	Post-Test $t_2$	
R	O	X	O	- Experimental Group
R	O		O	- Control Group

In addition to random assignment, the true experimental design involves the use of an experimental and control group. The use of the two groups is predicated on the desire to introduce the independent or

treatment variable in one group while not in the other, controlling for other factors that might affect the experiment. Once final measurements are taken ( $t_2$ ) comparisons between groups can be made to determine whether or not the treatment or independent variable had any effect. Thus, the researcher would examine the differences between the observations, measures, or tests of the experimental group for the pre- and post-test and then compare these observations with the control group's pre- and post-test. Differences between the experimental and control group's observations, measures, or tests, would then be attributed to the manipulated independent (or treatment) variable. Relatedly, the third aspect of the classic-experimental design is control over the introduction of the independent variable (X), where the experimental group is exposed to the treatment, and the control group is not.<sup>104</sup>

The classic-experimental design, while capable of yielding powerful evidence of cause-and-effect relationships is often precluded in agency settings where questions of ethics, costs, and time dictate the need for alternative research designs. Ethical considerations in the use of the classic-experimental design generally arise in the question: "Is it ethical to withhold a public or governmental service from part of the population?" For example, the assessment of alternative correctional strategies might be tested by randomly assigning correctional inmates to various forms of treatment. Convicted auto thieves might be treated by randomly assigning them to either 10 years imprisonment or putting them on probation. This design might be used

to assess the deterrent effect of long prison sentences on the future recidivism of auto thieves. Obviously, the disparity in treatment assignment may give rise to the ethical questions, such as that of equal justice. Similarly, police officials might want to assess the deterrent effect of certain kinds of police patrol. Within a particular city these officials might randomly assign police patrols to districts in the city while consciously withholding all police service to others. The ethical dilemma in following such a policy is obvious. The Kansas City Preventive Patrol Experiment approached the issue of police patrol by experimentally manipulating the level of police preventive patrol in various beats of the city. The ethical issue was to a degree overcome in that the Kansas City study did not remove police response to citizen requests for assistance, but rather only manipulated the uncommitted patrol time of the police officers.<sup>105</sup>

In addition to considerations of ethics, maintaining experimental conditions is often costly and time consuming. Assuring that the treatment manipulation occurred, such as the removal of preventive patrol in certain areas of the city, proved to be an expensive monitoring process. This was necessary, of course, because the researchers needed to exercise control over the treatment or independent variable (the level of preventive patrol). Finally, the use of the classic-experimental method is often precluded in agencies because such designs often require that individuals have specific training and expertise in research design and statistical analysis--skills that are not found in all criminal justice agencies.

To overcome the problems with classic experimentation, described above, agencies have generally been forced to choose between research designs, characterized by Campbell and Stanley as either preexperimental or quasi-experimental.<sup>106</sup> These designs will be briefly considered below.

Preexperimental designs are generally characterized by the absence of random assignment, and often do not include control groups. The One-Shot Case Study, One Group, Pre-Test/Post-Test, and the Static Group Comparison designs are all classified as preexperimental.

In discussing these three preexperimental designs the following symbols are used.

X = treatment  
 O = observation, measurement, or test  
 R = members of each group were randomly selected and assigned to that group.

1. one group, post-test 

X	O
---	---

The one group, post-test involves selecting a group of individuals, administering some treatment, and then measuring the effect of the treatment on the individuals through a measuring instrument. It is impossible to determine the influence of the treatment on the post-test. Because the group is tested only once, it is impossible to measure any change in their performance. Without a sufficient measure, an analyst cannot determine whether any change over time was due to the treatment or some other variable.

This type of design might be used to assess the impact of a particular training program. Individuals selected would be subjected to the training and, after its completion, tested on its impact on their

performance through some measure of performance. However, the results would be of marginal value in accurately determining whether or not the training program had its desired effect.

2. one group, pre- and post-test

0	X	0
---	---	---

The one group pre- and post-test includes three steps in its application. First, is the administration of a pre-test measuring the dependent variable. Then the experimental treatment is applied to the group, and finally, a post-test is administered to measure the dependent variable again. The pre-test and post-test are compared to determine any differences due to the application of the experimental treatment.

The major limitation of this preexperimental design is that, because a control group is not used, the analyst must assume that changes between the pre-test and post-test resulted from the experimental treatment. There is some chance that one or more extraneous variables could have caused part or all of the change discovered by comparing the pre-test and post-test. To reduce the likelihood of extraneous variables altering post-test results, the interval between the pre-test and post-test should be kept as short as possible. The one-group, pre-test/post-test design is limited to studying characteristics or behavior patterns that are relatively stable because of the assumption made that changes on the dependent variable are not due to extraneous factors. Here, stable behavior is defined as that behavior which is not likely to change unless some direct action by an experimenter is taken to bring about such change. For example,

the single-group design might be used for studying changes in attitudes towards race or religion because these attitudes are known to be quite stable in most individuals by adulthood, and are unlikely to change unless some effort is made to change them. In the prior training example, discussed for the one-shot case study, the researcher could alter that design to include a performance assessment of the individuals before receiving the training. This would represent a pre-test.

3. Static-Group Comparison

X	0
-----	-----
0	0

The static-group comparison preexperimental design attempts to compare the post-test results of an observation, measurement, or test, on the treatment group with a similar observation in a comparison group not experiencing the treatment. Often the static comparison group is selected on the basis of convenience--a neighboring city, or a selected city census tract. In corrections, a static comparison group might include other inmates in the institution not experiencing the treatment, or inmates at a neighboring institution. There are problems in inferring treatment effects in using this design because it is unknown whether or not the differences occur as a consequence of the treatment or as a consequence of other differences between the treatment and comparison groups. Differences in cities, among districts within cities, or among inmates in the same correctional or neighboring correctional institutions may account for the differences in observation or measurement rather than the treatment. The

static-group comparison essentially extends the one-shot case study by including a comparative group. As such, the use of the comparison group does have a positive effect on the internal validity of the research in that the comparison group provides for a testing of the measurement instruments and the testing procedures. Further, if the measurements are taken in relatively contiguous areas, such as neighboring cities, the affects of history (change in the dependent variable attributable to something occurring in the community) can be minimized.

Alternative research designs to the preexperimental, when the classic experimental design is precluded, are referred to as quasi-experimental. Quasi-experimental research designs differ from classic experiments in that they often violate the assumptions of random assignment, or control over the independent variable. Quasi-experimental designs are used when the researcher "can introduce something like experimental design into his scheduling of data-collection procedures (e.g., the when and to whom of measurement), even though he lacks the full control over the scheduling of the experimental stimuli (the when and to whom of exposure and the ability to randomize exposures) which makes a true experiment possible."<sup>107</sup> Quasi-experimental designs almost always result from a compromise in introducing scientific experimentation in action settings like those found in criminal justice. They are superior to the preexperimental designs discussed above, because they concern themselves with improving pre-test and post-test measurement (a feature absent in most

preexperimental designs), and with the making of valid comparisons with applicable nontreated groups.

While there are a number of quasi-experimental designs to select from, three will be briefly described here: the Time-Series Design, the Nonequivalent Control Group Design, and the Separate-Sample Pre-test/Post-test Design.<sup>108</sup>

	<u>Pre-test</u>	<u>----</u>	<u>Treatment</u>	<u>----</u>	<u>Post-test</u>				
1. Time-Series	0	0	0	0	X	0	0	0	0

The time-series, quasi-experimental research design attempts to improve measurement of the pre-test and post-test conditions by periodically measuring individuals both before and after exposure to the treatment. This design greatly enhances the stability of measurement for the pre-test and post-test time periods and affords the researcher a clearer indicator of change in the dependent variable. Applications of the time-series design might include the assessment of crime rates in a community before and after the use of an anti-crime police-patrol strategy. In this instance the measures of crime in the community are periodically taken before, to develop a clear measure of the level of crime, removing such things as seasonal variation in crime. The anti-crime program is then conducted and a similar series of measures, again adjusting for seasonal variation, are made and compared with the pre-test measures to determine whether or not the program has its desired effect. This design is clearly an improvement over the one-group pre-test/post-test design previously described, in that the additional measurements are taken. One drawback to the time-series design is the precise specification of when

the treatment effect is to happen. In this regard the researcher using a time-series design must specify, in advance, when the effect of the treatment is expected. Without such a specification, the selection of an observation in the post-test period is arbitrary and may not reflect the true causal relationship uncovered.

	<u>Pre-test----Treatment----Post-Group</u>		
2. Non-Equivalent Control Group	<u>0</u>	<u>X</u>	<u>0</u>
	0		0

The nonequivalent control group quasi-experimental design, extends our previous considerations of the preexperimental static-group comparison design. This is accomplished by adding a pre-test to both the treatment and comparison groups. While random assignment to either the treatment or control groups is not accomplished in this design, the addition of the pre-test measures affords some comparison in pre/post-treatment measurement for both the treatment and comparison groups. Quite often this design is used when we have a natural grouping of individuals, such as a police shift or platoon, or the correctional officers in one of three or four state correctional institutions. In instances where random assignment is precluded and such natural groupings are used, the nonequivalent control group design is superior to the static-group comparison design. The problems associated with the absence of random assignment attributed to the static-group comparison design, however, are also applicable to the nonequivalent control group design as well.

	<u>Pre-test----Treatment----Post-test</u>		
3. The Separate-Sample Pre-Test/Post-Test Design		X	(X)
R	0		
R		X	0

The separate-sample pre-test/post-test quasi-experimental design has great application when large populations are involved, say city populations or correctional systems within states. In such instances it may not be possible to disaggregate groups for treatment; instead equivalent groups are randomly assigned to the treatment, one group being measured before the treatment, the other after. Comparisons are then made on the basis of the pre-test on one group and the post-test on the other. The design is superior to the preexperimental designs in that random assignment is accomplished. But as a "patched-up" design,<sup>109</sup> the separate sample pre-test/post-test design may be affected by history. As one group is measured before the treatment and the other after, some historical event may intervene and account for the difference in pre-test and post-test scores. Where the periods between measurements are short, history has less of an effect.

For criminal justice agencies, research design plays a big role in the evaluation of human resource problems (e.g., appraising or assessing job performance, training programs, recruitment programs, and promotion programs). Research designs vary in the kind of evidence given (regarding cause-effect relationships) from weak evidence to strong evidence. The stronger the evidence a research design can provide, the more it costs to do the research and the more technically difficult the research is to do. Thus, evaluation research must

balance the strength of the evidence produced with the cost of obtaining the evidence.

Data collected quasi-experimentally are focused on depicting the causal relationships between two or more events, where classical-experimentation is impractical, unethical, or too costly. Preexperimental designs, perhaps used most often in criminal justice research, provide imprecise and often questionable information about the underlying effects of programs, and as a consequence, should be avoided or used sparingly. True experimentation, of course, provides the most valid and reliable information on cause-and-effect, but at great expense.

The design of policy research in human-resource problem areas will necessarily involve the selection of an appropriate research design. The information contained in this section briefly considered research designs classified by Campbell and Stanley (1963) as pre-experimental, experimental, and quasi-experimental.

#### ANALYZING HUMAN-RESOURCE DATA

The preceding sections of this part of Volume III have focused on the definition and collection of human-resource data in criminal justice agencies. In this section we consider various methods of data analysis applicable to human-resource planning. Data analysis of human-resource information is important for at least two reasons. First, it allows us to summarize and make some sense of vast amounts of information collected from individual criminal justice employees, such as in the

case of the Climate Survey. Secondly, analysis affords us the opportunity to systematically examine differing sources of data to determine consistencies and differences between variables of interest. This, in turn, provides us with the ability to examine relationships among and between variables.

In the discussion of data analysis in criminal justice human-resource planning that follows, we concentrate on two issues; first, the description of a population as a whole, or an identifiable sub-population (e.g., community residents in particular neighborhoods), and second, the examination of relationships or associations among variables of interest (e.g., college education and work performance). In the former case, that of description, we often rely on statistics that give us summary views about the population. For example, measures of central tendency (mean, median, and mode), instead of presenting measures of all observations, provide a summary of the distribution (the average, the middle, or the most frequently occurring). When examining relationships among variables we generally are concerned with association, rather than description, and rely on measures of association such as the correlation coefficient. In the sections that follow we look at these and other statistical measures that assist the process of data analysis.

#### Description in Human-Resource Data Analysis

Statistics used to describe human-resource data in criminal justice agencies are generally concerned with the distribution or frequency of observations, measures, or test scores of particular human-resource

variables. One such measure useful for data analysis is the frequency distribution. A frequency distribution is constructed by listing specific categories of a variable and counting the observations in each category. For example, the number of applicants who score 30 on a correctional selection test, the number of applicants who score 29, the number of applicants who score 31, and so forth. The following is the general form of a frequency distribution.

<u>Category</u> (Correctional Test Score)	<u>Frequency (f)</u>
I	$f_i$
II	$f_{ii}$
III	$f_{iii}$
IV	$f_{iv}$
TOTAL	F

In the left-hand column, the categories of the variables appear and in the right-hand column the frequency or number of observations in each category appears. The "frequency" usually is denoted by the letter "f". The last row (marked F) is the total of all frequencies appearing in the table.

Once the frequencies have been obtained they must be converted into figures that can be more readily interpreted. When frequencies are expressed in comparable numbers, they are called proportions or percentages. A proportion is obtained by dividing the frequencies of a category by the total number of responses in the distribution. When multiplied by 100, a proportion becomes a percentage. The expression for a proportion is:  $f_i/N$ . The expression for a percentage is:  $f_i/N \times 100$ , where  $f_i$  equals the frequency of category i and N equals the total number of responses. Two or more frequency distributions can be compared using proportions and percentages. For example, for the

level of education in a police department the following distribution of frequencies and percentages might be used for descriptive purposes.

<u>Level of Education</u>	<u>f</u>	<u>Percentage</u>
Bachelor's Degree	60	15%
Associate's Degree	40	10%
High School	300	75%
TOTAL	<u>400</u>	<u>100%</u>

Another example of a frequency distribution is presented as Table 1, the frequency distribution of individual scores on an entry level police entrance examination.

TABLE 1  
FREQUENCY DISTRIBUTION OF POLICE ENTRANCE SCORES

<u>Score</u>	<u>Frequency</u>
98	2
96	4
92	3
87	6
82	10
<u>70</u>	<u>8</u>
Total	33

Once descriptive data are collected and analyzed, the analyst must present the data in a format that will illustrate the kinds of information obtained. One method of data presentation is the use of the

frequency distribution. In this instance the analyst merely lists the values or categories of the variable of interest in one column and the frequency with which the values are observed in the other column. For example, the analyst might be interested in determining the number of correctional officers that have skills that might be helpful in assisting inmates with special problems. After conducting a job skills inventory the analyst might report the frequency of officers with such skills. A frequency distribution would then be constructed to present the results of the employee skills inventory as shown in Table 2.

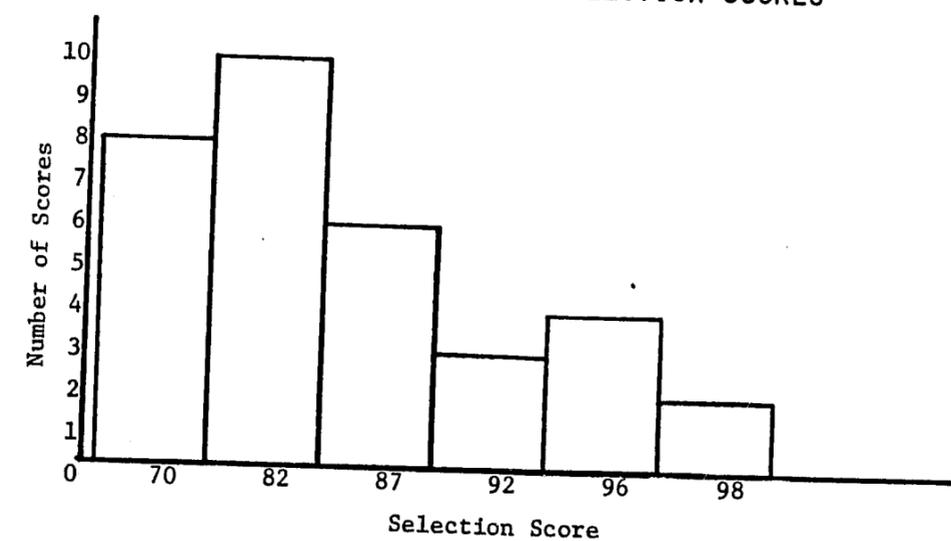
TABLE 2  
SKILLS INVENTORY OF CORRECTIONAL OFFICERS

<u>Employee Skill</u>	<u>Frequency</u>
Speaks Spanish	35
Speaks Foreign Language Other than Spanish	9
Psychological Counseling Skills	23
Certified First Aid	75
Para-Medical Experience	16
Para-Legal Experience	19
Computer Training Skills	6
No Skill Identified	48
TOTAL:	231

Having such a frequency distribution of employee skills might aid correctional officials in identifying program areas compatible with existing personnel skills.

Two other methods of presenting descriptive data are also considered in this section because they are most commonly used in agency-based analysis. The histogram or column diagram (sometimes referred to as a bar graph), presents data as a series of columns on the horizontal axis of a diagram, where the height of each column is determined by the value given on the vertical axis. In our example, the horizontal axis represents the actual scores achieved and the vertical axis represents the frequency with which each score was obtained. Figure 1 presents this histogram of the scores of the police examinations as previously referred to in Table 1.

FIGURE 1  
HISTOGRAM OF POLICE SELECTION SCORES

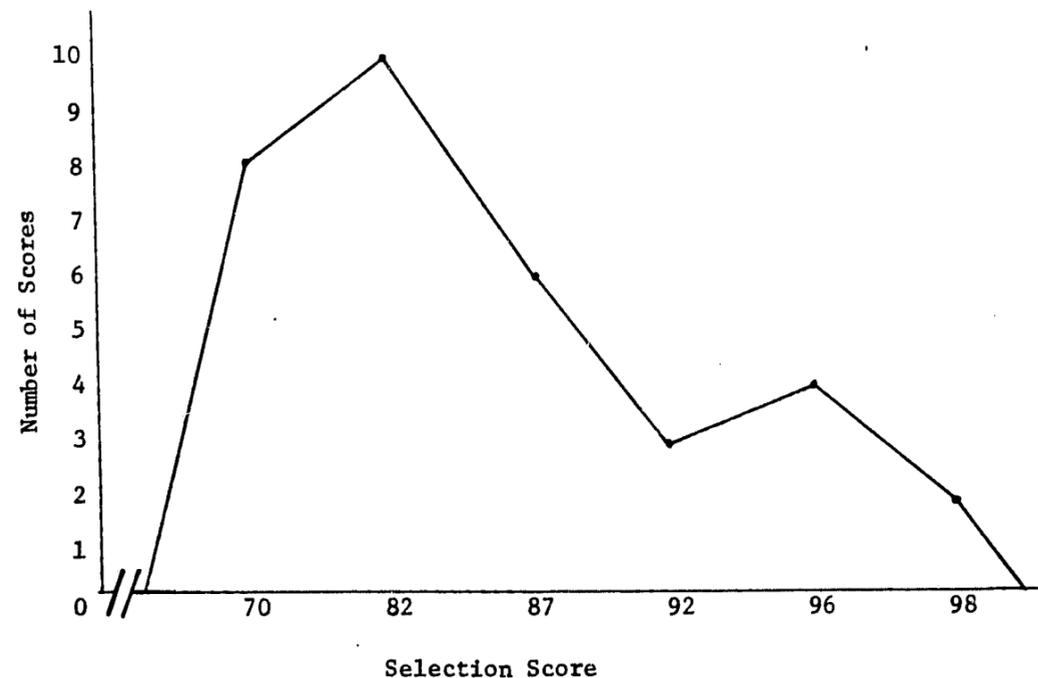


As shown in Figure 1, the columns represent the frequency of observations for each value of police performance score achieved. As a method of data presentation, the histogram graphically depicts the distribution of the scores.

A second method for presenting descriptive data is a frequency polygon. A frequency polygon, like a histogram, graphs the points in a distribution but the frequency polygon uses the midpoint of each class interval and connects these points to the baseline of the graph. Using our example of police entrance scores as presented in Table 1, Figure 2 depicts a frequency polygon for these observations.

FIGURE 2

## FREQUENCY POLYGON FOR POLICE SELECTION SCORES



The use of frequency polygons, histograms, and frequency distributions as methods of data presentation, can significantly improve the presentation of information in the decision-making process. Information describing a population or sample can be easily displayed and the variation in scores quickly recognized. Such graphing of human-resource planning data recognizes the importance of data presentation to the utilization of data in decision making.

Alternative ways of summarizing frequency distributions are measures of central tendency that are single numerical values used to describe a "central score" in an entire population or relevant sample of scores. The mode is the score category, or observation that appears most frequently in the distribution of observations. To identify the mode, the category containing the largest number of frequencies is singled out. For example, in Table 1 presented above a distribution of scores on an entry level police examination was presented. In that example the mode for the test scores was 82 because it is the test score with the highest frequency.

The median is the middle score observation in a distribution of scores. It divides the distribution into two equal parts, and is defined as the observation that is located halfway between the smallest and largest observation in the distribution. For example, in the series 1, 3, 4, 6, 7, the median is 4. The median can be calculated when data are ordered. In our example above, the median for police officer test scores is 82, where 16 individuals fall above or on that score and 16 fall on or below that score.

The median for ungrouped data is obtained by locating the middle observation. For an odd number of cases the median is found using the formula  $(N + 1)/2$ , where  $N$  is equal to the total number of cases. For example, for the following series of numbers, 6, 9, 11, 16, 18, 21, 24, 30, and 35, the median is 18. The fifth observation,  $(9 + 1)/2$ , divides the distribution in half, so the median is the fifth observation, 18.

For an even numbered distribution, the median is located halfway between two middle observations and then calculated by averaging the observations,  $N/2$  and  $N/(2 + 1)$ . For example, in the series, 1, 3, 4, 5, 6, 7, 8, 9, the median is the average of the fourth and the fifth observations:  $(5 + 6)/2 = 5.5$ .

The mean ( $\bar{x}$ ) is the most frequently used measure of central tendency. It is calculated by obtaining the sum ( $\Sigma$ ) of all the observations ( $x$ ) and then dividing the figure by the total number of observations ( $N$ ). The formula for calculating the mean is:  $\bar{x} = \frac{\Sigma x}{N}$ .

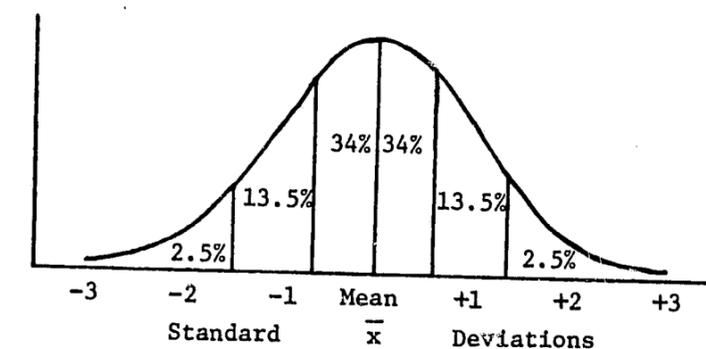
The mode indicates the point in the distribution with the highest density (most number of observations), the median is the distribution's midpoint, and the arithmetic mean is the average of all the values in the distribution. The use of these measures depends upon the level of measurement of the variable being analyzed. The mode can represent the distribution of members of an organization in certain classified positions (i.e., patrolmen, sergeants, lieutenants) and is generally used as the measure of central tendency for nominal variables. The median can be applied to ordinal variables such as performance rankings. The arithmetic mean is used with interval variables such as income or age. For

a discussion of the level of variable measurement, see the preceding section on data definition.

Measures of variability provide information regarding the extent of individual differences on a given measure. Variability is the amount of dispersion of scores about a central value, such as the mean. The measure of variability most often used is the standard deviation. It is the measure of the extent to which scores in a distribution, on the average, deviate from the mean. One step in calculating the standard deviation is to subtract each score from the mean; the resulting deviation scores are then squared, summed, and divided by the total number of observations to yield the variance (or the square of the standard deviation).

The standard deviation of a group of scores tells us something about the similarity among scores in the group. From an analytical point of view, many behaviors, test scores, or measures of human-resource data have been found to be distributed according to what is called a "bell-shaped curve." Figure 3 presents a bell-shaped curve, with its associated standard deviations.

FIGURE 3  
NORMAL OR BELL-SHAPED CURVE



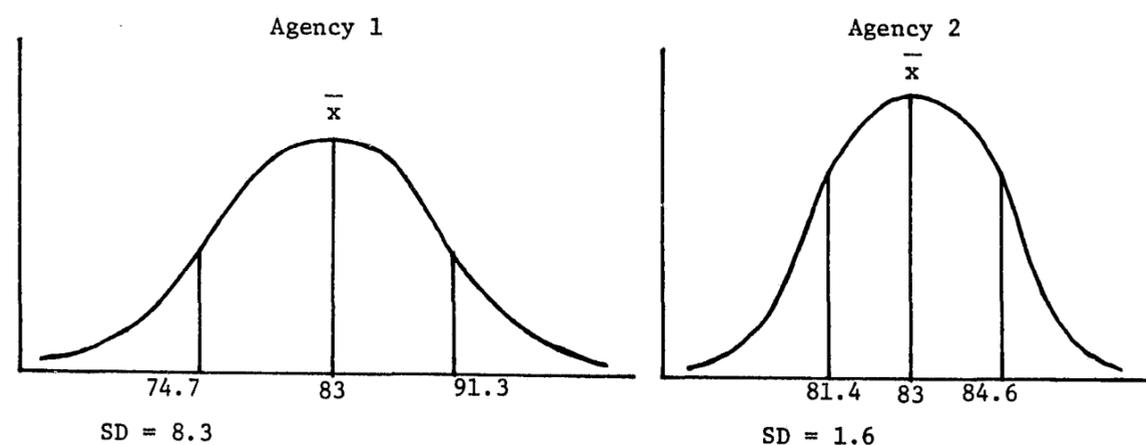
From the perspective of variability in a distribution of test scores, the bell-shaped curve represents the plotting of scores on a polygon and the degree to which these scores cluster toward the mean. As standard deviations are calculated from the variance in a group of scores, the resulting bell-shaped curve represents a probability curve where the standard deviations divide the curve into equal intervals and where an estimate of the percentage of cases falling within one, two, or three standard deviations can be calculated. For example, in Figure 3 we find that, on the average, sixty-eight percent of the observations, measures, or test scores fall within one standard deviation (above or below) of the average score for any given distribution. Further, within two standard deviations of the mean of a distribution (above or below) approximately 95 percent of the cases are found. The remaining five percent of the cases, observations, or measures will be located within three standard deviations. The determination of where a score is located in the distribution of a set of scores tells us much about the similarity or difference between that score and the larger distribution.

Perhaps one of the best ways of examining the importance of measures of central tendency and variability is through an illustration. This is particularly the case with respect to the concept of variance. Let us suppose that we have collected data on police officer test scores for two separate police agencies and in calculating the average score for both police agencies we find that the mean ( $\bar{x}$ ) test score for both agencies is 83. By looking at the measure of central tendency

alone we might conclude that the samples are relatively the same. Upon further examination, however, we might calculate the variance or dispersion in test scores for both agencies. Such calculations might reveal that the variance in the first agency's scores is much greater than that in the second agency's. For example, suppose that we calculate the standard deviations for both agencies to be 8.3 for the first agency and 1.6 for the second. Such standard deviation scores would result from subtracting individual test scores from the average test score within each police agency. The resulting deviations from the mean ( $\bar{x}$ ) are squared, summed, and divided by the number of individuals taking the test in each police agency.

Although the average score for both agencies remains 83, the calculation of standard deviations reveals that the distribution of test scores in both agencies is not nearly the same. In the first police agency we would find that test scores within one standard deviation from the mean range from 74.7 to 91.3, while in the second police agency the range in test scores within one standard deviation is from 81.4 to 84.6. Thus, the scores of the second police agency are more closely distributed about the mean of the distribution as compared to the scores of the first agency. Such differences in the dispersion of scores would not have been detected using the measure of central tendency alone. Figure 4 illustrates the two types of distributions in police officer test scores.

FIGURE 4  
COMPARISON OF TWO POLICE AGENCIES' TEST SCORES  
WITH EQUAL MEANS AND DIFFERENT VARIANCES



Analysis of the differences in distributions of test scores between the two police agencies might result in the conclusion that more officers in the first agency were likely to fail the test (assuming a passing score of 70 or greater) in comparison to the second police agency. Further, we might conclude that the test does not differentiate among officers in the second agency or, conversely, that the second police agency attracts a higher quality applicant (one better prepared to take the entrance test). Such comparisons illustrate the importance of measures of central tendency and variability in discussions of the distributions of a particular measure of human behavior.

A final measure of variability to be discussed here is the range, which is the distance between the highest and lowest values in the distribution. For example, in the following set of observations, 4, 6, 8, 9, 17, the range is the difference between 17 and 4 which is 13 ( $17 - 4 = 13$ ). To calculate the range, the scores or observations must be ranked according to size; thus, the range measurement can also be applied in cases where the distribution is on an ordinal measurement scale.

Measures of central tendency and variability begin to tell us something about the distribution of a particular variable in an identified population or sample. In human resource data analysis these measures might result in statements such as, the average score on the entrance test for police officers in this department was 85, the mode was 75, and the median was 80; the range in scores for our last promotional exam was from 87 to 96; or there was not much variability in test scores for promotion to correctional supervisor as the average score was 91 with a standard deviation of .5. The description of such human-resource data can provide the agency administrator with valuable information on the distribution of individuals among variables of interest in a number of human resource planning areas, i.e., distribution of particular employee skills, educational distribution, distribution of tests scores for entrance, proficiency test scores, and promotional examination scores. Such information can ultimately improve our understanding of the measurement of human resources in criminal justice agencies.

### EXAMINING RELATIONSHIPS AMONG AND BETWEEN VARIABLES

Quite often in criminal justice human-resource planning the concern is less with the general description of a population or sample, and more with the examination of relationships between or among variables. In these instances the analyst must rely on some form of bivariate (two-variable) analysis. In various sections of Volume III we present computational formulae for statistics measuring association among variables. For example, in the section on Performance Evaluation there is a detailed discussion of correlation and the Chi-Square non-parametric statistic, and in the consideration of manpower forecasting toward the end of this volume there is a discussion of regression analysis. Also in Volume II we briefly introduced the reader to a consideration of cross-tabulation in analyzing the Climate Survey.

The discussion to follow will elaborate on the concept of cross-tabulation particularly as it might be applied to criminal justice human-resource data analysis. Also in this consideration we will examine the presentation of cross-tabular data.

As is implied in its name, cross tabulation is a procedure by which one variable is examined in relation to another by cross-referencing the frequency of observations for both individual variables. As a method of data analysis, cross-tabulation represents the joint frequency distributions of observations according to two or more variables. Cross-tabulation generally relies on categorical or classificatory variables, rather than continuous variables, and can be used to test for statistical independence and for the degree of association between

variables. There are numerous cross-tabulation procedures for nominal and ordinal level variables.

Perhaps one of the best ways of examining the cross-tabulation procedure is through an illustration. In its most basic form cross-tabulation is illustrated by a 2 x 2 table. In a study of correctional officer effectiveness the analyst might examine whether or not correctional officers had received training in how to deal with the problems of inmates. It might be hypothesized that those correctional officers receiving such training would be less likely to have inmate complaints brought against them. In such a case, correctional officers would be classified according to whether or not they had received the training and whether or not inmates had filed complaints against them. In this example all correctional officers who had received one or more complaints from inmates would be classified as "yes" in reference to the columns denoting whether or not complaints had been received. The resulting relationships would be examined as presented in Figure 5.

FIGURE 5  
CORSS TABULATION OF CORRECTIONAL OFFICERS  
AND COMPLAINTS FROM INMATES

		Inmate Complaints Received	
		Yes	No
Correctional Training Received	Yes		
	No		

In pursuing our example, the analyst now examines one hundred correctional officers receiving the training and one hundred and fifty not receiving the training in relation to their history of inmate complaints. Having conducted such an analysis the joint frequencies for the correctional officers would be reported as in Figure 6.

FIGURE 6  
JOINT FREQUENCIES OF CORRECTIONAL OFFICER TRAINING  
AND INMATE COMPLAINTS

		Inmate Complaints Received		
		Yes	No	
Correctional Training Received	Yes	30	70	100
	No	90	60	150
		120	130	

A brief glimpse of Figure 6 reveals that there is an apparent relationship between the presence or absence of correctional officer training and the presence or absence of inmate complaints, and when the proportions of correctional officers receiving complaints is examined for the trained and untrained groups the differences become even more dramatic. Such differences are presented in Figure 7.

FIGURE 7  
PROPORTIONS OF CORRECTIONAL OFFICERS  
RECEIVING COMPLAINTS

		Inmate Complaints Received		
		Yes	No	
Correctional Training Received	Yes	(30) 30%	(70) 70%	100
	No	(90) 60%	(60) 40%	150
		120	130	

Apparent in Figure 7 is the finding that correctional officers not receiving training were proportionately more likely to have received complaints from inmates in comparison to those officers receiving training. The use of the cross-tabulation technique can provide useful information about the relationships between variables of interests, and various statistical tests are available to determine whether or not the proportional differences between groups are significant. One such test, the Chi-Square test of significance, is presented in the section on Performance Evaluation. Correlation coefficients such as the contingency coefficient (Phi, Tau, and Gamma) can also be used to measure the strength of association between variables examined through the cross-tabulation procedure. Correlation as a concept is explained in greater detail in the section on Performance Evaluation.

The basic procedures for cross-tabulation as explained for the 2 x 2 example above can also be used for analysis of more than two variables. In such usages, the third variable acts as a control variable. In our example above a third variable such as correctional assignment might be used to expand on our analysis of correctional officer training and inmate complaints. In such an example, we might classify correctional officers by the type of institution in which they work, i.e., minimum, medium, or maximum security. Then the officers in each institutional type would be examined in relation to training and inmate complaints. With such an extension, our original hypothesis, that officers receiving training would be less likely to receive complaints, could be examined in relation to the type of correctional institution or inmate population. From such an analysis we might find that in minimum security institutions there is no relationship between training and the existence of complaints, while in maximum security institutions there is a relationship.

Establishing the relationship between two or more variables through the use of cross-tabulation and correlation begins to allow us to predict the criterion variable (dependent) from values on the independent variable. This is the essential idea behind regression analysis. Such prediction can help us to make forecasts of human-resource supply and demand, as is presented in the section on Forecasting.

## SUMMARY

Data analysis in criminal justice human-resource planning can be used to describe the characteristics of a population or of a given sample, and it can be used to establish associations or relationships between two or more variables of interest. The measures of central tendency (mean, median, and mode) are generally used to describe the central scores in a frequency distribution, and measures of variability such as the variance and standard deviation are used to examine the degree of difference in scores in a given distribution. Data describing a population or sample can be presented in many ways, but the primary ones are the frequency distribution, histogram, and frequency polygon.

Examining the relationships and associations between two or more variables is accomplished through the procedures of cross-tabulation and correlation where the intent is to determine the significance and strength of association. Information obtained from such analyses forms the basis for predicting future behavior.

The use of analysis in human-resource planning and decision making has obvious implications for criminal justice agencies. First, such information provides a clearer picture about the agency, its human resources, and its needs. Such analysis is consistent with the "stock-taking" perspective suggested in Volume II. Secondly, such analysis can provide for in-depth considerations of the relationships between human resources and such concerns as productivity and efficiency. Lastly, the data collection and analysis process yields information necessary to predict future needs for human resources and the likely

available supply of human resources to the criminal justice agency.  
Such information is crucial for long-term planning in criminal justice agencies.

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SUBJECT INDEX TO VOLUME III \*

- Ability requirement scales, 350-351  
Absenteeism, 481-482  
Agency analysts, 26-32  
Agency-based research, 11, 15-17  
Application blank, 218-226  
Appraisal rating errors, 305-307  
Aptitude tests, 247-248  
Arithmetic progression, 387-388  
Assessment centers, 297-303  
Assignments, 40, 41  
Behavior-centered data, 353  
Behaviorally-anchored rating scales, 303-305  
Bivariate analysis, 202  
Bounded rationality, 14-15  
Bureau of Labor Statistics, 468  
Causal-comparative research, 175-177  
Central tendency, 306  
Change-in-labor-force analysis, 474-475  
Checklists, 293-294  
Chi-square test, 278-284, 294, 296  
Cohort studies, 174  
Concepts, 49, 50, 51, 54  
Constraints, 410-411  
Correlational research, 175-176  
Crime data, 59-64  
Criterion reference test, 257  
Criterion variable, 235-236  
Critical incident method, 284-285, 351-354  
Critical path method, 413  
Cross sectional survey, 172  
Cross tabulation, 202-206  
Current resource analysis, 470-471  
Daily diary, 327-328  
Data, 36  
Data collection, 131-141, 150-155  
Decision-banding method, 402  
Delphi technique, 434-436

\* This is a subject index to Volume III only. For an index to all of the volumes, see the Executive Summary.

Descriptive research, 171-172, 189  
 Document studies, 18-19, 127-128  
 Econometric models, 449-452  
 Economic and budget condition data, 64, 131-132  
 Element, 318  
 Employee-focused data, 80-82, 134  
 Environmental data, 56, 131  
 Equal Employment Opportunity Commission, 468  
 Essay form, 294  
 Evaluation, 22-25  
 Exogenous variables, 454-456  
 Experimental research, 177-188  
 Extrapolation, 439-440  
 Fact finding, 19  
 Factor comparison method, 392-398  
 Field reviews, 296-297  
 Forced-choice method, 294-296  
 Forced distribution method, 292  
 Forecasting, 407-409, 411-412, 421, 484-486  
 Forecasting demand, 420-421, 424, 425-428, 432-438, 483  
 Forecasting supply, 420, 421, 461, 467-470, 482  
 Forecasting techniques, 412, 413, 418, 419, 422  
 Frequency distribution, 189-194  
 Frequency polygon, 194-195  
 Functional job analysis, 336-343  
 Generating operational definitions, 52  
 Geometric progression, 388-389  
 Goal analysis, 18  
 Grade descriptions, 378, 380-381  
 Graphic rating scale, 272-284  
 Guide chart profile method, 399-401  
 Halo effect, 305-306  
 Histogram, 193-194  
 Identifying definition, 52  
 Implementation, 21-22  
 Information, 36  
 Intelligence tests, 239-247  
 Intentions forecasting, 433-434  
 Interest tests, 248-252  
 Interquartile range, 279-280, 292, 294, 296  
 Interval scales, 44-45  
 Interviews, 114-121, 228-233, 319, 328-333  
 IQ, 257  
 Job, 317  
 Job analysis, 313-317

Job analysts, 331-336  
 Job-behavior domain, 271  
 Job-centered data, 353  
 Job classification method, 378-381  
 Job description, 317, 372  
 Job elements, 354-356  
 Job element method, 366-371  
 Job evaluation, 371-372  
 Job factors, 383-385, 386  
 Job-focused data, 79-80, 133  
 Job ranking method, 372-374  
 Job specifications, 317, 372  
 Job title card, 372-373  
 Judgmental forecasting, 432, 434  
 JUSSIM, 464-467  
 Key jobs, 392, 396  
 Knowledge checklist, 343  
 Labor productivity ratio, 428-429  
 Leniency, 306  
 Longitudinal survey, 173  
 Management inventories, 472-474  
 Manpower estimates, 413-415  
 Manpower projections, 413-415  
 Markov chains, 441-444, 477-480  
 Mean, 196, 198-199  
 Measurement, 37, 38, 41-45, 48-49, 278-279  
 Measures of central tendency, 195-199  
 Median, 195-196  
 Missions and goals, 57-59, 132  
 Mode, 195-196  
 Models, 422-424  
 Moving averages, 444-445  
 Multiple correlation technique, 216  
 Multiple cutoff selection method, 216  
 Multiple tests, 254-255  
 National Manpower Survey, 416-418, 453-461  
 Nominal scales, 42-43  
 Norm-reference test, 257  
 Numerals, 39-40  
 Observation, 123-126, 328  
 Occupation, 317  
 Office of Education, 468  
 Office of Federal Contract Compliance, 468  
 Operational definitions, 49, 52, 55  
 Opinion-based forecasting, 432-433

Ordinal scales, 43-44, 279, 292

Organizational data, 56, 133-134

Paired comparison method, 289-291, 374-377

Panel studies, 174

Percentages, 190

Percentile rank score, 256

Performance data, 82-86, 135

Performance evaluation, 265-271, 307-308

Personal biases, 307

Personality tests, 252-254

Personnel selection, 215, 216-218

Physical-demands-analysis, 233, 234

Physical examinations, 233-234

Planning, 18

Points rating method, 382-292

Position, 317

Position-analysis questionnaire, 354-357

Population characteristics, 64-72, 131

Prediction factor, 427-428

Predictor variable, 236

Preliminary interview, 226

Production factor, 426-427, 428, 429

Profile method, 398-399

Program development, 20-21

Project STAR, 416, 461-464

Proportions, 190

Public and political values, 72-74, 132

Qualitative data, 37-38

Quantitative data, 37

Quasi-experimental design, 181-188

Question pool, 236-237

Questionnaires, 91-115, 318-326

Range, 201

Ranking scales, 286-289

Ratio scales, 45

Rational decision-making, 12-14

Raw score, 256

Recent-behavior bias, 306

Reference checks, 227-228

Regression, 445-449, 477, 480

Relative time spent scale, 344, 348-349

Reliability, 145-155

Replacement charts, 437

Rules of correspondence, 39, 41

Rules of thumb, 436, 437-438

Sample Size, 168-171

Sampling, 156-177

Sampling frame, 158-160

Sampling units, 158-160

Scattergram, 440-441, 446

Selection tests, 235-239, 240-256, 257

Simulation models, 465, 466-467

Skills inventory, 471-472

Social accounting, 19-20

Standard deviation, 197-198

Standardized tests, 256

Stanine scores, 257

Study population, 158-159

Successive hurdles technique, 216

Systems data, 86-87, 135

Target population, 157-161

Task, 317

Task checklist, 343-350

Task inventory, 344-350, 357-366

Time span of discretion method, 401-402

Trend studies, 173

Triangle of reference, 49-51

Turnover analysis, 475-477

Uncertainty, 409

Uniform Crime Reports, 59-62

U.S. Census Bureau, 468

U.S. Employment Service, 468

Validity, 141-152

Variability, 197

Victimization surveys, 62-64

Worker function scale, 338-342

Work loads, 74-79

A Handbook for Human-Resource Planning  
in Criminal Justice Agencies

Volume III  
Human-Resource Planning Guide: Part 2

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School of Criminal Justice  
Michigan State University  
August, 1982

NCJRS

OCT 14 1982

ACQUISITIONS  
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IN CRIMINAL JUSTICE AGENCIES

VOLUME III  
HUMAN-RESOURCE PLANNING GUIDE: PART 2

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The Michigan State University Human-Resource Planning Development Project is partially supported by Grant Number 80-MU-AX-004 awarded by the Office of Criminal Justice Education and Training, Law Enforcement Assistance Administration, U.S. Department of Justice, under the Omnibus Crime Control and Safe Streets Act, as amended. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

## ACKNOWLEDGEMENTS

The materials in this Handbook reflect the contributions of many individuals. Gary W. Cordner provided important conceptual help during the writing of Volume I and Robert Trojanowicz offered timely advice and review of the project's direction as it unfolded. Tim Bynum offered characteristically sound advice and helpful suggestions throughout the course of the project. During the first year of the project, Mike Donahue, Robert Smith and Gary Sonke provided assistance in helping to conceptualize the outline of the Handbook and to pull together information. Some of Robert Smith's material is found in Volume I and in the first part of Volume II; some material developed by Mike Donahue appears in Volume III; and material developed by Gary Sonke formed the basis for some of the items appearing in the surveys. Maryellen Geyer painstakingly typed the many drafts and the final version of the Handbook manuscript. She also served as project secretary in a highly efficient and characteristically professional manner. Betsy McGuire provided timely assistance in editing some of the materials, in checking sources, and in coordinating the printing of the Handbook. Katherine McCracken of the Social Science Research Bureau of the College of Social Science at Michigan State University provided editorial assistance for this and other project publications. Her assistance has greatly improved the volumes.

We particularly acknowledge the assistance given by Price Foster, Jean Moore, and Irv Slott of LEAA/OCJET. Price Foster awarded the grant and helped to frame its purposes and objectives. Irv Slott provided timely suggestions and advice when it came time to update the project objectives and design. Jean Moore is owed special thanks and recognition. She acted as project monitor and was a constant source of help and assistance. At many points during the course of the project her help and professional advice kept us on track. Working with her was a distinct pleasure.

Victor Strecher of Sam Houston State University and Frank Sistrunk of the University of South Florida, both of whom were project directors of companion manpower planning grants awarded by OCJET, offered vital assistance and advice throughout the research phase of the project. Frank Sistrunk additionally and tirelessly reviewed portions of the Handbook manuscript and made numerous helpful suggestions for changes and additions.

We also acknowledge and give special thanks to several individuals from criminal justice agencies who reviewed portions of the draft manuscript. These individuals invested substantial time and effort reviewing materials and offering suggestions for change. Their advice has markedly improved the final draft of the Handbook. Reviewers from criminal justice agencies included James Bannon and Ronald Vasiloff of the Detroit Police Department, Donald Willis of the Michigan Department of Civil Service, Abraham Takahashi of the Michigan State Police, Max Durbin of the Flint Police Department,

James McMillan and Gary Higgins of the Jacksonville Police Department, William Kime of the Michigan Department of Correction, James Ball of the Florida Department of Correction, and Leonard Territo of the University of South Florida. Ralph Lewis from Florida International University also reviewed materials and offered suggestions.

To these named individuals and to the many more not named who provided advice and other forms of help we offer our sincere gratitude.

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August 1982

## EXECUTIVE SUMMARY

Criminal justice agencies usually allocate 80 percent or more of their resources to meeting personnel costs. Criminal justice is thus a labor-intensive field, with productivity vitally dependent on the efficient and effective employment of personnel. Human-resource planning can be an effective managerial tool for helping administrators reach decisions about how most efficiently and effectively to acquire and to employ personnel. Additionally, some aspects of human-resource planning are particularly useful in helping management to identify, to diagnose, and eventually to solve personnel problems.

This executive summary provides a brief overview of the contents and objectives of the Human-Resource Planning Handbook prepared by the School of Criminal Justice at Michigan State University. The Handbook describes numerous human-resource planning and analytical techniques useful in criminal justice agencies, gives directions for their use, and provides examples of their application in criminal justice agencies. Also, special techniques are provided to assist management in identifying, diagnosing, and eventually resolving personnel problems. The Handbook is designed to offer the criminal justice manager, personnel administrator, and planner a self-instruction guide on how to implement more effective means of planning for the agency's personnel component.

One way of visualizing the purposes and objectives behind the Human-Resource Planning Handbook is to consider the principal kinds of managerial questions that it attempts to provide answers for. A few of these questions are:

1. How can an agency examine what its personnel needs are?  
How can these needs be substantiated or documented?
2. How can an agency validly determine and define the jobs required to achieve missions, goals, and objectives?  
How can it determine whether job descriptions validly reflect the nature of work currently done in the agency?
3. How can an agency assess its current employees? How can it determine what kinds of employees should be hired (prior experience, education, training, skills, etc.)? How can employment qualifications be identified and substantiated or validated?
4. How can an agency assess its key personnel practices (for example, recruiting, selecting, training, and assigning personnel? What are the effects of these personnel practices on the agency's ability to maintain a stable supply of qualified personnel to fill the agency's jobs? What effects do current personnel practices have on employees' morale, employees' performance, and employees' attitudes?
5. How can an agency go about identifying and diagnosing personnel-related problems? What kinds of personnel

- problems confront the agency? What are the causes of these problems? What kinds of effects do these problems have on agency productivity (efficiency and effectiveness)?
6. What kinds of analytical techniques are available to agency managers and planners who wish to diagnose not only existing personnel problems but also want to anticipate future personnel problems?
7. How can an agency go about identifying the major constraints posed by budget and outside decision makers that circumscribe the agency's ability to acquire needed personnel? How can an agency go about determining whether any of these constraints are manipulable--removing them as constraints in acquiring and assigning needed personnel?

The Handbook variously deals with these and other prime questions facing administrators charged with managing personnel. However, the Handbook is not prescriptive in the sense that specific solutions are prescribed for specific kinds of human-resource problems facing the agency. For important reasons that are pointed out in Volume I and in the first part of Volume II, the choice of a solution to any given personnel problem is properly the responsibility of agency management. Identifying viable solutions for problems such as turnover, or insufficient staffing, or poor employee performance must be done by management working within the constraints faced by the agency.

Nonetheless, the Handbook, its techniques for problem diagnosis, and its explanations of other human-resource planning techniques, can help point personnel administrators and planners toward discovering a range of viable solutions for agency personnel problems.

Development of the planning handbook was supported with funds from the U.S. Department of Justice (LEAA) and was conducted in two phases. Phase I assessed criminal justice agencies' current capability and need of human-resource planning. Phase II, building on this assessment, focused on the development of an extensive handbook that would assist criminal justice agencies more fully to implement and to utilize human-resource planning techniques.

#### THE HANDBOOK

The Handbook is presented in three volumes (bound in eight parts for convenience in handling and use). A comprehensive index to the contents of these three volumes follows the executive summary. Used in conjunction with the index, the Handbook has been designed to allow managers and planners to choose those portions that are of most interest or are most needed.

VOLUME I of the Handbook provides an introduction to human-resource planning in agencies--what it is, how it is carried out, and how it can help the agency manager. The material in this volume is written to be of interest alike to agency top management, to agency personnel administrators, and to agency planners. One principal objective of Volume I is for managers and planners to acquire a common overview about the definition, purposes, and uses of human-resource

planning in agencies. When managers and planners do not share such a basic understanding, planning tends not to be fully or appropriately utilized.

VOLUME II is bound in four parts and presents a means for comprehensively identifying and diagnosing personnel problems. It is designed to be of primary interest to agency personnel administrators and planners. Problem diagnosis is a very crucial and very practical part of human-resource planning. It is crucial because without good diagnosis, solutions to personnel problems cannot be adequately planned. It is practical because it focuses on what every manager spends most of his or her time doing--identifying and dealing with conditions that negatively affect the agency's ability to meet its goals and objectives.

Practical tools are presented to help personnel administrators and planners conduct two types of diagnoses. The first type is an overall assessment of agency human resources--a general stocktaking whereby the agency takes an overall look at its organizational climate, its personnel practices, and its ability to acquire, to develop, and to employ personnel. Three ready-for-use diagnostic surveys are provided with directions: 1. an Organizational Climate Survey, 2. a Personnel Practices Survey, and 3. an Environmental Factors Questionnaire. Analysis of results from administering these surveys will provide administrators with an overview of the agency's strengths and weaknesses regarding its personnel processes and its ability to identify and to deal with internal and external factors that affect its acquisition and use of personnel. This becomes essential background information for

later attempts to identify and to solve specific personnel-related problems.

The second type of diagnostic tool presented is a step-by-step procedure that can be followed to diagnose specific personnel problems more pointedly. For example, the agency may have identified turnover, or an inability to attract qualified personnel, or poor performance by employees as problems needing special attention. Comprehensive diagnoses of the causes and effects of problems such as these is crucial if effective solutions to them are to be found. The diagnostic model provided offers a way of marshalling key agency thinkers and key information for diagnosing problems and for eventually finding solutions.

VOLUME III is bound in two parts and is a resource guide intended primarily for use by agency personnel administrators and planners engaged in the more technical aspects of personnel administration and human-resource planning. Techniques such as job analysis, forecasting, selection validation, performance measurement (to name a few) are discussed. A common format is used throughout in presenting these techniques. First, the nature of the techniques and its prime uses are presented. This is followed by a consideration of the major technical and other supports required if the technique is to be used. Special attention is paid to factors that will limit an agency's ability to use a given technique, and alternatives are presented for these situations.

## BASIC DESIGN-FEATURES OF THE HANDBOOK

**A COMPREHENSIVE INDEX:** Few users will have the time or the need to use all the material in these volumes and do everything that is recommended. A comprehensive index or catalogue of materials to be found in all of the volumes is provided. Agency administrators and planners may use this index or menu-system as a means of quickly finding the portions of the Handbook that will be of most help.

**SELF-ADMINISTRATION:** The materials have been written to optimize self-administration and self-learning, and to minimize the need for outside help. For example, the diagnostic surveys found in Volume II have been designed for administration and analysis in house. Of course, some concepts or techniques will remain difficult to grasp and will require additional reading or the use of consultants. For example, job analysis techniques discussed in Volume III are very complex and are generally out of the reach of most agencies to apply themselves without the help of outside experts. Nonetheless, the objective has been to maximize as much as possible an agency's ability to do human-resource planning using in-house resources.

**PROBLEM-FOCUSED APPROACH TO PLANNING:** With the exception of some of the sections of Volume I where many of the general concepts and ideas about human-resource planning are discussed, the Handbook is designed to help managers and planners identify and diagnose concrete personnel problems (e.g., turnover, poor employee performance, inability to attract qualified personnel, EEO and Affirmative Action suits, and so forth). The emphasis, therefore, is on dealing with specific problems

as opposed to discussing human-resource planning from a conceptual point of view alone.

**VARYING LEVELS OF "BUY-IN":** Agencies differ in their need for and their ability to undertake human-resource planning. Agency size, environmental constraints, money, technical expertise, and the nature of human-resource problems confronted by an agency all affect the level of planning needed and possible. Where possible, Handbook materials have been written to provide alternative levels and options in the use of planning-related analytical techniques. Thus, there are options presented--different levels and kinds of analytical activities possible. Managers and planners are free to buy in at the level deemed most feasible and valuable.

**OUTSIDE CONSULTANTS:** The handbook material, besides helping agencies become more informed about what can be done in-house, helps identify conditions under which outside help is needed, what should be expected of this outside help, and whom or what to look for. One central purpose has been to provide agencies with the information necessary to become more intelligent and critical consumers of work done by outside consultants. Sometimes, agencies have not been able to sufficiently direct consultants about what is needed or wanted. This has frequently been the case, for example, when agencies sought outside help in validating selection and promotional practices, or when conducting job analyses.

## WHAT IS HUMAN-RESOURCE PLANNING?

In the most general terms possible, human-resource planning is the process of determining what an agency needs to do to ensure that it has the right number and kinds of people doing the right jobs, and doing those jobs well. To accomplish this, human-resource planning is composed of two distinct yet related activities. The first activity is called WORK FORCE PLANNING, while the second is labeled STAFFING-NEEDS PLANNING.

Workforce planning analyzes the agency's need for personnel--how many and what types of people. It also analyzes the required missions of the agency, determining the kinds of jobs that need to be done, and what qualifications people who hold these jobs need. Workforce planning is crucial, for without it agency management has little firm basis on which to justify the number and kinds of personnel hired or how they are hired, assigned, and employed.

Staffing-needs planning focuses on the various personnel administrative actions involved in acquiring, developing, and assigning agency personnel. The processes and policies associated with personnel administration (e.g., recruitment, selection, training, assignment, job design, compensation, and so forth) are closely tied to human-resource planning because personnel administrative actions put human-resource plans into operation. Just as there is a need to determine what kinds and how many people are needed (workforce planning), there is a need to determine and to plan the personnel actions required to acquire, to develop, and to employ personnel (staffing-needs planning).

Human-resource planning encourages and helps direct agency managers to take a "comprehensive" approach to personnel management and to the diagnosis of personnel problems. Factors affecting the need for and the availability of agency personnel are highly inter-related. So, too, the numerous steps in the personnel administrative process are interrelated and interdependent. Human-resource planning techniques help managers and personnel administrators to consider these factors in a more interrelated and systematic way.

#### WHY ENGAGE IN HUMAN-RESOURCE PLANNING?

Anticipating future requirements for manpower in the agency and forecasting future supplies of manpower are crucial to effective personnel management. Likewise, crime trends, budget forecasts, trends in the economy, population trends and the like greatly affect the need for personnel, and they also influence the availability of personnel. Thus, knowledge of current environmental conditions and impending changes in these conditions is vital to planning agency personnel policy. Current agency personnel policies in the areas of recruitment, selection, training, and so forth, produce certain kinds of results today that may or may not be appropriate or satisfactory in the future. Knowledge of both current results and likely future results produced by agency personnel administrative practice is, thus, also important. Planning-related analytical techniques provide the agency manager with powerful tools not only to analyze present conditions and effects, but also to anticipate future conditions and effects.

Besides making forecasts, human-resource planning also focuses on diagnosing personnel problems. A problem of poor agency performance or inadequate performance occasioned by insufficient, unqualified, or poorly utilized personnel requires agency managers first to diagnose the nature of and causes of the problem, and then to plan solutions. Several planning-related analytical techniques can help the manager in both of these endeavors. Additionally, human-resource planning not only helps to diagnose current personnel problems, but also to anticipate the emergence of personnel problems.

The kinds of personnel problems that will arise in an agency are numerous, and the combination of problems nearly infinite. So too, the causes of personnel problems will vary greatly from organization to organization. When we speak of personnel problems, we include conditions such as high turnover, poor employee performance, insufficient personnel, unqualified personnel, poorly trained employees, charges of discrimination in hiring and promotion, inability to attract qualified job applicants, constraints in assigning, reassigning, and promoting employees, and so forth. The numerous analytical techniques and tools described in the Handbook provide a basis for diagnosing the nature and causes of such problems and help identify and weigh potential solutions to them.

ABBREVIATED TABLE OF CONTENTS

VOLUME I:  
AN INTRODUCTION TO AGENCY HUMAN-RESOURCE PLANNING ..... 1

VOLUME II:  
PROBLEM DIAGNOSIS

PART 1:  
DIAGNOSING HUMAN-RESOURCE PROBLEMS ..... 1

PART 2, SECTION A:  
ORGANIZATIONAL CLIMATE SURVEY ..... 69

PART 2, SECTION B:  
PERSONNEL PRACTICES SURVEY ..... 205

PART 2, SECTION C:  
ENVIRONMENTAL FACTORS QUESTIONNAIRE ..... 347

PART 3:  
COMBINING RESULTS OF THE THREE DIAGNOSTIC SURVEYS ..... 413

PART 4:  
A PROCEDURE FOR PROBLEM DIAGNOSIS ..... 431

PART 5:  
THE DIAGNOSIS OF HUMAN-RESOURCE PROBLEMS: AN EXAMPLE ..... 485

VOLUME III:  
HUMAN-RESOURCE PLANNING GUIDE

PART 1:  
AN INTRODUCTION TO THE HUMAN-RESOURCE PLANNING GUIDE ..... 1

AGENCY-BASED RESEARCH ..... 11

AN INTRODUCTION TO RESEARCH METHODS FOR  
HUMAN-RESOURCE PLANNING ..... 35

PART 2:  
PERSONNEL SELECTION ..... 215

PERFORMANCE EVALUATION ..... 265

JOB ANALYSIS ..... 313

MANPOWER FORECASTING ..... 407

## PERSONNEL SELECTION

Selecting somebody for employment implies predicting that he or she will succeed if put on the job. Personnel selection is a process of making such decisions or predictions by matching individual differences in people with differences in jobs. Successful decisions about selection and placement require the best predictive information available about candidates, as well as substantial knowledge about what is needed to do the job well. Information about candidates can be obtained through a variety of sources, including application forms, interviews, tests, and reference checks. Information about jobs comes mainly from job analyses, which is dealt with in a separate section. The main topics of this section are sources and procedures for obtaining information about candidates for successful selection and placement.

Selection and placement of personnel has been a responsibility of management since the first organization was formed. Careful selection and placement is an effort to insure that employees are physically, mentally, and temperamentally adequate to function in specific jobs. Personal qualifications and employment standards determine whether a candidate is placed in a specific job. Employment standards can be adjusted to meet organizational needs and labor-market conditions.

Preceding page blank

There are two selection techniques characteristic of the selection process--the multiple cutoff or successive hurdles technique, and the multiple correlation technique. In the multiple cutoff technique, an applicant must be judged satisfactory through a series of screening devices such as application, preliminary interview, testing, reference check, and physical exam. An applicant will be eliminated automatically if there are unsatisfactory assessments at any of these points. Selection methods most likely to indicate job performance should be evaluated first, so that applicants with little chance of succeeding on the job are eliminated early in the process.

The multiple correlation technique is based on the assumption that a deficiency in one area may be counter-balanced by high qualifications in others. Thus, several selection procedures are employed in evaluating a candidate, and both high and low scores on each method are considered in an overall evaluation process. Applicants are not necessarily removed from consideration because of a low score on a particular selection device or test.<sup>1</sup>

Selection policies are very important to organizations. These policies require a great deal of planning, and the following factors should be considered in setting such policies:

1. Legal constraints, e.g., Equal Employment Opportunities, Office of Federal Contract Compliance.
2. Organizational objectives aimed at the fullest development of employee aptitudes, interests, and job satisfaction.
3. Organizational objectives concerning the degree of workforce stability or flexibility desired and future growth prospects of the agency.

4. Union policies relating to selection.
5. Forecasting and integrating manpower needs with other agency objectives.
6. Technological considerations such as automation to reduce manpower requirements or the adoption of new devices that require specially trained staff.
7. Problems posed by special groups--e.g., women, blacks, chicanos.
8. Using the multiple cutoff or the selective hurdles technique as a selection program.
9. Employee sources.
10. Role of line and staff personnel in hiring, final authority to hire or reject.
11. Degree of formality in selection process.
12. Emphasis upon groups of individuals or individual employees as basic selection units; organizations should either base their selection process on the duties and responsibilities of the jobs in the organization (job analysis), thus filling these jobs with groups of qualified individuals, or tailoring jobs to certain individuals who have specific skills and knowledge helpful to the organization.
13. Organizational objectives concerning research on and evaluation of selection procedures and policies.
14. Cost factors in employee selection.
15. Choice of professional techniques to be used, i.e., psychological tests, physical examinations.
16. Type of work assignment, e.g., team concept, individual responsibility.<sup>2</sup>

This list is comprehensive and provides a series of bench marks for referral when organizations begin planning, implementing, and evaluating their selection procedures.

## SELECTION PROCEDURES

Customarily, the following sources of information are used by organizations for selection and placement decisions:

1. The application blank
2. Preliminary interview
3. Selection tests
4. Main personnel/employment office interview
5. Investigation of applicant's background
6. Medical examination

Below, a brief description of these techniques will be given. Also particular emphasis will be put on and details will be given about certain analytical techniques specifically associated with personnel selection testing.

### APPLICATION BLANK

The application blank is used to gather information on applicants about their personal characteristics, and previous educational and work-related experience. It usually is the first step in judging a candidate. Through this information, obviously unqualified applicants can be screened and eliminated from the selection process. Four types of information asked for in application blanks can be distinguished:

- (1) information required by law or needed for government reports and employee-benefit programs, (2) information needed to communicate with the employee or his or her family, (3) personal information needed to match objective job requirements determined through job analysis and research, and (4) information to check the validity of the applicant's statements, such as names and addresses of previous employers and names of former supervisors.<sup>3</sup>

The design of an application blank should be relevant to the organization's needs and requirements. It should be attractive in appearance, and permit maximum efficiency in handling, filing, and retrieving. For reviewing applications, a checklist of relevant items may be used to expedite initial screening. One method is to place the especially significant items or crucial indicators in a box on the application blank. These indicators are certain questions on the application blank that the organization has determined to be important predictors of job success. Thus, when an evaluator is reviewing an application for the first time, he or she can screen candidates through their answers to these blocked or boxed in questions. A second method involves attaching a separate form to the application with a list of items, crucial standards, and space for the analyst to rate the applicant on these items. Another method is to print the application checklist form as a "coded box" with space for ratings on the application itself. For example, citizenship is required in a police department or correctional institution, so a "yes" or "no" can be checked for this factor in the code box.<sup>4</sup>

Application blanks can be weighted to score job applicant's characteristics for success on the job. Certain items on the forms are related to some criterion of job success (e.g., job tenure, performance index, salary increments). The weighted application blank permits rapid screening of applicants at low cost by means of simple scoring. The basis for weighting application blanks is research evidence that indicates that past experience, achievements, and behavior predict future behavior.

Some of the earliest research concerns centered on using weighted application blanks for selecting salesmen and sales clerks. These studies dealt with using biographical data to successfully predict job tenure and performance. More recent studies have shown that weighted application blanks can be used to predict creativity, turnover, job performance, and proneness to theft.<sup>5</sup> Further information on these studies can be found in the following references.

Scoring of Personal History Blanks (Report A-1921; Pittsburgh: Bureau of Personal Research, Carnegie Institute of Technology, 1921).

D. B. Goldsmith, "The Use of Personal History Blank as a Salesmanship Test," Journal of Applied Psychology, 1922, VI (No. 2), pp. 149-155.

J. F. Hughes, J. F. Dunn, and B. Baxter, "The Validity of Selection Instruments under Operating Conditions," Personnel Psychology, 1956, 9, pp. 321-324.

P. J. O'Neill, "Pattern Analysis of Biographical Predictors of Success as an Insurance Salesman," Journal of Applied Psychology, 1969, 53, pp. 136-139.

J. Welch, C. H. Stone, and D. G. Paterson, How to Develop a Weighted Application Blank (Research Center, University of Minnesota, Dubuque, Iowa: William C. Brown Co., 1952).

J. N. Mosel and H. W. Goheen, "Prediction of Department Store Sales Performance from Personal Data," Journal of Applied Psychology, 1952, 36, (No. 1), pp. 8-10.

R. L. Ellison, L. R. James, and T. J. Carron, "Prediction of R & D Performance Criteria with Biological Data," Journal of Industrial Psychology, 1970; 5, pp. 37-57.

P. Ash, "Screening Employment Applicants for Attitudes toward Theft," Journal of Applied Psychology, 1971, 55, (No. 2), pp. 161-164.

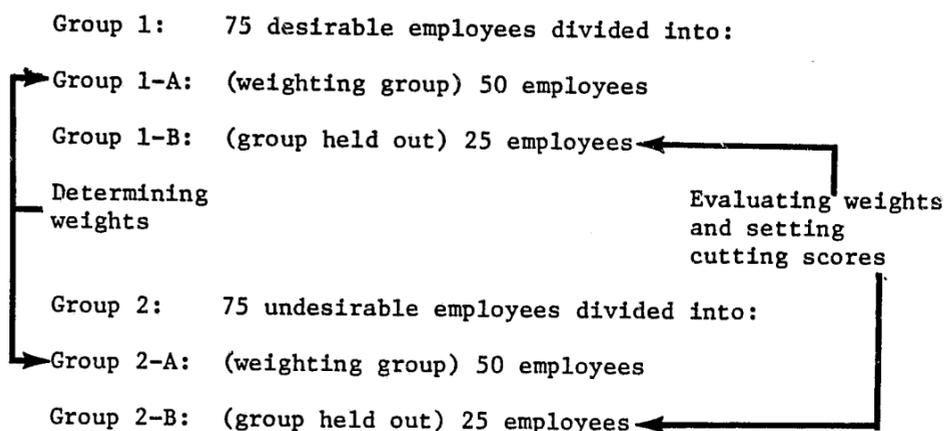
Developing weights for an application blank is accomplished by a systematic method of determining which item response is given more

frequently by applicants who prove to be desirable employees but less frequently by applicants who prove to be undesirable employees. The first step is to decide what employee performance is important to predict. This could be performance that is frequently lacking in employees hired by existing methods. For example, if job proficiency has been noticeably lacking, then objective factors indicative of job proficiency should be selected, related for example to job performance or absenteeism; or for high employee turnover, an instrument should be developed that will select longer-tenured employees.<sup>6</sup>

Once a criterion is decided upon, a sample of present and recent employees is needed. Half of these should be classified as "desirable" employees, and half as "undesirable" employees (those that, in retrospect, would not have been hired). For example, in looking at turnover rates, length-of-service records could be examined to determine how long after hiring the bulk of turnover occurred. For example, assume that a great number of employees leave within three months; these employees could comprise the "undesirable group." Those who had been with the agency for one year or more could comprise the "desirable group." According to England, a minimum of 75 percent of the individuals should be selected for each of these two groups.<sup>7</sup> If there are 150 individuals, then each group of 75 should be divided into a subgroup of 50, from which the weights will be determined and another subgroup of 25 on which the results will be checked. Table 1 illustrates this procedure.

TABLE 1

TOTAL SAMPLE - 150 INDIVIDUALS (MINIMUM) CONSISTING OF:



Source: E. F. Hartley, "The Weighted Application Blank Can Improve Retail Employee Selection" in Harish C. Jain, Contemporary Issues in Canadian Personnel Administration, (Scarborough, Ontario: Prentice-Hall, 1976), p. 137.

The next step is to analyze the application-blank items to determine which differentiate between "desirable" and "undesirable" employees. As many items as possible should be considered because many could be found not to differ significantly between criterion groups.

The responses in each application should be tabulated by long-tenured and short-tenured employees in the two 50-person subgroups. Personal history items that could be predictive include age, marital status, time lost from previous job, previous occupations, location of residence, number of dependents, time on previous jobs, and education.

The differentiating items should be weighted according to their importance in distinguishing the groups. A sample work sheet from

which weights were developed for two differentiating personal history items--age and sex--is shown in Table 2. The results of the differentiating items that are assigned weights should be checked against the two 25-person subgroups. A substantial correlation would suggest that certain personal history items do differentiate successfully between long- and short-tenured employees, and that a higher total score on the application would result in a more "stable," longer-tenured employee than one with a lower score.

TABLE 2

Response Category	Number Respondents		
	Long-tenured Group	Short-tenured Group	Assigned Weights
<u>Age:</u>			
Under 21	10	19	-1
21-30	8	11	0
31-40	12	13	0
over 40	<u>20</u>	<u>7</u>	<u>+2</u>
Total:	50	50	
<u>Marital Status:</u>			
Single	15	24	-1
Married	23	21	0
Divorced/Separated	4	2	+1
Widowed	<u>8</u>	<u>3</u>	<u>+2</u>
Total:	50	50	

Source: E. F. Hartley, "The Weighted Application Blank Can Improve Retail Employee Selection" in Harish C. Jain, Contemporary Issues in Canadian Personnel Administration, (Scarborough, Ontario: Prentice-Hall, 1976), p. 139.

A final step in developing a weighted application blank is to determine a cutoff score for selecting new employees. Scores of new applicants would need to be higher than this selected minimum score if they are to be considered further in the selection process. The long- and short-tenured employees should be separated by this score.

For example, Table 3 illustrates a hypothetical situation for determining an optimum cutting score. "The greatest percentage difference between the scores of long- and short-tenured employees occurs at the total score of six (see last column of Table 3). If applicants are accepted only if the total score of their application blank is six or higher, then 72 percent of the long-tenured people would be hired, and only 28 percent of the short-tenured people would be hired (calculated from the cumulative column). At any other cutoff score, the difference between the two groups would not be as great, or there would be more overlap. For example, if the cutoff score is raised to seven, then 64 percent of the long-tenured people would be hired (with 36 percent eliminated) while 24 percent of the short-tenured people would still be accepted."<sup>8</sup>

TABLE 3

Total Score	<u>Long Tenured</u>		<u>Short-Tenured</u>		<u>Percent Cumulative</u>		
	Number	Cumulative	Number	Cumulative	Long-Tenured	Short-Tenured	Difference
10 and above	6	6	0	0	24	0	24
9	3	9	1	1	36	4	32
8	5	14	3	4	56	16	40
7	2	16	2	6	64	24	40
6	2	18	1	7	72	28	44
5	3	21	4	11	84	44	40
4	3	24	3	14	96	56	40
3	1	25	3	17	100	68	32
2	0	15	2	19	100	76	24
1	0	25	2	21	100	84	16
0 or minus	0	25	4	25	100	100	0

Source: E. F. Hartley, "The Weighted Application Blank Can Improve Retail Employee Selection" in Harish C. Jain, Contemporary Issues in Canadian Personnel Administration, (Scarborough, Ontario: Prentice-Hall, 1976), p. 140

Another approach to weighting applications involves dividing present jobholders into two or three categories (in half: high/low; in thirds: high, middle, low) based on a success criterion such as job performance. Then previously completed application forms are examined to determine how many in the high and low groups selected each

**CONTINUED**

**3 OF 7**

alternative on a given item. A weight is assigned to the degree of difference: no difference, 0; some difference,  $\pm 1$ ; big difference,  $\pm 2$ . These weights are totaled for all applicants and subsequently ranked on the basis of highest to lowest score.

It is necessary to conduct a second validation study several years after the weighted application blank has been used. The predictive value of the instrument can diminish over time due to changes in agency policy, salary schedule, nature of the labor market, or applicant population. Different predictive items may be found because of occurring environmental and organizational changes.<sup>9</sup>

#### PRELIMINARY INTERVIEW

The preliminary interview is exploratory in nature and is conducted by a member of the personnel office. During this procedure, job positions and requirements are fully explained to candidates. The applicant's questions about the organization can be answered, and the interviewer has an opportunity to check for accuracy and completion of the application form.

Most criminal justice agencies require applicants to pass a civil service examination and other specialized tests. The preliminary interview provides an excellent opportunity for the interviewer to make certain that candidates are aware of these testing procedures and have taken steps to complete the civil service requirements. In addition, the preliminary interview serves as a screening device to eliminate uninterested applicants from further procedures of the selection process.

#### REFERENCE CHECKS

Background and employment reference checks are a procedure involved in personnel selection and placement. References should be obtained from applicants through application blanks. Personal, academic, and past employment references can verify information on an application, and provide facts about past job performance, salary, promotion, demotions, reasons for leaving previous employment, and whether the candidate would be considered for rehiring and why. The employer should keep in mind the Fair Credit Reporting Act when checking references. An employer must advise an applicant of any reports that will be gathered on him/her, and when an applicant is rejected for employment because of information obtained from a past employer, the applicant must be so notified.

Before employment in any criminal justice agency--police, courts, or corrections--a background investigation on candidates and their daily or regular acquaintances is generally conducted. For the purpose of determining the "good character" of a candidate and his or her abstinence from criminal conduct, the following people should be contacted during a background investigation: state and federal crime-information clearing houses to determine criminal record, if any, police agencies at place of residence and employment, motor vehicle departments for driving and collision records, schools, trade schools, and colleges attended, and employers and fellow employees.

The investigator should avoid personal contact with the candidate before or during investigation so as not to bias the

investigation in any way. Reports on candidates should be objective, providing facts and opinions through a variety of sources.<sup>10</sup>

## INTERVIEWS

Interviews are a widely used mechanism in the selection process. The major purpose of selection interviews is to complement other selection techniques and to assess qualities not objectively measured by other means, thus determining the suitability of an applicant for a specific position in an agency. In addition, the interview should provide sufficient information to the applicant for accepting or rejecting employment if it is offered.

There are many types of interviews--the three most common being the structured, unstructured, and stress. In the structured interview, the interviewer follows a format of predetermined questions to gather and to record information. This form of interview provides the same type of data on all applicants, and is useful for purposes of comparison. Also, it allows for systematic coverage of all necessary questions and minimizes any personal biases of the interviewer. An example of a structured interview guide appears in Figure 1.

The unstructured interview has no definite checklist of questions or preplanned strategy. The interviewer, through the answers to his or her questions, determines the direction of the interview. Generally, the applicant does most of the talking.

The stress interview puts the interviewee on the defense, and the interviewer attempts to confuse him or her through rigorous questioning. It is designed to assess the ability of the applicant to accept stress and to cope with it.

A central problem with interviewing is an easy tendency for interviewers to judge or to view an applicant favorably or unfavorably because of his or her appearance, mannerisms, or speech, not on the basis of job-related criteria. Further, the halo effect, or allowing a single prominent characteristic to dominate the interviewer's judgment of the applicant, is another problem. The following are suggestions for conducting interviews.

1. The interview should be held in private and in comfortable surroundings.
2. Enough time should be allowed to obtain necessary information--too often applicants are expected to reveal their personalities in five minutes.
3. The interview should have a purpose, planned before the interview.
4. The interviewer should collate existing information such as job specifications and application-blank data.
5. The interviewer should be aware of and try to avoid personal prejudices.
6. The interviewer should allow the candidate to talk.
7. The interviewer should establish effective rapport with the applicant.
8. The interviewer should plan concluding remarks to provide a good close.
9. Records should be kept of findings and results.
10. The interviewer should keep in mind that the primary goal of the interview is to gather information to aid in an employment decision, and should move the interview toward that goal.<sup>11</sup>

FIGURE 1  
INTERVIEW GUIDE

<u>Listen</u>	<u>Comment</u>	<u>Inquire</u>
Be receptive and responsive	Make conversation Keep questions open-ended	Probe: What? How? Why?

INTRODUCTION

<u>Cover:</u>	<u>Look For:</u>
Greeting Small talk Opening question Lead question	Appearance Manner Self-expression Responsiveness

WORK EXPERIENCE

<u>Cover:</u>	<u>Look For:</u>
Earliest jobs, part-time, temporary Military assignments Full-time positions	Relevance of work Sufficiency of work Skill and competence Adaptability Productivity Motivation Interpersonal relations Leadership Growth and development
<u>Ask:</u> Things done best? Done less well? Things liked best? Liked less well? Major accomplishments? How achieved? Most difficult problems faced? How handled? Ways most effective with people? Ways less effective? Level of earnings? Reasons for changing jobs? What learned from work experience? What looking for in job? In career?	

INTERVIEW GUIDE  
(continued)

EDUCATION

<u>Cover:</u>	<u>Look For:</u>
Elementary school High school College Specialized training Recent courses	Relevance of schooling Sufficiency of schooling Intellectual abilities Versatility Breadth and depth of knowledge Level of accomplishment Motivation, interests Reaction to authority Leadership Team work
<u>Ask:</u> Best subjects? Subjects done less well? Subjects liked most? Liked least? Reactions to teachers? Level of grades? Effort required? Reasons for choosing school? Major field? Special achievements? Toughest problems? Role in extracurricular activities? How financed education? Relation of education to career? Consider further schooling?	

PRESENT ACTIVITIES AND INTERESTS

<u>Cover:</u>	<u>Look For:</u>
Special interests and hobbies Civic and community affairs Living arrangements Marriage and family Finances Health and energy Geographical preferences	Vitality Management of time, energy, and money Maturity and judgment Intellectual growth Cultural breadth Diversity of interests Social interests Social skills Leadership Basic values and goals Situational factors
<u>Ask:</u> Things like to do in spare time? What social activities? Extent involved in community? Describe home? and family? Opportunities to build financial reserve? What kind of health problems? physical check-up? Reaction to relocation?	

INTERVIEW GUIDE  
(continued)

SUMMARY

Cover:

Strengths  
Weaknesses

Ask:

What bring to job? What are assets?  
What are best talents?  
What qualities seen by self or others?  
What makes you good investment for an employer?  
What are shortcomings?  
What areas need improvement?  
What qualities wish to develop further?  
What constructive criticism from others?  
How might you be risk for employer?  
What further training or experience might you need?

Look For:

PLUS (+) and MINUS (-)  
Talents, skills  
Knowledge  
Energy  
Motivation  
Interests  
Personal qualities  
Social effectiveness  
Character  
Situational factors

CLOSING REMARKS

Cover:

Comments about interview and applicant  
Further contacts to be made  
Course of action to be taken  
Cordial parting

Source: The Psychological Corporation, New York, NY, 1973, In Dale Yoder and Herbert G. Heneman, eds., ASPA Handbook of Personal and Industrial Relations, Staffing Policies and Strategies, Bureau of National Affairs, Washington, D.C., 1979, pp. 150-152.

In many criminal justice agencies--e.g., police departments and correctional agencies--departmental boards are formed to conduct selection interviews. For example, in a police department a three-person board, consisting of a command officer, a line supervisor, and

a patrol officer or personnel office staff member, might be assigned to interview each candidate. Each board member reviews the applicant's personal history report and attends the interview. Then the board discusses the interview, and finally rates the applicant on some predetermined criteria. It is necessary to establish a minimum passing score for applicants and to determine whether the total grade is an average of the three scores or whether one panel member can veto appointment regardless of the remaining two votes.<sup>12</sup>

PHYSICAL EXAMINATIONS

A physical examination is a necessary component for employment in many criminal justice agencies. Its purpose is to determine whether the applicant is physically capable of doing the job. The physical exam indicates the current physical condition of the applicant: it does not and cannot predict future conditions. Eligibility for group life, health, and disability insurance can also be confirmed through physical examination.<sup>13</sup>

The physical aspects of selective placement are concerned with matching and comparing the physical demands of jobs with the physical capacities of candidates. "Physical-demands analysis" deals with physical and environmental job requirements and conditions, and usually is determined by job analysis and physicians. "Physical-capacities analysis" is conducted by a physician familiar with the work environment to determine, for example, how much standing, lifting, and walking an individual can do.<sup>14</sup>

There are three types of physical-demands analysis. First, the disability method, which classifies jobs according to their suitability for classes of handicapped workers, such as the deaf or amputees. The disabilities of an employee is the major concern, rather than his or her abilities. The second method, the rating method, describes jobs in terms of the physical abilities required-- "heavy," "moderate," or "light" lifting or running, for example. One drawback of this method is that different analysts and physicians have different perceptions and definitions of "heavy," "moderate," and "light." The third method, the specific method, provides the job analyst and physician with identical work sheets listing a certain number of physical and environmental factors that are objectively defined. Each completes this report for a candidate, and then the personnel manager matches specific abilities of candidates with the specific demands of a job.<sup>15</sup>

Criminal justice agencies are concerned with detecting real and suspected disabilities. These agencies, when drafting medical standards, should focus on those disabilities that most often result in an employee's premature retirement from the department, e.g., hypertension or heart disease. Besides physical examinations, many police departments require physical agility tests. These tests should validly measure the actual degree of physical condition and ability required in performing the job.<sup>16</sup>

## SELECTION TESTS

Other methods of assessment besides application forms, interviews or reference checks are needed in order to select the best candidate for the job. Tests can contribute a great deal to better personnel selection and placement. Tests can provide:

1. Candidate assessment in a standardized situation.
2. Objective performance evaluation against a common yardstick.
3. Evaluation on a reliable measure.
4. Evaluation of an applicant against a clearly defined type of behavior that is a valid predictor of a desired job performance.<sup>17</sup>

## SELECTION TEST CONSTRUCTION

Many organizations utilize commercially available tests for selection purposes. However, specific agencies can construct their own tests to meet their own needs. Tests, whether commercially available or devised by an agency, should meet certain criteria and follow general construction procedures.

The selection test is a predictor test designed to predict the probability that a candidate will succeed at the job for which he or she is applying. It is necessary to review accurately specific job requirements and characteristics considered essential to job performance. This process is called defining the criterion variable or stating in measurable terms criteria that accurately describe the job to be filled.

The next step is to conduct research about previous attempts to measure the attributes in question, and to decide on the content and

form of the test. A predictor variable of job performance should be stated in measurable terms. For example, a police officer might be required to exhibit his or her knowledge in criminal law and procedure as a predictor of successful job performance. Such knowledge of criminal law could be measured through situational questions--for example, about investigating suspicious vehicles or intercepting a robbery in progress. The individual's knowledge of criminal law would be measured through questions about specific incidents. Test design is important. Design decisions include the number of questions to be included, whether the test should be in group or individual form, should be of performance, should be taken with pencil and paper, should be open-ended or multiple-choice, should have a time limit, what the instructions for administration and marking should be, and how the test should be laid out.

The next step is to draft a large number of items or questions for the test. The question pool should contain at least two to three times as many questions as will be needed for the test in its final form. The greater the number of questions, the more latitude there will be to choose among them in constructing the test. At this point it is good practice to have the pool analyzed for flaws. Unclear statements, incorrect answers, or more than one correct answer, extra-ordinary difficulty or simplicity, and inappropriateness are deficiencies that should be eliminated from the final test.

The question pool can be tested by administering it to a test group, roughly equivalent to those who will be the eventual subjects

of the finished exam. The results of this trial are analyzed to ascertain:

1. How difficult each separate question is by computing the percentage of the group who fail to get it right.
2. How valid each item is or how much those who answer this particular question right exhibit the characteristics the test is aimed to measure.<sup>18</sup>

More predictive efficiency can be expected when the criterion and predictor variables are well constructed. The variables are well conceived and constructed when a test does indeed measure certain traits or qualities deemed important for the learning or performance of some tasks, even though the test itself does not directly measure performance of those tasks. Each question on the test is correlated with all others to ensure that each question is measuring the same trait measured by every other question. Thus, the analysis of the questions will determine whether the test questions consistently measure the specified traits.

It must also be shown that the test provides a stable or reliable measure that is valid in the actual selection process. The reliability of a test is (1) how similar applicants' scores would be if they were to take another similar test at the same time, and (2) how similar their scores would be if they had taken the same tests on a different occasion. Reliability is never perfect because no two tests are exactly parallel, and individual's scores on any task will fluctuate to some degree. Reliability can be determined by using a parallel version of the test, by re-testing after a suitable interval, or by a within-test estimate of some kind.

Generally, objective selection tests are preferable to those in which the opinion of the scorer influences the results. Whenever opinion affects a test score, it is impossible to compare test results with others.<sup>19</sup>

The Executive Committee of the Division of Industrial and Organization Psychology of the American Psychological Association have listed eight principles of test construction and use.

1. The choices of tests and other assessment techniques should be based on a knowledge of organizational needs and careful job analysis. For example, it may be important to predict how quickly new employees can learn a job. In another setting, workers' career development in employment or motivation may be the primary concern; therefore, appropriate criterion measures may be attendance or survival on the job.
2. The methods of gathering and analyzing data in a validation research study should be consistent with expected or recommended use of the results. The validation data should be collected at approximately the point in the selection process where the tests will be used in practice.
3. Standardized procedures should be followed in administering and scoring tests. All test takers should receive exactly the same instructions for taking the test; and on timed tests, time limits should be observed. Scoring and interpreting test results should follow the instructions in the test manual or other directions accompanying the test.
4. Statements about validity should refer to the validity of particular interpretations or of particular types of tests used. No test is valid for all purposes. The scope of the study should be stated in terms of the jobs, samples of individuals represented, and the performance measure to be predicted.
5. A test user should state the basis for adoption of a cutting score which is used for personnel decision making.

6. Criterion measures should be described completely and accurately. These measures should be obtained independently of test scores.
7. Basic descriptive statistics should be reported for the validation sample, including the number of cases, measures of central tendency and variability for both test and criterion.
8. When the employment context permits, there should be an independent validation study for each ethnic, sex, or other identifiable subgroup for which there is reason to suspect that validity might differ. This principle relates to differential validity, and refers to tests that may have different predictive value for different populations. The tests may be predictive for one ethnic group and not another, and it would be inappropriate to use them for the latter group.<sup>20</sup>

#### GENERAL CONSTRAINTS AND CAPABILITIES OF SELECTION TESTS

A developer, when constructing and using a test, should bear in mind certain limitations and problems of tests. Often it is difficult to obtain accurate measures of job performance.

If the number of applicants is less than or nearly equal to the number of open positions, the costs of developing a special test would far outweigh its necessity. It would be more advantageous to use a commercially developed test. Also, the variables that are successful in predicting short-term job performance may not be applicable to long-term performance.

Overall, selection tests should be used only to supplement other selection devices. Tests measure what an individual can do, not what an individual will do. A test must be validated in the particular organization to be of any value; it is necessary to "test the test" for the organization to have any confidence in its predictability or

in its measuring what it's supposed to measure. The greatest contribution a test can make to the selection process is in situations where it has been difficult to obtain satisfactory employees by the use of other selection methods. Decision makers, hiring or rejecting individuals because of specific test scores, should be cautious in considering numerical test scores as precise measures of individuals. Is a person scoring a 92 all that much more qualified than one scoring 90? Test users should remain mindful of such limitations of tests and their usefulness. Since employees differ in the degree that they fit their jobs, employers must pay careful attention to picking selection and placement tools that will help increase the number of desirable employees and decrease the number of less desirable employees. As discussed below, there are several different types of standardized tests used in personnel selection and placement.<sup>21</sup>

#### TYPES OF SELECTION TESTS

Several different types of selection tests can be utilized by criminal justice agencies. The following discussion consists of general descriptions of test types, as well as specific tests for each general category. The chart on the following page provides examples of specific tests and their uses in particular criminal justice agencies. The chart is actually a review of specific tests and their applicability in criminal justice agencies. The author and year of each review is stated, as well as type and specific test, criterion that is being measured, results, and conclusion. In addition, several authors have given recommendations for using the tests.

Several of the tests reviewed were used in law enforcement agencies while in other instances the study site is not listed.

Intelligence tests indicate the general intellectual capacity of an individual by sampling his or her performance on a variety of tasks. These tests may yield an overall Intelligence Quotient (IQ), which represents an individual's mental age.

The Wesman Personnel Classification Test provides scores on verbal and qualitative abilities. The first part of the test consists of verbal analogies in a form like this: "\_\_\_\_\_ is to water as eat is to \_\_\_\_\_." Four options are provided for each of the two blanks, and the respondent is to choose one for each blank, perhaps selecting the number corresponding to the key word in the first series, drink (2), and also the letter corresponding to the key word in the second series, food (C). There are 40 such items with an 18-minute time limit. The second part of the test contains 20 items with a 10-minute time limit. These involve the addition, subtraction, multiplication, and division of integers, decimals, and fractions. Percentages, square roots, and ratios are also included. The items stress "the use of numerical concepts . . . the ability to perceive relationships and to operate with ingenuity," rather than "sheer figure-handling speed."<sup>22</sup> The Wesman Personnel Classification Test is published by The Psychological Corporation, 304 East 45th Street, New York, NY 10017. Test forms, answer sheets, and a test manual can be obtained from the publisher.

SUMMARY OF LITERATURE REVIEW

Study	Analyzed	Test Used	Independent Variable	Dependent Variable	Results	Conclusions	Recommendations
Terman (1917)	Intelligence	Binet-Simon	Education	IQ	Police applicants mentally inferior - median IQ of 84	Score of 80 was considered dull normal range	Candidates with IQ lower than 80 be eliminated from selection process
Spaulding (1948) Delaware State Police	Vocational interest	Kuder-preference record	Education	IQ, Civil Service test	Strong inclination toward helping services	Police applicants suffer "necessary syndrome"	
Humm and Humm (1950) Los Angeles Police Department	Personality tests	Humm-Wadsworth temperament scale	Various temperament scales	Voluntary or involuntary termination	High correlation in dismissal group	Temperament Scale was a good measure of success in a police agency	
Kates (1950)	Vocational interest	Strong Vocational Interest Blank (SVIB)	Various indicators of interest in police work	Job satisfaction	No difference between policemen and general population in terms of interest in police work	Absence of any relationships was due to complexity of police role	
Blum (1964) not identified	Personality tests	MMPI	IQ and mechanical tests developed for police applicants	Career development, personal injury, absenteeism, disciplinary charges, and commendations	High correlations were found between certain MMPI tests and serious misconduct	MMPI Schizo-Scale could be used to identify bad risks before appointment to police agency	The use of MMPI Schizophrenia subscale and (obsessive/compulsive) scale
Colarelli and Siegel (1965) Kansas State Highway Patrol	Personality of police applicants	California Test of Mental Maturity, Allport-Vernon Study of Values, MMPI	Scales on standard personality tests	Supervisory evaluation, arrest history	No specific correlations cited; men predicted to be good policemen generally performed well	Candidates rated satisfactory by supervisors; enjoyed the authority of badge and uniform	

## SUMMARY (continued)

Study	Analyzed	Test Used	Independent Variable	Dependent Variable	Results	Conclusions	Recommendations
Eilbert (1966) New York City Police Department	Personality, aptitude	Developed by author and Otis Intelligence Test	Battery of tests	Specially developed supervisory evaluation form which ranked officers high or low	Tests were unreliable, failed to provide significant difference between high and low rank performance		
Rhead (1968) Chicago Police Department	Personality	MMPI, Draw-A-Person Test	Projective Test	Capacity of the ego	Police applicants: Suspicious, take risks, impulsive	State of ego influences success/failure	
Gottesman (1969) Not Identified	Personality	MMPI Profiles	Scales on MMPI	Compared police applicants and veteran group	Typical police applicant more adjusted but more defensive than veteran group	MMPI general population norms are inappropriate as comparisons for police applicants	
Goldstein (1971) New York City	Personality	Civil Service Tests, MMPI	Scales on testing procedures	Pass or fail Civil Service Test	Applicants who pass likely to avoid danger, are honest, good listeners	There is a great difference between those who pass or fail a Civil Service Test	Retention of Civil Service Tests
Hogan (1971) Maryland State Police	Personality	California Psychological Inventory	Test Scores	Supervisory evaluation, grades in police academy	Position correlation	Replicates earlier research findings of Baehr and Matarazzo	
Cohen and Chaiken (1972) New York City P.D.	Biographical information	Personnel files	Background characteristics (33 in all)	Tenure, accidents, ratings, commendations, disciplinary charges, absenteeism, training grades	Strongest correlations existed between age, education, employment history, difference between black and white	Early job performance is a good predictor of later performance	Single selection process, continuing education, older officers to sensitive areas, broaden training programs

SUMMARY (continued)

Study	Analyzed	Test Used	Independent Variable	Dependent Variable	Results	Conclusions	Recommendations
Manyak (1975) Port Authority Police, New York and New Jersey	Biographical information	Personnel files, weighted application blank	Background characteristics	Tenure, supervisory evaluation, commendations, disciplinary actions	Able to predict 62 percent successful officers	Best background predictors are highly discriminatory	Use of coded application forms, computerize all selection information

Source: J. M. Polard, "Police Selection Methods and Prediction of Police Performance," Journal of Police Science and Administration, Vol. 6, 1978, p. 374.

The Adaptability Test is designed to measure "mental alertness" in job applicants. The test, which takes 20 minutes, yields three scores on the applicant: verbal knowledge, computational speed and accuracy, and visual-perceptual speed and accuracy.<sup>23</sup> The test publisher is Science Research Associates, Inc., 259 East Erie Street, Chicago, Illinois 60611.

The Wechsler Test is divided into 11 subsets, each containing one item type. The subsets are grouped into two series, a Verbal Scale and a Performance Scale. The verbal scale includes tests of information, comprehension, digit span, similarities, arithmetic, and vocabulary. The performance scale includes picture arrangement, picture completion, block design, object assembly, and digit symbol.

These 11 subsets are described in the following manner:

1. General information. This scale is a series of open-ended questions covering a wide variety of facts. The questions concern the kinds of information people pick up in ordinary contact with the world rather than through specific or specialized education.
2. Comprehension. A series of 10 items, open-ended, that tap the individual's understanding of the need for certain social rules for the solution of ordinary social problems.
3. Arithmetical reasoning. These are typical story problems. Most are administered orally, although the subject is shown the more difficult ones. Correctness and speed of response are both scored.
4. Digit span. The subject hears a sequence of numbers and then repeats them in proper sequence. The series varies from three to nine digits.
5. Similarities. Pairs of numbers are presented to the subject who must abstract from them a common property or characteristic.

6. Vocabulary. A list of 42 words is presented for definition. They vary from simple, commonplace words in everyday usage to those rarely encountered.
7. Picture completion. Involves relatively little performance on the part of the subject. A series of pictures is shown, and in each case a subject must indicate or describe the missing part of the picture.
8. Picture arrangement. The subject is given a set of pictures to be arranged in proper order; graded on a time basis.
9. Object assembly. Jigsaw cutouts of four objects are presented to be put together one at a time. Both speed and correctness are scored.
10. Block design. Working with a set of small white and red, or red and white faces, the subject must reproduce a series of 10 different printed designs, working for speed and accuracy.
11. Digit symbol. This is a coding test where the subject is shown nine symbols, each of which is paired with a number. The sheet handed to the subject contains the scrambled symbols, and he or she must record the symbol under the corresponding number. The task is to see how many can be done in a limited time span; the subject who learns the code quickly will do better on this test.<sup>24</sup>

The test is a point scale where each item is credited a certain number of points, and points earned are added to determine an overall score. Then the total number of earned points is converted, by norm tables provided in the test manual, into a Wechsler IQ. The full test requires 45 minutes to an hour to complete. A copy of the Wechsler Test can be obtained from the World Book Company, Yonkers, New York.<sup>25</sup>

Overall, intelligence tests have three limitations in their use for evaluating job applicants. First, it is difficult to validate general intelligence tests for use in personnel selection because there is little agreement between psychologists on the definition of

"intelligence." Intelligence can be broadly defined through criteria such as numerical reasoning, verbal fluency, and memory skills. The necessity for these skills varies from job to job. Second, some intelligence tests yield negative correlations with job performance. After a point, the more intelligent a person is, the less likely he or she will be able to cope with a routine job. Third, intelligence tests may be culturally and environmentally biased in favor of certain educational and linguistic backgrounds.<sup>26</sup>

Aptitude tests measure a person's overall ability to learn.

They are aimed at predicting later performance in a specific type of behavior. Six main aptitudes that can be tested fairly satisfactorily include:

1. Verbal aptitude, or facility in using words.
2. Numerical aptitude, or facility in using numbers.
3. Spatial aptitude, the ability to judge and to manipulate shapes and sizes.
4. Mechanical aptitude, the ability to comprehend principles of transmitting moments.
5. Mental dexterity; psychometer ability.
6. Clerical ability, or the ability to check and classify.<sup>27</sup>

Generally, aptitude tests cannot measure motivation, only ability.

Tests are designed to predict the applicant's ability to learn a particular job. Therefore, aptitude tests should be carefully selected in relation to specific jobs.

Verbal aptitude tests are more often referred to as verbal intelligence tests. A facility in the use of words is important to

jobs in which oral and written communication play a vital role. An individual needs verbal skills in order to get a solution implemented. Solutions to problems can be grasped in one's own mind without verbalizing, but verbal skills are needed to communicate the idea to others. The Henmon-Nelson Verbal Aptitude Test is easily administered and takes 30 minutes to complete. The publisher is the Houghton Mifflin Company, 2 Park Street, Boston, Massachusetts 02107.<sup>28</sup> The Ohio State University Psychological Test is an untimed test of verbal abilities. A copy can be obtained from the Science Research Associates, 259 East Erie Street, Chicago, Illinois 60611.

There is a basic special aptitude for making straightforward numerical calculations. This can be measured through a test of addition, subtraction, multiplication, and division. The Purdue Industrial Mathematics Test is used to measure numerical abilities of adults.<sup>29</sup> The test publisher is the Division of Applied Psychology, Purdue University, Lafayette, Indiana.

Tests of spatial abilities require candidates to reason about forms, and to recognize relations between them. Tests can be either pencil-and-paper or apparatus tests. The Revised Minnesota Paper Form Board Test takes 20 minutes to administer, and measures different itemtypes and spatial aptitude.<sup>30</sup> Its publisher is Psychological Corporation, 522 Fifth Avenue, New York, New York.

Interest tests present a candidate with a large number of systematically selected choice situations in which he or she is to indicate likes and dislikes. These situations include occupational, leisurely, and recreational activities. Interest tests assume that

a definite pattern of interests exists for those who are successful in an occupation, and if one has similar interests to that of a successful practitioner in some occupation then the person examined will like that line of work. The value of interest inventories depends greatly on the candidate's honesty and cooperation. These tests are quite vulnerable to faking. For instance, a subject for a persuasive-type job could manipulate certain answers to get a high persuasive-interest score. Therefore, interest tests may have a limited ability in straightforward selection for particular jobs. However, they are useful in broad selection programs that seek entrants to a variety of jobs or jobs general in nature. Similarly, interest inventories can be used for career guidance by aiding an individual to sort out his interests in a career.<sup>31</sup>

The Strong Vocational Interest Blank (SVIB) includes 400 activities and topics. Scores are expressed in terms of the similarity of the applicant's interests to those of people in certain occupations. Subjects indicate whether they "like," "are indifferent to," or "dislike" a topic. Scoring is done in terms of agreement with responses of persons working in a given vocation, i.e., if a person gives responses on the SVIB similar to those of a police officer, it is inferred that his or her interests resemble a police officer's. Scales for various occupational groups were built empirically by comparing the responses of persons in a given occupation with responses of a general population sample, scoring weights were assigned to discriminating items. The test manual accompanying the

Strong Vocational Interest Blank includes scales and scores for various occupations.<sup>32</sup>

The major drawback of the Strong is the effort involved in a complete scoring. There are 41 vocational scales available, plus the interest maturity, occupational level, and studiousness scales. Another weakness is the ability of the subject to fake an interest score if he thinks it is desirable to do so. This is not likely if the person is earnestly in search of vocational counseling, but where the Strong may be used as a screening device, this factor may be important. A "lie" scale would be a useful addition if such a thing were possible. Interests should not be looked upon as a separate thing from the personality, but should be considered as a part of the total personality and judged accordingly. The Strong offers some exciting possibilities of research in the study of personality. The Strong is a valuable instrument in the vocational counseling situation as an adjunct to other sources of information about the individual. The tedious scoring is not always a serious problem, for much valuable information can be gained from even incomplete scoring.<sup>33</sup> The publisher of the Strong Vocational Interest Blank is the Stanford University Press, Stanford University, California 94305.

The Kuder Preference Record Test has several forms. A candidate indicates, for ten broad interest areas, in sets of three activities each, the one most liked and least liked, leaving the third activity unmarked. The ten interest areas are outdoors,

mechanical, computational, scientific, persuasive, artistic, literary, musical, social service, and clerical. The test has 168 items and takes about 45 minutes to complete. A high score on a scale indicates greater preference than most people express for a specific kind of activity; degree of participation in that activity is not measured by the scale, nor is skill.

The Kuder Preference Record--Personal (KPR-P) was developed to define (to measure) interest and personality factors not already covered by the Kuder Preference Record--Vocational (KPR-V). Items presented in forced-choice preference triads to adults and high school pupils were selected to yield five scales having high internal consistency and low intercorrelations with each other and with the KPR-V scales.

The five scales were designed to yield information helpful to a person in deciding the interpersonal relationship situation in which he or she prefers to work. The five scales are titled: (a) preference for being active in groups, (b) preference for familiar and stable situations, (c) preference for working with ideas, (d) preference for avoiding conflict, (e) preference for directing or influencing others. In addition to these five preference scales there is a verification scale.

The verification (V) scale reflects the degree to which the examinee expresses conforming or "popular" responses. A typical V-score cast doubt on the meaning of preference scores and may indicate carelessness or ignorance of the examinee in completing the

record. They may also indicate truly unusual preferences that cannot be adequately evaluated by the KPR-P. The acceptable range of scores on the scale was established empirically.<sup>34</sup> The test manual and forms can be obtained from Science Research Associates, Inc., 259 East Erie Street, Chicago, Illinois 60611.

Personality tests measure some aspect or set of aspects of one's total personality or temperament. Personality tests have no correct or incorrect answers but predict whether an individual will like or dislike doing particular tasks. Temperament tests predict such things as the ability of an individual to accept high-tension situations. Both personality and temperament tests can be in the form of objective paper-and-pencil tests or projective tests where subjects are asked to project their own interpretation into certain standard stimulus situations. The meaning an individual places on a stimulus is dependent on certain held values and motives.<sup>35</sup>

The Minnesota Multiphasic Personality Inventory consists of 551 items that are judged "true," "false," or "cannot say."

It can provide considerable valid and clinically useful information that goes well beyond simple diagnostic classification, a task for which the test was originally designed and one which in fact it does not always accomplish very well (although it may compare favorably in this latter respect with the clinical interview, which itself has limitations for making valid diagnostic classifications). The test is useful, for example, for assessing degree of depression or anxiety or suicidal risk or ego strength or potential for impulsive acting out, to mention a few variables that are somewhat independent of specific diagnostic classification. It is most useful to supplement rather than to replace information obtained by interview or observation.<sup>36</sup>

The publishers provide the professional with a kit of materials along with guidelines for the use of the service. Answer sheets are mailed to the service, where they are scored and interpreted by computer. Narrative reports are then returned to the referring professional. These vary considerably, particularly in regard to complexity of the narrative and, indeed, one service offers several "levels" or types of reports, some of which are geared for consumers who are not psychologists or psychiatrists.<sup>37</sup>

The publisher is The Psychological Corporation, 304 East 45th Street, New York, New York 10017.

The Gordon Personal Profile is designed to yield four scores on ascendancy (takes the lead in group discussions), responsibility (thorough in work undertaken), emotional stability (calm and easy going manner), and sociability (enjoys having people around). It is a brief 18-item questionnaire that is self-administered.

The GPP provides a modified forced-choice format which the manual proposes as a control for favorability in self-description. In each of the 18 items, four statements representing the four personality dimensions are grouped so that two are high preference and two are low preference. The individual is asked to select the statement "most" and "least" like himself from each item group. Gordon presents evidence that suggests that faking on the test does not markedly influence group-scale-score means if it is assumed that application for employment systematically elicits more favorable self-descriptions from job candidates.<sup>38</sup> The Gordon Personal Profile can be obtained from Harcourt Brace Jovanovich, Inc., 757 Third Avenue, New York, New York 10017.

The California Psychological Inventory measures traits thought to be relevant to interpersonal behavior and intellectual functioning. It was developed to make possible the comprehensive, multidimensional assessment of normal persons in a variety of settings. The resulting inventory, composed of 480 statements, is essentially self-administering for literate subjects who are instructed to respond to each item on a separate answer sheet, "True" or "False" according to whether they agree or disagree with a statement or feel that "it is" or "is not" true about them. The inventory yields 18 raw scores. Three types of answer sheets are available: one for hand scoring and two for machine scoring.

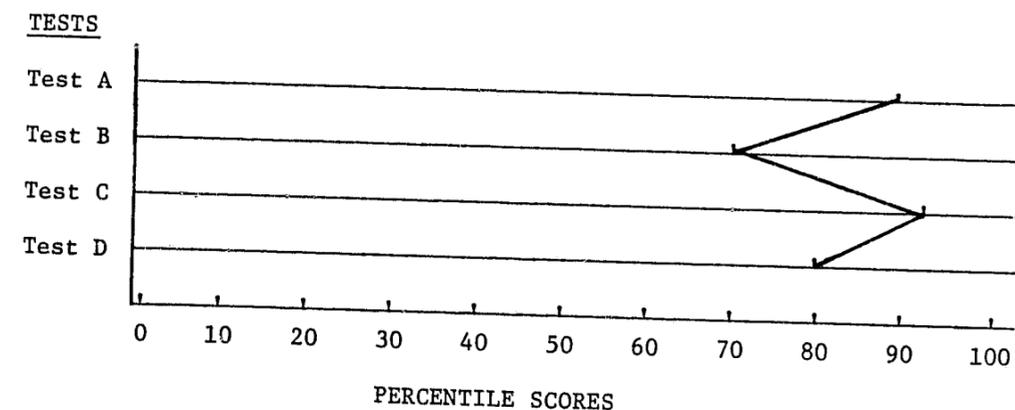
The 18 scales include dominance, sociability, responsibility, good impression, flexibility, intellectual efficiency, achievement via independence, self-acceptance, communality, interest mode, maturity, poise, ascendance, achievement potential, and sense of well-being.<sup>39</sup> Its publisher is the California Test Bureau, Del Monte Research Park, Monterey, California 93949.

Use of Multiple Tests. In many instances instead of relying on one test in the selection process, a battery of tests can and should be administered. This battery of tests will provide measures on all capabilities and abilities necessary for job performance (assuming that no single test can do this).

In addition, instead of computing a composite score, test results are plotted on a graph that depicts the separate test scores an applicant has received. Each score measures a different aptitude

or ability necessary for job performance. The appropriate tests used are weighted as to importance in predicting job performance. Through this prediction equation it is possible for a particular candidate to have a low score on one test and still obtain a passing composite score.<sup>40</sup> Instead of computing a composite score, when multiple tests are used, it is easier to plot a profile of the scores that an applicant has obtained on the various tests. Such a plot is shown in Figure 2. Using this approach the profile can be compared with a normal or standard profile that is typical of successful workers in that occupation in the agency.<sup>41</sup>

FIGURE 2  
PROFILE PLOT



Source: D. S. Beach, Personnel, The Management of People at Work, New York: The MacMillan Company, 1970, p. 261.

## INTERPRETING TEST SCORES

Generally, commercially available tests provide test manuals that describe procedures for analyzing the relationship between test scores and job success. Validity data, reliability data, the types of subjects appropriate for the test, necessary conditions for test administration, methods of interpreting test scores, and other information about the test form is available in the test manual. Copies of tests and test manuals are available from the publishers.<sup>42</sup>

There are several basic terms that test users should be familiar with. Standardized tests (examples above) measure how an individual compares with a group of similar individuals who took the same test for similar purposes. This comparison group is called a norm group. Test scores that compare individuals to a norm group are called norm-referenced test scores.

The raw score is the numerical report that describes a candidate's test performance. It usually reports the exact number of questions answered correctly on a test. Standing alone, the raw score means relatively little, but can be significant when compared with some standard. When compared with the raw scores of the norm group, the raw score can be expressed in a number of different ways to compare a candidate's scores with others' scores. The percentile rank score, the stanine, and the IQ are the most common norm-referenced test scores.

In the percentile rank score, a candidate's test performance is ranked or placed in relation to others who took the test. It tells what percentage of the norm group subjects did better and what

percentage did not as well. Percentile ranks begin at 1 and go to 99. A percentile rank of 75 means the subject scored as well as or better than 75 percent of all those who took the test. In addition, it means that 25 percent of those taking the test scored as well as or better than this candidate. (The percentile rank of 75 does not indicate that 75 percent of the questions were answered correctly.)

Stanine scores are more general measures of performance than percentile ranks, and range from one to nine. Each stanine score includes several percentile ranks. For a stanine score of six, all those scoring between the 60th and 77th percentile ranks would be included. Although some candidates could have different percentile ranks, they would still have the same stanine score. Average stanine scores are 4, 5, and 6; below average are 1, 2, and 3; and above average are 7, 8, and 9.

The IQ is another type of score used to show a candidate's performance rank in comparison with others. It is not a direct measure of intellectual or innate ability. An average IQ score is 100, an above-average score is 116, and 84 is a below average score.

A criterion-referenced test measures what people have already learned. These tests are different from norm-referenced tests. Criterion-referenced tests give specific information about what an individual has not learned. Test results indicate which skills an individual has or has not learned. A norm-referenced test is usually designed to measure broad areas. Scores indicate an individual's placement in relation to others.<sup>43</sup>

## SUMMARY

Selection is the process whereby managers decide to accept or to reject recruits or other applicants. The primary objective of a selection program is to obtain a good match between the qualifications of the individual and the requirements of the job. Most commonly, selection programs consist of a number of hurdles which must be cleared by candidates in order for them to be hired by the organization. These hurdles usually include the application blank (which may or may not be weighted), the preliminary interview, reference checks, primary interviews, a physical examination, and specific selection tests.

The application blank and the preliminary interview are designed to eliminate applicants who are uninterested in the job or unqualified. Specific employment tests supply a sample of behavior which is used to make inferences about the future actions or performance of the test taker. Personal- and employment-reference sources are often contacted to verify information supplied by the candidate or to obtain additional information. Among the most useful sources of information on prospective employees are previous employers.

An in-depth interview with the job candidate is usually conducted by a member of the organization. When an applicant has successfully overcome these hurdles, a physical examination is required to confirm that he or she is physically capable of performing the job. Finally, management, on the basis of the candidate's performance in overcoming these hurdles, must make a decision whether to accept or

reject that candidate. Overall the goal of these hurdles is to improve the proportion of success and to reduce the percentage of errors in the selection process.

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## PERFORMANCE EVALUATION

Performance evaluation or appraisal is the systematic evaluation of an individual's performance on a particular job. Performance evaluation techniques may be used also to assess an individual's potential for development. Performance evaluation is a management tool; it is a component of the personnel information system that supplies management with information about how well objectives are being accomplished. In addition, it provides an employee with information about how management views his or her performance and contribution to the organization. Formal performance appraisal then, describes how well a jobholder does his or her tasks, indicates, on the basis of results achieved, how well he or she is fulfilling certain requirements of the position, communicates to the jobholder his or her rating, and establishes some plan for improvement.

There are three principal reasons for establishing a performance evaluation program. The first is to provide administrative control over such personnel actions as salary increases, promotions, transfers, demotions, and terminations. The formal evaluation attempts to develop an objective, valid, and comparable technique for more control in personnel decisions.

Second, the formal evaluation process supplies a means of communicating job responsibilities and goals to an employee. The

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supervisor and subordinate jointly review progress toward these goals and, together, plan the employee's development. Thus, evaluation provides a basis for counseling and coaching by a supervisor. The supervisor, where it is appropriate, can suggest changes in attitude or improvements in skill or job knowledge.

Finally, performance evaluation forms a basis for agency research. Performance measures can be used to determine the value of the procedures utilized in such activities as selection, training and assignment.<sup>1</sup>

Performance evaluations also benefit employees by providing them with information about their present performance and about ways of improving their future performance. For example, a supervisor can inform an employee that he or she ranks second out of ten members in a group thus indicating the present status of the employee's performance. And if the supervisor provides information to the employee on how to better his or her performance, the supervisor is issuing feedback about the employee's work. Performance evaluations can highlight needs and opportunities for growth and development for employees. This can result in employees having the opportunity to enroll in formal training courses, self-study courses, or job-related activities, such as special broadening assignments and job rotation. All of these mechanisms for improving performance benefit employees, and may evolve from performance evaluations.

Many organizations relate job promotions, transfers, and wage and salary scales to performance evaluations. When job openings and salary increases become available in an agency, the employee who

will receive the promotion, transfer, or raise can be selected in part on the basis of a performance appraisal. Thus, performance evaluations benefit employees by allowing managers to recognize the most qualified employees for promotions and raises.

Many organizations use appraisal programs for a variety of reasons. In order to meet the specific needs of an agency, certain questions need to be answered: (1) What is the appraisal program expected to accomplish? (2) Is the program to be used for development or control? (3) Who will be involved in the program?<sup>2</sup>

An employee performance evaluation program should be consistent with the primary objectives of the agency. To be successful, a program should be viewed as a management tool designed to meet specific objectives. For example, if a manager recognizes that developing employees is of crucial importance, the use of a performance evaluation program to achieve that purpose should be given strong consideration.<sup>3</sup>

There are three essential ingredients to developing a successful performance evaluation program. First, top management must support any performance evaluation process adopted in the agency by publicizing support of it throughout the agency. Top management needs also to understand the program and to become involved in it so that employees recognize the sincerity of this commitment. Second, employees should be involved in the development of the performance evaluation system so as to obtain and insure their commitment. By being involved in the development stage, employees are encouraged

to recognize the program as "theirs," and so perhaps will be more willing to support it. Third, the information obtained from the evaluations should be used by the organization--to improve the organizational environment, to improve individuals' performance, and to upgrade or to alter the overall personnel complement of the agency.<sup>4</sup>

It is also important to test the initial program before its formal implementation in the organization. The approach used to test the program will depend on such constraints as time, money, and manpower available. One procedure is a pilot program where a small number of supervisors are randomly selected, trained sufficiently in the new evaluation technique, and then given time to try it out on one or more of their subordinates. After the pilot program, both supervisors and subordinates are interviewed to identify format and methodological problems. With this approach, problem areas are isolated while, at the same time, supervisors' and subordinates' identification with the program is reinforced.

Once a particular performance evaluation program has been chosen, tested, and approved by management, the next step is communicating the program to the remaining agency employees who will be involved in it. Top management should affirm support for the program, and explain fully the "whys, whens, and hows" of the program. In a small-to-medium-sized organization, a series of meetings for supervisors about using the program can accomplish this purpose. However, a larger organization may choose to implement the program department by department. A large police department may do it precinct by precinct.<sup>5</sup>

## METHODS OF EVALUATING JOB PERFORMANCE

In general, personnel ratings are formal, written appraisals by a supervisor about the performance of one or more subordinates. Such evaluations include assessing or recording judgments or observations related to an employee's past, present, or future behavior (future performance) in a work setting. Ratings are used to evaluate employees as individuals and to provide means of comparing individual employees in a specific work group.<sup>6</sup>

The following questions should be considered in observing and recording behavior on the job. First, "what behaviors should be observed and recorded?"<sup>7</sup> Those aspects of job performance or behavior relevant to doing the job properly should be observed and recorded. Those not relevant should not be considered. Making this distinction properly requires that a careful job analysis be conducted to insure that relevant and valid criteria are chosen. Second, "what is an adequate measure of job performance?"<sup>8</sup> Means must be found to measure achievement of certain expectations about performance. That is, valid and reliable measures of job behaviors must be identified.

Third, "what problems are encountered in observing and recording job behavior and how may they be overcome?"<sup>9</sup> One problem is the rater's (e.g., the supervisor's) willingness to rate according to the principles and mechanics of the prescribed rating program. The rater may be unwilling or unable to comply with the procedures. For example, a rater may not have participated in developing the evaluation program. Thus, he or she may disagree with the program and be unwilling to follow its directions, or not understand the program and so be

unable to follow it. Another problem is the rater's ability to rate accurately, which can be vitiated by an ambiguity in the trait to be observed, by lack of training or of a uniform standard of rating, or by the rater's own biases. There is a tendency for raters to be unwilling to make unfavorable evaluations of employees they identify positively with. When a rater evaluates an employee, he or she tends to think in terms of what kind of person the employee is as well as what caliber work the employee has produced. Thus, appraisals often admit subjective feelings about the employee's personal traits and characteristics into the evaluation. These are subjective determinations because different raters may evaluate the same individual differently. For example, Bill Smith's attitude toward the agency may seem acceptable to one supervisor, but another may feel Smith is a little too critical of departmental policies and score him lower on that account. Appraisals should be limited to aspects of performance appearing overtly in the work environment. The specific duties and responsibilities stated in a job description should be the basis for job evaluation. Job analyses can provide the basis for validly constructing such job descriptions. Aspects of performance should be reduced to specific types of behavior, and judgments should be made on those behaviors.<sup>10</sup>

Rating forms should provide controls for differences among raters in making judgments. Rating forms should force the rater to discriminate and to provide controls for differences among raters in making judgments. For example, if the personnel department provides forms to supervisors that do not state how much weight is to be

assigned to each criterion in the overall rating process, there will be great variances in assessment on specific items from rater to rater because the relative weights assigned to criteria will differ widely. So, too, raters should be people who have had enough opportunity to observe the individual and the job-related attributes being rated.<sup>11</sup> Finally, raters should be sufficiently trained in using the chosen evaluation program so as to minimize ignorance in the use of the technique as a source of variance.<sup>12</sup>

In addition to errors caused by raters, other types of errors may occur from inadequate sampling of the job-behavior domain. A job-behavior domain can be defined as the duties and responsibilities of a particular position obtained through a job analysis and stated in a job description combined with the social, work, and behavioral environment in which the job exists. Ratings will provide insufficient information about an employee's job performance where the domain is incompletely defined or includes behaviors not really related to performance. This can be avoided by careful job analysis.<sup>13</sup>

Changes in the job or job environment provide another source of error in evaluation forms. Temporary changes in jobs should be carefully investigated.<sup>14</sup> For example, in one evaluation period, an employee may assume or add a temporary assignment to his or her present position--an assignment that requires duties and responsibilities additional to those of the employee's present work. The employee for that rating period should be evaluated on the basis of the regular position duties as well as the temporary assignment. However, for

the next rating period, if the temporary assignment has ended, then the employee should only be evaluated on his current job.

Lastly, apparent variations in employees' day-to-day performance may actually reflect little more than errors in the ratings. One type of such error is produced by incomplete recall. Such a situation may be tipped off when a rater tends to recall most recent observations and variations in the manner in which an employee performs in the work environment but recalls little if anything further back.<sup>15</sup>

There are several alternative techniques available for conducting performance evaluations. Eleven of the most commonly used methods are explained below.

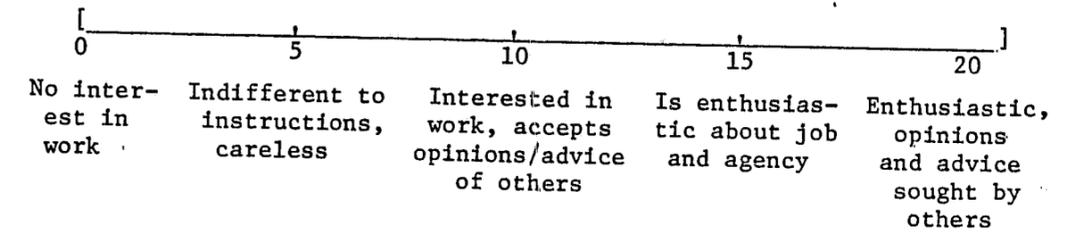
### 1. GRAPHIC RATING SCALE

The graphic rating scale lists a number of characteristics on which the employee is rated on either a three-point (excellent, average, and unsatisfactory) or a five-point (exceptional, very good, satisfactory, marginal, and inadequate) scale. The rater is supplied one printed rating form for each employee. Points are assigned to each degree on the scale, and may be entered directly on the form or recorded after the evaluation is completed in the personnel office. Examples of topics or characteristics included on the form are job knowledge, judgment, dependability, human relations, appearance, or attitudes.<sup>16</sup>

Graphic rating scales may be either continuous, discontinuous, or itemized. In a continuous scale, the rater puts a mark on a continuum, whereas, in a discontinuous scale, the rater checks the box most descriptive of the employee on the trait measured (see Diagram A).

DIAGRAM A

#### Continuous Scale - Attitude



#### Discontinuous Scale - Job Knowledge

[ ]	[ ]	[ ]	[ ]	[ ]
Serious gaps in knowledge of job essentials	Satisfactory knowledge of routine phases of job	Well-informed in all phases of job	Has good knowledge of all aspects of job	Exceptional understanding of job, extremely well-informed

Source: Dale S. Beach, Personnel, The Management of People, New York: The Macmillan Company, 1979, pp. 316-317.

The itemized scale includes a series of statements from which an evaluator selects the one best reflecting the individual's job performance. The judgments are ordered progressively in terms of more or less of some characteristic. Each category is illustrated in words, and most itemized scales have five to seven categories.<sup>17</sup>

## DIAGRAM B - ITEMIZED SCALE

How well does the employee get along with fellow workers?

- \_\_\_\_\_ He is always involved in some friction or argument with a fellow worker.
- \_\_\_\_\_ He is often at odds with one or more fellow workers--clearly more so than the average worker.
- \_\_\_\_\_ He gets involved in frictions about as often as the average worker.
- \_\_\_\_\_ He is infrequently involved in frictions with fellow workers--less often than are most workers.
- \_\_\_\_\_ He almost never gets involved in frictions with fellow workers.

Source: Dale S. Beach, Personnel, The Management of People, New York: The Macmillan Company, 1979, pp. 320.

Developing such rating forms is time-consuming and difficult. However, it provides more information and meaning to the evaluator, and increases reliability because more-detailed statements aid evaluators in holding the same frame of reference while using the form.

One particular advantage to graphic rating scales is that they are relatively simple to understand and take only a short time to complete. The following is an example of a rating form for a probation officer.

Name and Badge Number \_\_\_\_\_

Date(s) covered \_\_\_\_\_

## Rating Officer:

When marking this report remember that your life or well-being may someday depend on this new officer. An evaluation report, when conscientiously marked, becomes a valuable training aid in this individual's development.

Factors shall be marked on an objective basis with an explanation added on all categories listed as weak or strong. Rating boxes may be marked in ink but each report will require a typewritten summary.

		WEAK	AVERAGE	STRONG
JUDGEMENT	Actions based on sound reasoning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEMPERAMENT	Proper self-control; calm in emergencies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MATURITY	Takes suggestions and criticism well. Profits from advice or criticism.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
APPEARANCE	Physical bearing and demeanor correct at all times. Uniform worn properly. Mannerisms generally acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JOB INTEREST	Interested in all phases of police work. Questions well-directed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JOB KNOWLEDGE	Adequate ability and knowledge for time on the job. Applies previous experience to advantage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PERSONALITY	Poise that stimulates confidence; sense of humor; flexible. Pleasing habits and characteristics.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXPRESSION	Written and oral, clear and concise; uses proper grammar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INITIATIVE	Recognizes problems or situations that require police action. Displays normal curiosity. Active interest without continual prompting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AGRESSIVENESS	Takes necessary action without hesitation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Rating Form (continued)

		WEAK	AVERAGE	STRONG
ATTITUDE	Maintains proper attitude toward superiors, fellow officers, the Department and the public.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POTENTIAL	Ultimate value to the department.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SUMMARY:				
		_____ Evaluating Officer		

Source: Adams, Buck, & Hallstrom, Criminal Justice Organization and Management, Goodyear Publishing Company, Santa Monica, California, 1974, p. 111.

This rating scale is composed of an itemized list of factors and their definitions. With these the rater is to indicate whether the employee is "weak," "average," or "strong" in each particular factor. An important consideration in this scale is the explanation or definition accompanying each factor because an objective "standardized" base for the evaluation is thereby provided. For example, the first concept, "judgement" can have different meanings to different raters. Yet, its accompanying definition, "actions based on sound "judgement," narrows or specifies how the rater is to evaluate an employee's "judgment."

Graphic rating scales may vary by the degree to which the meaning of the category is defined and by the rater's ability to understand and to communicate what response was intended. Yet, there are several limitations of the scales. First, this technique assumes each characteristic of job performance is equally important for all jobs. For example, in the graphic rating scale for the probation officer on the preceding page, each factor is counted equally. This assumes that each factor is equally important in the duties and responsibilities of a probation officer. This may not be true. A probation officer's "judgement" and "expression" may be more important for the job than his "appearance." Second, it presumes uniform definitions for job characteristics. For measurement and comparison purposes graphic rating scales attempt to standardize definitions of job characteristics and to use a standardized form. However, it is hardly recommended that the same form and uniform definitions be

utilized for different job positions with different duties and responsibilities even if the jobs appear similar on the surface. Third, there may be an illusion of precision when definite numbers are assigned to opinions of supervisors. But how large is the difference between the job performance of an employee receiving a total 77 and another receiving an 80? Frankly, the difference is probably ridiculous to take into serious account.

Finally such scales are often used as "one-shot" evaluations of performance. Thus, an employee has little or no opportunity either to change performance or participate in setting standards used to judge his or her performance. Scales used on a one-shot basis may not provide a realistic basis for giving feedback intended to maintain or to improve performance.<sup>18</sup>

#### NUMERICAL MANIPULATION OF CATEGORICAL AND GRAPHIC SCALES

Categorical and graphic scales lend themselves to various types of numerical manipulations. Measurement is defined as the process of mapping or assigning numbers to objects or observations. In measuring, scales are devised and observations are mapped onto the scale. The kind of measurement achieved is a function of the rules under which the numbers were assigned. Each scale has its own set of underlying assumptions about how the numerals correspond to real-world observations. Scale classifications can be based on any one or a combination of the following three characteristics:

1. Numbers are ordered; one number is greater than, less than, or equal to another number.

2. Differences between numbers are ordered; the difference between any pair of numbers is greater than, less than, or equal to the difference between any other pair of numbers.
3. The number series has a unique origin, indicated by the number zero.<sup>19</sup>

Graphic rating scales are ordinal scales--meaning that only condition 1 above is fulfilled; determinations of greater or lesser values can be made, but no distance between ratings can be determined. The appropriate measure of a central tendency in this case is the median; a percentile or quartile measure is used for measuring dispersion. Measures of statistical significance are technically restricted to nonparametric methods, with a Chi square one-sample test being the most commonly used.<sup>20</sup>

The median is the positional measure or score that divides the distribution of scores into two equal parts. It is the score located halfway between the smallest and largest number of observations in a distribution. For example, the series of numbers, 1, 2, 3, 4, 6, 7, has a median of 3.5.<sup>21</sup>

The interquartile range allows an evaluator to discard the extreme items and to find the amount of variation in the central part of the data. The interquartile range is calculated by subtracting the score at the 25th percentile (referred to as  $Q_1$  or first quartile) from the score at the 75th percentile ( $Q_3$  or third quartile). The range is then measured in the remaining central half of the items. (The range is calculated by taking the difference between the largest and smallest values in the group. For example, in the case

of examination marks, with the highest mark being 206 and the lowest 43, the range is found by subtracting the smallest from the largest:  
 Range = 206 - 43 = 163.)<sup>22</sup>

The Chi-square test ( $\chi^2$ ) is a statistical test used when data are in the form of frequency counts. The frequency counts can be placed in two or more categories. The Chi-square test is concerned with testing for significant differences between the observed distribution of data and the distribution of data expected on the basis of some previously stated hypothesis or belief about a situation. Performance evaluation usually deals with a particular group of individuals who are being rated--or a one-sample case, in statistical terms. A manager or personnel departmental member must first determine and state the expected frequency of the objects in each category. Then the deviations of the actual frequencies per category and the hypothesized or believed frequencies are compared. For example, suppose you are interested in determining whether officers on the police force one year, three years, or five years have had favorable or unfavorable ratings on a certain measure of job performance. Then the question becomes: "Does the frequency with which each of the five categories is characteristic of an officer differ from the frequencies that could be expected if the performance levels of the population were normally distributed about the 'indifferent' category?" A Chi-square test could answer this question.

Table 1 presents hypothetical data regarding distributions of performance among first-, third-, and fifth-year police officers.

The fifth- and first-year officers deviate from the frequency distribution expected by chance, while a close relationship exists from the third-year officers. The greater the difference between the expected and observed frequencies, the larger the Chi-square value will be and the less the probability that these differences can be attributed to chance (the greater the probability that they are real). A specific table can be consulted to determine whether a particular Chi-square value has reached the level of significance chosen by the researcher.<sup>23</sup>

TABLE 1\*

Fifth-Year Officers			
	Favorable	Indifferent	Unfavorable
Observed performance	39	14	13
Expected performance	22	22	22
Third-Year Officers			
Observed performance	21	30	23
Expected performance	25	25	25
First-Year Officers			
Observed performance	22	27	32
Expected performance	27	27	27

\*Reproduced partly from Borg & Gall, *Educational Research: An Introduction*, Longman, Inc., New York, 1979, p. 465.

The value of  $X^2$  is the measure that expresses the extent of the difference. The larger the divergence the larger the  $X^2$  value. The formula for which the  $X^2$  test is calculated is:

$$X^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

where  $O_i$  = observed number of cases categorized in the  $i$ th category.

$E_i$  = expected number of cases in the  $i$ th category under the hypothesized situation.

$k$  = the number of categories

$\Sigma$  = sum

The calculation for the above example would be:

$$\text{Fifth-Year: } \frac{(39 - 22)^2}{22} + \frac{(14 - 22)^2}{22} + \frac{(13 - 22)^2}{22} =$$

$$\frac{17^2}{22} + \frac{(-8)^2}{22} + \frac{(-9)^2}{22} =$$

$$\frac{289 + 64 + 81}{22} = 19.73$$

$$X^2 = 19.73$$

$$\text{Third-Year: } \frac{(21 - 25)^2}{25} + \frac{(30 - 25)^2}{25} + \frac{(23 - 25)^2}{25} =$$

$$\frac{(-4)^2}{25} + \frac{6^2}{25} + \frac{(-2)^2}{25} =$$

$$\frac{16 + 36 + 4}{25} = 2.24$$

$$X^2 = 2.24$$

$$\text{First-Year: } \frac{(22 - 27)^2}{27} + \frac{(27 - 27)^2}{27} + \frac{(32 - 27)^2}{27} =$$

$$\frac{(-5)^2}{27} + 0 + \frac{5^2}{27} =$$

$$\frac{25 + 25}{27} = 1.85$$

$$X^2 = 1.85$$

## 2. CRITICAL-INCIDENT METHOD

In the critical-incident technique, a supervisor rates an individual on the basis of specific instances of actual behavior. When an incident occurs, reflecting either good or bad for an employee, it is recorded and placed in the employee's file. The basic premise underlying the critical-incident technique is that it makes the supervisor less a judge than a recorder of what actually happened. Then, during performance review interviews, these incidents can be discussed through feedback from the supervisor and employee. Job-performance areas utilized for the critical-incident method may include judgment, learning ability, productivity, dependability, accuracy of work, responsibility, and initiative.<sup>24</sup>

A first step in the critical-incident technique is to draft a list of factors deemed critical to the successful performance of the job. Routine tasks and behavior have no place on this instrument. Once critical job requirements have been identified, it is necessary for evaluators to be alert for incidents that point out strengths or deficiencies in the listed areas (listed areas may number upwards of fifteen). The form should have identifying information at the top, followed by each factor and sufficient space to list debits and credits beneath the items, as in the following excerpt from a sergeant's rating form:<sup>25</sup>

## HANDLING EMPLOYEE GRIEVANCES

- 6/23 Refused to consult with Patrolman Carleton who had a minor equipment-related complaint, thereby forcing the officer to lodge a complaint with the union steward.
- 9/16 Gave Patrolman Stern permission to seek redress for a minor grievance at a higher step when it could have been solved at the shift level.
- 10/1 Persuaded Patrolman Garucy to withdraw a grievance on the belated payment of shift differential.
- 11/6 Suggested a new and better plan to facilitate the upward flow of unresolved grievances.

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Source: William J. Bopp, Police Personnel Administration, Holbrook Press, Boston, 1977, p. 213-215.

For each rank, patrol administrators must define those duties that are essential, as opposed to routine. The handling of these essential areas is specifically documented. For example, if a patrol administrator were using this method to evaluate a patrol commander, he or she would identify such essential skills as the ability to communicate: Specifically does the commander know how to talk, and does he or she know how to adapt language and content to the audience? In looking for specific or critical instances involving this skill, we might analyze the commander's action at the scene of a barricaded person. Or, can the commander maintain crowd control while at the scene of a hostage situation or major fire? In each such case, the patrol administrator would document the employee's job performance during each situation; and then, at evaluation time, the discussion would involve the incident and the associated leadership qualities

necessary for the job-position and the essential duties associated with it.<sup>26</sup>

The critical-incident method records actual behavior relevant to job performance. Personality traits are excluded because specific incidents are to be cited. Yet, this technique requires a supervisor to take the necessary time to record certain incidents accurately. Several problems may threaten this accuracy: A supervisor may postpone recording an incident until a later time, and thus details may be forgotten. Negative incidents may be recorded more frequently than those positively reflecting on an employee; negative incidents are often more noticeable than positive instances because good work is expected from employees. In addition, utilizing the critical-incident method for evaluation may result in the over supervision of employees. A supervisor may provide too much feedback to an employee during a performance review session by "unloading" a series of complaints, obtained from negative reports. The employee may perceive the review process as punishment.<sup>27</sup>

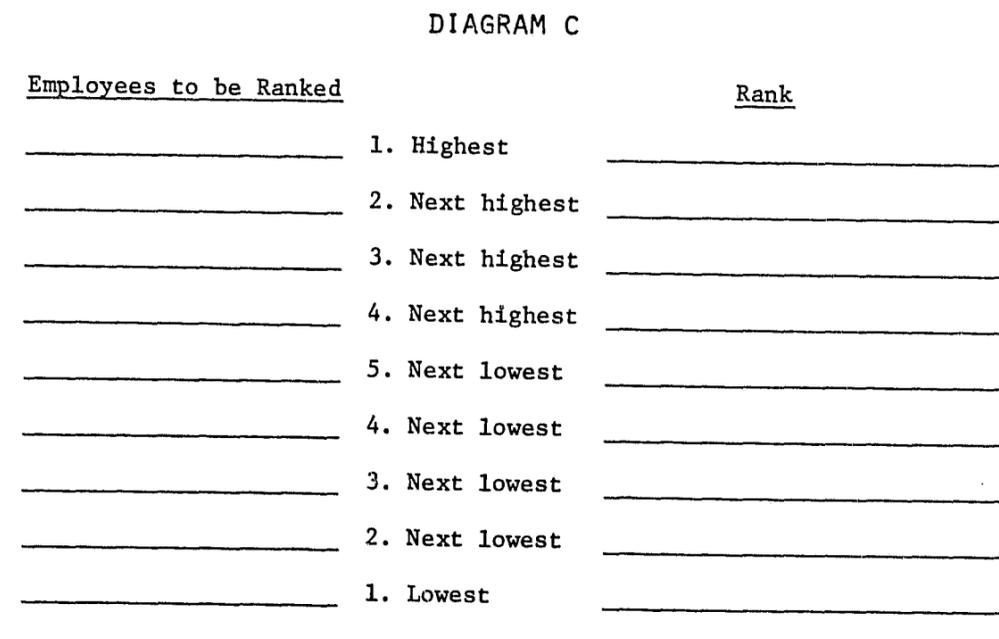
Overall, however, the critical-incident method provides a great deal of relevant information about an employee's job performance, especially when used (with some modification) to evaluate an individual's potential for promotion. And in sum, evaluations concerning specific incidents yield information regarding an employee's specific skill and knowledge of the job.<sup>28</sup>

### 3. RANKING SCALES

There are several different forms of ranking scales for evaluation of job performance. Basically, in all the forms, employees are

ranked from highest to lowest on the basis of some criteria. The alternative rank method consists of placing the "best" employee at the top of a list and the "worst" employee at the bottom. Then the second best and second worst are chosen. This process is continued until all employees have been ranked. A variation of the alternative rank is a straight rank order where a supervisor simply ranks employees from best to worst. The best and worst employees do not necessarily have to be chosen or ranked first. Both methods show how an employee stands, relative to other employees, but do not reveal the amount of difference between them.<sup>29</sup>

Diagram C is an illustration of a ranking scale for ten employees:



Source: H. G. Heneman and Dale Yoder, (eds.), Staffing Policies and Strategies, Bureau of National Affairs, Washington, 1979, p. 193.

Using Diagram C, a police sergeant having ten officers under his or her supervision would first select the officer who is highest in respect to a specific characteristic being considered and write his or her name opposite "highest" in the right-hand column, drawing a line through his or her name in the left-hand column. Then he or she would select the officer "lowest" and write his or her name in the right-hand column, crossing it off in the left-hand column. This procedure would continue until all officers are ranked.<sup>30</sup>

Despite the fact that this method is practical and popular, it has three major limitations. First, it assumes equal distance between those rated. Thus, it has a leveling effect when performance is variable and a dispersing effect when performance is similar. Second, it disregards individual or situational variations that influence specific aspects of performance being ranked. A rater may rank an employee higher than another on the basis of one characteristic in which that employee stands out favorably. Or, the rater recalls this one incident and thus ranks the employee according to his or her job performance in that situation. The employee is not compared to others and then ranked, but is ranked on the basis of a single situation.

Finally, ranking scales force the classification of individuals into a highest-to-lowest distribution (a "zero-sum" activity). This may be unrealistic in criminal justice agencies and situations, because measurement of job performance necessarily entails measuring a spate of complex human behaviors that are not necessarily quantifiable

in the simple terms expressed by rankings. Thus, it can be difficult to classify individuals into a highest-to-lowest distribution because the behavior itself being evaluated may not readily lend itself to quantification.<sup>31</sup> For example, although there may not be a quota system in the enforcement of traffic law, some supervisor may consider a subordinate officer below average if the officer issues fewer than 30 citations per month. Perhaps all the officers on that shift are evaluated against this standard of 30. The inadequacy of the criterion may be seen when one officer issues 30 citations that eventually result in 16 convictions, and another officer issues 23 citations that result in 17 convictions. Which officer is the better of the two?

#### 4. PAIRED COMPARISONS

The paired comparison method compares each employee with all others in a work group, one at a time, on the basis of some criterion of job performance. The number of times an individual is preferred over another is tallied. An index of the number of preferences is compared to the number being evaluated. The number of judgments required in a paired comparison is:

$$N = \frac{n(n-1)}{2} \quad \text{where } N = \text{number of judgments, and} \\ n = \text{number of employees to be evaluated}$$

For example, the results of a ten-man patrol squad ranked by paired comparisons follow:

Patrolwoman Frances Duffy	9
Patrolman Robert Willner	8
Patrolman Willie Washington	7
Patrolwoman Vicki Kroner	6
Patrolman Thomas Schultz	5
Patrolman Mario Salerno	4
Patrolwoman Sandra Linder	3
Patrolman Stephen Rupnow	2
Patrolman Kendall Byron	1
Patrolman Wilmont Gray	0

Source: William J. Bopp, Police Personnel Administration, Holbrook Press, Boston, 1977, p. 211.

The ranking indicates that Patrolwoman Duffy is the best officer while Patrolman Gray is the worst. The number to the right of each man's or woman's name represents the result of an individual-by-individual comparison in which one point was awarded to the better of two, and none to the other. Duffy, in a head-to-head rating battle with the other nine officers, was thought better than each; Willner was thought better than eight, Washington better than seven, and so on down to Gray, who was thought to better no officer on the shift.<sup>33</sup>

A typical paired comparison rating form would look like:

FACTOR: QUALITY OF WORK (MARK "1" IF THE INDIVIDUAL IS BETTER)

	Kroner	Duffy	Linder	Rupnow	Schultz	Willner	Bray	Byron	Washington	Salerno	TOTAL
Kroner	X	0	1	1	1	0	1	1	0	1	6
Duffy	1	X	1	1	1	1	1	1	1	1	9
Linder	0	0	X	1	0	0	1	1	0	0	3
Rupnow	0	0	0	X	0	0	1	1	0	0	2
Schultz	0	0	1	1	X	0	1	1	0	1	5
Willner	1	0	1	1	1	X	1	1	1	1	8
Gray	0	0	0	0	0	0	X	0	0	0	0
Byron	0	0	0	0	0	0	1	X	0	0	1
Washington	1	0	1	1	1	0	1	1	X	1	7
Salerno	0	0	1	1	0	0	1	1	0	X	4

Source: William J. Bopp, Police Personnel Administration, Holbrook Press, Boston, 1977, p. 212.

Performing paired comparisons of employees can become very time consuming for supervisors. They may tire to the point where ill-considered answers are given or forms are not fully completed. The number of employees for each supervisor to compare should be limited to a manageable number.<sup>34</sup>

## 5. FORCED DISTRIBUTION METHOD

The forced distribution method is an alternative ranking method, different from the paired comparison or straight ranking scale. This method can be adopted for evaluations of large numbers of employees. Raters place their subordinates in categories according to predetermined proportions. Employees to be evaluated are "graded on a curve" that has been established before the rating. A common forced division is:

LOW	MIDDLE LOW	MIDDLE	MIDDLE HIGH	HIGH
10%	20%	40%	20%	10%

The above distribution presupposes that both inferior and superior individuals will be in the minority, while there will be a cluster of adequate workers toward the middle. So, if a patrol division commander was asked to evaluate 50 patrol officers according to a contrived or forced distribution, like the one above, the ranking scale would, of necessity, reflect the following real numbers of individuals:<sup>35</sup>

LOW	MIDDLE LOW	MIDDLE	MIDDLE HIGH	HIGH
5	10	20	10	5

All ranking techniques are ordinal scales: Numbers on these scales only have rank meaning; distance cannot be determined. Thus, the appropriate measure of central tendency is the median, a percentile or quartile measure, for dispersion and a Chi-square test for a correlational test of statistical significance.<sup>36</sup> (For a discussion of measurement see Rating Scales.)

## 6. CHECKLISTS

The checklist approach consists of a set of statements about an employee's job performance. A supervisor simply checks the statements most descriptive of the employee being rated. Points are assigned to each statement by the personnel office, and an employee's score is based on the cumulative points awarded to him or her.<sup>37</sup> For example, for correctional officers, the supervisor would look at "quality of work," "initiative," "knowledge," and "personal appearance" in the horizontal column, and then check the box matching his or her judgment on the vertical column. The vertical column may read "not satisfactory," "improvement needed," "average," "above average," "meets standards," "excellent," "exceeds standards," or "outstanding." Instructions usually accompany the form and discuss each section and block.<sup>38</sup>

A variation of the standard checklist is the weighted checklist that consists of a large number of statements describing various types and levels of behavior for a job. Every statement has an individual weight attached to it. The rater checks statements that most closely describe the behavior of the employee. The rating sheet is scored by averaging the weights of all the descriptive statements checked by the rater.

A weighted checklist is constructed through analyzing each job for its specific duties or, more specifically, conducting a job analysis. Then judges or individuals familiar with the duties of a particular job categorize specific duties into levels of importance,

from poor to excellent. Finally, weights are assigned according to the rankings made by the judges.<sup>39</sup>

The checklist and the weighted checklist yield scores based on an ordinal scale. Appropriate statistical measures to be used in conjunction with them are the median, percentile, of quartile measure, and the Chi-square test. (For a discussion, see Graphic Rating Scales.)<sup>40</sup>

## 7. ESSAY FORM

An open-ended, free-form appraisal of an employee can be produced through an essay form. The supervisor writes his or her general impression of an employee. Topic coverage of the appraisal can be provided by using guidelines, or a rater can be free to write on any topics relating to an employee's job performance. The essay form may yield a wide array of information about an employee's performance because the rater is not restricted by a list of choices. However, this appraisal form is time consuming for the rater to complete and for the evaluator to analyze. The essay form should not be used for comparative purposes, and may have limited usefulness because of rater bias. In addition, the entire evaluation of an employee's job performance may rest on the skill and effort of the writer, not the real performance of the individual being rated.<sup>41</sup>

## 8. FORCED-CHOICE METHOD

The forced-choice method requires a rater to choose from several seemingly similar statements and to pick those that are most and

least applicable to the person being reviewed. A series of tetrads or phrases about job behavior or personal qualities--for example, two positive and two negative--are listed. The rater indicates which of the four phrases is most and least like the individual. Of the two favorable-sounding phrases, only one discriminates between high and low job performance. Similarly, of the two negative-sounding statements, only one distinguishes good and poor performance. The rater is "blind" to these weights. An employee receives "plus" credit if a positive statement is checked as most characteristic. Additionally, the subject receives "plus" credit for a negative statement credited as least characteristic.<sup>42</sup>

The following are three examples of items in a forced choice evaluation technique:

<u>Blind Weight</u>		<u>Most</u>	<u>Least</u>
0	_____ Has a well-rounded personality.	_____	_____
0	_____ Lacks force and drive.	_____	_____
-2	_____ Tends to be overbearing.	_____	_____
+2	_____ Shows foresight.	_____	_____
<u>Blind Weight</u>		<u>Most</u>	<u>Least</u>
0	_____ Temperamental	_____	_____
0	_____ Everyone likes him/her	_____	_____
-1	_____ Autocratic	_____	_____
+2	_____ Low-key but effective leader.	_____	_____

Adapted from: H. C. Heneman and D. Yoder, (eds.), Staffing Policies and Strategies, Bureau of National Affairs, Washington, 1979, p. 192.

<u>Blind Weight</u>		<u>Most</u>	<u>Least</u>
0	Doesn't pull rank	_____	_____
1	Knows his officers	_____	_____
-1	Low efficiency	_____	_____
0	Speaks in a steady monotone	_____	_____

Adapted from: William J. Bopp, Police Personnel Administration, Holbrook Press, Boston, 1977, p. 216.

This method reduces rater halo and bias since the weights assigned statements in each tetrad are not known to the rater in advance. The personnel office scales the statements on the basis of the weights and analyzes them as to their discrimination among good and poor performers. The forced-choice method produces scores that are ordinally scaled. Measures of central tendency, dispersion, and correlation are the median, percentile, or quartile measure, and Chi-square test, respectively.<sup>43</sup> (For an explanation, see discussion under Graphic Rating Scales.)

## 9. FIELD REVIEWS

The personnel office interviews supervisors about employees through field reviews. Supervisors do not complete evaluation forms. Instead, a personnel office representative interviews all supervisors about their employees' job performances. Then the notes taken during the evaluation interview are compiled in a report by the representative and forwarded to the supervisor for approval or modification.

Employees are categorized as either outstanding, satisfactory, or unsatisfactory for specific job requirements and performance criteria. This evaluation process takes a lot of time because it involves interviews and report writing, but it can provide very useful critiques of employees' job performances.<sup>44</sup>

## 10. ASSESSMENT CENTERS

Assessment centers conduct performance evaluations through utilizing a number of different assessors and a variety of procedures. An assessment center is a process, not a place. In the process, a number of candidates, usually 10 to 15, are observed (normally in a mock, but job-related situation) by several trained assessors. Assessment centers can be used to measure dimensions of organizing and planning, stress-resistance, creativity, interpersonal competence, orientation and motivation to work, quality of thinking, dependency on others, and oral communication. After participating in the exercises, candidates are dismissed and assessors refine their observations and complete a final evaluation report on each participant, outlining their impressions of employee potential, and defining developmental actions appropriate for the organization and individuals.

First, the program objectives of the assessment center need to be agreed upon by management and the personnel department, and then stated as departmental procedures. Assessment centers can be used for selecting new employees, evaluating those seeking promotion, or developing employees through the specialized training offered in assessment centers.

Second, the dimensions or criteria for evaluation should be determined. The aspects of job performance that a manager is interested in evaluating should be outlined. For example, a criterion could be supervisory skills, leadership abilities, or use of interpersonal communication skills.

Third, the assessment center director must determine the exercises or tests that will be used to measure the performance criteria that have previously been stated. Several examples follow later in this section.

Fourth, the time, date, and place for the program should be announced throughout the agency, with any requirements for participation listed. The agency's customary means of communication should be used.

Fifth, assessors need to be trained. After they are, participants are put into job-related situations and observed on the specific behaviors being measured.

Sixth, after the exercises are conducted, each participant is evaluated and a summary report is written by the assessors. These reports are pooled to give an overall evaluation of each participant. Often these summary reports are a combination rating scale and essay form. These reports are then forwarded to the participant's supervisor. Participants receive feedback on their performance at the center through interviews and consultations with their supervisors and assessors.

Once the assessment has been used, its programs should be evaluated to determine its effectiveness in predicting job success. This

procedure is similar to the procedures used to validate a selection test or weighted application blank. (Please refer to those sections for a detailed description of the procedures to follow.)

Candidates for assessment centers can be selected in a variety of ways. For example, supervisors can nominate subordinates; employees selected in this manner usually are performing satisfactorily (in the view of the supervisor) and appear to have potential for advancement. Alternatively, employees can be permitted to nominate themselves; thus, biases inherent in the process of relying solely on supervisory judgment can be overcome but employee bias may enter the process. Participation in the assessment center may be required by an agency as a component of an overall evaluation program, or it may be required for specific job levels, e.g., sergeants or lieutenants.<sup>45</sup>

Several specific techniques can be applied in an assessment-center evaluation of an employee's job performance: situational problems, management games, interviews and case or problem solving. For example, in the leadership group-exercise, each member initially supports a predefined position on some issue, but one group is directed to find a consensus about that issue. Individual interpersonal skills of group members can be assessed through this exercise. The task-force exercise is composed of a group with a designated leader. The group must decide upon some course of action. The ability to organize, leadership qualities, and the oral communication of the individual assigned the leadership role can be evaluated.

Assessment centers also use personal interviews, projective tests, and written tests to assess work motivation, career orientation

and dependency on others. Simulation games (where an individual is given a set of problems possibly encountered on a job during a day or a week) direct an individual to formulate an oral report about what action will be taken to solve these problems. Stress, creativity, and dependency on others can be determined through simulation games.<sup>46</sup>

An example of a simulation exercise is as follows:

In each exercise the candidate assumes the position of sergeant. Within a set period of time, the candidate must process materials, analyze problems, and deal with subordinates in the most efficient way possible. The candidate must make decisions, delegate, analyze, and communicate with subordinates, superiors, and the public. After completion of each exercise, each assessor will complete a rating form. Then assessors will pool data, arrive at a conclusion, and report each of the skilled areas being measured. A consensus rating is required for each area.<sup>47</sup>

An in-basket simulation game requires a candidate to demonstrate the handling of paperwork typical of that particular job. Each candidate must review and study the items and handle them as if in a "real world" situation. A time limit is imposed, usually two to three hours to complete this exercise. Every action taken must be recorded in writing--notes to subordinates, command personnel, and others. In addition where formal correspondence is necessary, candidates should draft such letter and memoranda.<sup>48</sup>

Instructions for such an in-basket exercise for corrections sergeant might include:

1. You are Sergeant T. J. Flint, Day Shift Supervisor along with Sergeant J. R. Wright.
2. At 11:45 a.m. you will depart for a training program in Colorado.
3. It is now Tuesday, May 8, 1979, your second day in your new assignment.
4. Take action on all items in the in-basket.

5. Write out each action and explanation you take. Clip each action to the in-basket item or items.
6. Write neatly; it cannot be assessed if it cannot be read.<sup>49</sup>

Role-playing exercises require two or more actors to assume specific roles. Interaction with others can be measured through role playing. The following role-playing exercise concerns a sergeant conducting a performance evaluation with one of his corrections officers.

Instructions to each of the participants could be as follows:

In this role-playing exercise, you are asked to assume the role of Sergeant T. J. Flint. Your task is to conduct a performance appraisal interview with Corrections Officer Robert Miller. You are scheduled to testify in court as a breathalyzer operator within the hour; accordingly, you must limit your meeting with C. O. Miller to not more than thirty (30) minutes.

You have been recently promoted to the rank of Sergeant; you have not had any prior working contact with C. O. Miller.

The Corrections Division Lieutenant, R. T. Now, has directed you to discuss C. O. Miller's performance rating and several "problems" and to prepare a memorandum to Lt. Now regarding the outcome of your meeting with C. O. Miller.

You have asked C. O. Miller to come to your office (in time period) to review his ratings; you will have this time period to prepare for the interview by reviewing C. O. Miller's performance appraisal file. Make any notes/comments on the memo sheets contained in the attached packet.

In this role-playing exercise, an actor is asked to assume the role of Corrections Officer Robert Miller.

Profile:

Officer Miller is a six-month employee in the Corrections Division at the half-way mark of his probationary employment period.

Officer Miller is a "problem employee" who does not mix well with co-workers and has been observed to be argumentative and "moody". Miller is perceived as a "loner". It is rumored that Miller is involved in a divorce action with his wife of five years.

Situation:

Officer Miller goes into the performance interview very sullen/withdrawn but becomes mildly agitated with the Sergeant as the performance-appraisal interview progresses. Officer Miller becomes defensive and claims that Sergeant Burns was "out to get him" and was "from the old school".

When playing the role of Officer Miller, respond realistically to the candidate's skill in giving you this performance review.<sup>50</sup>

The results of assessment centers have consistently been associated with measures of performance effectiveness, such as rate of promotion, performance, job-potential ratings, and salary-growth rate. The situational programs contribute greatly to prediction of performance in managerial positions. The reliability of all assessment centers is heavily dependent on intense staff training, regardless of whether psychologists or managers serve as the assessors.

Yet, assessment centers do have several limitations. The selection process for participating individuals may result in lowered motivation for those not selected. Anxieties, produced because of the nature of assessment-center exercises, may have long-range effects on an individual's career. Assessment-center programs may tend to produce managers that conform to values and views of their assessors, thus dampening individual incentives and initiatives. Finally, the cost of an assessment center is often high. Costs include expenses of assessors and candidates, expenditures for physical equipment,

location of the center, and professional and administrative personnel to operate the center.<sup>51</sup>

## 11. BEHAVIORALLY ANCHORED RATING SCALES (BARS)

BARS is a modification of the Critical-Incident Technique that allows for quantification of the evaluation. A number of critical incidents are elicited from supervisors, and are placed in several categories. Judges rate each incident in each category on a scale (e.g., from 1 to 9 points), and where there is consensus on certain items, those are put on a scale for use by managers in evaluating job performance. Supervisors can record observations about their employees' behavior, and then refer to the scale for a certain point designation. During periodic performance-appraisal interviews, an overall measure of job performance can be obtained by scaling the statements and calculating the mean scale value for each job dimension. The following is an example of a BARS scale.

## BARS SCALE

Could be expected never to be late in meeting deadlines, no matter how unusual the circumstances.

Could be expected to meet deadlines comfortably by delegating the writing of an unusually high number of orders to two highly rated selling associates.

Could be expected always to get his associates' work schedules made out on time.

Could be expected to meet seasonal ordering deadlines within a reasonable length of time.

Could be expected to offer to do the orders at home after failing to get them out on the deadline day.

Could be expected to fail to schedule additional help to complete orders on time

Could be expected to be late all the time on weekly buys for his department.

Could be expected to disregard due dates in ordering and run out of a major line in his department.

Could be expected to leave order forms in his desk drawer for several weeks even when they had been given to him by the buyer after calling his attention to short supplies and due dates for orders.

Behaviorally anchored rating scale for the dimension "Meeting Today's Deadlines," from John Campbell, Marvin Dunnette, Edward Lawler III, and Karl Weick, Managerial Behavior Performance and Effectiveness (New York: McGraw-Hill Book Company, Inc., 1970), p. 122.

BARS focuses attention on job performance and not personality traits of an individual. Yet, it is time consuming to develop, and its complexity may limit its usefulness to large, rather than small, organizations: it is more likely that large organizations will be able to incur the financial obligations of time and effort necessary to develop BARS than small organizations.<sup>52</sup>

Behaviorally ranked scales provide a number of advantages. They usually are developed through extensive participation by potential users. Thus, performance examples are phrased in common terminology (for both the job and the organization). BARS sample behavior over a long period of time, and do not utilize short-term judgments or impressions. BARS provide an excellent avenue for providing feedback about specific aspects of individual job performance and communicating performance expectations. However, behaviorally anchored scales do require considerable time for preparation, and separate forms must be developed for specific jobs.<sup>53</sup>

## APPRAISAL RATING ERRORS

There are several general sources of errors and shortcomings in each of the various techniques of performance evaluation. Efforts should be addressed to minimizing these errors if an effective appraisal system is to be maintained by an organization. The several sources of error listed below are not equally applicable to every technique; their effects vary among the techniques.

The Halo Effect. The halo effect appears when an evaluator rates an employee either good or poor on one factor, and this rating

excessively influences their ratings on all other measures of performance. Weighted checklists and graphic rating scales are the two techniques most closely associated with the halo effect.<sup>54</sup>

Standards of Evaluation--Leniency and Strictness. Problems of evaluation standards occur because of perceptual differences in the meaning of evaluative words. Different evaluators put various meanings on "good," "adequate," "satisfactory," and "excellent." Some supervisors will appear to be lenient in rating all their subordinates while others may be extremely strict. This difficulty arises mostly in graphic rating scales, but may also appear with essays, critical incidents, and checklists.<sup>55</sup>

Central Tendency. Some supervisors rate all their employees within a narrow range. These appraisers are reluctant to rate individuals as either very poor or very good; consistently average rates are given to employees. Graphic rating scales characteristically present a problem with central tendency.<sup>56</sup>

Recent-Behavior Bias. The time frame used for performance evaluation may be a problem with some evaluation systems. A six-month or yearly performance appraisal may result in only an evaluation of recent behavior because past behavior is easily forgotten. Thus many individuals are evaluated more on their past several weeks' performance rather than six months' average behavior. Evaluation systems should include regular, on-going appraisals of individuals' job performance.<sup>57</sup>

Personal Biases. An evaluator's biases can influence their evaluation of employees. Basic differences in personality make it very easy to be biased for or against an individual. This is least likely to occur with the forced-choice and field-review techniques.<sup>58</sup>

#### CONSIDERATIONS FOR SELECTING A TECHNIQUE

When determining which performance evaluation technique is most appropriate, organizations should bear in mind several contingencies. First, is the size of the organization. The more complex the technique, the more time and resources are required for administration and analysis. Small agencies may not be equipped to support the use of certain techniques.

Second is the organizational environment. More stable organizations of sufficient size may be able to allocate the resources needed to develop complex techniques, while more dynamic organizations may want to use a simple technique that is easily changed. A "stable" organization is characterized as one that has clearly established goals and objectives, and procedures and resources necessary to meet those defined goals. The goals, objectives, procedures, and resources rarely change and are routinized.

Third, different appraisal techniques are developed for different levels of employees. Some techniques are better suited to measure performance of middle managers, and others of rank and file. Methods should be used for their appropriate purposes.<sup>59</sup>

## SUMMARY

In this section we have discussed the various reasons for establishing a valid performance evaluation program as well as the different methods for evaluating personnel. Performance evaluation was defined as the systematic evaluation of individuals' performance on a particular job. The various methods of evaluating personnel include graphic rating scales, the critical-incident, ranking scales, paired comparisons, forced distributions, checklists, essays, forced choice, field reviews, assessment centers, and behaviorally anchored scales.

Summing up, several basic guidelines should be considered when planning, implementing, and finalizing a performance evaluation program in your organization. Any performance evaluation method adopted by your agency should be tailored to meet your unique organizational needs; the pros and cons of each method should be fully explored; and top management together with agency personnel should agree on how the results will be used. Once such an agreement is reached, it should be specified in your agency's policies and communicated to all employees. Evaluators should receive proper training in the use of the technique finally adopted, and the program should be monitored to guarantee that the evaluation is being conducted properly, the results are being used as specified, and the program is continuing to meet your agency's needs.<sup>60</sup> These guidelines should help to ensure that whichever performance evaluation technique or method you select will be beneficial to your organization in assessing the performance of agency employees.

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## JOB ANALYSIS

Knowledge about the content and nature of jobs in an organization is vital for effective management. All organizations exist to accomplish both long- and short-term goals and objectives, and in attempting to achieve these goals and objectives, organizations use the combined work efforts of employees. The work to be done is generally divided and grouped into sets of functions called jobs. The complexity, content, and combination of tasks included in jobs is determined by the availability of human resources as well as by the specific needs of the organization. Job analysis provides a means to effect a detailed systematic study of jobs so that the best combination or grouping of tasks can be organized. Job analysis also helps increase the amount of employee input into determining the tasks assigned to particular jobs.

The nature of some jobs may be the result of or be affected by a variety of factors, such as how far the functions of the job in question are automated or mechanized; the design of any equipment used; the physical space and surroundings the work is done in; or the procedures, methods, job standards, and organizational structure of the agency. Recognizing these factors that influence the nature of jobs is very important to successfully defining tasks and task groups within the organization. Job analysis is used to determine the

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duties, responsibilities, working conditions, and working relationships of and between jobs. A thorough job analysis should define the characteristics that make a worker more or less successful in completing the tasks, given organizational and physical conditions.

The literature on job analysis offers several definitions. According to Otis and Leukart, job analysis is "the technique of obtaining job information to be used in various operations in the field of personnel management."<sup>1</sup>

Beach provides a lengthier definition, quoting from the Department of Labor's Training and Reference Manual: job analysis is "the process of determining, by observation and study, and reporting pertinent information relating to the nature of a specific job. It is the determination of the tasks that comprise the job and of the skills, knowledge, abilities, and responsibilities required of the worker for successful performance and which differentiates the job from all others."<sup>2</sup>

Ralph Davis defined job analysis as including a complete study of the job as well as an analysis of the conditions or the environment under which the job is performed. "Job analysis is an investigation and analysis of work assignment and the conditions surrounding it, to determine its requirements from an organizational standpoint."<sup>3</sup>

Although each of these definitions may differ somewhat, they all have one element in common. All three state in some form that job analysis is a procedure for obtaining relevant job information.

Job analysis is associated with various personnel practices in an organization. Employee selection, job evaluation, wage surveys,

accident prevention, and some detailed quantitative studies of jobs are based on a previously conducted job analysis. Although each technique of job analysis is designed for specific uses or application, job analysis as a concept has many important applications. First, job analysis is an essential element in effective human-resource planning. After certain types and amounts of work to be done are identified, the work must be divided into certain jobs within the organization. Work must be "packaged" within the organization's structure to provide meaningful units, and job analysis aids in determining the number and kinds of jobs and the qualifications needed to fill them. The determination of numbers and kinds of jobs and job qualifications is an important component of human-resource planning.

Second, job analysis plays an important role in the recruitment, selection, and placement of workers. For an employment program to be effective, it is necessary that clear statements be made about the work to be done and of the skills and knowledge required of employees. The goal of recruitment, selection, and placement is to match as closely as possible a job's requirements with a worker's aptitudes, abilities, and interests. Thus, good staffing requires full information about jobs--information that can be supplied through job analysis.

Third, establishing proper rates of employee compensation can be accomplished through job analysis. This includes determining the relative worth of jobs in the organization by means of job evaluation (another technique that will be discussed later in this section) and

comparing wages paid by the organization with those paid for comparable jobs in other agencies. This comparison is done through a wage survey. Job evaluations and wage surveys have different purposes. Job evaluation is a method used to insure internal pay equity from one job to another, while wage surveys indicate whether the wages in the organization are at pace with the going wages in the labor market. Job analysis describes characteristics of jobs, and these jobs are in turn used for wage comparisons.

Fourth, job information obtained from job analysis is useful information for the newly employed. It aids in orienting them to what they will be expected to do. In addition, such job information can also be very beneficial for those conducting training and development programs--it can aid in their determination of the content and subject matter for training courses, for example.

Fifth, job analysis can be used to establish clear standards of performance for jobs. These standards can later be used as measures in the appraisal of employees' performance. When evaluating the performance of an employee, a supervisor can compare the actual work of the employee with the written job standard. These written standards obtained through job information helps make performance evaluations more objective.

Finally, the process of conducting a detailed analysis of jobs and the environments within which they operate provides an opportunity to uncover and to identify hazardous or unhealthy conditions (such as heat, noise, fumes, or dust), so that steps can be taken to

minimize the possibility of injury to the employee. This involves an assessment of the working conditions associated with a particular job.

Terminology in the area of job analysis is becoming somewhat standardized and throughout the literature certain terms are used frequently. Before pursuing any discussion of the techniques employed to analyze jobs, it is important that the reader acquire some understanding of these terms. The techniques of job analysis are analytical, and thus it is important that clear-cut distinctions be made among these various job and occupational designations.<sup>4</sup>

The terms to be used throughout this chapter include:

An element - the smallest practical subdivision of a work activity without analyzing the separate motions, movements, and mental processes involved.

A task - one or more elements or distinct activities that constitute the logical and necessary steps of work done by an employee. Whenever physical or mental human effort is exerted to accomplish a specific purpose, a task has been created.

A position - a collection of tasks that constitutes the total work assignment of a single employee.

Jobs - a group of positions identical to one another with respect to their major tasks and enough alike to justify their being included in a single category. There may be one person or many persons employed in the same job.

An occupation - a general class on an across-the-board basis regardless of organizational lines. One can refer to the occupation policeman, teacher, or accountant whenever people are engaged in these activities.

A job description - descriptions of work activities performed in a job as well as working conditions, tools and equipment, and other job-related characteristics.

Job specifications - the personal requirements specified for those seeking the job in question. These requirements may include statements about education or work experience, skills, age, physical characteristics, vision, sex, test scores, and other characteristics required of candidates.<sup>5</sup>

**CONTINUED**

**4 OF 7**



PLEASE READ ALL OF THE ITEMS IN THE QUESTIONNAIRE  
BEFORE GIVING ANY ANSWERS.

Make your answers as complete as possible, but avoid repetition and unnecessary wordiness. If the space allotted for an answer is insufficient, use additional paper and attach to this form. If the meaning of a question is not clear, consult a member of the Job Analysis Committee, but do not discuss the questions with any other employee. Since the questionnaire was drawn up in general form for all jobs, certain questions may not apply to you. Please return the questionnaire as soon as possible, and certainly within a week, in the attached envelope addressed to the Chairman, Job Analysis Committee.

#### Description of Duties

(1) List the specific duties (1, 2, 3, etc.) which you regularly perform in the usual course of your work. Tell from where you receive your work or who assigns it, what you do with it, and where you send it or to whom you report on it. Your list of duties should be a general outline of your daily routine. Indicate on what duties you spend most of your time and the approximate percent of your total time spent on each.

(2) List the regular duties which you perform only at definitely stated periods, such as weekly, monthly, etc. For each duty indicate when the work is done and the approximate amount of time spent on it.

(3) List any occasional duties which you perform only at irregular intervals. For each duty indicate roughly its frequency of occurrence and the amount of time spent on it.

(4) List any duties performed regularly or irregularly in a Department other than your own. Indicate when and where the work is done and the approximate amount of time spent on it.

#### Responsibilities of Your Job

(5) How many employees do you supervise? List job titles and number of people in each job. The term "supervise" implies personal contact with employees including operational, planning, review, and personnel functions.

(6) Check the one item below which most nearly describes your supervisory responsibilities.

1.  No supervisory responsibilities.
2.  Limited to making work assignments to small group performing simple, routine work; may check or review work performance; normally performs same operations as those supervised.

3.  Immediate supervision over Division or Section in which operations are routine or performed in accordance with established procedures; responsible for work planning, review, and personnel.
4.  Immediate supervision over Division or Section in which operations are varied and complex; responsible for work planning, review, and personnel. Or, general supervision of Department or Division in which operations are performed in accordance with established procedure. Or, general supervision of a major function occurring periodically.
5.  Direction of Department whose functions involve varied and complex operations; plans, directs, and coordinates work, makes recommendations to and consults with officers in determination of operating policies.

(7) What instructions do you receive as to what work is to be done or how to do it?

(8) In the performance of your duties, what decisions are you permitted to make without reference to higher authorities?

(9) What parts of your work are checked by others?

(10) Check the one item below which most nearly describes the amount of supervision received in your work.

1.  All work done under direct observation and on specific instruction from immediate supervisor (immediate supervision).
2.  Most work done under immediate supervision; occasional routine duties may be performed without supervision.
3.  Only a small portion of work, if any, done under immediate supervision; most work done under general supervision in which duties may be only occasionally checked but in which frequent instructions may be given as to what to do and how to do it.
4.  No work regularly done under immediate supervision; small portion of work may be done under general supervision, but most work done independently with only occasional direction as to what is to be done and how to do it.
5.  No supervision of work except in regard to general policies or occasionally in regard to general methods.

(17) What machines or equipment do you personally operate or service? Indicate whether such operations occur regularly or irregularly and the approximate amount of time spent on each. What supplies do you handle (including purchase, storage, or distribution)?

(18) Check the one item below which most nearly describes your responsibility for equipment (including building premises) or supplies.

1.  No responsibility for the operation or care of equipment; not responsible for supplies.
2.  Occasionally responsible for the operation and/or care of machines or equipment where carelessness or error would result in only minor damage or loss of time. Or, occasionally responsible for supplies whose loss or damage would result in only minor financial loss or loss of time.
3.  Regularly responsible for the above (no. 2).
4.  Occasionally responsible for the operation and/or care of machines or equipment where carelessness or error would result in serious damage (\$5,000.00 or more) or in serious loss of time (a full day's employment for one or more persons). Or, occasionally responsible for supplies whose loss or damage would result in serious financial loss (\$5,000.00 or more).
5.  Regularly responsible for the above (no. 4).

(19) What contacts with other people in or out of the organization you required to make in connection with your job?

(20) Check the one item below which most nearly describes your responsibility for personal and public contacts (including contact through correspondence, telephone, conferences, research reports, legal reports, etc.).

1.  Few contacts except with immediate associates or supervisor.
2.  Frequent contacts with fellow employees or occasionally with officers in giving or receiving routine information. Little or no contact with the public.
3.  Frequent inter-departmental contacts requiring tact in securing information or resolving difficulties. Occasional contacts with public or other organizations.
4.  Regular inter-departmental or branch contacts involving coordination of work; occasional major contacts with officers; public contacts involving maintenance of good will toward the organization.
5.  Outside or inside contacts involving difficult negotiations; requires high degree of judgment and diplomacy. Or, personal contacts with Board of Directors or Board of Governors. Or, contacts through research reports, legal advice, or technical advice on organizational problems.

(21) For what kinds of confidential information are you responsible?

(22) Check the one item below which most nearly describes your responsibility for confidential information.

1.  No responsibility for confidential information.
2.  Occasional contact with information which is confidential but whose divulgence would not result in serious embarrassment to the organization or its officers.
3.  Frequent contact with information which is confidential but whose divulgence would not result in serious embarrassment to the organization or its officers.
4.  Occasional contact with highly confidential information.
5.  Regular contact with and responsibility for information whose divulgence would result in serious embarrassment to the organization or its officers.

(23) What is your responsibility for developing or improving the methods of work involved in your job or others' jobs?

(24) Check the one item below which most nearly describes your responsibility for methods.

1.  No responsibility for methods. Performs routine operations under direct supervision.
2.  Performs operations in which responsibility is limited to carrying out methods developed by others.
3.  Responsible for having methods carried out by employees on complex jobs. Or responsible for development and improvement of routine operations.
4.  Responsible for development, improvement, and execution of methods employed in a Department or major Division.
5.  Responsible for over-all policies of a Department or major Division.

#### Working Conditions

(25) Indicate roughly what proportions of your time daily are spent in: standing \_\_\_\_\_%; sitting \_\_\_\_\_%; climbing \_\_\_\_\_%; lifting \_\_\_\_\_%; walking \_\_\_\_\_%; other \_\_\_\_\_%.

(26) What unusual dangers or accident hazards are present in your work?

(27) List the days you work each week and the regular working hours per day. Indicate when you normally report for work and when you leave.

(28) Estimate the average number of overtime hours per week called for by your work. Indicate whether the overtime work is done regularly or irregularly.

(29) Does your work require traveling? If so, how often and for how long per trip?

(30) Are you subject to call for emergency work outside of regular working hours? If so, how frequently are you called?

(31) Describe any especially unpleasant conditions in your work, such as irregular hours, fumes or gases, very fatiguing work, etc.

#### Psychological and Training Requirements

In answering the questions of this section do not enter your own qualifications unless they happen to correspond with your own opinion of the job requirements.

(32) What is the lowest level of general education (formal schooling, or the equivalent) which you think should be required of a person starting in your job? Check one: No education needed \_\_\_\_; Primary grades (ability to read and write) \_\_\_\_; Grammar 8th \_\_\_\_; H.S. 2 \_\_\_\_; H.S. 4 \_\_\_\_; College 2 \_\_\_\_; College 4 \_\_\_\_; Postgraduate \_\_\_\_.

(33) What school or technical courses, if any, would be especially useful as preparation for beginning your job?

(34) Given the above education, what is the lowest amount of past practical experience necessary which an employee should have before he could be assigned to your job? Name the kind of experience, if any is necessary, where and how it could be obtained, and the time required to acquire it.

(35) Given the above education and experience, what would a new employee have to learn on the job in order to perform the duties required? What is the shortest period after starting the work in which he could learn what these new factors are and how to handle them?

(36) Do you consider age to be an important factor in your job? If so, what do you consider to be the youngest age at which a person could start in your position? \_\_\_\_ What do you consider to be the oldest age at which a person could start in your position? \_\_\_\_

(37) Check ( ) any of the following abilities and characteristics which a person must possess in exceptional degree in order to perform your duties satisfactorily. Mark (0) characteristics which a person must possess at least in average degree in order to do your work satisfactorily. Leave all other items blank.

1. \_\_\_\_ General intelligence (general mental brightness)
2. \_\_\_\_ Quantitative reasoning (ability to solve complex number problems)
3. \_\_\_\_ Number ability (ability to make simple mathematical computations accurately and quickly)

4. \_\_\_\_ Memory for words or numbers (ability to remember word or number details)
5. \_\_\_\_ Memory for persons (ability to remember person from sight)
6. \_\_\_\_ Memory for ideas (ability to remember concepts, including general instructions and plans)
7. \_\_\_\_ Word-number perception (ability to recognize quickly small differences in word, name, or number details)
8. \_\_\_\_ Finger dexterity (speed of finger movement or of handling objects with fingers)
9. \_\_\_\_ Rate of manipulation (speed of hand and arm movements)
10. \_\_\_\_ Eye-hand coordination (ability to control movement of hand accurately by what the eye sees)
11. \_\_\_\_ Bimanual coordination (coordination of independent movements of both hands)
12. \_\_\_\_ Eye-hand-foot coordination (ability to control simultaneous movements of hands and feet by what the eye sees)
13. \_\_\_\_ Visual acuity (keenness of vision)
14. \_\_\_\_ Color perception (ability to recognize small differences in color)
15. \_\_\_\_ Size or quantity perception (ability to estimate size or quantity of objects from sight)
16. \_\_\_\_ Form perception (ability to recognize form or shape of objects from sight)
17. \_\_\_\_ Speed perception (ability to estimate speed of objects from sight)
18. \_\_\_\_ Distance or depth perception (ability to estimate distance or depth of objects from sight)
19. \_\_\_\_ Auditory acuity (keenness of hearing)
20. \_\_\_\_ Pitch perception (ability to recognize small differences in sound pitches)
21. \_\_\_\_ Tactual acuity (sense of touch)
22. \_\_\_\_ Olfactory or gustatory acuity (sense of smell or taste)
23. \_\_\_\_ Fluency of oral expression (ability to express oneself well in speaking)
24. \_\_\_\_ Fluency of written expression (ability to express oneself well in writing)
25. \_\_\_\_ Grammatical skill (proficiency in spelling, punctuation, and grammatical usage)
26. \_\_\_\_ Artistic ability
27. \_\_\_\_ Mechanical aptitude (understanding mechanical devices)
28. \_\_\_\_ Attention to detail (orderliness in handling details)
29. \_\_\_\_ Organizational ability (ability to plan and organize on a broad basis)
30. \_\_\_\_ Ability to concentrate amid distractions
31. \_\_\_\_ Ability to endure monotony
32. \_\_\_\_ Initiative (ability to assume responsibility without specific direction; ability to "go beyond" the set requirements of a job and independently to develop and execute plans and procedures)

33. \_\_\_\_\_ Adaptability (ability to adjust readily to new and changing circumstances. This ability is to be considered apart from general intelligence or wide knowledge; it has to do more with general flexibility of personality)

Adapted from: Federal Reserve Bank of Richmond, Virginia, in E. Lanham, Job Evaluation, McGraw-Hill, New York, 1955, pp. 144-152.

Lanham listed several advantages and disadvantages of questionnaires in eliciting job information. As was said above, one advantage of the questionnaire is that it is a quick and rather inexpensive collection method for securing information. Questionnaires usually are not too time consuming to complete. They also allow participation of a large number of employees in the job-analysis process. Employees and supervisors can complete questionnaires in a relatively short time. Such a large amount of employee and supervisor participation would not be possible with interviews, for example.<sup>6</sup>

Yet, questionnaires are not without their disadvantages. Many organizations have difficulty in constructing questionnaires to secure information about their specific jobs. Consistent and uniform interpretation from completed questionnaires is difficult. Complete information is not always obtained; some people have trouble answering some questions because some of the words mean nothing to them, or suggest the wrong idea to them, and the impersonal nature of a questionnaire used to supply job information is to the detriment of employees' understanding of a job-analysis program. However, the section on questionnaire construction in the data section of this volume can help to alleviate some of these problems.<sup>7</sup>

### Daily Diaries

Written narratives or daily diaries are self-reporting tools that may be used to document the activities included in a particular job. They have the jobholder record in detail job-related activities and the amount of time spent on them throughout each day. If done carefully, these techniques provide an accurate description of a job, while eliminating the recall error characteristic of questionnaires and interviews. However, daily diaries are tedious to complete and put an additional work load on the employee. A worker may view the diary as an extra duty and make completing it a low priority. So, if other high-priority duties have consumed most of the worker's regular work hours and only a small amount of time remains to complete the diary, the information put in the diary may be incomplete or inaccurate. A worker simply may not have enough time to complete a diary during regular work hours. Although use of this method can elicit a general synopsis of the activities of a job, it usually cannot supply very much detailed hard data about the skills or expertise employed.<sup>8</sup>

Another problem associated with the keeping of diaries is the selective definition of work and the variation in the importance workers attach to certain activities. For example, some may not attach much importance to (and therefore not record) a particular task performed--say, directing traffic at the scene of a fire, or writing infraction "tickets" to inmates violating some correctional institution rule. If workers make and use such distinctions about the

importance of the work done, much valuable information about the actual work undertaken may be lost in the diaries.

#### Observation

The most direct method used for obtaining job-related information is actually observing the individual jobholder during his or her working hours. When this method is used it is generally a good idea to obtain from the supervisor of the work group, department, or bureau whose jobs are being analyzed an over-all picture of the operations conducted in the department. The supervisor will probably be a good source for suggesting the best work stations where the most profitable job observations can be made. The observer should be primarily concerned with determining what the worker does, how he or she does it, why he or she does it, what skill is involved, and the physical demands put on the worker by the job. In general, the observation method provides the job analyst with an opportunity to determine the nature of a job, its scope and limitations, and its relationship to other jobs in the organization. This technique is effective for gathering information about routinized jobs.<sup>9</sup>

#### The Interview

Conducting an interview with the jobholder can supply information relative to all aspects of the job, including the nature and sequence of various component tasks. The interviewer can ask many probing questions that otherwise might have gone unanswered or unasked when the employee simply received a questionnaire to complete. For example,

if the respondent gives an answer to a question in only a generalized fashion, the interviewer can ask a follow-up question about specific details. These specific details would have been absent from the worker's answer to the same question on a survey questionnaire. Because the interview is an interpersonal transaction between the interviewer and respondent, more detail can be obtained and additional questions might be asked. This method is highly recommended as a data-gathering mechanism supplementary to the questionnaire and to observation. Questionnaires can be incomplete and observation can leave an analyst confused about some job tasks. Interviewing the jobholder or supervisor can help fill in the blanks.

The interview requires workers to describe their work in detail, which may be hard for some. Yet, many workers will be more willing to discuss their job verbally than in written form. Further, when the interview is used, the worker is directly involved in the job-analysis process. This method requires a great deal of time, however, especially when there is a large number of jobs to be analyzed, and it is relatively expensive because the salaries of both the interviewee and interviewer must be paid. Despite these drawbacks, interviews can uncover many detailed tasks included in jobs and can separate essential from nonessential information.<sup>10</sup>

When conducting interviews to obtain job information it is a good idea to formulate an interviewer's guide sheet or a list of questions to ask. This is done primarily to ensure that the analyst does not overlook any relevant, pertinent points during the interview, and that all

interviews cover the same questions. An example of an interviewer's guide appears as Figure 2.

FIGURE 2  
JOB INTERVIEW DATA SHEET

Interviewer \_\_\_\_\_ Suggested job title \_\_\_\_\_  
City \_\_\_\_\_ Department \_\_\_\_\_  
Agency \_\_\_\_\_ Section \_\_\_\_\_

TYPE OF JOB

Clerical \_\_\_\_\_ Maintenance \_\_\_\_\_ Specialist \_\_\_\_\_ Supervisory \_\_\_\_\_

- A. 1. Employee interviewed \_\_\_\_\_  
2. Years with agency \_\_\_\_\_  
3. Time on this job \_\_\_\_\_  
4. Present job title \_\_\_\_\_  
5. Immediate superior \_\_\_\_\_

- B. 1. Please describe in detail (numbered paragraphs are helpful) primary duties that an employee on this job performs daily. If the nature of the work changes materially from day to day or week to week, describe all principal duties performed and indicate frequency of performance.

Percentage of time spent on primary duties.

(Use reverse side of this sheet if more space is needed.)

- B. 2. Please describe in detail the secondary duties that an employee on this job performs at periodic intervals, such as weekly, monthly, quarterly, etc., and state frequency of performance. Also describe any occasional duties that may be performed at irregular intervals.

Percentage of time spent on secondary duties.

- C. 1. Please specify the formal education, or its equivalent, considered to be the minimum required for satisfactory performance of this job.
- C. 2. Please specify the special training necessary for an employee prior to his being assigned to this job or which must be acquired soon after his assignment.
- C. 3. Please specify any job experience required of an employee prior to his assignment to this job. Indicate the number of weeks, months, or years needed to obtain such experience and state whether in the organization or elsewhere.
- C. 4. Please specify the amount of on-the-job training (weeks or months of special attention from the supervisor) necessary after an employee has been assigned to the job for him to attain acceptable proficiency. Describe the nature of training, if any.
- C. 5. Please name any machines, equipment or tools that an employee uses in performing this job (for example--adding machine, Addressograph, laundry tumblers, mechanics tools, Mimeograph, Recordak, sorter, tabulator, typewriter) and the approximate percentage of time spent in using them.
- C. 6. Please write a brief descriptive statement of the forms and records used that are designed especially for this job.
- (Use reverse side of this sheet to elaborate any subhead.)
- D. Supervisory Responsibility
1. Please specify the proximity, extent, and closeness of supervision received by an employee on this job. To what degree does the immediate superior outline methods to be followed, outline results to be accomplished, check progress of work, handle exceptional cases, check performance or production?

D. 2. Please specify the degree or kind of supervisory responsibility assigned to this job. What is the degree of accountability for results in terms of responsibility for production, methods, and personnel?

D. 3. Please specify the "size" of supervisory responsibility of an employee on this job in terms of number of persons supervised. List job titles of these individuals. Indicate whether direct or indirect supervision is given (by direct is meant those who report directly to the person on this job; and by indirect, those who report to those who are directly supervised).

E. Nonsupervisory Responsibility

E. 2. Please specify the responsibility of an employee on this job for confidential data. State the type of confidential information handled, whether about personnel, salaries, or policy. Is the meaning of the data known by the person working with it?

E. 3. Please specify the responsibility of an employee on this job for appearance and form of finished work, for contacts with fellow employees, those in other departments, and with the public by personal meeting, telephone or correspondence.

E. 4. Please specify the seriousness of an error on this job. Who would discover it? How long might be taken to correct it? Would it affect the work of the individual making the mistake, others in the same department, other departments or persons outside the organization? Might the organization suffer embarrassment or financial loss? What might be the extent of the loss?

F. 1. Please specify the complexity of the job. What is the degree of independent action permitted the incumbent? What kind of decisions regarding his work is he permitted to make? To what extent is the position circumscribed by standard practice instructions? Are they written or verbal?

F. 2. Please specify the type and amount of dexterity or motor skill required in the performance of this job. Also indicate the job duties in which this skill is necessary, such as "operates typewriter" or "uses both hands to operate keyboards of I.B.M. Proof Machine."

F. 3. Please describe this job from the point of view of volume of work assigned and the necessity and desirability to get the work accomplished before a specified time.

F. 4. Please indicate the degree of repetitive detail that characterizes this job and that might create a feeling of monotony on the part of an incumbent.

G. Physical Requirements

1. Please list any unusual physical requirements of this job. Such factors as unusual vision, strength, and appearance should be included if they are truly necessary to the work.

Adapted from: Federal Reserve Bank of Richmond, Virginia, in E. Lanham, Job Evaluation, McGraw-Hill, New York, 1955, p. 135-137.

### CONDUCTING JOB ANALYSIS: SOME CONSIDERATIONS

An important component of conducting job analysis that is neglected by many agencies is the training and supervision of job analysts. The credibility, validity, and overall success of a job analysis depends not only on the information obtained from jobholders but also on the skills of the job analyst. Job analysts may be selected from employees within the organization or analysts supplied by a consulting firm contracted with. In determining the number of analysts needed, an organization should bear in mind the number of interviews to be conducted, the number of questionnaires to be administered, and/or the

amount of observation time required. Also, the number of analysts needed is also related to the speed at which the organization desires to conduct the analysis, and any deadlines for completion. According to Lanham, a full-time analyst should be able to complete from two to three interviews per day. An agency, knowing this figure, might divide the number of interviews to be held by two, estimate the days within which it hopes to have all interviewing completed, and from this arrive at the approximate number of analysts needed. This could serve as a base-line estimate from which adjustments could be made during the analysis process.<sup>11</sup>

When agency employees serve as job analysts, the employees giving the information may feel freer and at more ease with their fellow workers than with outsiders. This enhances cooperation from employees. Agency employees, because they are familiar with the organization and its jobs, more so than outside consultants, are well-equipped to get information about specific jobs. The major drawback in using agency employees for conducting the job analyses is that they may not be sufficiently trained in conducting job analyses; a good training program is essential when agency employees are used as analysts. Having analysts from within the agency also saves on costs associated with contracting with outside consultants. Yet, these same employees are taken away from their regular jobs and this may cause a work-load or work-force problem for the organization. These advantages and disadvantages must be weighed by the agency in light of time and cost constraints.

Instead of using analysts from within the agency, the administrator might consider using a consulting firm whose analysts are pre-trained and can expedite the job analysis without interfering much with agency work. Although these consultants can be quite knowledgeable of the mechanics of job analysis, they will be unfamiliar with the agency's operations and structure, and will need to be oriented to the particular setting and climate of your agency.

Many agencies have turned to using a combination of outside consultants and agency employees to alleviate this problem of unfamiliarity. Outside consultants are employed to train agency employees who, in turn, conduct the interviews, administer the questionnaires, and/or act as observers. With such a method the agency is able to capitalize on the technical knowledge of the consultant while at the same time allowing participation by employees in the analysis process.

As previously noted, if an agency decides to utilize its own employees to conduct the analyses, then they must be trained. Several methods are available for an agency to train its employees in job analysis. The analysts can study the job analysis literature; attend lectures and seminars held by the agency that detail the mechanics of constructing and administering questionnaires, interviews, or observations; conduct practice interviews or pretests; study, edit, and refine sample questionnaires; or do a combination of these activities. These employees might also be sent to outside training programs to gain skills in job-analysis techniques.

It is important that the job analysts know what job analysis is, the advantages and disadvantages of the analysis process, and what form or method is to be used, why it was chosen, and any specific instructions associated with its use. For instructions on the administration of questionnaires and interviews the reader is referred to the data section of this volume.<sup>12</sup>

## METHODS OF JOB ANALYSIS

### Functional Job Analysis

Functional Job analysis combines a means for defining the dimensions of worker activity with a method of measuring levels of work. This method is based on a fundamental distinction made between what gets done and what workers do to get things done. For example, the police officer alone does not prevent crime; what he or she does is a number of tasks that encourage or foster the prevention of crime. What employees do, related specifically to their job, is accomplished through "things, data, and people," which are both the inputs and outputs of worker efforts. Things indicate interaction with tangible events or physical resources; data mean ideas, facts, and statistics; and people entail the notion of communication and interaction among people at the work place. To some degree all jobs require the worker to relate to each of these dimensions. The "primitives," or anchors on each of these dimensions (things, data, and people), allow for profiling jobs according to the level of task complexity in jobs.<sup>13</sup>

Although worker behavior or tasks done can be described in many ways, ultimately there are only a few definitive functions involved in functional job analysis. For example, workers who interact or use

machines may feed, tend, operate, or set up the machine. Even though each of these functions may vary in difficulty and content, each draws on a relatively narrow range of similar kinds and degrees of worker characteristics and qualifications for effective performance. This narrow range of similar kinds and degrees of worker characteristics are thought of in terms of things, data, and people. Similar tasks performed by workers can be either quite simple or very complex, and the three anchors provide a way to measure the level of a job or its relative complexity in relation to things, data, and people, and the orientation of a job or its proportional involvement with things, data, and people.

The three anchors mentioned above are the worker-function scales used by the functional approach to job analysis. Each anchor contains several specific functions that represent various ordinal positions. The level of a job is indicated by a specific function of each anchor considered applicable to the job in question, while the orientation of a job is expressed by the analyst assigning a percentage of time, in units of five, to each of the three functions, adding up to 100 percent. The definitions of specific functions are given in Figure 3. Once the level and orientation scores are assigned to jobs, a worker's total involvement with the specific contents of tasks, defined on the basis of mental, physical, and interpersonal, is obtained. For example (in the social welfare field):<sup>14</sup>

Task: Asks client questions, listens to responses, and writes answers on standard intake forms, exercising leeway as to sequence of questions, in order to record basic identifying information.

Analysis of Task

<u>Area</u>	<u>Functional Level</u>	<u>Orientation (%)</u>
Data	Copying	50
People	Exchanging information	40
Things	Handling	10

FIGURE 3

WORKER FUNCTION SCALES  
OF FUNCTIONAL JOB ANALYSIS

## DATA FUNCTION SCALE

1. Comparing Selects, sorts, or arranges data, people, or things, judging whether their readily observable functional, structural, or compositional characteristics are similar to or different from prescribed standards.
2. Copying Transcribes, enters, and/or posts data, following a schema or plan to assemble or make things and using a variety of work aids.
- 3A. Computing Performs arithmetic operations and makes reports and/or carries out a prescribed action in relation to them.
- 3B. Compiling Gathers, collates, or classifies information about data, people, or things, following a schema or system but using discretion in application.
4. Analyzing Examines and evaluates data (about things, data, or people) with reference to the criteria, standards, and/or requirements of a particular discipline, art, technique, or craft to determine interaction effects (consequences) and to consider alternatives.
- 5A. Innovating Modifies, alters, and/or adapts existing designs, procedures, or methods to meet unique specifications, unusual conditions, or specific standards of effectiveness within the overall framework of operating theories, principles, and/or organizational contexts.

- 5B. Coordinating Decides time, place, and sequence of operations of a process, system, or organization, and/or the need for revision of goals, policies (boundary conditions), or procedures on the basis of analysis of data and of performance review of pertinent objectives and requirements. Includes overseeing and/or executing decisions and/or reporting on events.
6. Synthesizing Takes off in new directions on the basis of personal intuitions, feelings, and ideas (with or without regard for tradition, experience, and existing parameters) to conceive new approaches to or statements of problems and the development of system, operational, or aesthetic "solutions" or "resolutions" of them, typically outside of existing theoretical, stylistic, or organizational context.

## PEOPLE FUNCTION SCALE

- 1A. Taking instructions - helping Attends to the work assignment, instructions, or orders of supervisor. No immediate response or verbal exchange is required unless clarification of instruction is needed.
- 1B. Serving Attends to the needs or requests of people or animals, or to the expressed or implicit wishes of people. Immediate response is involved.
2. Exchanging information Talks to, converses with, and/or signals people to obtain information, or to clarify and work out details of an assignment within the framework of well-established procedures.
- 3A. Coaching Befriends and encourages individuals on a personal, caring basis by approximating a peer or family-type relationship either in a one-to-one or small group situation; gives instruction, advice, and personal assistance concerning activities of daily living, the use of various institutional services, and participation in groups.
- 3B. Persuading Influences others in favor of a product, service, or point of view by talks or demonstration.
- 3C. Diverting Amuses to entertain or distract individuals and/or audiences or to lighten a situation.

- 4A. Consulting Serves as a source of technical information and gives such information or provides ideas to define, clarify, enlarge upon, or sharpen procedures, capabilities, or product specifications (e.g., informs individuals/families about details of working out objectives such as adoption, school selection, and vocational rehabilitation; assists them in working out plans and guides implementation of plans).
- 4B. Instructing Teaches subject matter to others or trains others, including animals, through explanation, demonstration, and test.
- 4C. Treating Acts on or interacts with individuals or small groups of people or animals who need help (as in sickness) to carry out specialized therapeutic or adjustment procedures. Systematically observes results of treatment within the framework of total personal behavior because unique individual reactions to prescriptions (chemical, physical, or behavioral) may not fall within the range of prediction. Motivates, supports, and instructs individuals to accept or cooperate with therapeutic adjustment procedures when necessary.
5. Supervising Determines and/or interprets work procedure for a group of workers; assigns specific duties to them (delineating prescribed and discretionary content); maintains harmonious relations among them; evaluates performance (both prescribed and discretionary) and promotes efficiency and other organizational values; makes decisions on procedural and technical levels.
6. Negotiating Bargains and discusses on a formal basis as a representative of one side of a transaction for advantages in resources, rights, privileges, and/or contractual obligations, "giving and taking" within the limits provided by authority or within the framework of the perceived requirements and integrity of a program.
7. Mentoring Works with individuals having problems affecting their life adjustment in order to advise, counsel, and/or guide them according to legal, scientific, clinical, spiritual, and/or other professional principles. Advises clients on implications of analyses or diagnoses made of problems, courses of action open to deal with them, and merits of one strategy over another.

## THINGS FUNCTION SCALE

- 1A. Handling Works (cuts, shapes, assembles, etc.), digs, moves, or carries objects or materials where objects, materials, tools, etc., are one or few in number and are the primary involvement of the worker. Precision requirements are relatively gross. Includes the use of dollies, handtrucks, and the like. (Use this rating for situations involving casual use of tangibles.)
- 1B. Feeding - offbearing Inserts, throws, dumps, or places materials into, or removes them from, machines or equipment which are automatic or tended/operated by other workers. Precision requirements are built in, largely out of control of worker.
- 1C. Tending Starts, stops, and monitors the functioning of machines and equipment set up by other workers where the precision of output depends on keeping one to several controls in adjustment, in response to automatic signals according to specifications. Includes all machine situations where there is no significant setup or change of setup, where cycles are very short, alternatives to nonstandard performance are few, and adjustments are highly prescribed. (Includes electrostatic and wet-copying machines and PBX switchboards.)
- 2A. Manipulating Works (cuts, shapes, assembles, etc.), digs, moves, guides, or places objects or materials where objects, tools, controls, etc., are several in number. Precision requirements range from gross to fine. Includes waiting on tables and the use of ordinary portable power tools with interchangeable parts and ordinary tools around the home, such as kitchen and garden tools.
- 2B. Operating - controlling Starts, stops, controls, and adjusts a machine or equipment designed to fabricate and/or process data, people, or things. The worker may be involved in activating the machine, as in typing or turning wood, or the involvement may occur primarily at startup and stop as with a semiautomatic machine. Operating a machine involves readying and adjusting the machine and/or material as work progresses. Controlling equipment involves monitoring gauges, dials, etc., and turning valves and other devices to control such items as temperature, pressure, flow of liquids, speed

of pumps, and reactions of materials. Includes the operation of typewriters, mimeograph machines, and other office equipment where readying or adjusting the machine requires more than cursory demonstration and checkout. (This rating is to be used only for operations of one machine or one unit of equipment.)

- 2C. Driving -  
controlling Starts, stops, and controls the actions of machines for which a course must be steered or guided in order to fabricate, process, and/or move things or people. Actions regulating controls require continuous attention and readiness of response. (Use this rating if use of vehicle is required in job, even if job is concerned with people or data primarily.)
- 3A. Precision  
working Works, moves, guides, or places objects or materials according to standard practical procedures where the number of objects, materials, tools, etc., embraces an entire craft and accuracy expected is within final finished tolerances established for the craft. (Use this rating where work primarily involves manual or power hand-tools.)
- 3B. Setting up Installs machines or equipment; inserts tools; alters jigs, fixtures, and attachments; and/or repairs machines or equipment to ready and/or restore them to their proper functioning according to job order or blueprint specifications. Involves primary responsibility for accuracy. May involve one or a number of machines for other workers or for worker's own operation.

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Source: Adapted from S. A. Fine and Wretha A. Wiley, An Introduction to Functional Job Analysis: A Scaling of Selected Tasks From the Social Welfare Field, W. E. Upjohn Institute for Employment Research, Kalamazoo, Michigan, 1971, pp. 43-70.

Functional job analysis is one of the most comprehensive of the work-oriented methods of job analysis. A large amount of data is generated from a job analysis using this method but, because of its comprehensiveness, it is a quite laborious method. The data from the

worker-attribute scales should not be used to design job-related tests or training programs. Further, it does not allow for ready comparisons between jobs.

#### Task and Knowledge Checklists

The primary objective of a functional job-analysis procedure is to provide a valid, reliable set of data that can later serve as a verification of occupational data collected with a task and knowledge checklist. Task checklists contain brief task descriptions and ask about the amount of time spent on tasks performed, identification of where each task was learned, the amount of training received for each task, and which learning source was considered the most valuable.<sup>15</sup>

Knowledge checklists usually contain questions about knowledge and skills, and scales for rating the level of knowledge or skill required for adequate performance and the level typically necessary for newly assigned employees. Both task and knowledge checklists are used to generate information about jobs. They are generally some kind of standardized form that allows for collecting a substantial amount of occupational information from large samples of respondents. Figure 4 is an example of a task checklist used in functional job analysis for several law enforcement positions. Tasks are listed on the left-hand side of the form, and the columns contain the following information:<sup>16</sup>

Do ( ) or Don't Do ( )

Amount of time spent on task:

- A = a very small amount of time
- B = a moderate amount of time
- C = a considerable amount of time

Where learned (ranked 1, 2, 3):

- Formal training
- College course
- On-the-job training

Adequacy of training/education:

- Too little
- About right
- Too much

(SEE FIGURE 4)

To complete a task inventory list, the respondent checks whether he or she does the task, the amount of "time spent" on the task, and "significance to the position" of each task. All possible tasks that a jobholder might be required to do should be included in the inventory list.<sup>17</sup>

It is evident that the key to a successful job analysis through a task inventory is the task-inventory listing itself. In developing a task inventory, the job analyst should read materials that describe the job in question. Training materials, instructional manuals, texts, technical reports, and organizational charts and directives can provide the analyst with a great deal of information about particular jobs. Jobholders can also participate in this process by supplying lists of task statements. The task statements should be written. They should be clear and unambiguous so that they will present the

FIGURE 4

TASK CHECKLIST - INCUMBENT

Job Titles {  
 { Patrol Line Supervisor  
 { Investigative Services Line  
 { Supervisor  
 { Patrol Officer  
 { Detective/Criminal Investigator

Scale ) A = A very small amount of time  
 Amount ) B = A moderate amount of time  
 of Time )  
 Spent on ) C = A considerable amount of  
 Task: ) time

TASK STATEMENTS	Do (✓) or Don't Do (0)	Amount of time spent on Task (see scale above)	Where learned (rank order 1,2,3)			Adequacy of (✓) Training/Education		
			Formal Training	College Course	On Job Training	Too Little	About Right	Too Much
97. Compiles periodic activity report to provide an individual performance record for each officer to superior(s) and for retention in personnel records.								
98. Trains, supervises, and/or evaluates trainees.								
99. Reads records of crime activity such as station log, hotsheet and posted notice, and exchanges information with fellow officers.								
100. Drives motorized vehicle and/or walks in assigned patrol area and observes traffic, streets, buildings, people and residences for unusual or suspicious happenings and irregularities.								
101. Responds to calls for service requiring the presence of a sworn police officer in order to effectively handle the situation.								

TASK STATEMENTS	Do (✓) or Don't Do (0)	Amount of time spent on Task (see scale above)	Where learned (rank order 1,2,3)			Adequacy of (✓) Training/Education		
			Formal Training	College Course	On Job Training	Too Little	About Right	Too Much
102. Operates motorized police vehicle.								
104. Familiarizes self with the assigned area of patrol, learns the hours of operation of business and commercial establishments in the area, and identifies potential targets for criminal activity.								
105. Assists people with problems or refers them to appropriate public service agencies.								
106. Writes down events and details surrounding all situations encountered regarding which subsequent court proceedings or investigation may take place.								
107. Writes required reports in order to record crimes committed, persons taken into custody, property recovered, information received, activities performed while on duty, etc.								
108. Interrogates suspects and interviews complainants, witnesses, victims, etc. to gain information for use in resolution of case in question and/or other unresolved cases of a similar nature.								

TASK STATEMENTS	Do (✓) or Don't Do (0)	Amount of time spent on Task (see scale above)	Where learned (rank order 1,2,3)			Adequacy of (✓) Training/Education		
			Formal Training	College Course	On Job Training	Too Little	About Right	Too Much
109. Enters and conducts proper search of premises specified in search warrant or while in "hot pursuit" of a fleeing suspect or fugitive.								
110. Recovers stolen or lost property.								
111. Recruits informants who have access to information concerning criminal activities and solicits information from them.								
112. Participates in booking an arrested person.								
113. Talks with juvenile offenders and their parents concerning offenses committed by the juveniles in order to deter further criminal activity and provide recommendations to juvenile authorities re disposition of juvenile offenders.								

Source: Albert S. Glickman, "Job-Task Analysis Applications in the National Manpower Survey," in Proceedings of the National Symposium on Job-Task Analysis in Criminal Justice, 1978, p. 39.

same meaning to all jobholders. Tasks should be dramatized in a quantifiable form to permit later data analysis. Frequently, the use of such phrases as "relative time spent" or "amount of time" allows for quantifying the worker's responses. The statements should be structured so that the worker is the subject of the sentence; the jobholder should be referred to with the first person pronoun "I," and the verb should be in the present tense. For example "I identify and label packages." Finally, terms used in the task listings should be familiar to the workers and expressed without qualifiers. These statements should then be reviewed by a panel familiar with the jobs for missing tasks and for editing. The final list should include a final open-ended question asking jobholders to supply any task statements that may have been omitted.<sup>18</sup>

A worker reads the task list and checks those tasks he or she does as part of the normal job routine. Then the worker rates the tasks according to a relative "time-spent" scale.

A relative time-spent scale is used in a task inventory because employees may not have a clear idea of the exact percentage of their time that is spent on a certain task, but they can state that they spent more time on one task than on another. Using such a scale, workers report the amount of work spent on a certain task compared to the amount spent on another task. A five-point or seven-point scale can then be adapted to quantify the responses. Task statements are left blank when an employee does not do the particular task. Those tasks done are rated from "1" (meaning that very little time is spent

on that task compared to others) to either "5" or "7" (meaning that the worker devotes an extremely large proportion of time to this task). The data-analysis component of task inventories involves converting these relative time spent ratings into estimated percentages of the work day. For an individual, the percentage values for each task across the inventory can be summed and should equal 100 percent. Similarly, for a group of workers the average values indicate the percentage of group time spent on each task, with the sum of these values equaling 100 percent. Also, the overlap of (a) two individual jobs with each other, or (b) an individual job with a group job description, or (c) a group job description with another group job description can all be computed by using percentage time values. A cumulative sum of average percentage of time spent by all members, average percentage of time spent by members performing, and percentage of time spent on tasks allows the further calculation of time spent by individuals or groups on particular types of work.<sup>19</sup> For example, a police supervisor may wish to know how much time is being spent by shift members on completing traffic accident reports. This can be computed rather quickly when time is measured using percentages.

Data from task inventories have been used for personnel training, especially in developing skill-enhancing programs. Occupational specialties and associated training have been identified through task inventories by identifying task combinations of certain occupations. According to Yoder and Heneman, task inventories have their greatest potential utility in agencies where there are large numbers of

employees in specific occupations.<sup>20</sup> Task inventories require a great deal of time to develop. Spending this time is worth it if the final product, the inventory, can be administered to a large number of personnel. The statistical analysis of task inventories also requires a relatively large sample, thus a large number of personnel are needed to complete the inventories and for the subsequent analysis.<sup>21</sup>

#### Ability Requirement Scales

Ability requirement scales provide a way of classifying tasks by distinguishing the individual differences required in performance and in specific abilities. This method is based on the idea that abilities are general traits, distinguishable from skills--skills are proficiencies at single tasks; abilities are intangible attributes that in effect enable some employees to perform better than others on similar tasks.

Thirty-seven abilities are grouped and typed under four headings: mental abilities, physical abilities, abilities that require some action when sensory cues are present, and abilities relating to the way incoming sensory material is perceived. The first heading includes such things as verbal comprehension, memorization, and originality; the second, stamina, coordination, and speed of limb movement; the third, choice, reaction time, and manual dexterity; and the fourth, spatial orientation and visualization. An ability-requirement scale is used to rate how much of each of these abilities is needed for average job performance. The rating scales contain five to seven points, with three examples of behavioral task anchors that require certain levels of the ability in question.

One difficulty with this method is that it can generate a hundred or more tasks for a single occupational group. This rather large

number can be reduced through a statistical method, factor analysis, that enables one to define or to uncover similarities between data (or in this case, tasks) that can then be rearranged into a smaller manageable set of tasks that in a general way reflect the major tasks performed by the occupational group. Ability-requirement scales have been used for job classification, job evaluation, job design, defining personnel requirements, and work-force planning.<sup>22</sup>

#### The Critical-Incident Technique

The Critical-Incident Technique focuses on what a worker does that characterizes him or her as a good or bad employee. An incident is defined as "any observable human activity that is sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act."<sup>23</sup> The incident becomes "critical" when it occurs in a situation where the intent of the actor is clear to the observer and where the consequences of the action are sufficiently definite to leave little doubt about its effects. Information about critical incidents can be collected through individual interviews, group interviews, questionnaires, record forms or diaries, or by employing job analysts who have opportunities to observe the worker at work.

To use this method, the general aim of an activity being analyzed must first be obtained from field experts and stated in simple and agreed-upon terms. Next, specific plans for documenting incidents should be outlined. These plans should include instructions for those

reporting the critical incidents, including what training is necessary for those reporting. Observers must decide how important a particular observed incident is with respect to the accomplishment of a general aim. Critical incidents are documented through interviews, questionnaires, or daily diaries.

According to Flanagan, observers should be chosen on the basis of their familiarity with the job in question, and should review the nature of the job in relation to the environment in which it operates.<sup>24</sup> The following outline lists certain specifications for observation.

#### Specifications Regarding Observations

1. Persons to make the observation
  - a. Knowledge about the activity
  - b. Relation to those observed
  - c. Training requirements
2. Groups to be observed
  - a. General description
  - b. Location
  - c. Persons
  - d. Times
  - e. Conditions
3. Behaviors to be observed
  - a. General type of activity
  - b. Specific behaviors
  - c. Criteria of relevance to general aim
  - d. Criteria of importance to general aim

Data collection will be enhanced if observers record information fairly soon after the occurrence of the behavior and further enhanced if they know in advance what information will be required. If the analyst has some advance notice about what kinds of information will

be relevant and important to record, then the critical incident will reflect more accurately the tasks involved. Using the outline, "Specifications Regarding Observations," on the preceding page will help to alleviate some problems associated with an observer's lack of knowledge about what information will be required.

Critical incidents provide information that is both job-centered and behavior-centered. The job-centered data focus on a job description that views the job as a static entity. The behavior-centered approach defines a job in terms of those behaviors necessary for successful performance. Overall, the primary value of the critical-incident method is that it generates a record of specific behaviors from those persons in the best position to make the necessary and sufficient observations and evaluations. The emphasis is on observing behaviors that are critically important to doing the job well.

The critical-incident method has a wide range of uses. It can be used to measure typical job performance or to measure job proficiency; it can be used for training purposes, for selecting and classifying employees, and for designing jobs. Primarily this method has been used for measuring the performance of employees, and for evaluation, training, and selection.

The critical-incident method is easy for employees to use and to understand. Its major limitation is that because it employs a narrative form, incident reports may be biased. The personal characteristics of the individual involved in the critical incident are quite frequently included in the narrative, and an observer must still make

a judgment about what knowledge, skills, or abilities indicate individual differences. Further bias may enter the analysis as individuals seek to perform "satisfactorily," avoiding critical incidents that are "unsatisfactory." Many job tasks are mastered quite well and done very frequently on the job, but rarely show up in critical incidents. Thus, the technique may not capture the routine of the work done. These critical incidents might then tend to overlook some important job tasks--for example, report writing or other "noncritical" tasks. Also, a job-analysis emphasis limited to critical incidents may result in a fragmented view of the job. It may also be difficult to ascertain how various tasks fit together. If jobs are looked at only in terms of isolated incidents, it may be difficult to piece these together to represent a "whole" job. Finally, this method is quite time consuming and expensive to administer.<sup>25</sup>

#### The Position-Analysis Questionnaire

The Position-Analysis Questionnaire (PAQ) is a structured job-analysis questionnaire that contains 194 job elements. It is based on the idea that there is a common behavioral structure for a wide variety of jobs, and that small, discrete elements can be identified and quantified for individual jobs. This commonality across jobs results from workers doing similar tasks rather than from the technology being used or the product being produced.

Each job is analyzed using these elements either by checking those that do not apply to the job in question or by using a six-point rating scale that measures the "importance" of the element to performance of the job. According to McCormick, job elements are

"worker-oriented" in nature because they strongly characterize the human behaviors involved in jobs, not "job-oriented" or task-oriented" in nature, both of which are concerned with the technological processes of jobs.<sup>26</sup>

The job elements in the PAQ are used to characterize jobs in terms of various sources of job information, various mental processes required for job performance, and various actions involved in jobs. Other elements deal with the work situation, work context, interpersonal activities in work, and other miscellaneous aspects of work.

Overall, the 194 elements are grouped under six different headings. These headings are "Information Input," "Mental Processes," "Work Output," "Relationships with Other People," "Job Context," and "Other Job Characteristics." Under the first heading, elements are developed to assess what worker behaviors are required to secure information input. Questions in this section ask about sources of job information and about discrimination and perceptual activities. Items under the second heading are intended to measure the level of mental processes--e.g., reasoning and decision making--demanded by the job. The third heading, the work output, asks about the use of physical devices, integrative manual activities, manipulation, and coordination activities. Communication requirements such as interpersonal relationships, personal contacts, and supervision are included in the fourth heading. The fifth heading concerns physical working conditions and the social aspects of the job; and the final heading includes miscellaneous topics like uniform requirements, work schedules, and job demands.

The rating scales employed by the PAQ are constructed in relation to the corresponding job element. They include "importance" (of the job element) to the job, "extent of use" (for example, of written materials), "amount of time," "possibility of occurrence" (e.g., for a hazard), and "applicability" (whether the element does or does not apply).

The Position-Analysis Questionnaire may be completed by the employees themselves, with the aid of a consultant or analyst, or the analyst can interview employees and complete the questionnaire during this time. Responses to the PAQ can be sent to PAQ Services in Logan, Utah for scoring.

The scores obtained from a PAQ can be used for predicting the aptitude requirements of jobs. The validity of aptitude tests is confirmed in two ways: either by a concurrent validation procedure in which tests are administered to currently employed individuals and their scores are correlated with an appropriate criterion measure administered at the same time or within a short interval of time; or by a predictive validating procedure in which tests are administered to job candidates and these scores correlated with measures of their later job behavior. The PAQ offers some possibility of serving as the foundation for a generalized way of estimating the aptitude requirements of jobs directly from job-related data. (For any further discussion on validity the reader should refer to the data section of this volume.)

The PAQ has been used successfully in setting compensation rates and for evaluating and classifying jobs according to their relationship to others in an organization. The 13 overall job dimension scores can be used to compare jobs and to divide them into groups based on commonly defined work functions. Jobs whose titles may not suggest a common grouping may be placed together as a result of using the PAQ method. The data can be useful for consolidating or selecting more appropriate job titles. Contrarily, the PAQ can also be used to identify jobs assumed to be similar because of classifications or titles, but really having different work functions. It is a highly standardized form of analysis that requires only minimal participation of jobholders to supply a quality analysis of any job. Its costs are small; it requires minimal analyst training time; and it is suitable for predictive, construct, and job component validation. But according to several studies the PAQ is not suited for performance appraisals. This is primarily due to the fact that it was not designed to be used for performance appraisals, and also because the content validity refers to the degree to which the items in the PAQ form represent the content of the jobs measured.) Additionally, the PAQ reading level is said to be near the college level, which may limit its use in some organizations, or with certain types of workers.<sup>27</sup>

#### Task Inventories

Task Inventories consist of a listing of tasks that are done by jobholders in some occupational area. (Task inventories are a component of the Functional Job-Analysis Technique, but may also be used as a separate method of analyzing jobs.) The tasks are arranged in

logical groups such as those encompassing some broad duty category. Four types of data about each task of a job are collected in a task inventory. First, frequency data, or data on how often job tasks are done, are collected. The primary purposes for obtaining frequency data is to determine what tasks in an agency are done, and how often. The California Commission of Peace Officers Standards and Training (POST) developed a task inventory that measured the jobholder's involvement with each task by focusing on how often an employee did a certain task.<sup>28</sup>

Second, "importance" data are collected in task inventories for the purpose of identifying those tasks of sufficient importance to serve as a basis of the behaviors required for successful job performance. These "importance" data are essential for defining agency-specific job differences (based on the importance attached) that in turn could have implications for agency-specific selection systems. (Here agency-specific means that certain jobs are unique to that particular agency and are not common among agencies with similar purposes. For example, a local law-enforcement agency whose jurisdiction includes a large lake may have a section or division devoted to water patrol. However, water patrol is not a division commonly found in local law-enforcement agencies; thus it could be labeled agency-specific.)

An example of a rating scale used to collect importance data follows:

IMPORTANCE: When this task is completed, how important is its successful completion to the overall performance of a patrol officer?

- (1) of little importance
- (2) of some importance
- (3) important
- (4) very important
- (5) critically important

---

Source: J. W. Kohls, J. G. Berner, and L. A. Luke, "California Entry-Level Law Enforcement Officer Job Analysis, Final Report" in Proceedings of the National Symposium on Job-Task Analysis in Criminal Justice, United States Department of Justice, Government Printing Office, 1978, p. 241.

Third, "when learned" data are data that relate the necessity of knowing how to do a task to actual job assignment. "When learned" data can give the agency an idea about which tasks should be learned in training or on the job.

The task inventory developed by the California Commission on Peace Officer Standards and Training included several sections that measured factors relating to the tasks themselves. The following example asks the respondent to indicate to what extent a patrol officer should be capable of performing certain tasks before academy training.

**FIGURE 5**  
**INSTRUCTIONS FOR**  
**RATING TASKS**

The following pages contain tasks that are performed by patrol officers/deputies assigned to radio car patrol. The tasks have been sorted into nineteen major job content areas:

- |                         |                       |
|-------------------------|-----------------------|
| Patrol Function         | Custody Procedures    |
| Patrol Inspection       | Training              |
| Patrol Contact          | Community Relations   |
| Patrol Response         | Reading               |
| Traffic Supervision     | Reporting             |
| Criminal Investigation/ | Weapons               |
| Accident Investigation  | Physical Activity and |
| Evidence and Property   | Physical Force        |
| Procedures              | Time Spent            |
| Auxiliary Function      | Vehicle Operations    |
| Civil Procedures        | Equipment             |

Please rate each task on the following pages in terms of the frequency with which you have performed it in the last four months. Describe the job as you have performed it on your present beat and shift. For example, using the Frequency Scale below, if you "Transport prisoners/inmates" on the average of more than once per day, you would assign a Frequency Rating of 9. On the other hand, if you have never "Fired a handgun at a person," you would assign that task a Frequency Rating of 1. If you have performed a task in your agency, but not in the last four months, assign the task a Frequency Rating of 2. If you have performed a task only as part of training, you would assign a Frequency Rating of 1 indicating "I have never done this task in this agency."

**FREQUENCY SCALE**

In the last 4 months, I have generally done this task:								
More than once per day	Daily	Several times a week	Weekly	Several times a month	Monthly	Less than once per month	I have done this task in this agency but not in the last 4 months	I have never done this task in this agency
9	8	7	6	5	4	3	2	1

If a task occurs with a frequency somewhere in between two scale positions (e.g., between several times a week and weekly), choose the scale value which is the closer approximation to the actual frequency.

Remember to describe only your own experience. Tasks which you have not performed, but which are generally performed in your agency, will be identified by other officers/deputies in the sample. Therefore, do not be concerned that an important task will be omitted from further consideration if you indicate "I have never done this task in this agency."

Do not skip any items. Make sure you rate each task listed in the survey.

**FREQUENCY SCALE**

In the last 4 months, I have generally done this task:								
More than once per day	Daily	Several times a week	Weekly	Several times a month	Monthly	Less than once per month	I have done this task in this agency but not in the last 4 months	I have never done this task in this agency
9	8	7	6	5	4	3	2	1
<b>PATROL RESPONSE</b>								<b>Fre-</b>
<b>Handle These Type of Incidents:</b>								<b>quency</b>
								<b>Rating</b>
1.	Abandoned vehicle.							
2.	Abandoned house or building.							
3.	Activated alarm.							
4.	Animal control violation.							
5.	Assault (felonious).							
6.	Assault and battery. Responsibility for follow-up investigation? Yes = 1 No = 2 <input type="checkbox"/>							

PATROL RESPONSE		Frequency Rating
7.	Assault with intent to commit rape or other felony. Responsibility for follow-up investigation? Yes = 1 <input type="checkbox"/> No = 2 <input type="checkbox"/>	
8.	Attempted murder. Responsibility for follow-up investigation? Yes = 1 <input type="checkbox"/> No = 2 <input type="checkbox"/>	
9.	Attempted suicide.	
10.	Bad check. Responsibility for follow-up investigation? Yes = 1 <input type="checkbox"/> No = 2 <input type="checkbox"/>	
11.	Begging.	
12.	Bicycle theft.	
13.	Bomb threat. Responsibility for follow-up investigation? Yes = 1 <input type="checkbox"/> No = 2 <input type="checkbox"/>	
14.	Brandishing weapon. Responsibility for follow-up investigation? Yes = 1 <input type="checkbox"/> No = 2 <input type="checkbox"/>	
15.	Building code violation.	
16.	Burglary. Responsibility for follow-up investigation? Yes = 1 <input type="checkbox"/> No = 2 <input type="checkbox"/>	
17.	Business or peddler license violation.	
18.	Child stealing. Responsibility for follow-up investigation? Yes = 1 <input type="checkbox"/> No = 2 <input type="checkbox"/>	
19.	Citizen locked out of building or vehicle.	
20.	Complaint regarding city or county service.	
21.	Concealed or loaded weapon.	
22.	Concerned party request for check on welfare of citizen.	

Source: J. W. Kohls, J. G. Berner, and L. K. Luke, "California Entry-Level Law Enforcement Officer Job Analysis, Final Report" in Proceedings of the National Symposium on Job-Task Analysis in Criminal Justice, United States Department of Justice, Government Printing Office, 1978, pp. 393, 391, 302, 309.

## INSTRUCTIONS

In this Section of the survey you are asked to provide two additional pieces of information about each of the personal behaviors that appeared in the previous section of the survey.

Necessity at Entry

On pages 1-4 you are asked to indicate the extent to which it is necessary that a prospective patrol officer/deputy be capable of performing each behavior prior to academy training and/or job assignment (as opposed to acquiring the capability in training and/or on the job). The rating scale to be used for this purpose appears below. Please review the scale carefully. If you have any questions concerning the scale, seek the assistance of the POST representative before proceeding. When you are satisfied that you understand the scale fully, rate each of the personal behaviors on pages 1-4. Place your ratings in the boxes to the right of the behavior descriptions. Note that the rating scale appears at the top of each page.

Necessity at Entry: To what extent is it necessary that a patrol officer/deputy be able to exhibit this behavior prior to academy training and/or job assignment?

1. Not necessary - capability to perform this behavior can be easily acquired through training and/or on the job experience with a minimum of risk to the public.
2. Necessary - not possible to acquire the capability to perform this behavior satisfactorily through training and/or on the job experience.

Relation To Superior Job Performance

On pages 5 - 8 you are asked to indicate to what extent a patrol officer's/deputy's general job performance improves as the officer/deputy improves his/her performance of a given behavior. The rating scale to be used for this purpose appears below. Please review this scale carefully and inform the POST representative of any questions you have concerning the scale. Then use the scale to rate each of the personal behaviors on pages 5 - 8. Indicate your ratings in the boxes to the right of the behavior definitions. As before, the rating scale appears at the top of each page.

## TASK INVENTORY NECESSITY AT ENTRY

Necessity at Entry: To what extent is it necessary that a patrol officer/deputy be able to exhibit this behavior prior to academy training and/or job assignment?

1. Not necessary - capability to perform this behavior can be easily acquired through training and/or on the job experience with a minimum of risk to the public.
2. Necessary - not possible to acquire the capability to perform this behavior satisfactorily through training and/or on the job experience.

RECALL: Remember various types of information, such as factual information (laws, written or oral instructions or descriptions, etc.), visual information (photographs, physical characteristics of a patrol area, etc.), and specific details of past events (arrests, investigations, etc.); recall information pertinent to one's duties and responsibilities.

HANDWRITING: Have legible handwriting.

INITIATIVE: Proceed on assignments without waiting to be told what to do; improve one's skills and keep informed of new developments in the field; work diligently and exert the extra effort needed to make sure the job is done correctly, rather than merely "putting in time."

COORDINATION: Integrate the actions of one's arms and legs to produce coordinated movement (such as in running, jumping, etc.).

INTEGRITY: Be honest and impartial; refrain from accepting bribes or "favors" or using one's position for personal gain.

AGILITY: Perform physical actions or movements quickly and nimbly.

ARITHMETIC COMPUTATION: Add, subtract, multiply, and divide numbers.

INFORMATION PROCESSING: Identify the similarities and/or differences in information gathered from different sources (e.g., inconsistencies in witnesses' statements); identify significant details from a body of information (i.e., distinguish significant from insignificant information); recognize conditions or circumstances that indicate something might be wrong, or at least out of the ordinary.

BALANCE: Maintain one's balance in unusual contexts (such as when climbing, crawling, crossing narrow ledges, etc.).

Finally, "relation to performance" data generate ratings of the extent to which successful performance of a given task distinguishes superior employees from marginal employees. Those tasks that distinguish superior from inferior employees could then be incorporated into a performance-appraisal system. A rating scale used to collect this task information could be structured like the following:

RELATION TO PERFORMANCE: To what extent do successful officers do this task better than marginal or poor officers?

- (1) In general, all officers do this task equally well.
- (2) Some officers do this task better than others, but they are not necessarily the better workers.
- (3) Generally, successful officers do this task better than marginal or poor officers.

Source: Adapted from J. W. Kohls, J. G. Berner, and R. A. Luke, "California Entry-Level Law Enforcement Officer Job Analysis, Final Report" in Proceedings of the National Symposium on Job-Task Analysis in Criminal Justice, U.S. Department of Justice, Government Printing Office, 1978, p. 242.

#### The Job Element Method

The Job Element Method is based on analyses of jobs by those persons in the agency regarded as "subject matter experts." Subject matter experts are people in the organization very familiar with and knowledgeable about the particular job in question. For example, an experienced police officer would observe such attributes as the ability to follow instructions or the knowledge of how much detail should be included in an accident report. These subject matter experts should be those persons in the agency who can accurately identify and rate the job elements required for superior performance in a particular job.

Once these experts are identified, the job analyst organizes group meetings or panel sessions. During these group sessions, the participants are asked to list the elements necessary to doing the job. Some examples of job elements are:

knowledge, such as knowledge of report writing or arrest procedures.

skill, such as the skill in self-defense tactics.

ability, such as the ability to make quick decisions and communicate orally.

willingness, such as the willingness to work overtime or to rotate shifts.

personal characteristics, such as stress tolerance or adaptability.<sup>29</sup>

The job elements are first listed in broad categories; then sub-elements are identified, and from them more specific, detailed descriptions of worker characteristics are generated. Then the participants rate each element and subelement on the basis of four criteria.

Bare acceptability (B): What proportion of even barely acceptable workers are good in the element?

Superiority (S): How important is the element in picking out the superior worker?

Trouble (T): How much trouble is likely if the element is ignored when choosing among applicants?

Practicality (P): Is the element practical? To what extent can we fill our job openings if we demand it?<sup>30</sup>

Using a job-element form, the participants or subject experts rate the job elements, giving each element either a "0," a "1," or a "2." For example, consider the job of police officer. If all barely acceptable police officers possess the "ability to complete a basic

accident report," that element would receive a rating of "2" on the B scale. However, if only a portion of the barely acceptable workers possess the element, it would be rated "1"; if no barely acceptable worker possesses the element, it gets a "0." Then, the job element is rated on its ability to indicate superior workers--how important is the element in differentiating between a superior and barely acceptable worker. For the trouble likely, or T scale, the elements are analyzed in terms of the trouble that could result if the element is not given special consideration in the selection process. An example for the job of police officer could be "stress tolerance." A low level of stress tolerance might lead to an officer's overreacting in a crowd-control situation which, in turn, could result in incidents of "unnecessary force," or allegations of police brutality. For this reason, stress tolerance would get a "2" on the T scale.

The practicality scale is used to measure the likelihood that job applicants will possess the element; or the ease (or the difficulty) of filling job vacancies if the element were required of all applicants. For example, it would be practical to expect that most applicants would possess the ability to read and write, giving this element "2" or "1," while it would be unlikely that most applicants would possess a knowledge of the dispatcher codes, resulting in a "0" rating on this scale.

After all of the job elements and subelements are identified and rated, each of the four categories are summed by adding up the individual ratings in each category. A high bare-acceptability figure would indicate that the majority of the barely acceptable workers are

adequate in the element. A high superiority figure would signify that the element is important for identifying superior employees. A high trouble value would imply that the element should be taken under consideration if failing to have the element could be a detriment to doing the job--for example applicants weak in oral communication skills may prove to be weak employees. These individual ratings used to produce the above group sums are also used to compute an item index (IT), a total value index (TV), and a training value index (TR).

The item index (IT) is calculated by first multiplying the superiority (S) value by the practicality (P) value for each individual job element. This value is then added to the T scale rating. The formula for the item index is:

$$\begin{array}{rcll} \text{IT} & = & ( \text{S} & \times & \text{P} ) & + & \text{T} \\ \text{Item} & = & \text{Superiority} & \times & \text{Practicality} & + & \text{Trouble-Likely} \\ \text{Index} & = & \text{Rating} & & \text{Rating} & & \text{Rating} \end{array}$$

The item index serves as an indication of how valuable the element will be for identifying superior workers.

The total value index (TV) is calculated by adding the item index of an element with the superiority rating and then subtracting the bare-acceptability and practicality rating.

$$\begin{array}{rcll} \text{TV} & = & \text{IT} & + & \text{S} & - & \text{B} & - & \text{P} \\ \text{Total} & = & \text{Item} & + & \text{Superior} & - & \text{Bare-} & - & \text{Practi-} \\ \text{Value} & = & \text{Index} & + & \text{Rating} & - & \text{Accept-} & - & \text{cality} \\ \text{of an} & = & \text{of an} & + & & - & \text{ability} & - & \text{Rating} \\ \text{Element} & = & \text{Element} & + & & - & \text{Rating} & - & \end{array}$$

This index is used to distinguish between broadly stated elements and specifically identified subelements. Elements with high TV values are considered to describe the overall abilities of a job without much

detail or precision. Thus, when selecting applicants, subelements are used in place of these general elements to allow for a more accurate and precise assessment of job applicants.

The training value (TR) is calculated by first reversing the rating on the practicality scale. For example, the elements that almost none of the applicants possess receive a rating of "2" and not "0." Then this value is multiplied by the superiority rating. The superiority rating puts high marks on those elements high in superiority but low in practicality--these elements distinguish superior workers and are not found in the applicant group. For example, if an employee needs to possess a certain element--say the knowledge of particular laws or statutes--to be superior on the job, and yet the candidates cannot be expected to possess it, a training program to provide such information about the law and statutes could be developed and implemented. The formula for the training value is:

$$\begin{array}{rcccccc} \text{TR} & = & \text{S} & + & \text{T} & + & \text{SP} & + & \text{B} \\ \text{Training} & & \text{Superiority} & & \text{Trouble-} & & \text{Product of} & & \text{Bare-} \\ \text{Value of} & = & \text{Rating} & + & \text{Likely} & + & \text{Superiority} & + & \text{Accept-} \\ \text{Element} & & & & \text{Rating} & & \text{\& Reversed} & & \text{ability} \\ & & & & & & \text{Practicality} & & \text{Rating} \\ & & & & & & \text{Rating} & & \end{array}$$

The value obtained from this calculation indicates whether the particular element should be included in a training program.

This method is useful for determining, selecting, training, and appraising employees. Small sample sizes, minimal analyst training time, small costs as well as easy administration characterize the job-element method. However, there are problems in that the job-element method really does not use any operational definitions for "knowledge,"

"skills," in the knowledge, skills, and abilities needed to perform a job. An additional problem is that of scheduling panel sessions. The work schedules of the participants may not coincide, thus causing some problems in arranging panel sessions. In small organizations, the job-element method may be impractical because of the time involved; a smaller organization may not be able to afford such a manpower loss even if it is only temporary.<sup>31</sup>

#### METHODS OF JOB EVALUATION

Recent times have seen an increasing number of organizations that are employing systematic and orderly methods of classifying jobs and determining wage scales. Job evaluation is a way to price jobs; it is concerned with money and work. It seeks to answer some of the following questions: How much is a job worth? How much does an individual jobholder feel he or she should be paid? What is the value of the work to the employer? How might this value be determined?

Overall, job evaluation is a process of comparing jobs in relation to other jobs in the organization. It includes several steps such as securing and analyzing facts about jobs, turning these facts into job descriptions, studying and evaluating these descriptions and jobs according to preestablished rating methods, and finally pricing the jobs in relation to the evaluation. However, such an evaluation process does not replace judgment in the administration of a pay structure. It does provide facts upon which management and employees may base their decisions. Job evaluation is used primarily for determining and administering compensation systems.

There are several methods available for use in evaluating jobs. The literature has generally divided these into two categories, the nonquantitative methods and the quantitative methods.<sup>32</sup>

#### Nonquantitative Job-Evaluation Methods

The job-ranking method was one of the first job-evaluation techniques developed. Jobs are compared against each other to determine whether one job has a level of duties, responsibilities, and requirements similar to those of others in the series, or a higher or lower level than theirs. This comparison allows for a rank order of importance for each job. Jobs are not separated into their component parts and then parts compared. Instead, with specific guidelines, "whole" jobs are compared to one. For example, a group of jobs can be compared and ranked according to the amount of education and experience required for adequate performance, the complexity of the functions executed, the degree of skill employed, or the responsibilities demanded.<sup>33</sup>

In ranking jobs, the first step is to generate clear job descriptions and job specifications that state the qualities workers should possess in order to respond to various job demands. These statements should be accompanied by a job title that not only identifies a job, but also aids the raters in making accurate judgments.<sup>34</sup> One successfully used technique for this is to write job titles and descriptions on small cards; such cards are easily handled and provide a means of quick reference. An example of a card appears in Figure 6.

FIGURE 6  
JOB TITLE CARD

#### Patrol Sergeant

Position Summary - supervises and trains patrol personnel and desk operations in order to increase their effectiveness and provide a greater degree of public service.

Duties: briefs assigned personnel on activities in the field; discusses departmental announcements and directives; inspects equipment, appearance, vehicles, and weapons; coordinates activities of assigned personnel at scenes of major crimes or disasters; supervises desk personnel; handles citizen complaints; responsible for follow-up reports; acts as watch commander in commander's absence.

Source: Adapted from Los Angeles County Sheriff's Department, Career Development for Law Enforcement, Department of Justice, Washington, D.C., 1973, p. 124.

Then these cards are sorted into rank order. The easiest job or the job having the least worth is identified and put last. The job that takes the next lowest skill, education, knowledge, etc., is designated and put next to last. This procedure is followed until all the job descriptions in a particular set are ranked from lowest to highest. Conversely, the rater can begin by identifying the hardest job or the one having the most worth, and rank it "1"; then the next hardest and rank it "2." This procedure, from top down, would continue until all the jobs are ranked. Another way is first to select the job representing the mid-point range in difficulty of a particular job set and then work up in difficulty and down in difficulty from this job. Still

another method of ranking jobs is to have the rater select the job with the least requirements and put it lowest. Then the job with the most requirements is identified and put highest. Then a job that represents mid-point requirements is selected. Then the rater ranks the remaining jobs from the mid-point to the lowest and from the mid-point to the highest. When at least three positions are established at the beginning of the ranking process, the rater has more "concrete" levels to work from, thus facilitating the entire process.<sup>35</sup>

#### Quantitative Methods

The paired-comparison method is used when the number of jobs to be ranked is quite large. As the number of jobs increase, some distinguishing differences among jobs may be overlooked because there are so many data to recall about each job. The paired-comparison method was developed, in part, to deal with this problem. Each job being rated is compared with every other job being rated, and this is accomplished by pairing jobs. The number of comparisons to be made for a given number of jobs is:

$$\frac{N(N-1)}{2} \text{ where}$$

N = the number of jobs to be ranked.<sup>36</sup>

For example, if there are 10 jobs in a department, the number of comparisons equals:

$$\frac{10(10-1)}{2} = 45.$$

A rater is only required to make one decision at a time: which of two jobs is harder? The comparisons are randomized, where each comparison

has an equal probability of being chosen, so that the order is not in a definite job sequence. The harder of two jobs of a pair is noted either with underlining or a star. After the rater has completed the ranking procedure, a count is taken of how many times a particular job has been ranked harder than the ones it was compared with. The job with the highest count is ranked at the top, while the job having the lowest count is placed at the bottom. The remaining ones are then put into rank order by determining the number of times they were judged the harder of two in a pair.

The statistical analysis of ranking scales can be handled through either simple computation or by advanced methods. (For more advanced methods, the reader should refer to the bibliography for further reference and information.)

A somewhat easy method for evaluating ranked jobs is first to reduce each set of rankings to the same scale. Hull recommends transforming ranks into equivalent scores using a 10-position ranking scale and the following formula.<sup>37</sup>

$$\text{Equivalent score} = 100 \frac{(R - .5)}{N} \text{ where}$$

R = rank of a particular job

N = total number of jobs being ranked

For example, if the job "chief investigator" was ranked "1" among "six" jobs to be ranked, the following would be computed:  $100(1-.5)/6 = 8.33$ . Using the same formula the ranker would compute the percent positions for all the remaining jobs. Then these figures are changed into the scores. (See Figure 7.) These linear scores appear in the last column of Figure 8.

TABLE 1

TABLE FOR TRANSMUTING "PERCENT POSITION" IN RANKED SERIES INTO SCORES OR UNITS OF AMOUNT ON AN ORDINARY SCALE OF TEN POINTS

Percent Position	Scale Score	Percent Position	Scale Score	Percent Position	Scale Score
.09	9.9	22.32	6.5	83.31	3.1
.20	9.8	23.88	6.4	84.56	3.0
.32	9.7	25.48	6.3	85.75	2.9
.45	9.6	27.15	6.2	86.89	2.8
.61	9.5	28.86	6.1	87.96	2.7
.78	9.4	30.61	6.0	88.97	2.6
.97	9.3	32.42	5.9	89.94	2.5
1.18	9.2	34.25	5.8	90.83	2.4
1.42	9.1	36.15	5.7	91.67	2.3
1.68	9.0	38.06	5.6	92.45	2.2
1.96	8.9	40.01	5.5	93.19	2.1
2.28	8.8	41.97	5.4	93.86	2.0
2.63	8.7	43.97	5.3	94.49	1.9
3.01	8.6	45.97	5.2	95.08	1.8
3.43	8.5	47.98	5.1	95.62	1.7
3.89	8.4	50.00	5.0	96.11	1.6
4.38	8.3	52.02	4.9	96.57	1.5
4.92	8.2	54.03	4.8	96.99	1.4
5.51	8.1	56.03	4.7	97.37	1.3
6.14	8.0	58.03	4.6	97.72	1.2
6.81	7.9	59.99	4.5	98.04	1.1
7.55	7.8	61.94	4.4	98.32	1.0
8.33	7.7	63.85	4.3	98.58	.9
9.17	7.6	65.75	4.2	98.82	.8
10.06	7.5	67.48	4.1	99.03	.7
11.03	7.4	69.39	4.0	99.22	.6
12.04	7.3	71.14	3.9	99.39	.5
13.11	7.2	72.85	3.8	99.55	.4
14.25	7.2	74.52	3.7	99.68	.3
15.44	7.0	76.12	3.6	99.80	.2
16.69	6.9	77.68	3.5	99.91	.1
18.01	6.8	79.17	3.4	100.00	.0
19.39	6.7	80.61	3.3		
20.83	6.6	81.99	3.2		

Source: J. Otis and R. Leukart, Job Evaluation, Prentice-Hall, New York, 1948, p. 60.

TABLE 2

ILLUSTRATION OF TRANSMUTING RANKS TO LINEAR SCORES

Job Title	Rank	Percent Position	Scale or Linear Score
Chief Investigator	1	8.33	7.7
Patrol Sergeant	2	25.00	6.3
Crime-Prevention Officer	3	41.66	5.4
Dispatcher	4	58.33	4.6
Telephone Operator	5	75.00	3.7
Receptionist	6	91.66	2.3

Source: J. Otis and R. Leukart, Job Evaluation, Prentice-Hall, New York, 1948, p. 60.

The final step when using the paired-comparison job-evaluation method is to combine the department rankings into a single set of ranks. In a large organization having several hundred jobs, it would be quite difficult to rank such a large number of jobs into one single set of ranks. In such instances, it is much more feasible to make job comparisons within departments.

The basic purposes for integrating departmental ranks are to provide the organization with a single set of job rankings for the organization as a whole and also to establish horizontal and vertical equity among various departments. Through the organizational ranking obtained by collating the various department ranks, the number of groups or grades of jobs present in the organization can be determined and then defined to insure proper allocation of newer revised jobs in the future.<sup>38</sup>

The job-classification method (also called the grade or grade-description method) was developed, in part, to deal with the major disadvantage of the ranking method; that of not supplying any concrete scale or "yardstick" for measuring differences in jobs. The job-classification method consists of a series of definitions designed to differentiate jobs into wage groups. These definitions, called grade or class descriptions, form the foundation for the method. The generation of definitive grades, expressed in terms of lowest-level requirements to highest-level requirements, rests on the assumption that with any given range of jobs there are gradations in the levels of duties, responsibilities, and skills required for performance. Each grade definition is a general description of the requirements necessary for a job; no attempt is made to state specific details of the various elements of jobs. The job is analyzed as a whole; an analyst assesses each job description and selects a grade definition that most clearly represents the level of performance in that job. Thus, the analyst is really comparing the job to a scale to determine its relative position in the range. Positions are not only classified by level but also by kind--clerical, administrative, etc. Many organizations first classify jobs by kind and then attach a level or grade.<sup>39</sup>

The most widely known job-classification system is that used in the public services of the United States federal government. All civilian positions, officers, and employees in most federal departments are included in this system. The following is a section of this classification system, which has two schedules. The first schedule, the

General Schedule (GS), covers professional and scientific service, clerical, and administrative positions. The second schedule, the Crafts, Protective, and Custodial Schedule (CPS), covers crafts, protective, and custodial employees. The GS and CPC schedules are further divided into grades, which are defined, for example, as follows:

Grade GS-7 includes all classes of positions the duties of which are (1) to perform, under general supervision, work of considerable difficulty and responsibility along special technical or supervisory lines in office, business, or fiscal administration, or comparable subordinate technical work in a professional, scientific, or technical field, requiring in either case (A) considerable specialised [sic] or supervisory training and experience, (B) comprehensive and thorough working knowledge of a specialised and complex subject matter, procedure, or practice, or of the principles of the profession, art or science involved, and (C) to a considerable extent the exercise of independent judgment; or (2) to perform other work of equal importance, difficulty, and responsibility, and requiring comparable qualifications.

Grade GS-15 includes all classes of positions the duties of which are (1) to perform, under general administrative direction, with very wide latitude for the exercise of independent judgment, work of outstanding difficulty and responsibility along special technical, supervisory, or administrative lines which has demonstrated leadership and exceptional attainments; (2) to serve as head of a major organization within a bureau involving work of comparable level; (3) to plan and direct or to plan and execute specialised programmes of marked difficulty, responsibility, and national significance, along professional, scientific, technical, administrative, fiscal or other lines, requiring extended training and experience which has demonstrated leadership and unusual attainments in professional, scientific, or technical research practice, or administration, or in administrative, fiscal or other specialised activities; or (4) to perform consulting or other professional, scientific, technical, administrative, fiscal, or other specialised work of equal importance, difficulty, and responsibility, and requiring comparable qualifications.

Grade CPC-1 includes all classes of positions the duties of which are to run errands, to check parcels, or to perform other light manual tasks with little or no responsibility.

Grade CPC-2 includes all classes of positions the duties of which are to handle desks, mail sacks, and other heavy objects, and to perform similar work ordinarily required of unskilled labourers [sic]; to pass coal; to clean office rooms; to perform regular messenger work with little responsibility; or to perform other work of equal difficulty and responsibility and requiring comparable qualifications.<sup>40</sup>

The first step in the job-classification method is to decide which type of position is to be classified. Then a grade-description scale is constructed for each type of job. However, a decision must also be made about the number of grades or classes, and this is often somewhat arbitrary and dependent on the traditional number of job classes used in the payroll system of the agency. Another consideration in determining grade-description scales is the range of jobs to be included. For example, if the scale is to be applied only to jobs below the supervisory levels, there would be fewer grades than if supervisory level jobs were included. Most systems used today range from a minimum of six grades to a maximum of twenty. The number of grades generally depends on such factors as type of job included, range of salary or wage, range of job skills, policy of promotion within a grade, collective bargaining considerations, and tradition in the agency. Usually the greater the salary range of jobs being evaluated, the greater the number of grades, and vice versa. This is because many salary ranges are related to job advancements, which in turn usually include additional duties or responsibilities for the job incumbent. Such job advancements would require a new grade. Thus, the more salary ranges, the more grades.<sup>41</sup>

Two general methods can be used to write grade descriptions. The first involves classifying jobs before writing grade descriptions. Once jobs are classified, job descriptions assigned to each class are used as the basis for writing each job description. The second method is to establish a number of predetermined grades in advance of job classification. The grades are described and, after the scale is constructed, jobs are assigned to the grades. Job descriptions are really necessary for the classification method; they provide a list of the duties and requirements for all jobs in a particular unit. The assigning of grades is based on the level of duties and requirements necessary for adequate job performance.

The major disadvantage of this method is the extreme care required in writing the grade descriptions. It is hard to express such factors as complexity of duties, nonsupervisory and supervisory responsibilities, and necessary qualifications in a general concise statement. Each grade must be outlined in fairly broad terms but still allow jobs with specific duties and unique responsibilities to be compared with them. A balance must be maintained between being too general or too specific. With a job whose tasks fall at several grade descriptions, classification is difficult. This type of jobs may be hard to classify. Should these jobs be classified on the basis of the highest skill demanded or at the level where the majority of duties fall? Using the former policy would result in some routine jobs receiving an unwarranted rating, while using the latter would only determine how often certain duties are included in a particular job.<sup>42</sup>

The major advantage of the classification method is that most agencies and workers have a fairly good idea about a general classification structure. Thus, this method is easy for workers to conceptualize and to use.

The points rating method is used to single out the component functions of a job for comparison with work functions of other jobs. Jobs are divided into their component functions by a scale created by selecting factors common to the range of jobs to be related. All the jobs in the particular range should have each of these factors, but their degree of importance may differ from job to job. For example, each job may require some formal training, but not the same amount. Those at the lower levels of the range may require only basic training, while those at upper levels may require advanced or specialized training. Therefore, a measure is needed to determine how much of each factor each job has. Degrees are established for each factor to measure differences in requirements among jobs to be rated by the scale. A point value is assigned to each degree of each factor. Then the rater can measure a job, factor by factor, against the scale, selecting the degree of each factor that most nearly describes the requirements for that job. Degree values are summed to arrive at a total point value of the job. This approach is both quantitative and analytical.<sup>43</sup>

The three most common considerations in constructing a point scale are the types of jobs to be evaluated, the range of jobs to be evaluated, and the number of different scales required to evaluate the

types and ranges of jobs. Once these determinations have been made, the job factors must be identified. It is important here that a clear distinction should be made between the job and the holder of the job; the purpose of job evaluation is not to rate the worker but the job. Thus, factors identified should only be those that distinguish jobs from one another, not jobholders from one another.<sup>44</sup>

The factors should be ratable; the amount of each factor must vary to some degree between different jobs. Only those factors important to determining compensation should be chosen--factors like skill, responsibility, effort, working conditions, education required, and accuracy.

The following are examples of factors that could be used for a point scale:

- a. Frequency: how often is the task done?
- b. Duration: how much time is spent on the performance of the task?
- c. Consequences: if an error is made in the performance of the task, how damaging will the consequences be?
- d. Difficulty: how hard is it to learn to do the task?
- e. Performance level: must the task be learned before entry at the beginner level?
- f. Overall performance: is the overall job dependent upon whether the task is done?<sup>45</sup>

Each factor should measure one aspect of the job. Factors should not overlap in meaning. And, finally, the factors should be universal in application or be applicable to the type of jobs for which the system was constructed. Examples of job factors are:

- |                                       |   |
|---------------------------------------|---|
| 1. Skill                              | 11. Responsibility for policy formulation |
| 2. Effort                             | 12. Adaptability                          |
| 3. Initiative                         | 13. Supervision exercised                 |
| 4. Complexity                         | 14. Supervision received                  |
| 5. Judgment                           | 15. Personal contacts                     |
| 6. Experience                         | 16. Public relations                      |
| 7. Working conditions                 | 17. Education                             |
| 8. Aptitude for learning              | 18. Application                           |
| 9. Planning procedures                |   |
| 10. Responsibility for work of others |   |

Source: E. Lanham, Job Evaluation, McGraw Hill, New York, 1955, p. 76.

Once the point factors have been identified, each should be formally defined through a statement of the meaning or significance of the title word or phrase. This formal definition is required so that the raters will interpret each factor similarly to avoid inconsistencies, and only use the factor to measure one and the same aspect of the job. In addition, definitions should be clear, concise, and stated in simple terms. The following examples illustrate factor definitions:

Initiative - the extent to which resourcefulness, ingenuity, and aggressiveness are required in planning and executing job responsibilities.

Mental Requirements - the possession of and/or the active application of the following:

- A. (Inherent) mental traits, such as intelligence, memory, reasoning, facility in verbal expression, ability to get along with people, imagination.
- B. (Acquired) general education, such as in grammar, arithmetic, or general information about sports, world events.
- C. (Acquired) specialized knowledge, such as of chemistry, engineering, accounting, law.

Education - schooling or its equivalent: a measure of the general knowledge required for successful performance on any particular job.

Source: J. L. Otis and R. H. Leukart, Job Evaluation, Prentice-Hall, Inc., New York, 1948, p. 100; E. Lanham, Job Evaluation, McGraw Hill, New York, 1955, p. 79.

The points rating method is based on selected factors that have attached to them a series of "degrees" or categories, each having a different point value. The next step in constructing a point scale is to divide the factors into degrees. The factors selected are usually divided into degrees before the determination of the relative values of the factors. Then it is easier to decide on the importance of each factor because the degree categories have already been established. The following rules are designed to aid in defining degrees for each factor in a scale.

1. The number of degrees selected should be only those needed adequately to differentiate between the jobs being rated. For example, if, in general, working conditions are quite similar for all but a few employees, then only two degrees or levels of working conditions will be needed. Conversely, if required experience for jobs varies widely, then more levels will be required.
2. Degrees should be selected so that jobs fall at each level. Each level defined should have some jobs included in it.
3. Workers should be able to understand the definitions of each degree. Words used should be those familiar to employees.
4. Ambiguous terms should be avoided; definitions should accompany such words as intelligence, character, average, small.<sup>46</sup>

5. Objective terms should be used in writing degree definitions.
6. Examples should accompany definitions as often as possible.

An "experience" factor might contain the following degrees:

<u>Degree</u>	<u>Amount of Experience</u>
1	Up to one month
2	Over one month but less than three months
3	Over three months and up to one year
4	Over one year and up to three years
5	Over three years

Source: Adapted from J. L. Otis and R. H. Leukart, Job Evaluation, Prentice-Hall, Inc., New York, 1948, p. 103.

After job factors are identified and defined, they should be assigned weights according to the percentage or proportionate amount each factor contributes to the total worth of the job. Although these factors should be common to all jobs in the range, their weights are determined by the value each is judged to contribute to the difficulty and worth of all jobs.

For example, if the factors of effort, responsibility, working conditions, and skill had been chosen, they would first have to be ranked in order of importance. The rank in ascending order might be:

<u>Rank Order</u>	<u>Factor</u>
1	Working conditions
2	Effort
3	Responsibility
4	Skill

The final weighting might be:

<u>Rank Order</u>	<u>Factor</u>	<u>Relative Weight</u>
1	Working conditions	10%
2	Effort	15%
3	Responsibility	30%
4	Skill	45%
		<u>100%</u>

Source: E. Lanham, Job Evaluation, McGraw Hill, New York, 1955, p. 87-88.

The relative weight assigned to each factor corresponds with its rank order.

A committee system of analysts and employees is a good method to use for judging the relative values of the factors. Each committee member assigns values or percentages to the factors included in a job so that the values assigned total 100 percent. Then the relative values obtained are averaged.<sup>47</sup>

The next step after obtaining the relative value of each factor is to assign points to the degrees in each factor. Using the arithmetic approach, the points between the degrees of a factor are constant. Table 1 illustrates the use of arithmetic progression to assign degree values. Here, ten factors were classified under the main headings: skill, effort, responsibility, and working conditions. The weights of each are: skill 50 percent, effort 15 percent, responsibility 25 percent, and working conditions 10 percent--which total 100 percent. The percentage weighting of each heading is apportioned among the factors listed under the heading. The numerical value assigned each factor is the point value of the first degree of that factor.

TABLE 3  
DEGREE VALUES ASSIGNED BY ARITHMETIC PROGRESSION

Factor	Relative Weight	Degrees					
		1	2	3	4	5	6
Skill	50%						
Education		16	32	48	64		
Experience		14	28	42	56		
Analytical Ability		20	40	60	80	100	120
Effort	15%						
Mental		9	18	27	36	45	
Physical		6	12	18	24		
Responsibility	25%						
Materials		8	16	24	32	40	
Equipment		7	14	21	28	35	
Supervision		10	20	30	40	50	
Working Conditions	10%						
Surroundings		4	8	12	16	20	
Hazards		6	12	18	24		
	100%						

Source: E. Lanham, Job Evaluation, McGraw Hill, New York, 1955, p. 90.

When the geometric approach is followed, the points between degrees increase progressively. Table 2 is an example of the geometric approach to assigning degree values. The relative value assigned to each factor is the point value of the first degree of that factor. The first degree value is doubled to get the value of the second degree, the second degree is doubled to get the value of the third degree, and so on for each succeeding degree.<sup>47</sup>

TABLE 4  
DEGREE VALUES ASSIGNED BY GEOMETRIC PROGRESSION

Factor	Relative Weight	Degrees					
		1	2	3	4	5	6
Skill							
Education	50%	16	32	64	128		
Experience		14	28	56	112		
Analytical Ability		20	40	80	160	320	640
Effort	15%						
Mental		9	18	36	72	144	
Physical		6	12	24	48		
Responsibility	25%						
Materials		8	16	32	64		
Equipment		7	14	28	56		
Supervision		10	20	40	80		
Working Conditions	10%						
Surroundings		4	8	16	32	64	
Hazards		6	12	24	48		
	100%						

Source: E. Lanham, Job Evaluation, McGraw Hill, New York, 1955, p. 92.

An advantage of the points rating method is that it provides a logical justification for certain jobs to be graded above or below others. Unions usually endorse this method of job evaluation because they can not only negotiate for higher compensation rates but can also bargain over the selection and modification of job factors. This technique is applicable over a wide range of jobs, and allows for the content of new jobs to be quickly assessed. Finally, this method is easy to explain to an agency's employees.

However, this method has several drawbacks, one being that it is quite complicated to set up. Considerable time and money is needed to select the appropriate job factors and their weightings. Once

formulated the system may need several revisions when the nature of jobs change. This can be a tedious process. Finally, there is a good amount of clerical detail required for recording, combining, checking, and adding ratings, which may be a constraint to many organizations.<sup>48</sup>

The following is a part of a point rating scale used by a large company.

#### Educational Requirements

This factor refers to the preliminary training necessary to prepare an individual for the job. It is not to be interpreted in the narrow sense, as meaning that a designated amount of formal education is an absolute necessity; however, the ratings are expressed in terms of equivalent formal education for convenience.

Grade	Approximate time beyond elementary school	Points
A. Minimum requirements; read and understand simple instructions, use ordinary arithmetic, etc. Roughly equivalent to elementary school education.	None	15
B. Additional knowledge on the order of understanding decimals and using arithmetic involving decimals; comprehension of simple drawings, charts or diagrams. Equivalent to partial (technical) high school education; or comparable brief shop training.	1 or 2 years	30
C. (1) Training or education beyond that specified for 2d degree, embracing such knowledge as: understanding of somewhat complicated drawings, diagrams, charts; shop arithmetic and ordinary shop mathematics, including use of hand-book formulas, tables, basic principles and methods of set-up and operation of several machine tools (or highly specialized knowledge of one or two types of machine tools); or broad knowledge of other types of shop operations, such as plating, heat treating, sheet metal work,	3 to 5 years	45

#### Grade

#### C. (continued)

foundry practice, and comparable trade knowledge. Equivalent to partial high school education plus 2 or 3 years of apprenticeship or trades training; or equal to about 4 years of trades training; when high school equivalent is not required (as in some foundry jobs).

(2) For office type jobs, general educational background, usually equivalent to full high school education, which may include specialized courses relevant to the job under consideration, such as stenography, bookkeeping or elementary accounting, statistical methods, fundamentals of mechanical drawing.

Grade	Approximate time beyond elementary school	Points
D. (1) Training or education in a highly skilled trade, such as tool-making, pattern-making, or all-around machinist, usually requiring 3 to 4 years apprenticeship or its equivalent, in addition to two or more years mechanical drawing, etc., mathematics equivalent to technical high school education.	5 to 7 years	60
(2) "Office" or "Salary" type jobs requiring specialized training generally of one or two years beyond usual high school education. Extensive business school training in subjects like accounting or general office management; technical training as in drafting, or design; industrial organization and management, materials control, traffic management, etc.; or (for shop supervision and some other factory jobs), training such as indicated in (1) above. May also be equivalent to about two years of college or engineering school training.		
E. Requires broad training in a professional field such as the following; mechanical engineering; electrical engineering; industrial engineering, comprising industrial management, industrial relations,	8 years (college education)	80

Grade	Approximate time beyond elementary school	Points
E. (continued) production engineering and control; accounting and finance, or other recognized vocations generally obtained through 4 years of college education. May also include jobs that require about 2 years of college plus broad additional industrial training.		
F. Requires broad scientific or engineering training in a recognized profession, plus extensive knowledge of specialized field such as metallurgy, chemistry, aeronautical engineering; involves familiarity with experimental and research techniques, new developments and methods, beyond the scope of ordinary college training, usually equivalent to college education plus one or two years of graduate work.	9 or 10 years	100
G. Requires 4 years of undergraduate work in college, plus additional training in some advanced profession such as medicine, usually equivalent to 3 or 4 years of college work beyond the basic 4 year course.	11 to 12 years	125

Source: E. Lanham, Job Evaluation, McGraw Hill, New York, 1955, p. 94-95.

The factor comparison method is quantitative and analytical in its approach to rating jobs. It breaks the job into its various elements through the use of factors common to the range of jobs to be rated. Jobs are then compared with each other to determine their relative order of importance. Factors existing in and important to the jobs to be rated are selected and defined. Then key jobs are identified, representing each major level of duties, responsibilities, and skills within the range of jobs in question. Key jobs are compared with one

another, factor by factor, by ranking the jobs in relation to each factor in order of their relative importance.<sup>49</sup> Figure 9 is an example of a job-ranking sheet. Each rater should receive copies of this data sheet, and it should be used to record the rank order given to each of the key jobs under each of the factors. Each job should be studied with regard to mental requirements, skill, physical requirements, responsibilities, and working conditions. Then the rater should list the jobs by the title from low to high under each factor on the form; the job having the minimal requirements should be listed as Rank 1, the job with the next to the least requirements as Rank 2, and so on for each job.

FIGURE 7  
JOB RANKING DATA SHEET

Rank	Requirements			Responsibility	Working Conditions
	Mental	Skill	Physical		
1					
2					
3					
4					
5					
6					
7					

Source: E. J. Bengé, S. L. H. Burk, and E. N. Hay, Manual of Job Evaluation, Harper's Brothers, New York, 1941, p. 107.

Once this is completed (jobs compared and ranked under the various factors) a value is assigned to each. Additional jobs are rated, and then arranged according to this procedure until all jobs are ranked.

Accurate job descriptions and specifications serve as the basis for the evaluation process. The selection and definition of factors is conducted, using the job descriptions and specifications. According to Bengel, five basic factors will measure most jobs, and these are used most frequently by agencies using the factor-comparison method. They include mental requirements, skill requirements, physical requirements, responsibility, and working conditions.<sup>50</sup> The operational definitions for these factors appear in Figure 10.

### FIGURE 8

#### DEFINITIONS OF FACTORS USED IN JOB COMPARISON SCALE

##### 1. Mental Requirements

Either the possession of and/or the active application of the following:

- A. (inherent) Mental traits, such as intelligence, memory, reasoning facility in verbal expression, ability to get along with people and imagination.
- B. (acquired) General education, such as grammar and arithmetic; or general information as to sports, world events, etc.
- C. (acquired) Specialized knowledge such as chemistry, engineering, accounting, advertising, etc.

##### 2. Skill

- A. (acquired) Facility in muscular coordination, as in operating machines, repetitive movements, careful coordinations, dexterity, assembling, sorting, etc.
- B. (acquired) Specific job knowledge necessary to the muscular coordination only; acquired by performance of the work and not to be confused with general education or specialized knowledge. It is very largely training in the interpretation of sensory impressions.

#### Examples

- (1) In operating an adding machine, the knowledge of which key to depress for a sub-total would be skill.
- (2) In automobile repair, the ability to determine the significance of a certain knock in the motor would be skill.
- (3) In hand-firing a boiler, the ability to determine from the appearance of the firebed how coal should be shoveled over the surface would be skill.

#### 3. Physical Requirements

- A. Physical effort, as sitting, standing, walking, climbing, pulling, lifting, etc.; both the amount exercised and the degree of the continuity should be taken into account.
- B. Physical status, as age, height, weight, sex, strength and eyesight.

#### 4. Responsibilities

- A. For raw materials, processed materials, tools, equipment and property.
- B. For money or negotiable securities.
- C. For profits or loss, savings or methods' improvement.
- D. For public contact.
- E. For records.
- F. For supervision.
  - (1) Primarily the complexity of supervision given to subordinates; the number of subordinates is a secondary feature. Planning, direction, coordination, instruction, control and approval characterize this kind of supervision.
  - (2) Also, the degree of supervision received. If Jobs A and B gave no supervision to subordinates, but A received much closer immediate supervision than B, then B would be entitled to higher rating than A in the supervision factor.

To summarize the four degrees of supervision:

Highest degree	--gives much--	gets little
High degree	--gives much--	gets much
Low degree	--gives none--	gets little
Lowest degree	--gives none--	gets much

#### 5. Working Conditions

- A. Environmental influences such as atmosphere, ventilation, illumination, noise, congestion, fellow workers, etc.
- B. Hazards--from the work or its surroundings.
- C. Hours.

Source: Asa S. Knowles, Job Evaluation for Hourly and Salaried Workers, The Supervision Publishing Co., New York, 1943.

In most organizations certain jobs stand out from others because they are easy to recognize, are well known, or are common to many other organizations. These are "key jobs." The major component of the factor comparison method is the identification and subsequent comparison of key jobs in an agency. A job is "key" when it can be clearly defined with respect to its skills, responsibilities, and requirements. These jobs must be distinctly identifiable so that no misunderstanding will occur among raters. In addition, key jobs should be those that accurately reflect the going rate of compensation both internally and externally to the agency, as well as characterize each level of difficulty within the range of jobs to be evaluated. At maximum, 25 key jobs should be chosen for inclusion in the evaluation process. However, smaller organizations will probably require fewer than 15 key jobs.<sup>51</sup>

Once key jobs are selected, they must be ranked. Raters should evaluate each job relative to the requirements of each particular factor, and then rank the jobs from low to high. Then the raters' ranks are averaged into a single rank that represents the rank for the key job in question. All the raters' ranks for all key jobs should be averaged.<sup>52</sup>

For each key job, the compensation rate per hour, week, or month is distributed over the five factors by each rate. Figure 11 is an illustration of how monthly rates were distributed according to the relative value of the factors and according to the ranks of 14 jobs.

TABLE 5  
DISTRIBUTING RATES ACCORDING TO RANKS\*

Mental Requirements			Skill Requirements			Physical Requirements			Responsibility			Working Conditions		
Job	Rank	Rate	Job	Rank	Rate	Job	Rank	Rate	Job	Rank	Rate	Job	Rank	Rate
F	1	9	F	1	9	K	1	13	F	1	10	J	1	7
R	2	14	O	2	25	L	2	13	P	2	21	P	2	7
O	3	17	J	3	19	I	3	15	J	3	21	L	3	7
J	4	16	B	4	20	C	4	16	R	4	22	F	4	7
D	5	17	R	5	27	P	5	16	D	5	25	K	5	7
B	6	20	D	6	27	J	6	16	O	6	47	C	6	9
P	7	25	P	7	32	Q	7	16	B	7	31	R	7	10
Q	8	25	K	8	36	R	8	16	Q	8	45	O	8	18
E	9	30	Q	9	36	O	9	18	L	9	55	Q	9	11
K	10	40	E	10	38	D	10	17	M	10	34	E	10	11
L	11	42	L	11	40	E	11	18	K	11	60	D	11	11
M	12	29	M	12	36	F	12	25	E	12	60	I	12	13
C	13	70	I	13	56	B	13	25	I	13	55	B	13	18
I	14	65	C	14	70	M	14	18	C	14	133	M	14	19

\*Source: From Bengé, Burk, and Hay, Manual of Job Evaluation, Harper and Brothers, New York, 1941.

The average ranks are useful for dividing the money rate for each job into five parts and assigning each part to one of the factors in accordance to its estimated importance. This procedure is followed for all the key jobs. The result is a job-comparison scale: a complete sequence of job compensation rates undivided into grades.<sup>53</sup>

There are several advantages found in the factor-comparison method that are not characteristic of other job-evaluation methods. First, there are several published instruction booklets that make it easy for agencies to develop and use their own factor-comparison technique. Secondly, the scales are easily adaptable to any organization, and thus can be "tailor-made." Thirdly, there are only a few factors used in this

method, and the definitions of these five factors overlap very little. This will shorten and simplify the evaluation process. Overall, this method is relatively easy to use and understand.

The weaknesses of this method include the difficulty of defining "key" jobs whose duties are clear and whose rates are not subject to criticism. The entire method is based on using identifiable key jobs; if they are unidentifiable, the method cannot be used. To use this method, considerable rater time and payment are necessary. Several of the complicated steps may be difficult to explain to employees--and thus they may reject or try to inhibit its use for setting compensation rates.<sup>54</sup>

The profile method begins with a selection of key or benchmark jobs that represent the jobs to be considered for evaluation. These jobs are rated according to six factors: responsibility, knowledge, mental demands, social demands, physical demands, and work environment. Each of these factors is divided into 12 to 18 characteristics that are defined and broken down into a number of levels. Each main heading is scored on a four-point scale; benchmark jobs are placed in rank order according to their total score values.

This method is relatively straightforward, easily understood, and an agency can use it fairly easily and quickly. It is applicable across a wide range of jobs and includes a high level of employee participation. Consistency is enhanced because the method only uses four levels whose definitions overlap very little.

The major disadvantage of the profile method is the frequent difficulty in selecting appropriate job facts. When this method is used,

it requires several regular reviews to maintain the job classifications. Job descriptions and factors must continuously be updated to reflect any job changes.

The guide chart profile method combines simple profiling or ranking with factor-based points rating. This system of evaluation is primarily concerned with specifying and measuring the relative importance of jobs in relationship to one another within a specific agency. Thus the structure of job importance in this technique is highly related to the nature of the agency in which the jobs are measured. This method is principally concerned with decision-making, responsibility, and authority within the organization. Jobs are evaluated under three factor headings: know-how, problem solving, and accountability, and the technique is primarily management-focused.

Management know-how is measured in the guide chart profile technique from two perspectives: the depth and the breadth of knowledge required. Depth of knowledge is evaluated on an ordinal scale ranging from primary or basic knowledge through unique authority or a special command of theories or principles. Breadth of knowledge ranges from none or minimal to what is termed "total"--including the understanding of management strategic functions and policy formation. A resulting matrix of breadth and depth of knowledge is then constructed--each skill category subdivided into three levels of human relations skills: basic (referring to ordinary courtesy), important (referring to understanding and influencing people), and overriding (referring to developing motivational skills). The resulting matrix of 24 x 12 subcategories

is used to place jobs in relation to each other on the know-how skill level.

Also part of the guide chart profile method is the evaluation of job problem-solving responsibility and accountability. Problem solving is measured by evaluating jobs according to the "thinking environment," or the context in which decisions for the position are made. The thinking environment classes are on an ordinal scale, and range from those decisions guided by rules or supervision, to those where abstract internalized philosophy guides decisions. This scale contains eight categories. Thinking environment is then contrasted with "thinking challenge," measured on a five-point ordinal scale, and range from repetitive, unchallenging, routine decisions, to creative and novel decision challenges. The two concepts of thinking environment and thinking challenge also form a matrix in which jobs are evaluated in comparison to each other.

Lastly, the guide chart profile method evaluates accountability in jobs, or the level of responsibility (accountability and answerability) for each job in the organization. Job accountability is measured on two dimensions: freedom to act and magnitude of accountability. Freedom to act is measured on an eight-point ordinal scale ranging from prescribed and controlled action to total oversight and guidance actions. Magnitude is measured in four degrees, from very small to large, and each of these categories is further subclassified according to the degree of shared responsibility of the decision maker. The resulting matrix for accountability defines jobs according to the

breadth and depth of decision making accountability. The resulting chart guide profiles (know-how, problem solving, and accountability) are then compared to salary scales to determine the degree of fit between the dimensions and the level of job compensation.

The time span of discretion technique divides jobs into two basic elements: a prescribed method involving clear instructions from an immediate supervisor on how the job should be done, and a discretionary element allowing the employee to decide how the job is done best. This method is based somewhat on the concept of work-payment-capacity (W-P-C). The assumption is that the employee has an unconscious awareness of the level of work he or she is capable of, the level of work being done, the equitable pay scale for the work being done, and the level of work he or she is capable of doing. For a state of equilibrium to exist, a situation must be present in which the demands of a job are consistent with (his or her) personal capacity for doing it (C-W) and in which the pay rate must be regarded as fair and equitable.

The time span of discretion method relies on a single factor for ranking jobs: "responsibility." Responsibility is defined as the maximum period of time over which the outcome of the employee's exercise of discretion in his or her job remains unchecked. The maximum number of time spans of discretion is determined by interviews with supervisors and subordinates. Then money values or compensation rates are assigned according to a given list of equitable pay levels. Overall, this method focuses on the employee's doing the job rather than

on assessing the job alone. This is its major disadvantage. Job evaluation is concerned with evaluating jobs, not employees.

The decision banding method employs a single factor--"decision making"--to evaluate jobs. This one factor is present to some degree in every job, and thus it can serve as a basis for comparison purposes.

The first step in this method involves establishing a set of job bands according to decision type and structure. Job bands are essentially broad categories of work classified on the basis of the level of decisions made. These bands are then subdivided by a decision count made to determine the difficulty of the decision made. From a previously concluded job analysis, the degree of decision making contained in a job is determined, and the job is placed in its appropriate band. Finally, monetary values are ascribed on the basis of the decision making involved in each job.

#### SUMMARY

The job-analysis and job-evaluation techniques presented in this section are representative of a wide variety of techniques used to analyze and to evaluate jobs within organizations. The purposes of job analysis and evaluation, as previously indicated, include the systematic study of jobs and workers for future selection and training, the assignment of organizational reward (including salary), the setting of promotional criteria and the like, and the determination of the hierarchy of importance of jobs within an agency. This information can be collected over a number of criterion variables. As we have seen, such criteria as the level of skill required to perform in the

job, the level of decision-making authority, the level of accountability, and the kind and frequency of decisions made can all be used to differentiate among jobs. And such differentiation among jobs provides an agency with an assessment of job importance, level of responsibility, and the congruence of these factors with compensation. Such evaluations also provide information critical for defining jobs, recruiting individuals capable of performing satisfactorily in those jobs, and training and promoting individuals in positions within the organization. Job analysis and evaluation, then, are critical methods of information collection and interpretation for the organization because they define the roles, tasks, skills, and abilities sought after and rewarded by the organization.

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## MANPOWER FORECASTING

Manpower forecasting in criminal justice organizations is related to other organizational planning processes because it is an attempt to plan ahead for the human resources necessary to fulfilling organizational goals and objectives. These organizational goals and objectives are themselves projections of how the organization views its current state of affairs and its future. Therefore, efforts of forecasting must be ultimately related to overall planning in the organization. Forecasting is specifically concerned with projecting the future needs of the organization while at the same time assessing current organizational capabilities and comparing potential demand with potential supply.

All organizations undertake some form of employment projections, if for no other reason than to estimate the turnover of employees and the replacement needs of the organization. Beyond this, however, long-range employment planning (forecasting) can aid the organization in a number of ways.

First, through extended analysis of human resource potential and need, the organization can improve its utilization of current personnel. That is, by examining the changing long- and short-term needs of the organization and by adjusting personnel accordingly, the organization can more efficiently and effectively use the human resources it has at hand. Such a process is also believed to affect

organizational well-being by providing for greater employee satisfaction through job design.

Second, forecasting can help develop a better understanding of the evolving needs of the organization. That is, through forecasting, the organization can approximate changes in personnel needs and, consequently, orient organizational training and developmental processes toward re-socializing workers into emergent organizational roles or focusing recruitment and selection processes toward new and better methods. Thus, forecasting has the potential for improving the intra-organizational development of personnel as work roles change, while at the same time such processes portend a method for updating organizational assumptions about the types of individuals who should be recruited into the organization and the criteria of personnel selection.

Lastly, forecasting in criminal justice organizations creates the framework for critically examining the organization as a whole, including assessments of organizational mission, goals, and objectives, and the methods for insuring that these organizational intentions will be accomplished. By focusing on the future, forecasting as a process requires that the organization become explicit about what it will or will not do. Operating assumptions about organizational life are bared in such processes, and when related to the broader concerns of organizational planning, forecasting efforts shed light on where the organization thinks it is going and where it is likely to go. Thus, forecasting is potentially useful in clarifying

the future options for the organization as well as providing useful information for organizational self-assessment and change.

#### ORGANIZATIONAL UNCERTAINTY AND ENVIRONMENTAL CONSTRAINTS

All organizations face some uncertainty when confronted with factors outside the organization that affect the attainment of their goals. Factors like municipal, county, or state financing, economic conditions, social support for agency services, politics, and the availability of labor will all, to one degree or another, pose prediction problems for the organization. By engaging in forecasting, the organization seeks to gain some advantage over these environmental uncertainties by predicting or estimating their likely consequences and then attempting to design organizational strategies to overcome these potential environmental obstacles or fluctuations.

Whether or not organizations have formal forecasting processes, forecasting is undertaken in most of them. For example, all organizations are readily able to identify fixed factors in their environment that will without doubt affect the pursuit and attainment of the goals of the organization. City, county, or state charters specifying organizational prerogatives and holding organizations accountable to some norm are readily identifiable in most jurisdictions. Similarly, union contracts, legal mandates imposed on the organization, jurisdictional projections of tax revenues and the like are within the bounds of organizational consideration and assessment. The collection and analysis of this information, even if done informally, amounts to the rudiments of forecasting.

**CONTINUED**

**5 OF 7**

Beyond these informal forecasting methods, many jurisdictions collect information on unemployment, changes in population, service demand, and a host of other useful social statistics that might be used in organizational assessments of the future. The existence of such information and its use in organizational planning reduces the organization's uncertainty and, hence, its dependence on the behavior of the environment. Being able to estimate future service demand, changes in the service population, the likely effect of voter sympathy with "Proposition 13" type proposals, and court mandated EEOC practices or changes in local union contracts, the organization is better prepared to design and to implement programs that will incorporate these environmental changes, while minimizing disruption to the current functioning of the organization. And, in fact, by projecting or forecasting these changes, the organization can develop a planning posture that anticipates environmental change. Thus, forecasting efforts can reduce organizational uncertainty created by a turbulent environment and provide the information necessary for organizational responsiveness to community and service needs. Such information is integral to other organizational planning as well. Without such forecasts organizations are hard put to redesign their goals or to provide for goal succession. As a consequence, long- and short-term projections provide the necessary information for addressing such broader organizational questions like: What new functions will the organization be expected to take on in the years to come? Which of these can be done by people who already work there? What

kinds of changes in personnel practices will be necessary to get the new work done--e.g., how will recruitment and selection processes be affected or need to be altered? These questions, and many like them, can be addressed through forecasting.

#### THE ROLE AND FUNCTION OF MANPOWER FORECASTING

As previously indicated, manpower forecasting is a process whereby the organization seeks to estimate the future and to provide information relevant to organizational development and change. Beyond this, manpower forecasting is a process for "forming expectations and anticipations in which we have greater confidence than in the unguided and unsupported guess."<sup>1</sup>

Further, by applying a systematic approach, manpower forecasting functions to improve the estimation of long-range manpower needs and thus to improve the organization's "return on investment" in human resources.<sup>2</sup> By systematic approach we mean considering the organization, its missions and roles, its programs and objectives, and the personnel available to accomplish all these, rather than limiting forecasting to one or two of them. Manpower analyses have the potential for improving at least four aspects of organizational planning and management. First, such efforts help in describing the organization, its environment (both internal and external) and the relationships between the two. This description can be done through the use of statistical analysis<sup>3</sup> or through more normative assessments. Secondly, manpower analyses, including projections, provide for the prediction and forecasting aspects of organizational planning. This

information is then presumably used for the control of the manpower processes throughout the organization. Where needed, these analyses provide the information for the assessing of various manpower policies and the design of new policies. Thus, projected information forms the grist for other related organizational manpower processes.

Manpower forecasts are often interpreted as being statements about what will happen in the future. More correctly, these forecasts represent conclusions about what is likely to happen if the assumptions in the forecast are accurate and if the data supporting the forecasts are reliable and valid. Such a distinction recognizes that manpower estimates, projections, or forecasts are subject to distortion and error, and that their accuracy is influenced by a number of factors. This touches on a second and perhaps more important issue regarding manpower forecasts, particularly those of organizational manpower problems.

Manpower forecasts of future organizational problems are subject to a major paradox. This paradox stems from the fact that in making such forecasts, and in anticipating such problems, the organization can, and often does, take corrective action to ward off the problem anticipated. So, the predictions often prove to be inaccurate. But the existence of this paradox establishes the ultimate value of manpower forecasts. For as Cascio indicates:

Of themselves [manpower forecasts] are little more than academic exercises, but when integrated into a total planning process, they take on special value because they enable an organization to extend the ranges of other phases of manpower planning and of planning for other functions.<sup>4</sup>

### MANPOWER ESTIMATES AND PROJECTIONS: SOME NECESSARY DISTINCTIONS

Before examining the various frameworks for manpower forecasting and the associated methods, we need to make some distinctions between manpower estimates and projections. These distinctions affect both the rigor of the analysis and the breadth of data collection associated with particular prediction efforts, and the degree of confidence placed in the outcomes of such efforts as well. Also, the distinctions between estimates and projections provide a basis for exploring the differing use of each, how much effort is necessary to conduct such analyses, and the utility and purpose of such methods for organizational planning.

The first and foremost distinction between estimates and projections is how much confidence is put in the prediction. In estimates, the fundamental concern is with making an "educated guess"<sup>5</sup> about how human resources will be used in the future. Estimates are often based on an historical analysis of existing information about the organization--hence the "educated guess." The individual making the estimate, after examining historical information and making some assessment of current developments, constructs a working model from which the estimates are to be made. This working model includes a series of assumptions about which variables are most likely to affect the particular manpower issue under consideration (e.g., turnover or labor-market change, including the availability of certain skills in the work force or expectations about the impact of future legislation). Such estimates are obviously influenced by the accuracy of the

assumptions and by the historical and current data used to build estimates of the future. Hence, the validity of the estimates is often difficult to prove, as the events necessary for validation occur in the future. Nevertheless, estimates based upon explicit and sound assumptions with full explication of the relevant variables and their interrelations are extremely useful for planning purposes, even though the statistics upon which they are based are subject to greater error. What is recognized is that estimates are made on the basis of available information, that the relationships expected are explicitly stated and hence are subject to discussion, consideration, and modification, and that the educated guess is indeed theory- or hypothesis-oriented instead of being a wild guess about the behavior of the environment. The key here is to make informed guesses.

Projections are more formalized than estimates in that they generally involve the mathematical modelling of a particular manpower phenomenon--mathematical extrapolations of existing data on manpower into the future.<sup>6</sup> Despite their mathematical rigor, projections are based on assumptions about the future behavior of relevant variables and, as a consequence, are subject to the same concerns as are estimates--namely, that the assumptions be made explicit and testable. Essentially then, the distinction between estimates and projections is the degree of mathematical rigor in each. Each has its place in the policymaking process and each yields information for specific organizational purposes. As much of the current interest in criminal justice agencies is with estimates (despite the many references to

to projection), we will not make hard and fast distinctions between estimates and projections; both will generally be subsumed under the broader label of forecasting.

Manpower forecasting techniques can also be distinguished from each other on the basis of two additional criteria: how normative the forecast is and where in the organization the forecast originates.<sup>7</sup> Forecasts can be classified as descriptive or normative. The essential distinction here is that descriptive forecasts make predictions about what is likely to be where normative forecasts are concerned with what ought to be. As a result, normative forecasts are actually "expressions of policy, that is, estimates of what should happen if certain goals are to be met."<sup>8</sup> Normative forecasts have the potential for greater participation of various values in the forecasting process because they may be used to sample many opinions about what the organization ought to do. So, normative forecasts can provide a vehicle for examining often opposing viewpoints and reconciling differences in values about organizational directions before they become problems of goal-dissensus. Normative forecasts, then, are indeed germane to considerations of agency missions, the definitions of which are themselves subjective evaluations of alternative goals toward which the organization desires to move. Normative forecasting can include, for example, the sampling of opinion about what the future direction of the organization should be, or its service clientele, and the relative importance of services to be provided in the future. These types of forecasting processes can make for greater public involvement in

agency decision making, including considerations of manpower acquisition and use.

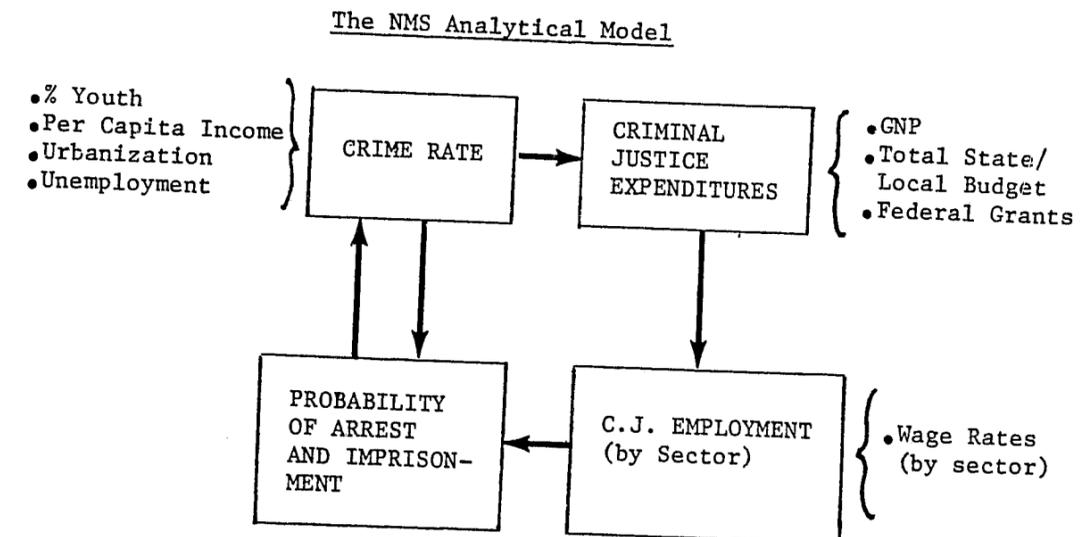
Descriptive forecasting, by contrast, is concerned with the projection of historical and current circumstances into the future. Although it is less reliant on the values inherent in the policymaking process, values are there in descriptive forecasting, too, if more latently.

The combination of descriptive and normative forecasting is obvious in criminal justice today. For example, Project STAR (System and Training Analysis of Requirements for Criminal Justice Participants) was an extended effort to examine individual role performance in the criminal justice system. While this project was primarily focused on job analysis and the behavior of individuals in their work roles, a component of the project investigated the social trends associated with increases or decreases in types of criminal justice employment and the likely consequences of these trends on the roles of certain classes of criminal justice employees. Using such projective methods (to be discussed in greater detail in following sections) as expert opinion, the analysis of historical trends, and linear extrapolation, Project STAR incorporates a concern with normative forecasting (expert opinion) and descriptive forecasting (historical analysis and linear extrapolation).

Using essentially the descriptive forecasting method and projecting the data into the future, the National Manpower Survey of the Criminal Justice System used indicators such as population characteristics (including the percentage of youth in the population and the

percentage of population residing in urban areas), unemployment, per capita personal income, total government expenditure, federal grants and wages, various measures of crime, and police and correctional statistics to create a forecasting model for criminal justice manpower prediction.<sup>9</sup> The specification of the assumptions in the model were also made explicit in the National Manpower Model and the general model is presented here as Figure 1.

FIGURE 1  
KEY FACTORS AFFECTING  
LAW ENFORCEMENT AND CRIMINAL JUSTICE EMPLOYMENT



As illustrated in Figure 1, the National Manpower Survey<sup>10</sup> specifies relevant variables and their interactions. For example, as shown, it was assumed that such factors as the percentage of youth in the population, the per capita income, and the degree of urbanization and unemployment would affect crime rates. Crime-rate fluctuations would, in turn, affect criminal justice expenditure and ultimately criminal justice employment. Criminal justice employment would in turn influence the probability of arrest and imprisonment, presumed to affect the crime rate. The explication of these relationships is crucial for the forecasting process and the use of descriptive forecasting techniques.

Manpower forecasting techniques may also be considered in relation to where in the organization the forecast emanates. In this regard, Glueck has classified manpower (employment) forecasting as either "top-down or "bottom-up" or a combination of the two.<sup>11</sup> Top-down approaches focus on top management in the forecasting process, and the essential concern is with the total demand for human resources throughout the organization. While information is collected throughout the organization, the whole of the organization is the primary focus. Bottom-up approaches, by contrast, are geared to considering the demand of each unit for human resources. This might include forecasting the need for detectives or correctional counselors without doing the same for other organizational specialities, e.g., patrol officers or correctional custody officers. A mix would, of course, attempt to blend the two perspectives.

The distinction of where (top or bottom) the forecasting focuses explicitly recognizes the different environments confronted by organizational subunits compared to the organization as a whole. Each approach provides useful information for essentially different questions. For example, the bottom-up approach may be limited to a consideration of replacement for turnover in the detective bureau, while the organization-level (top-down) process may in reality be considering the utility of detectives over against other organizational specialities. As can be seen from the example, the level of organization and the manpower forecasting issue at stake are highly related. Techniques for each of these levels of manpower forecasting will be considered below. First, however, we will turn our attention to a consideration of the two major purposes of manpower forecasts-- predicting manpower supply and predicting manpower demand. This discussion will be followed by a consideration of various categories of models, then a discussion of the various manpower forecasting techniques and some of their criminal justice applications, and their utility for criminal justice manpower planning.

#### FORECASTING SUPPLY AND DEMAND

Manpower forecasting is primarily concerned with making estimates about the organization's human-resource needs and the environment's ability to fulfill those needs. Within this consideration are two primary concerns; predicting the supply of labor and predicting the demand for labor. As Cascio indicates; "There are two component processes in this task: anticipating the available

manpower supply, both within and without the organization at some future time period, and anticipating organizational demand for various types of employees."<sup>12</sup>

The important distinction to be made between supply analysis and demand analysis in manpower forecasting is that supply analysis often focuses on the internal resources of the organization without consideration of the external environment. This form of analysis would also include a concern for employee-development programs and policies that might be preparing employees for future roles within the organization. Demand analysis, by contrast, relies heavily on external environmental conditions and data. Generally, this form of analysis seeks to link the organization's work to the need for human resources. For example, in industry, estimates are constantly made about the volume of sales and the need for new employees in production. Other estimates such as product volume and expanding markets are associated with increases or decreases in the labor demand. Furthermore, industrial assessments of product appeal and consumer behavior also provide information upon which these estimates are made. In the public sector the absence of an external monetary indicator such as gross sales or return on capital investment<sup>13</sup> complicates but does not obviate the need for forecasting demand. Such production factors as the number of arrests, the number of calls for service responded to, and the number of follow-up investigations conducted by law enforcement agencies are increasingly used as indicators of production and then linked to the need for manpower.<sup>14</sup> In corrections,

such factors as inmate population, and, in probation, such factors as case-load size are increasingly used in making predictions about the number of correctional officers or probation officers needed. And in the courts, statistics about number of warrants filed, trials conducted, and verdicts rendered are used as proxy measures for organizational production where clear and unambiguous measures of external production are not readily available.

Of course, estimates of demand, including such considerations as consumer behavior, the economy, and the rate of change in technology, complicate the process of predicting with great certainty the demand for manpower. For example, estimates of public behaviors such as reporting various types of crimes, litigating disputes, or voting for additional correctional facilities to be built are fraught with uncertainty. And since many of these behaviors are ultimately linked to manpower needs (e.g., more police officers to respond to public demand, more clerks of the court, or more correctional officers to staff new prisons), the uncertainty of demand makes for uncertainty in the manpower projections made from such demand. Such predictions do, however, force the organization into a consideration of the external factors affecting the flow of resources (in this case, human) into the organization.

#### MODELS AND MANPOWER FORECASTING

Manpower forecasting is primarily concerned with predicting the supply of and demand for human resources to accomplish organizational goals. In constructing models of manpower phenomena, a brief

consideration of modeling is in order. This discussion is intended to describe the purpose and nature of models and to develop a specific classification of them. Such a classification will aid the discussion of the specific manpower forecasting methods (models).

The term model can mean a number of things. As Bohigian indicates,

A model can mean an ideal, such as a model penal code. A model can mean a duplicate, such as the modus operandi of a criminal. A model can mean a representation, such as a police duty chart. A model can mean an example, such as a judicial precedent. A model can mean an indicator, such as the FBI Crime Index. And, finally, a model can mean an imitation, such as the reconstruction of a crime.<sup>15</sup>

Such varied definitions of models can, and often do, complicate the forecasting process. For example, normative forecasting is often oriented toward the definition of a model described as an ideal. Descriptive forecasting is generally associated with the definition of a model "as a representation designed to describe, to explain, to control, and to predict, as realistically as possible, the essential aspects of a concept, device, object, process, system, or phenomenon."<sup>16</sup> While this definition is necessarily broad, it incorporates our earlier description of the functions of manpower forecasts--namely, to describe, to forecast, to control, and to design manpower policy.

An inherent strength and, as a result, a concomitant weakness of models is their ability to simplify complex processes. The use of assumptions in models only generally reflects the phenomena they were designed to investigate. Yet, the assumptions in models become important cornerstones of the forecasting process because erroneous and

invalid assumptions can only lead to inaccurate models, bad forecasts, and faulty conclusions.

Models may be classified on numerous dimensions. First, they may be classified on the basis of the type of data represented in the model and the standard of measurement of that data. Thus, models can be classified as being either qualitative or quantitative. Another classification of models is descriptive or prescriptive, depending on the model's attempt to deal with causality or with the assertion of desired value. Finally, models can be classified on the basis of whether they are deterministic or stochastic. Deterministic models treat phenomena in a constant manner, assigning weights to variables and then examining the movement of that variable throughout the model. Examples include manpower forecasting techniques such as the Critical Path Method (CPM) where the developed paths in the model are predetermined and fixed and the resulting predictions for manpower are rooted in the desired path (called the critical path). For example, suppose that a correctional administrator was using the critical-path decision method to determine the number of correctional officers needed for a particular institution. Further, suppose that the administrator had determined a fixed ratio for the number of correctional officers for classes of inmates (e.g., minimum, medium and maximum security). Once the determination of the class of inmate to be housed in the correctional facility is made, the preferred ratio of correctional officers to inmates (given the inmate type) is used for the projection of manpower. Under this mode, then, manpower

requirements are seen as constant and determined. Other similar techniques include the Performance Evaluation Research Technique (PERT) and Gantt Charting.

Stochastic models assign probabilities to variables rather than treating them as constant. This, of course, complicates the model but also makes the model more sensitive to individual variations that tend to be ignored in the more deterministic models. For example, probabilistic models might be used in predicting police officers' ability to handle stressful situations. By estimating such variables as the officer's age, family situation (married or single), orientation toward authoritarianism, propensity for the use of violence, and past emotional stability, the police administrator might predict whether certain officers might be assigned to a family crisis intervention unit. The certainty of the prediction, however, is not viewed as the same for each officer. Rather, the probabilistic mix of background and psychological and social circumstances is used to estimate likely performance in stressful situations. And this prediction is itself affected by error in measurement, yielding a prediction stated as the likely occurrence of a behavior rather than the actual occurrence of the behavior.

#### FORECASTING DEMAND: MODELS AND TECHNIQUES

Perhaps the most difficult of the forecasting methods, demand forecasting, seeks to predict future demands for labor by examining factors external to the organization believed to influence the consumption of organizational output and, hence, the need for more or

or less labor. In the business realm, and also within public organizations, demand forecasting generally seeks to identify a business or production factor to which manpower needs can be related. In the private sector, such factors might include sales figures (in dollars), the number of automobiles produced, or the number of clients served. In the public sector such production indicators as number of citizen calls responded to by the police, number of inmates receiving certain types of service, or number of complaints filed with the court are used.

As a general process, demand forecasting is comprised of six steps<sup>17</sup>:

1. Identifying the essential business or production factor.
2. Analyzing the historical and current behavior of that factor with regard to the employment of manpower.
3. Calculating a productivity ratio.
4. Projecting a trend in employment from productivity.
5. Making necessary adjustments, where appropriate.
6. Projecting the required manpower demand for the target time period.

These six steps are embodied in all of the demand forecasting models and techniques to be presented below. Each, to one degree or another, and with one level of confidence to another, follows this general pattern. Before reviewing these techniques, however, we must consider the implications of these procedures in forecasting manpower demand in criminal justice organizations. For, while the steps or procedures outlined above appear at first glance to be rather straightforward

and unambiguous, their application to criminal justice organizational settings is, indeed, much more problematic.

The first consideration in making projections about manpower demand is the identification of the appropriate "business" factor from which the projections are to be made. Cascio indicates that the selection of a proper prediction factor is contingent on that factor's satisfying two important criteria; first, that it should relate to the essential nature of the business, and secondly, that changes in the production factor should be proportional to the amount of manpower required.<sup>18</sup>

The requirement that the production factor be integral to the business or service provided simply means that organizations should select a predictor that epitomizes the organizational output. This output, whether gross sales, tons of steel produced, or number of inmates assigned to community correctional programs, should be the same factor on which other organizational planning processes are based. Selecting the appropriate prediction factor can be very hard. Part of this difficulty is related to the fact that many organizations, including those in criminal justice, produce many goods and services that are difficult to relate to each other under one predictor classification. Police agencies, for example, use such production factors as the number of citizen calls for assistance responded to by patrol officers, the number of traffic citations issued per patrol officer, the number of crimes reported to the police, the number of arrests made by investigators, the number of

cases completed by investigators, and so forth. Correctional programs include number of inmates, inmates in each security classification, amount and kinds of services provided according to type of inmate, and level of institutional security as measures of correctional production. Other criminal justice agencies (courts and probation) generally have many production factors, any of which might be used as a predictor of manpower needs in the future. What is apparent from this discussion is that quite often, an organization will need to make separate manpower forecasts for the varied production factors in the organization. This obviously, complicates the forecasting process as it is necessary to make projections of manpower demand for these various manpower predictors and then to aggregate the demand for the organization as a whole. Further, these multiple forecasts must remain somewhat disaggregated in that they will be needed separately if the organization is to recruit, to select, and to develop the right mix of individuals required for the work.

Besides considering the selection of the best or most appropriate predictor, a proper predictor must be proportional to the manpower requirements. This means that the output be related to the number of workers in such a way that the number of services provided per police officer, the number of correctional clients served per correctional worker, or the number of cases per judge are meaningful measures of work load. Such production statements will provide the data for trend projections and for calculations of productivity ratios.

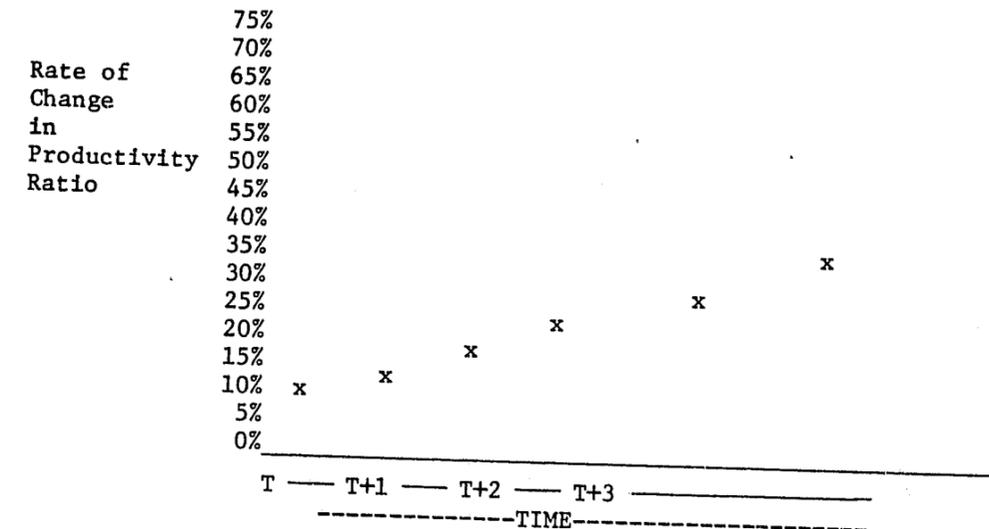
Finally, the selection of a prediction factor will ultimately be a major undertaking for criminal justice organizations. Multiple outputs, and no firm agreement on what the outputs of the police, courts, or correctional agencies are, will immensely complicate and confound the prediction process. As the entire demand prediction process is rooted in the specification of an agreed-upon product of an agency, criminal justice agencies will, no doubt spend considerable time and energy in arriving at acceptable measures of organizational production. And, in arriving at these definitions of production, considerable organizational insight--including intuitive and normative definitions of output, personal judgment, common sense, and an understanding of the work performed--will be required.

Assuming that a production factor can be agreed upon, the next step in the demand forecasting process is the amassing of data from which these projections can be made. As Cascio indicates; "What is required is a quantitative understanding of the past so that an organization can more accurately plan for the future."<sup>19</sup> In this stage of the forecasting process, the organization seeks information on the amount of labor (historically) required to affect organizational outputs. For example, in police agency "X" it took 35 police officers to respond to 8,000 calls for service, or 10 detectives to investigate 500 criminal complaints. In the merging of such production data with personnel data the organization can estimate a ratio--the labor productivity ratio--a statistic that is the calculation of the rate of individual production.

Once a productivity ratio is established, the next step in the forecasting process is to examine the historical trend of productivity ratios and to examine the rise or decline in worker output. Such an examination of trends in worker productivity must be tempered with the judgment of supervisors and managers. Their judgments will help account for what might appear to be anomalies in the trends, dramatic increases or decreases in output that might largely be a consequence of factors like the introduction of major technological innovation, the discontinuation of a service, or significant changes in the demographic characteristics of the service population that might alter demand for certain organizational outputs. Also the adjustment and clarification of trends in productivity afford the organization a second glance at the assumptions made in selecting a particular production factor, and the opportunity to interject the collective subjective interpretations of managers into the forecasting of labor demand. The appropriate production factor having been identified and agreed upon, and the productivity ratio having been calculated, the actual projection of the demand for manpower is relatively simple (although various statistical models are quite complex). The various productivity ratios calculated for an historical time period (usually about 10 years) provides the basis for plotting the rate of productivity change for the organization and the likely manpower requirements if estimates of future work load are accurate. Hence, once the productivity ratios are available, they are used to calculate the rate of change in productivity. This estimate is then used to

project in a linear fashion the estimated rate of productivity per worker in the future. Having such an estimate facilitates the estimation of the number of workers needed to produce the projected workload of the agency. As shown in Figure 2, the rate of change in productivity ratios for criminal justice agencies might include the change in number of arrests per police officer, or the change in number of inmates supervised by correctional officers, or the number of cases tried by judges. By examining the rates of change between years, quarters or months, the forecaster can develop a trend in change in productivity. This estimate can then be extrapolated into the future.

FIGURE 2  
PLOTTING THE RATE OF CHANGE IN  
PRODUCTIVITY FOR A CRIMINAL JUSTICE AGENCY



\* Where the rate of change is calculated as:

$$\frac{\text{Productivity ratio in time period T+1}}{\text{Productivity ratio in time period T}}$$

Criminal justice examples would include:

$$\frac{\text{number of arrests/police officer (T+1)}}{\text{number of arrests/police officer (T)}}$$

$$\frac{\text{number of inmates/correctional officer (T+1)}}{\text{number of inmates/correctional officer (T)}}$$

$$\frac{\text{number of cases tried/judge (T+1)}}{\text{number of cases tried/judge (T+2)}}$$

This generalized procedure for forecasting manpower demand is obviously predicated on the projection of service demand of the organization. Such issues as what the public will demand of the police, what the prison population is likely to be, or what the level of correctional after care will be affect the estimate of manpower demand tremendously. And, it is precisely these issues that complicate this aspect of manpower forecasting. As we will see in the review of the several manpower demand models and techniques available, few are actually able to estimate with great accuracy these external demand issues. As we consider these models of demand forecasting, we will move from those that are based on opinion to those that are more empirical--obviously, as one moves from expert opinion to the development of stochastic models of environment behavior and labor requirements, confidence in prediction increases, but so too does cost.

#### OPINION-BASED OR JUDGMENTAL FORECASTING OF MANPOWER DEMAND

Opinion-based or judgmental forecasting comes in many varieties and is perhaps, the most widely used form of forecasting manpower needs. Judgmental forecasting has two major varieties: opinion forecasting and intentions forecasting.<sup>20</sup>

Opinion forecasting as a general type is usually based on the opinion of the judge or group of judges. Often this opinion is believed to be "expert" or informed and, as a result, valid as a method of estimating future outcomes. Typically, an expert or judge is selected by an agency administrator to survey the problems of the agency and to make recommendations about manpower, among other things.

The expert, through a variety of methods (e.g., interviewing agency personnel, studying agency records) makes an informed judgment about the future directions of the agency and the likely implications for human resources.

In law enforcement, the use of the administrative survey is an excellent example of opinion-based manpower forecasting. Similarly, surveys conducted by known "experts" of correctional facilities, court systems, or probation departments conform to the idea of judgmental prediction.

While judgmental assessments may involve quantitative data (e.g., agency work-load records), the underlying method of analysis is essentially subjective, or the professional judgment of the expert. Because of this, the method of data analysis and the weight accorded various pieces of information collected by the judge are difficult to interpret or to replicate once the judge has rendered a decision. Often, opinion judgments are about things outside the judge's control and, hence, speculative.

Whereas opinion-based predictions involve the judgments of individuals about things over which they have little direct control, "intentions are statements that people make about their planned behavior, or about the behavior of things that they control."<sup>21</sup> As such, intentions forecasting might include the judgments of supervisors about their specific manpower needs at least in the near future. Such estimates, being somewhat rooted in the work performed and subject to the individual control of supervisors, can provide

reasonable benchmarks for short-range estimation. Again, however, the data collected by the supervisor and the weights assigned to the information collected are within the subjective interpretation of the supervisor, and are, therefore, less susceptible to review, assessment, and replication.

Improving on the single-judge forecasting methods is the use of groups of judges. These methods help to overcome the problems of bias that might be inherent in the opinions of a single judge. This method may employ the panel meeting of experts to discuss the agency's problem or the likely future that the agency will confront and the then resulting demand for manpower. Another example is the roundtable discussion, where opinions, pro and con, are aired.

An extension of the opinion-judgmental forecasting methods is the Delphi Technique, a forecasting method that uses multiple judges and obtains information through the use of a mailed survey. As a method for acquiring forecasts the Delphi method incorporates a number of features that have vastly improved the opinion-based method of forecasting. Delphi as a technique involves the solicitation of opinion from a group of judges by survey. The first advantage in this approach is that it reduces the interaction between judges and hence the possibility of response bias being introduced through the interaction of the judges. Secondly, the Delphi method employs a multiple survey design in which each judge is asked for his/her opinion more than once, and each judge has had the opportunity to review other expert opinions.

As a process the Delphi method involves the following:

1. A group of judges is identified on the basis of their expertness. In some instances these judges will be people outside the organization who are well known for their understanding of the organization's affairs or the particular issue being addressed. This group might also include individuals in managerial positions within the organization, although when such individuals are selected, the requirement that judges not formally interact often presents a problem.
2. Expert opinion is surveyed on a number of occasions rather than with the traditional, one-shot approach to organizational consulting.
3. Controlled or guided feedback is provided throughout the Delphi exercise. As a result, the results of each survey are processed by an intermediary and then fed back to the experts for the second round of iteration in the process. The responses to the second survey are then processed and become the grist for the third round, and so forth.

The use of the Delphi method is specifically recommended as an approach when concern is with avoiding the interaction of judges that might lead to premature closure on an issue as a result of group dynamics being involved. As indicated by proponents of the Delphi method:

The mode of controlled interaction among the experts is a deliberate attempt to avoid the disadvantages associated with more conventional uses of experts such as in roundtable discussions or direct confrontation of opposing views. The developers of the Delphi argue the procedures are more conducive to independent thought and allow more gradual formulation to a considered opinion. In addition to an answer to the problem, the interrogation of the experts is designed to cull out the parameters each expert considers relevant to the problem, and the kinds of information he feels would enable him to arrive at a confident answer to the question.<sup>22</sup>

The Delphi method, then, as a technique for sampling judgmental forecasts improves upon traditional expert judgments by incorporating a

method for capturing the information used by the judge in forming the opinion and using multiple judges to overcome bias which might be introduced by only one judge.

Despite the obvious advantages of the Delphi method over other methods of judgmental forecasting, it has some limitations. First, the role of the intermediary becomes crucial for the Delphi method. In this regard, the intermediary must be able to synthesize all the relevant information provided in each iteration of the process, ensure for the richness of interpretation, and communicate the information back to the judges in a manner consistent with their needs. Secondly, the Delphi method, involving many rounds to improve on the judgments requires a great deal of time and effort and is hard to use well when prognostications have to be made relatively quickly. Finally, the Delphi method has been criticized in that interest in the method begins to decline after only a few trials,<sup>23</sup> and that gains in successive iterations are modest.<sup>24</sup> A major advantage in using the method, however, is its ease in use and the fact that only minimal expertise is necessary to conduct the method.

#### JUDGMENTAL TECHNIQUES: RULES OF THUMB AND REPLACEMENT CHARTS

Another of the judgmental techniques are the use of rules of thumb and replacement charts. Rules of thumb are generally statements that approximate productivity ratios by linking manpower demand to some fixed and, generally, single factor in the environment. This method is, perhaps, the most dominant in criminal justice. Examples include police department estimates of manpower needs on the basis of

population by creating the ratio of police officers per thousand population. Similar measures such as number of correctional officers to inmate populations and number of probation officers to case loads are all examples of rules of thumb.

Generally, rules of thumb are practical for estimating some standard of manpower to work. They do, however, maintain the status quo by assuming that certain factors have a fixed relationship to manpower requirements and that these factors are invariant.

Replacement charts as judgmental techniques of manpower forecasting have had some success in industry and business, where they have been used to estimate executive turnover and replacement. Essentially, "a replacement chart is a graphic device designed to insure that suitable replacements are ready to move into vacated positions as vacancies occur among incumbent personnel."<sup>25</sup> As such, the replacement chart generally contains such information as the nature of the job to be performed and the skills, education, experiences, and training of those awaiting promotion. In this regard the replacement chart is more likely to be associated with supply-side manpower forecasting, but as it also examines demand for certain types of personnel, it is offered here as well.

Rules of thumb and replacement charts, while using quantitative data, are generally not dynamic in nature; rather, they picture the organization in a static condition and preserve the status quo. They do, however, begin to suggest the kinds of data required for forecasting the demand for manpower. Obviously, the rule-of-thumb method

makes certain assumptions regarding the "cause" of manpower demand from the external environment, while the replacement chart begins to examine changes from within the organization--changes that will necessarily affect manpower demand, albeit in a more qualitative fashion.

#### FORECASTING MANPOWER DEMAND: THE USE OF STATISTICAL TECHNIQUES

Forecasting the demand for manpower in other than judgmental terms requires the use of statistical techniques to attempt to predict the behavior of the environment. As indicated above, all demand forecasting techniques attempt to define a productivity factor in the environment and relate changes in manpower to changes in demand for products or services. As we have just seen, judgmental techniques attempt this prediction on the basis of the expertness of the judge, or the accuracy of the rule of thumb, while statistical techniques attempt such projections on the basis of quantitatively defined relationships between variables in the environment. Predicting manpower demand on the basis of statistical analysis is not well developed in terms of predetermined "models" that an agency can acquire and then use for its purposes. Rather, standard statistical techniques have been employed situationally and contextually. So, for each organization, both the set of relevant variables and the relationship must be established de novo, and simple assumptions regarding the transferability of findings from setting to setting are difficult to make.

We will briefly examine three general types of statistical techniques helpful in determining manpower demand: Simple extrapolation, regression, and econometric modeling. The discussion of these techniques is necessarily brief, and the reader is referred to standard statistical analysis texts (see bibliography) for extended treatments of these methods.

One of the underlying premises in the use of the three methods to be discussed is that they assume some continuity between future and past trends. "Extrapolation assumes that past trends will continue; regression analysis assumes that particular relationships will hold firm; and econometric models assume that the basic interrelationships between a whole range of variables will be carried on into the future."<sup>26</sup> These three methods of estimating manpower demand assume that trends will continue into the future and that the variables being measured or used as the predictors will continue to be the best predictors of the phenomenon under study. Past, present, and future are, thus, all linked in these methods.

Extrapolation methods are concerned with predicting the development or growth of a single variable. This method can be used for sets of variables as well. Such techniques as trend-projection are essentially extrapolation-based methods.<sup>27</sup>

Trend projections essentially say that given that X has occurred with a particular frequency in the past, and given that it is expected that X will occur in the present, the best predictor of the future frequency of X is the trend represented by the average rate of change

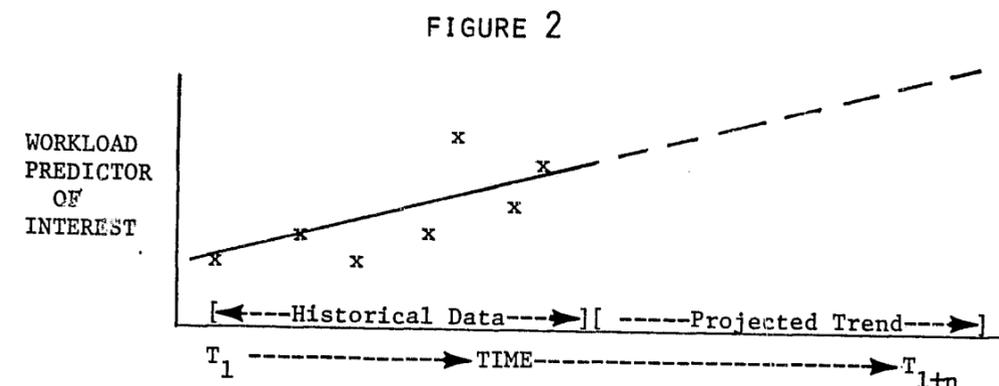
in  $\bar{X}$  over time. The  $\bar{X}$  might be number of police officers per 100,000 population, the number of district court judges by case load, or the number of correctional officers per class of inmate.

Extrapolations essentially rely on historical data and as a result are affected by two major conditions: the accuracy of the historical data and the extent to which the underlying dimensions will change in the future.<sup>28</sup> Therefore, extrapolations are as good a projection of future events as the data are valid and reliable measures of past and current circumstances. Further, these same extrapolations are very dependent on the assumption that the behavior of the variables under consideration will be in the future as it has been in the past.

There are a number of statistical methods for making extrapolations. While the mathematics for calculating these statistics is beyond the intention of this description, the methods will be discussed briefly for clarification, and the reader is referred (see bibliography) to other sources for a more complete discussion of these statistical procedures.

As indicated above, extrapolation methods attempt to plot the behavior of the variable(s) of interest over time, and thus to extend the trends of historical data into the future. The first stage in extrapolation forecasting methods is to identify a trend line from data depicted in a scatter diagram. On the axis of the scatter gram is the measured variable of interest: in law enforcement, this might be number of citizen calls to the police; in

corrections, the ratio of correctional workers to inmates; in probation, the average case load size. On the other axis is plotted time. Figure 2 below presents a scatter diagram with these two dimensions plotted.



The method of extrapolation is to extend the trend line into the future (as indicated by the dotted line in Figure 2). Two methods for deriving such extrapolations will be briefly considered here: Markov Chain analysis and moving averages.

#### EXTRAPOLATIONS: MARKOV CHAINS AND MOVING AVERAGES

Markov Chains essentially use the "recent pattern of behavior as a basis for forecasting."<sup>29</sup> More specifically, Markov Chain analysis examines the future behavior of a variable by analyzing the current state of the variable and how that variable moves from one state to another--what is referred to as the transition. Essentially, Markov Chains identify the probabilities associated with changes in various

states of the variable over time. For example, suppose that criminal justice agency "X," a city police agency, wanted to estimate the future patterns of community use of police ambulance service (A) in comparison to other available ambulance services in the community--say that provided for the hospital (B), and that provided by private ambulance services (C). By surveying neighborhood residents about their ambulance use over the past 10 years suppose the following distributions were reported:

- Neighborhood 1. AAAAAACABB      Where A = police ambulance,  
 Neighborhood 2. BBBBBCBABBB      B = hospital ambulance, and  
 Neighborhood 3. ACCCCCCCB      C = private ambulance.

Assuming that the neighborhoods and the families selected to be surveyed are representative of the total community, a prediction can be made about the likely future distribution of the selection of ambulance service. And such information can be used to estimate the ultimate demand for personnel to operate police ambulances. The first step in Markov Chain analysis is to calculate the transition matrix or the fraction of the times that preference for one particular type of ambulance service moves or changes from one time period to another. Figure 3 represents the transition matrix for the selection of ambulance service.

FIGURE 3  
 AMBULANCE TYPE SELECTED AT TIME T+1

	A	B	C
A	.6	.2	.2
B	.1	.8	.1
C	.1	.2	.7

In the current example, the transition matrix indicates that of those individuals who selected the police ambulance service over others, 60 percent will be likely to select the police ambulance in the future, while 20 percent will use the hospital ambulances and 20 percent will contract privately for ambulance service. And if we know the total proportion of ambulance service provided for by the police, say 75 percent of the total, we can multiply the total percentages with our estimates of changes in use. Therefore, if the police accounted for 75 percent of total ambulance service, hospitals 10 percent, and private contractors the remaining 15 percent, we could estimate that the future distribution of ambulance services would be calculated as:

$$\begin{aligned} \text{police share} = & (\text{total police proportion}) \times (\text{proportion of those to retain police service}) + \\ & (\text{total hospital proportion}) \times (\text{proportion of hospital service captured by the police}) + \\ & (\text{total private proportion}) \times (\text{proportion of private service captured by the police}) \end{aligned}$$

Therefore, in our example:

$$\text{police share projected} = (.75 \times .6) + (.10 \times .1) = 47.5\%$$

A similar calculation would reveal that hospitals would be predicted to account for 26 percent of the ambulance service, and private contractors for 26.5 percent. In the example, the analysis provided through the Markov Chain method would predict that the police were losing a sizable share of the ambulance service market, from 75 percent to 47.5 percent of the total market. This information could then be used to calculate the needed patrol officers to operate these ambulances or to develop policies to improve police ambulance service or to shift the responsibility to another agency--say the hospital.

While the example above is somewhat trivial, it illustrates that Markov analysis can be used to predict or to extrapolate future states from historical data, as long as the data are representative of the population under study and we assume that the transition value will remain constant over time.

The extrapolation of manpower demand through the use of moving averages also assumes that past trends will continue into the future. The moving-average procedure attempts to smooth out differences between data points by averaging them over some time period. This smoothing out is designed to get rid of cycles in the data which, if not accounted for, might skew the interpretation. For example, it may be that during certain months or other intervals (quarters, for example) the demand for certain court services is high, while at other times it is low. By using a moving-average procedure, we

attempt to take better account of high points and low points in the behavior under examination. The behavior of the variable of interest is observed (data collected) for a number of time periods (say 12 months) and then averaged. Say that monthly court statistics on the number of cases adjudicated were examined for two years and that estimates of the next quarter's work load were required. The forecaster might group the data into four-month periods and average monthly differences over quarters. This would result in the calculation :

$$Y_t = \frac{Y_{t-3} + Y_{t-2} + Y_{t-1} + Y_t}{4} \quad \text{where } Y_t = \text{the monthly average of the quarter}$$

and  $Y_{t-3}$  through  $Y_t$  = the monthly data

The moving-average procedure, thus smooths out erratic behavior in the data and provides for a better estimate of the actual behavior of the variable being examined. Extensions of the moving-average procedure include exponential smoothing procedures that essentially differ from moving averages in that they put more weight on the most recent data (behavior), where moving averages treat all the data (behaviors) as equally weighted.

#### REGRESSION ANALYSIS AND FORECASTING MANPOWER DEMAND

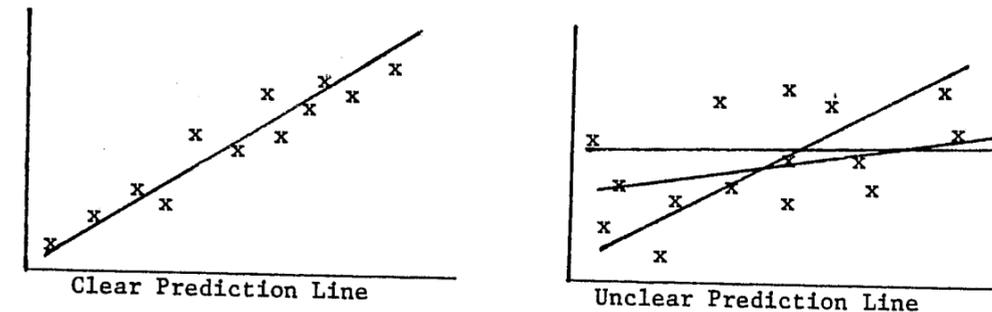
Extrapolation techniques based on regression or correlation statistics essentially attempt to predict changes in one variable on the basis of changes in other variables where the value in the future of the predictor variables is estimated and the relationships (correlations) between the predictor variable(s) and the variable to be

forecasted are arrived at through statistical analysis. Therefore, if a correctional treatment program were to find that the number of working hours expended by correctional staff were highly related to the success of inmates in the program, the estimation of future success levels would make it possible to forecast the number of correctional treatment hours needed and hence the number of correctional specialists (and vice versa). In this example, the analysis is known as a simple regression in that two variables form the analysis.

Where more than two variables are used, the analysis is known as multiple regression. Perhaps the most common form of regression analysis for extrapolation is the least-squares method.

The least-squares method of regression analysis is a linear statistical procedure indicating that the relationship between a predictor (independent) variable and the variable of interest (dependent) can be described by a straight line. Often, and as previously indicated, a scatter diagram is constructed and the observed relationships between the predictor and dependent variable are plotted. On occasion, the line of best fit is readily identifiable in the distribution of the data. However, more often than not the relationships could be explained by more than one line. Figure 4 illustrates how the distribution of the relationships might be graphed.

FIGURE 4



As shown in Figure 4, the estimation of the "correct" line describing the relationship between two variables can sometimes be made by simply drawing the line near the path of the data distribution (left-hand graph in Figure 4)--that is, when there is a natural path in the distribution. Other times, however, the relationships are not clear from the graph and statistical methods will be needed to assist in determining the relationship.

The notational form of simple regression is:

$Y = a + bX$ ; where  $Y$  is the predicted variable (in our last example, number of correctional treatment hours) and  $X$  is the independent variable (level of resident inmate success in the program);  $a$  and  $b$  are known as the regression coefficients,  $a$  being the constant value, and  $b$  the value of the slope of the straight line. The  $b$  coefficient represents the change in the value of  $Y$  for one change in the value of  $X$ .

Because the behaviors plotted on the right graph in Figure 4 do not conform to a single straight line, we must modify our regression formula to include a consideration of possible error ( $e$ ) which might result from measurement. So, the formula, in its general application, is:

$$Y = a + bX + e$$

The least-squares method of fitting the regression line is a procedure for minimizing "the sum of the squared deviations for all the observations. The deviations represent the differences between the actual observation and the corresponding value on the straight line."<sup>30</sup> By subtracting the value of the observed behavior and the predicted value given by the regression line, we develop a measure of the deviation ( $d = O - S$ , where  $O =$  observed and  $S =$  regression line value). The least-squares regression line is that straight line produced by reducing or minimizing the sum of the squared deviations of the observations; that is, the sum of  $d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2$ , or,  $(O - S)^2$ . Further the least-squares procedure is such that the sum of the deviations equals zero, "showing that the deviations are spread evenly above and below the regression line. The methods for calculating the deviations and the resulting regression line are available in standard statistical texts.

What is important to remember about the least-squares method is that it fits a line between the observed relationships between two variables in such a way that the line is the best predictor of that relationship. Once such a line has been calculated in the regression equation, the forecaster in raising or lowering the value of the independent variable (predictor) can forecast the likely result on the behavior of the dependent variable.

In addition to simple least-squares methods for making extrapolations, there are a number of statistical procedures designed to accommodate multiple variables and to examine the effects of time

on the behavior of the independent and dependent variables. Such techniques as multiple regression and, more specifically, Time-Series, and Interrupted Time Series Analysis<sup>31</sup> are useful for these purposes.

#### ECONOMETRIC MODELS AND MANPOWER FORECASTING

Manpower forecasts based on econometric models require that data used in such analyses be objective, causally ordered, and capable of accurate prediction and estimation. Variables included in such models, then, are required to be valid and reliable measures of the behavior under examination, conceptually related to the problem studied, and capable of detecting large changes or differences in the variable studied.

In econometric analysis it is important to identify variables that are believed to be causally related to the dependent variable under study. Thus, the predictor variables used in this method are selected on the basis of their a priori theoretical or empirical relationship with the dependent variable. In selecting independent variables, the forecaster should be guided by prior research that has lent support to there being a causal relationship between the variable selected and the dependent variable. Also expert opinion, such as that developed through the Delphi method discussed previously, may be used to guide the selection of independent variables. In selecting from among variables that have been determined to be causally related to the dependent variable, Armstrong notes additional criteria to consider:<sup>32</sup>

1. Is a strong causal relationship expected?

2. Can the causal relationship be estimated accurately?
3. Will the causal variable change substantially?
4. Can the change in the causal variable be forecast accurately?

Generally, numerous indicators for the causal variable can be identified before the actual selection of a variable for inclusion in the model. By applying the above criteria, the forecaster can begin to single out the variable that best measures the concept variable and that meets the necessary conditions for the use of this technique. Variables that fail to meet the above criteria are likely to be of little value in forecasting. For example, if the variable selected is expected to have only a weak or moderate causal relationship to the dependent variable, changes in the independent variable may not greatly affect the dependent variable and, hence, the predictive value and confidence in the forecast is reduced. Also, if the causal relationship cannot be estimated accurately or if there is little variability in the causal variable once the independent variable changes, the forecast will be difficult to interpret and, more importantly, will not inspire confidence. Lastly, if the causal variable is difficult to measure, particularly with respect to its change, then it will be difficult to analyze the independent variable's relationship to it. For all these reasons, these criteria are extremely important in selecting variables to be included in the model.

The general criterion that variables be selected on the basis of theoretical justification is also important to consider. Each variable selected should meet the test of being thought to cause or at

least to predict change in the dependent variable. While there are many statistical techniques that identify the statistical relationships between variables and, hence, might be used for sorting out variables for inclusion in the model, such techniques rely solely on statistical relationships, not on theoretical or causal ones. Merely selecting variables on a statistical basis can result in the inclusion of variables that are theoretically independent of the variable under study. For example, statistical analysis might reveal a large number of traffic citations among Hispanics in a city. One might conclude that there is something about Hispanics that makes for more traffic violations. Such a causal hypothesis seems pretty far-fetched, however. The more conceptual approach applied by Moraes was that because of surveillance patterns among the police, people with Spanish surnames were more likely to come within the police purview and, hence, had a higher probability of being cited for a motor vehicle offense.<sup>33</sup> If the statistical relationship had been exclusively relied on, the implication could seem to be that there was something about the citizens themselves.

Once the forecaster has selected variables to predict the dependent variable, the forecaster must combine them in a fashion consistent with the theoretical relationship assumed. For example, the researcher might add the variables together or weight certain of them before adding them. At other times the variables might be multiplied. Such combinations are generally accomplished through the use of regression analysis, using the regression weights derived from the

regression model. Essentially, the regression equation will assign a weight to the variable on the basis of that variable's explanation of the historical data. These weights are then used to compute the new value of the dependent variable given changes in the independent predictor variables.

A major example of the use of such techniques is that of parole-success prediction. In such analyses various attributes of the incarcerated offender--total criminal record, activities while in prison, education, and a host of social and psychological indicators--are used to predict success on parole. The resulting prediction is then examined in relation to the inmate's behavior while on parole.

The analysis of the actual behavior of the inmate while on parole, in the above example, raises the issue of model updating. A priori specification of the variables and causal relationships should be "tested" by objective data generated through the model and its congruence with the forecasts made. By examining the actual experience of the variable under study with the predicted experience, the econometric model can be adjusted to changes in the causal ordering of variables or to the biases that might be introduced into the model through measurement. Constant reanalysis of the model and of the actual behavior results in a process whereby experience informs prediction. In the parole decision-making example described above, such changes might incorporate better measurement of the independent variables or the identification of a particular variable that is more explanatory of the dependent variable than were previous independent variables.

## APPLICATIONS OF MANPOWER DEMAND FORECASTING IN CRIMINAL JUSTICE

As previously indicated, much of the demand-forecasting activity in criminal justice has been judgmental forecasting, particularly using private management consultants and the traditional management survey. These studies, abstracted from the National Criminal Justice Reference Service, illustrate both the variation in application of the judgmental technique and outcomes of such application.

Demand forecasting in criminal justice beyond the judgmental techniques has been quite limited. Earlier, however, we indicated that two sizable efforts at including data other than expert opinion have been attempted--the National Manpower Survey and Project STAR. Also, a recent development in criminal justice modeling--JUSSIM--is worth examining. We will briefly review these three projects with particular concern for the forecasting of demand for criminal justice manpower.

The National Manpower Survey (NMS). The National Manpower Survey (NMS) of the Criminal Justice System was a massive effort both to document the manpower now available in criminal justice organizations and to project future requirements. Volume 6 of that report was devoted to manpower planning and is the central concern of this brief discussion. For the complete report, see The National Survey of the Criminal Justice System, Volume 6, Criminal Justice Manpower Planning.<sup>34</sup>

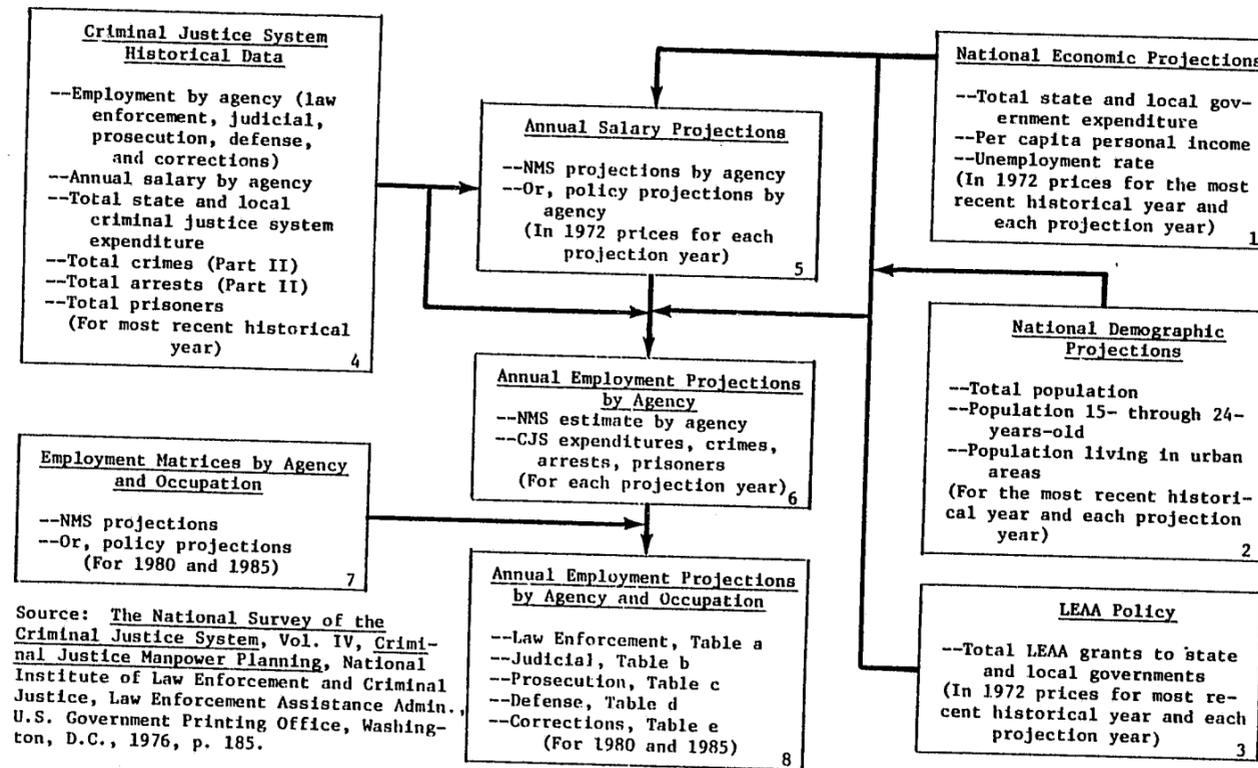
As indicated above, the essential role of the NMS was to assess the current manpower resources of criminal justice agencies (law enforcement, corrections, and the judiciary) including a consideration

of the adequacy of existing training programs, and to project the future manpower needs of these agencies. Within this latter objective the NMS was attempting to develop quantitative prediction models for manpower demand in the criminal justice system, including projections, mathematical estimations, and the appropriate data-collection models. Using a multi-method approach, the NMS approached its task by collecting information on criminal justice manpower from a variety of sources: a comprehensive national questionnaire survey of about 8,000 criminal justice executives, a survey of more than 1,600 state courts, a survey of over 250 police agencies, an examination of census data collected on about 50,000 employees of criminal justice agencies, and field visits to over 250 criminal justice agencies. For a complete review of the methodology, see the original report; and for an excellent critique of the NMS see Selected Summaries of Human Resource Studies in Criminal Justice, Volume IV.<sup>35</sup>

The predictions made by the NMS were based on a theoretical model that viewed criminal justice manpower as related to changes in demographic characteristics--e.g., in the percentage of the population that is young, in per capita income, in the degree of urbanization, and in unemployment. Changes in these and other "exogenous" variables were believed to affect the level of crime, which in turn affected work load and employment in criminal justice. Earlier, we presented Figure 1, which was the simplified model underlying these manpower projections. Figure 5, presented below, represents the actual prediction model and the sources of the data used in the NMS.

FIGURE 5

NATIONAL MANPOWER SURVEY MANPOWER PROJECTIONS MODEL



Source: The National Survey of the Criminal Justice System, Vol. IV, Criminal Justice Manpower Planning, National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Admin., U.S. Government Printing Office, Washington, D.C., 1976, p. 185.

As indicated in Figure 5, the far right-hand side of the figure represents an expanded description of the demographic variables thought to influence crime expenditures and, hence, criminal justice manpower. For example, the model takes into account national economic trends, including available expenditures for criminal justice at the state and local level, and projections of levels of income and unemployment. Also included in the "exogenous" factors are changes in national demographics including the age of the population and the degree of urbanization. These factors as well as assessments of LEAA policies were all argued to affect the annual salary and employment projections for criminal justice personnel. On the far left-hand side of the figure such factors as the historical analysis of criminal justice employment, existing salary patterns, the level of crime, total arrests, and total imprisonments were predicted to affect expenditure and employment of criminal justice personnel as well. These factors, considered to be "endogenous" variables, or factors associated with change within the criminal justice system, were also viewed as affecting manpower expenditure and employment levels. Finally, annual salary projections conducted by the NMS and/or criminal justice agency policy projections, together with employment projections (center boxes of Figure 5) were expected to affect the employment projections. The resulting predictions of the NMS, together with the variable definitions used in the calculations, are presented as Figures 6 and 7.

FIGURE 6  
VARIABLES IN NMS CRIMINAL JUSTICE MANPOWER MODEL

Variable	Definition
<u>Exogenous Variables</u>	
POP - Population	Total population of state
YTH - Youth Percentage	Percent of total population, aged 15 to 24 years, inclusive
URB - Urban Percentage	Percent of total population in Standard Metropolitan Statistical Areas (SMSA's)
UNM - Unemployment Rate	Percent of civilian labor force unemployed
PIN - Per Capita Personal Income	Total personal income in state divided by total population
EXP - Total Expenditures	Total direct general expenditures of state and local governments
GRANT - Federal Grants	Federal grants to state and local governments for criminal justice activities
W <sub>1...5</sub> - Wages	Average earnings of employees in each of the five sectors of the criminal justice system (full-time equivalents)*
<u>Endogenous Variables</u>	
CRIME - Number of Part I Census	Total Part I Crimes known to the police, as reported to FBI
TCR - Crime Rate	Part I Crime rate per 1,000 population
ARS - Number of Arrests	Number of arrests for Part I crimes
AR/CR - Arrest Rate	Ratio of arrests per Part I crime
PRIS - Prisoners	Number of inmates in state adult institutions
CJX - Criminal Justice Expenditures	Direct general expenditures of state and local governments for all criminal justice activities
E <sub>1...5</sub> - Criminal Justice Employment	Full-time equivalent employment by state and local governments for police prosecution [E <sub>1</sub> ], judicial [E <sub>2</sub> ], prosecution [E <sub>3</sub> ], indigent defense [E <sub>4</sub> ], and corrections [E <sub>5</sub> ].

FIGURE 6  
(continued)

VARIABLES IN NMS CRIMINAL JUSTICE MANPOWER MODEL

Sector	Definition
Police Protection	-- Includes all government agencies whose function is that of enforcing law, preserving order, and apprehension of violators. Such agencies include police departments, sheriffs' departments, special police forces maintained by government agencies outside of the criminal justice system, and lock-ups and tanks holding prisoners for 48 hours or less.
Judicial	-- Includes all courts and activities associated with courts such as law libraries, grand juries, petit juries, etc. Courts include appellate courts, major trial courts, and courts of limited jurisdiction.
Prosecution	-- Includes the civil and criminal justice activities of the attorneys general, district attorneys, states' attorneys, corporation counsels, solicitors, and legal departments.
Indigent Defense	-- Includes activities associated with the right of persons to legal counsel and representation: offices of public defenders and other government programs that pay fees for appointed counsel.
Corrections	-- Includes government agencies whose activities or functions involve the confinement and rehabilitation of adult and juvenile offenders. Limited to institutions with the authority to hold prisoners for more than 48 hours, such as prisons, reformatories, and jails. Also included are government agencies involved in diagnosis, evaluation, pardon, parole, and probation activities.

\*Sector definitions are based on those used in the LEAA/Census annual reports on expenditures and employment data for the criminal justice system.

Source: The National Survey of the Criminal Justice System, Vol. IV, Criminal Justice Manpower Planning, National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U.S. Government Printing Office, Washington, D.C., 1976, pp. 30-31.

Figure 6 represents the data sources and definitions used in the calculation of the predictions of manpower for criminal justice agencies conducted by the NMS. As indicated, the calculation involved the collection and analysis of rather disparate data from many sources. Such agency records as arrest and crime statistics were collected from the police, while correctional statistics about prisoner populations were also provided. Employment and expenditure data were also collected across types of criminal justice agencies. Demographic information was collected from census data, and total grant expenditures for state and local criminal justice agencies were collected from state planning agency records. Further, data were collected from numerous censuses of criminal justice agencies, including data on work loads of agencies, personnel practices, and operating procedures.

Obviously, such an effort as the NMS requires time and expense in the collection and analysis of data. And, as was previously indicated, mathematical projections based on quantified data involve expense in the collection and analysis of such data. When attempting such projections, the reader should carefully consider the appropriate sections of this sourcebook regarding data collection, analysis, and the various methodological issues also presented.

Finally, in our consideration of the NMS, we turn our attention to the actual projections made in this effort (Figure 7). In this regard, the NMS projections must be interpreted with caution as they are only likely to be realized if the assumptions on which the

FIGURE 7

THE NMS PROJECTION MODEL: PROJECTIONS OF SELECTED CRIMINAL JUSTICE  
WORKLOAD INDICATORS, EXPENDITURES AND EMPLOYMENT BY SECTOR: 1974-85

	Actual 1974	Projected		Percentage Change 1974-85	Average Annual Growth	
		1980	1985		74-80	80-85
Part I - Crimes (Rate Per Thousand Population)	10,192 4,821	11,989 5,377	10,174 4,400	-.2 -9.0	2. 1.8	3.2 -3.9
Part I - Arrests (in thousands) Arrests Per Part I Crime	2,164 .21	2,604 .22	2,421 .24	12 14	3.1 0.7	-1.4 1.8
Prisoners in State Institutions Prisoners Per Arrest	190 0.9	243 0.9	252 .10	33 11	4.2 -	0.7 2.1
Criminal Justice Expenditures (\$ Billion Constant 1972 Dollars)	10.9	14.0	16.6	52.0	4.3	3.5
Criminal Justice Employment (Full-Time Equivalent)	916	1,171	1,304	42	4.2	2.2
Police Protection	539	655	718	33	3.3	1.8
Judicial	118	155	182	54	4.6	2.7
Prosecution and Legal Services	45	66	79	76	6.5	4.0
Indigent Defense <sup>a</sup>	11	17	21	91	7.5	4.3
Corrections	203	278	324	60	5.4	3.1

<sup>a</sup> Includes estimate of publicly-funded contract employment, as well as employees in public defender offices.

Source: National Institute of Law Enforcement and Criminal Justice, The National Manpower Survey of the Criminal Justice System, Volume One, Summary Report, Government Printing Office, Washington, D.C., 1978, p. 48.

projections are based are accurate. In this regard the comments made by Sistrunk et al. are important:

Based on the NMS analysis of recent experience, overall economic and fiscal trends are likely to have a greater impact upon the future demand for criminal justice manpower than more specific trends within the criminal justice system itself. These trends will be influenced by a large number of variables, including governmental, economic and fiscal policies and developments abroad. Despite the increased sophistication of economic projections systems, all of these projections are subject to widening margins of uncertainty the longer the projection period. Hence, the shorter-term projections for the period to 1980 are probably somewhat more reliable than those for the period 1980-1985.<sup>36</sup>

With such a caveat, however, the NMS stands as a major effort to predict demand for criminal justice manpower more accurately in the immediate and the long-range future.

Project STAR. Project STAR (System and Training Analysis of Requirements for Criminal Justice Participants) was a major research effort designed to examine role performance in the criminal justice system. As such, its consideration is more appropriate under the heading of job analysis, evaluation, or assessment. And as a result, the full methodology and findings of Project STAR will not be reported in this section. The reader is referred to the original documents and the four volumes included within the attached bibliography. What will be considered here is one aspect of the STAR methodology, an attempt to estimate trends in the criminal justice system that were thought likely to affect the content of many criminal justice jobs and, hence, the manpower requirements of the criminal justice system.<sup>37</sup>

The intent of the social-trend analysis conducted under the auspices of Project STAR was to identify changes in social forces likely to have an impact on the criminal justice system and to create a method for the continuous monitoring of these trends and their effects. The time frame established for the social-trend analysis was 1970-1990 and much of the analysis was based on expert opinion, historical analysis, and linear extrapolation--for the most part, however, expert opinion was much relied upon in Project STAR. Sistrunk et al.<sup>38</sup> have well summarized the findings of the social-trend analysis of Project STAR and the monitoring mechanisms established, and Figure 8 indicates the important trends identified.

As indicated in Figure 8, ten trends were identified as affecting future developments in criminal justice: population growth and change, industrialization, urbanization, changes in personal values, increased technology (science), increasing struggles between democracy and bureaucracy, increasing affluence and professionalism, and changes in modes of production. Through an analysis of these various trends, Project STAR attempted to make predictions about changes in the role behavior of selected criminal justice occupations. For example, increases in urbanization were predicted to increase crime in the cities, especially crime committed by blacks, who are over-represented in urban areas. This was, in turn, predicted to influence police officer behavior by shifting the police role from crime control to providing social services. Another prediction was that increases in bureaucratization and specialization would eventually require that

FIGURE 8  
TRENDS DERIVED FROM SOCIAL TRENDS ANALYSIS

- Population Growth and Change
- Industrialization, Including the Emergence of a Post-Industrialized Society
- Urbanization
- Increasingly This-Worldly, Empirical, Humanistic, Pragmatic, and Utilitarian Cultures
- Increasing Growth of Science, Empirical Knowledge, and Technology
- Increasing Democratization, Egalitarianism, and Meritocracy
- Increasing Organization, Bureaucracy, Integration, and Specialization
- Increasing Economic Affluence
- Increasing Professionalization
- Increasing Automation of Production and Information

Source: Frank Sistrunk, et al., Selected Summaries of Human Resource Studies in Criminal Justice, Vol. IV, Center for Evaluation Research, Human Resource Institute, University of South Florida, 1980, p. 96.

judges specialize in certain aspects of the law. Other assessments made by Project STAR include the idea that criminal justice personnel would become more professionalized through more education and training; that correctional facilities would need to reduce the level of impersonal bureaucracy to accommodate the needs of inmates; and that through the disappearance of traditional barriers to political participation (e.g., sex, race, class, age), previously excluded groups would demand that more services and equal opportunity for employment be provided in criminal justice agencies.

The social trend analysis of Project STAR incorporates our previous considerations of both normative and descriptive estimates and provides the basis for many of the recommendations of this role-focused project. Also, and of equal importance, is the fact that Project STAR is a fine example of the judgmental technique of manpower forecasting in that the use of a panel of national experts was used to predict changes in criminal justice roles and the need for manpower.

JUSSIM - The Justice System Interactive Model. JUSSIM, the name for a simulation model of the criminal justice system, "calculates the flow, costs, and resource implications" of changes in intake into the criminal justice system.<sup>39</sup> The JUSSIM model is a computer simulation of the criminal justice system, including police, prosecution, judiciary, probation and parole, and institutional corrections. It is based on historical data corrected for the particular jurisdiction under consideration. County-level jurisdictions have been used almost exclusively in the model to provide necessary empirical data.

Someone using this simulation model can introduce any change in the basic model and then calculate the changes that would occur throughout the model. For example, changes in the level of crime might lead to a consideration of the cost implications for different work-groups of criminal justice personnel, including numbers of personnel needed to handle increased case loads and institutional populations. In the JUSSIM model there are essentially two systems: a manpower and facilities system to process offenders, and a flow system of offenders through the various decision points of the criminal justice system. Generally, with the altering of the flow of offenders through the various decision points, the model begins to specify the likely implications of these alterations on manpower and facility requirements throughout the system. For example, if the assumption were made that the police in city "X" increase their enforcement activities directed toward a particular crime, say burglary, and that this behavior results in a higher arrest rate, the model can then calculate the resultant changes required in other areas of the criminal justice system: e.g., court hours and court work load, and correctional placements. This, of course, can then be translated into increased need for manpower.

The basic JUSSIM model has predetermined estimates of costs, work loads, personnel availability, and maximum capacity of personnel in any of the criminal justice agencies. Altering such variables as the amount of new arrests (virgin arrests) or recidivism arrests, the model can calculate system flows. Further, the simulation could make

these alterations offense specific, or change the resources available to any one component of the criminal justice system and then calculate the impact of such a policy on other component agencies. For example, increases in numbers of police patrol officers might require concomitant increases in prosecutorial services or correctional manpower. Through the use of simulation modeling like JUSSIM, the consequences of such policy alteration or increases in work accounted for by changes in the external environment can be estimated and examined before the implementation of such policies or in anticipation of such environmental change.

Simulation modeling, however, is perhaps, the most costly in time and money of any of the forecasting techniques. First, such a technique requires much detail in data about costs, work loads, and capacities of many criminal justice personnel. Further, such models require a thorough understanding of the probabilities of types of judicial pleas for types of offenses and the likelihood of incarceration for offenders in the various offense categories, among other things. Such data are costly to generate, to validate, and to maintain. Lastly, such simulation methods require access to computer facilities and the programming capability within the criminal justice agency. The benefits, of course, include better estimates of change induced by the system and external change. Such estimates also

include the relationship of manpower planning to other forms of broader organizational planning--particularly mission analysis and overall organizational or system-wide planning because they force the analyst and manager to consider the actual work of each worker in the organization, how that work produced adds up to the organization's work, and finally how the organization's product fits into the entire criminal justice system.

#### FORECASTING SUPPLY: MODELS AND TECHNIQUES

The forecasting of manpower supply is the process of determining the availability of manpower resources from both within and outside of the organization. As such, supply forecasting is complementary to demand forecasting, in that "forecasts of future labor demand alone will be of limited value unless the manager is able to relate them to the current and future supply condition."<sup>40</sup>

In assessing manpower supply, the forecaster is essentially evaluating existing supply of manpower within the organization and measuring this aspect of supply against manpower demand to estimate the necessary external supply to be recruited, selected, and developed. As a consequence, much of supply forecasting has been associated with internal measurement of existing manpower and of projections of the development of current organizational manpower resources. Yet, there are both external-organizational and internal-organizational supply issues that are important to consider. Below, we briefly consider each.

External Supply. External manpower supply forecasting is similar to external demand forecasting in that both attempt to make predictions about environmental circumstances that will affect the organization's requirements for and ability to acquire manpower. The techniques for predicting manpower demand are equally used in the estimation and projection of supply and so, will be explored in great depth here. Regular supply analyses are conducted by such agencies as the Bureau of Labor Statistics of the U.S. Department of Labor, the Office of Education of the U.S. Department of Education, and the U.S. Employment Service. Other federal agencies like the Equal Employment Opportunity Commission and the Office of Federal Contract Compliance maintain estimates of employment supply for specific industries and for specific categories of people. Further, each state, generally through the State Employment Commission, maintains estimates of the availability of labor in the work force for that particular state and, often, by class of worker. This information is readily available in many government publications that are updated annually. Finally, the U.S. Census Bureau maintains work- and labor-related estimates for selected industries and regularly publishes analyses of labor-related topics.

Organizational understanding of the make-up of the labor force can be useful for a number of purposes. First, if the organization should be contemplating an expansion, estimates can be made of how many workers will be available to fill positions as they open. In this instance, when the organization expands by taking on some added

functions or by increasing the production of something, estimates of the supply of labor can be useful to guide the organization in its expansion efforts--slower when labor is short and competitive, and faster when labor is readily available. Secondly, analysis of labor supply can assist the organization in its replenishment of organizational turnover. So, expansion as well as maintenance is facilitated through an appreciation of external supply.

Estimations and projections of external supply are also important as they affect other planning processes. For example, the requirement that police officers have criminal justice college degrees, say, may lead us to measure the number of police science or criminal justice majors available in the same area. If certain more advanced educational skills are needed, say skills held by social planners, computer programmers, or evaluation specialists, the organization will need to estimate their availability both now and in the future. Federal and state labor programs and policies may drastically affect the level of skills necessary, and the monitoring of these policies and their likely influence on manpower supply will aid the organization in better approximating its future.

The types of data collected for external manpower-supply forecasting are similar to those used in demand forecasting. Levels of local unemployment, alternative sources of labor, population density, stability, and migration patterns will no doubt be taken into account. Also, city, county, or state development plans, including new housing development and business development, will influence the estimates

made. Lastly, data about such things as national population characteristics, population mobility, and age characteristics may all influence supply forecasts.

Internal Supply. It is a simple fact that today's work force is the basis for making projections of the future. Manpower forecasting of internal organizational labor supply can aid the planner in addressing three important manpower issues: What is the existing mix and level of manpower in the organization, and how do the mix and level relate to the attainment of organizational objectives? What are the likely changes in manpower demand, and what are the likely accommodations that can be made through adjustments of the current work force (this might include employee development or job design)? And what are the future requirements for manpower in the organization; and what recruitment, selection, and retention policies should the organization pursue to accomplish these future requirements?

While there are numerous techniques for forecasting how much labor is internally available, three general areas of internal supply will be considered: current labor resources, changes in the labor force, and turnover. Analyzing each of these three is a big part of internal manpower-supply forecasting.

#### CURRENT RESOURCE ANALYSIS

Current resource analysis can be likened to taking stock of existing resources and cataloging such resources so that the organization has its manpower inventory at hand when planning decisions require estimates of manpower supply. There are numerous methods for

cataloging such information and for projecting the likely configuration of skills and people. Basically, the labor force of any organization can be divided according to organizational subunit, function, the job classification or occupational category, or the level of skill or qualification necessary for the job. Of course, combinations of these approaches may be used as well. Much of the information or data for this type of analysis come directly from personnel records and from organizational job descriptions. This latter source of data (job descriptions) is predicated upon the assumption that the organization has made the effort actually to study and to define the nature of the work done by individual employees and has, as a consequence, a valid assessment of the job roles of the organization (see section on job analysis for a detailed discussion of job-analytic techniques).

Having such personnel- and work-related information, the forecaster can begin to inventory existing skills and talents and to compare these with inventories of projected organizational manpower needs. Perhaps the most recognized method for such analysis is the development of skills banks or, more accurately, skills inventories.

"A skills inventory in its simplest form is a list of the names, certain characteristics, and skills of the people working for the organization. It provides a way to acquire these data and makes them available where needed in an efficient manner."<sup>41</sup> The types of data that could be contained in a skills inventory are, indeed, endless; so the organization must make some conscious effort to define

in advance the amount and kind of data to be collected and the amount of detail to be reflected in the skills inventory. On the basis of our previous discussion of the ways in which an organization could be divided, however, it seems appropriate that skills inventories should reflect the major divisions of the organization (patrol officer versus detective, custody versus treatment in correctional agencies, public defense versus prosecution) as well as the specific requirements of the jobs and the skills of the present holders of the jobs. This latter consideration--namely, the level of skill of the job-holders--has been used in industry for the purpose of keeping abreast of changes in management personnel through the use of management inventories.

Management inventories or management replacement charts have been used extensively in industry to forecast what managerial personnel will be available for organizational purposes. Typically these charts provide very little analysis, but configure information in a convenient format for management. Such techniques have been labeled by Bryant et al.<sup>42</sup> as matrix models because they generally format characteristics of workers or managerial personnel in matrix form.

One such matrix model is the one used for executive-development planning.<sup>43</sup> This approach uses fairly sophisticated data and employs five matrices in planning for executive manpower. These five matrices are: (1) the task-talent matrix, arrived at through job analysis to determine the task-talent configuration for each executive

position; (2) the man-job matrix which examines the "fit" between the job and the holder of it, and allows for the adjustment of the "man" through training or development, or of the job, through job design; (3) the talent-task matrix which examines the necessary talent requirements of the organization as a whole and is used for evaluation of the recruitment of talent needed; (4) the executive personnel matrix which examines the present and anticipated requirements of executive positions; and (5) the management-manpower planning matrix which examines the flow of management personnel throughout the organization.<sup>44</sup> While the above matrix model is, indeed, complex and requires a high degree of data collection and analysis, there are other less detailed, yet nonetheless useful models. While there is no rigid format for such management inventories, they all share similar kinds of information.

A management inventory system can be designed on the basis of individual managers or the management positions to be filled. If the former approach is taken, detailed information is compiled about the incumbent in a position, such as age (which would indicate retirement date as well as maturity), date of employment, present position and length of service. The summary also indicates a brief appraisal of present performance and notes strengths, weaknesses, and potential for promotion . . . . If the system is maintained on the basis of jobs rather than individuals, little about the incumbent manager is included, but a great deal about several of his possible replacements is indicated, such as their present positions, duration of employment, salary, and the nature and amount of additional training necessary before promotion.<sup>45</sup>

Inherent in the above management-inventory systems is the idea that both the job-analysis information is there for the collecting and that the personnel evaluation system is reliable and valid for providing

information pertinent to the promotion decisions of top managers. (For a complete discussion of job analysis and performance evaluation, see the appropriate sections of this volume.)

Management-inventory systems can prove to be invaluable aids in assessing management supply, and other forms of personnel inventories have the same potential for informing the organization about its existing supply of manpower.

#### CHANGE-IN-LABOR-FORCE ANALYSIS

If an organization has taken steps to collect, to format, and to analyze personnel and work-definition records along such dimensions as sex, age, skill level, etc., the organization has established the basis to estimate the likely changes in the present work force. For example, if it were to be found that a significant proportion, say 40 percent, of the work force had been employed for more than fifteen years in the organization, projections regarding a massive turnover in worker cohort could be made, and personnel recruitment and selection practices could be alerted to the impending need for increasing the number of new employees. Similarly, if this same analysis were to reveal that 40 percent of the work force were relatively low in seniority--on the job, say, less than five years--then organizational forecasts for different skills and level of ability might suggest personnel development efforts to give the workers more experience in the roles they will have to take over, lest they all have too little experience in tasks other than their present ones. Thus, training and educational efforts might assume primacy in an organization

predicting little ability to recruit and to select new skills from the marketplace. Such analyses of current work-force data permit the organization to review its long-term policies in light of current and projected internal manpower supply.

With respect to the analysis of change in the labor force, the techniques of judgment, Markov Chain analysis, and extrapolation have been used with great success. This is particularly true in the analysis of turnover, which has perhaps been chief among the activities in forecasting the internal supply of manpower.

#### TURNOVER ANALYSIS

Turnover analysis is essentially the process for predicting changes in the internal composition of the work force due to such factors as natural wastage (due to death or illness), discharges (dismissals or firings), voluntary wastage (voluntary turnover through personnel quitting), and transfer and promotions.<sup>46</sup>

Each of these factors affects the internal supply of manpower both in current situations and in the future. And it is essential for the organization to be able to estimate the changes in the work force due to individual and position turnover.

Turnover analyses generally have been most applied to examining two organizational manpower supply issues: employee turnover and absenteeism. Methods for analysis of employee turnover have included calculations of different types of turnover (total turnover versus quit rates versus avoidable turnover rates), the calculation of employee wastage through the use of Markov Chain analysis,

and multivariate analysis of the correlates of employee turnover, including job satisfaction, employee self-investment in work, and alternative sources of employment. Each of these types of turnover will be discussed briefly below.

Calculations of employee separations from organizations are, perhaps, the easiest made. The most common formulas for these types of calculations are outlined by Glueck.<sup>47</sup>

1. Separation rate =  $\frac{\text{Number of separations during the month}}{\text{Total number of employees at mid-month}} \times 100$
2. Quit rate =  $\frac{\text{Total quits}}{\text{Average working force}} \times 100$
3. Avoidable turnover =  $\frac{\text{Total separations} - \text{unavoidable}}{\text{Average work force}} \times 100$

The first calculation, that of the separation rate, is a gross indicator of the rate of employee separations from the organization. It does not, however, make any distinction between those who quit the organization and are valued employees and those who are fired because of their poor performance. As a result, the separation rate, while useful in getting a quick estimate of the turnover in a particular period, is not very sensitive to other questions of organizational life--namely, whether employees are being lost for the right or wrong reasons.

The quit-rate calculation has a similar defect, albeit a smaller one. Clearly, the quit rate is an aggregate of the rate of voluntary quits (as opposed to involuntary separations), and, as a consequence, may be viewed as a measure of employee problems with the organization rather than of organizational problems with the employees. Quit rates

are, however, still rather insensitive to the reasons for quitting, e.g., medical reasons, getting a better job, dissatisfaction with current job, or quitting under threat of being fired. Though the quit rate's sensitivity to the reasons for voluntary separations is poor, the statistic might be useful for a number of other purposes--for example, a general indicator of the "health" of the organization.

The third calculation--of avoidable turnover--is the most sensitive of the three measures in capturing the rate of employee turnover that the organization would like to prevent. Calculating the difference between total separations and those that were unavoidable (e.g., firings, quitting for medical reasons, retirements, and so forth), the organization is left with the number or rate of individuals leaving the organization because of factors the organization would like to correct or at least avoid. And at the heart of the issue in turnover analysis is how many people leave the organization because of factors that the organization might correct or avoid.

More elaborate analyses of employee turnover are realized through the use of Markov Chains and cohort analysis, or the measurement of groups of workers as they proceed through the organization,<sup>48</sup> as well as the use of regression analysis, particularly multiple regression, to identify the factors correlated with rising and declining turnover.<sup>49</sup>

The use of Markov Chains to analyze turnover in the organization follows the same logic reported for its use in predicting manpower demand--namely, that the transition periods are stable, and that the measures of the data are reliable and valid. Having made such

assumptions, the Markov Chain method might be made to estimate labor supply in a correctional institution. Say that a correctional forecaster wants to project the availability of labor for four classes of workers: (a) correctional custodial officers, (b) correctional treatment specialists, (c) correctional supervisors, and (d) treatment supervisors. Data have been collected from personnel records that indicate the current size of these work forces and the rates at which individuals within these classes are transferred to other classes (promoted) or leave the organization. Figure 9 presents the results of this analysis.

FIGURE 9

Present Employment	Transition Probabilities				Forecasted (Supply) Employment (T+1)
	A	B	C	D	
Correctional Custodial Officers (a) = 500	A .7	.1	--	--	350 + 30 = 380
Correctional Treatment Specialists (b) = 300	B --	.6	--	--	180 = 180
Correctional Supervisors (c) = 275	C .2	--	.6	--	165 + 100 = 265
Treatment Supervisors (d) = 190	D --	--	.2	.8	38 + 152 = 190
	Exit .1	.3	.2	.2	

As shown in Figure 9, let's assume that as a class of workers, correctional custodial officers, have the following distribution of employment changes: 70 percent remain as custodial officers; 20 percent are

promoted to supervisory (custodial) positions; and 10 percent leave the organization. Of correctional treatment specialists, by contrast, 60 percent remain treatment specialists, 10 percent become correctional officers, and 30 percent leave. Similar kinds of calculations of the proportions of workers changing classifications or leaving the organization are presented for correctional and treatment supervisors (Figure 9), with correctional supervisors experiencing a 20 percent rate of change to treatment supervisors, 20 percent leaving, and 60 percent staying as correctional supervisors, while 80 percent of treatment supervisors stay in the same position 80 percent of the time and 20 percent leave the organization. Knowing these transition probabilities, and assuming that they do not change over time, the forecaster can estimate the supply of manpower in the future (T+1), simply by multiplying the number of workers in the class by the transition probability, and adding this to the sum of the other class/transition products for the other types of workers. In our example, 350 correctional officers would be expected to remain as correctional officers, while 10 percent of the correctional treatment specialists would shift to correctional custodial officers. As a result, 380 of the original 500 workers would be predicted to be available as correctional custodial officers. Similar calculations are performed for each class of worker in Figure 9. The resulting predictions of 380 correctional custodial officers, 180 treatment specialists, 265 correctional supervisors, and 190 treatment supervisors are made in Figure 9, using Markov Chain analysis. What is also interesting

about the data presented in Figure 9 is that, while there is a 20 percent turnover rate in treatment supervisors, this imbalance is made up for by a 20 percent shift in correctional supervisors to positions of treatment supervisor. So, while an analysis of turnover in treatment supervisors might suggest that a recruitment drive be activated, the analysis in Figure 9 suggests that a development program for correctional supervisors might be a more appropriate method for acquiring treatment specialists. Markov Chain analysis, as presented in Figure 9, is a very useful analytical procedure for projecting manpower supply. The use of this procedure, however, like its application in demand forecasting, requires a rather substantial amount of reliable and valid data. The estimates of Markov Chain analysis, or any of the statistical techniques, for that matter, are solely dependent on the quality of the information put into them.

Markov models are useful techniques for forecasting manpower supply from historical data, but they are not very useful in relating complex variable relationships to one another, nor are they predictive for situations where the transition probabilities are unstable. In these instances, the forecaster must rely on a multivariate technique--for example, multiple regression analysis--where the primary interest is to examine the relationships between two variables while controlling for the intervening effects of some third variable. Such procedures are beyond this rather simple explanation of forecasting techniques, because the application of these techniques is situational and oriented to the particular organizational context. The reader is

therefore referred to the bibliography for more detailed discussions of multiple regression.

Some of the questions that could be addressed by a multivariate technique would be how the level of turnover for certain job classes was affected by factors such as the employee's self-reported level of job satisfaction, alternative employment opportunities in the surrounding community, the employee's age, sex, and past employment experience. Through the use of statistical procedures, such questions are approachable by the manpower forecaster. But such techniques also carry with them the requirement for a higher level of data to be collected and, hence, a greater organizational investment in data collection, maintenance, and analysis, as well as the analytical skills and computer access. Many of these requirements deter organizations from this type of analysis. Despite such a limitation, information generated through multivariate techniques begins to provide answers to very complex social and behavioral problems, which as of yet are generally treated over simply.

Absenteeism, like turnover, is a concern to organizations in that often it is thought to be related to poor employee morale and negatively related to performance. Absenteeism is generally defined as the failure of employees to come to work when they are scheduled to do so--that is, the definition recognizes legitimate absences. In recognizing legitimate absences, the analyst must separate avoidable from unavoidable absenteeism, thus requiring that personnel records be collected with this distinction in mind. Once such a

distinction is made, the standard formulas for absenteeism are straightforward:

$$\frac{\text{Number of worker days lost through absence in period}}{\text{Average number of employees X number of work days in period}} \times 100$$

or alternatively,

$$\frac{\text{Total hours of worker absence}}{\text{Total worker hours scheduled}} \times 100$$

The rate-calculation method of measuring absenteeism may be used as a gross indicator of change in employee absenteeism, but it is not too sensitive to the reasons for such absences. Once a pattern of absenteeism has been established in the organization through the rate-calculation method, estimates of future absenteeism can be made, using the statistical methods of extrapolation. Analyses to determine the correlates of absenteeism will require multivariate statistical procedures and the collection of data from the employee (such as about attitude toward the job) and from the organization (such as about the nature of the work performed).

Such information should provide for an analysis of the psychological, social, and organizational correlates to worker absenteeism, and it may provide the organization with some idea of how to improve worker satisfaction, thereby possibly reducing absenteeism. Such analyses may also provide information about the causes of absenteeism that are unavoidable (e.g., sickness). Such determinations can then be used to discount current rates of absenteeism and to provide a clearer view of worker absences.

## RELATING MANPOWER SUPPLY TO MANPOWER DEMAND

Obviously, the intention behind both the forecasting of manpower demand and supply is the desire to predict whether the organization will have a shortfall in employees, whether there will be too many, or whether the demand and supply of labor will coincide. The use of demand and supply forecasting, as indicated at the onset of this review, is designed for the explicit purpose of affecting manpower policy. The forecasting exercises are designed to aid the decision maker in the creation of policy to avoid having too many workers and not enough work, or too much work and not enough workers. As a policymaking tool, a manpower forecast is but one form of information at the disposal of the decision maker. Such other information as political uncertainty, public demand for emergency service, rapid changes in environmental conditions, and violation of the assumptions inherent in the forecasting process itself might all influence the use of the forecasts themselves. Nevertheless, manpower forecasting is a process to help the organization think about its likely and intended future and to bring these two futures together whenever possible.

## SUMMARY

As we have seen in this section, the forecasting of labor supply and demand in criminal justice involves the identification of work factors in the environment that give rise to labor demand and the projecting of these factors into the future. The forecasting of labor supply requires the identification of available human resources,

estimating turnover rates (the loss of employees through retirement, voluntary and involuntary separation from the organization), and estimating absenteeism. Through such estimates, available human-resource supply can be gauged and steps undertaken to minimize any gaps between the supply of human resources and the demand for human resources.

All of the forecasting methods, from the simple rule of thumb methods to the more sophisticated Markov Chain analysis and regression techniques, share a common purpose. That purpose is reduction of organizational uncertainty caused by fluctuations in the agency's environment--fluctuations that require more or less organizational work to be produced. Forecasting methods also seek to monitor changes in the internal environment of the agency--changes that offset such things as human resource utilization and individual productivity. Forecasts provide the agency with a description of current demand and supply levels, provide the basis for extrapolations of future supply and demand requirements, provide the information basis for designing human-resource policy, and they provide for increased agency control of human resource processes such as recruitment, selection, training, and assignment. Each of these functions reduces the agency's uncertainty and dependence on random occurrences within and without the organization.

Forecasting also provides the agency with the ability to approach human resource acquisition and use on a systematic basis. Often, estimates of supply and demand are rashly drawn and not founded on

the best information available. Policies made on the basis of such information are necessarily suspect as valid and reliable descriptions of the agency's human resource supply and demand. The procedures and techniques described in this section encourage the systematic use of a wide range of information in making forecasts. Accurately analyzing and projecting human resource supply and demand requires that the agency consider such issues as the agency mission, goals and objectives, political, social, and economic constraints in the local environment and the relationships of these factors to human resource acquisition and use. Such analyses extend previous rules of thumb and educated guesses that have traditionally guided human resource projections in criminal justice, and, as a consequence, improve the agency's use of information in determining its human resource needs.

Human resource forecasting techniques, as presented in this section, can be elaborate or rather simple; they can also involve complex analysis of inter-agency decisions such as found in the JUSSIM model, or as found in the forecasting model of the National Manpower Survey. But of equal importance, they can involve estimating the rate of turnover in your agency, the degree of absenteeism and the nature of your local community as it affects demand for criminal justice services. The application of these techniques, then, can be either broad (system-wide) or agency focused. In either application, however, information is being brought to bear on agency- and systems-level questions regarding the acquisition and use of human resources. Improvement of analysis, information, and projections

of supply and demand for labor in criminal justice agencies can aid an agency in achieving its missions.

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## SOURCES

- American Academy for Professional Law Enforcement  
 Contact: T. Kenneth Moran, Ph.D.  
 Activities: Police, Higher Education, Overall Criminal Justice System - focus on education and development programs in areas of law enforcement and ethical standards.  
 Information: Consultation services; publications library of 500 volumes  
 Publications: status reports, quarterly, policy documents on specific law enforcement issues  
 Address: 444 W. 56th St., Suite 2312, New York, NY, 10019
- American Correctional Association  
 Contact: A.D. Travisano, R. S. Olsen  
 Activities: Education and training services to plan, promote and coordinate professional development  
 Publications: Corrections Today, On the Line, Newsletter  
 Address: 4321 Hartwick Road, Suite L-208, College Park, MD 20740
- American Institute for Research  
 Contact: Dr. Robert E. Krug  
 Activities: Examines various facets of law enforcement and criminal justice system, such as personnel training and selection and program administration for the purpose of system improvement.  
 Address: 1055 Thomas Jefferson St., N.W., Washington, D.C. 20007
- American Law Enforcement Officers Association/American Police Academy  
 Contact: Col. F. Pearson  
 Activities: Plan cooperative programs between police, prosecutors, courts, corrections, and private security personnel; fill educational needs of professionals with little time or training opportunities; develop and encourage citizen participation in local programs under police professionals.  
 Publications: Police Times, monthly  
 Address: 2000 P St., N.W., Room 615, Washington, D.C., 20036
- Blackstone Associates  
 Contact: Richardson White, Jr.  
 Activities: Assist agencies to improve the efficiency and effectiveness of their operations consistent with goals of the administration of justice. Capable of designing manpower information systems in criminal justice fields.  
 Address: 2309 Calvert Street, N.W., Washington, D.C. 20008

## Bureau for Municipal Police

Contact: Administrative Services

Activities: Objective is to help municipal law enforcement agencies promote community peace by reduction and prevention of crime. Bureau accomplishes this through professional training, planning, and management services aimed at making local police activities more precise and efficient.

Publications: Training Schedules, bi-monthly

Legal Aspects, bi-monthly

Annual Report

Address: Executive Park Tower, Stuyvesant Plaza, Albany, NY 12203

## Bureau of the Census Publication

Separate reports of the most recent censuses are available for each state, subject, industry, etc. Complete information on publications of all the censuses and current surveys by the Bureau in Bureau of the Census Catalog published quarterly, cumulated to annual issue, with monthly supplements.

## Bureau of Social Science Research

Contact: Connie Zuga, Librarian

Activities: Involved in survey research, data analysis, and criminal justice manpower planning research . . . use of social science data, application of robust estimation techniques to criminal justice statistics, and research and development planning in crime victimization.

Publications: various monographs; Newsletter, quarterly

Address: 1990 M Street, N.W., Washington, D.C. 20036

## Business

U.S. Government Bureau of Census

Current business reports

U.S. Government Council of Economic Advisors

Economic indicators, monthly

## Commission on Peace Officer Standards &amp; Training (POST)

Contact: Executive Staff

Activities: Adopts minimum standards and guidelines for the selection and training of law enforcement personnel, develops and certifies training courses, and provides management assistance.

Publications: Annual Report; Post Scripts Newsletter, quarterly

Address: 7100 Bowling Drive, Suite 240, Sacramento, CA 95823

## Committee on Research on Law Enforcement and Criminal Justice

Contact: S. E. Martin

Activities: Committee undertakes studies of emerging or current concern to public policy makers or to professionals in a particular research area

Address: National Research Council, 2101 Constitution Avenue, Washington, D.C. 20418

Congressional District Data Book

Includes data on present population and housing and vote cast in congressional and presidential elections for congressional districts in the United States

Contact: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

## Construction, Housing, Real Estate

U.S. Bureau of Labor Statistics

Consumer Price Index, monthly (housing, rent, and home ownership index)

Employment and earnings, monthly

Employment and earnings, United States Annual

National Association of Realtors

Existing Home Sales, monthly

## Consumer Income and Expenditures

U.S. Government Bureau of the Census

Current population reports (series on consumer income, p-60)

Bureau of Economic Analysis

Personal income by states, updated and published quarterly

Internal Revenue Service

Statistics of Income (individual income tax, personal wealth)

Office of Economic Opportunity

Poverty program information

## Correctional Service Federation, U.S.A.

Contact: Mary C. Lennon

Activities: Represents 20 correctional service agencies in the U.S.; goals to maintain communication between member agencies, disseminate to its members news in correctional fields.

Publications: Newsletter, quarterly; Directory of Correctional Service Agencies

Address: 297 Park Avenue South, New York, NY 10010

County and City Data Book

Statistical data for each county in the United States, 277 standard metropolitan statistical areas, 910 incorporated cities, information for census divisions and regions, states, including business, governments, industry, agriculture, population.

Contact: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

**Crime and Justice Foundation**

Contact: N. Houston, J. Larivee

Activities: Primary purpose is developing a realistic understanding of both the issues affecting the current administration of justice and needs for improvement. Provides library loan, publications, films, a newsletter, seminars, conferences, consulting services

Address: 31 St. James Ave., Room 348, Boston, MA 02116

**Criminal Justice Center**

Contact: D. Bracey, J. Brennan, E. Taylor

Activities: Research targeted at education, training, research and evaluation, and publications of the criminal justice system and its members; provides consulting, reference service, program evaluation, training workshops, seminars

Publications: Law Enforcement News, twice monthly

Address: John Jay College of Criminal Justice, 444 West 56 St., New York, NY 10019

Directory of Federal Statistics for Local Areas, Urban Update, A Guide to Sources

Guide to new federal statistics for cities and metropolitan centers; includes changes in population

Contact: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

**Education**

Indexes - Education Index  
Research in Education (ERIC)

Statistical Data Sources  
Digest of Educational Statistics

**Education**

U.S. Government Bureau of Labor Statistics  
Occupational Manpower and Training Needs (Bulletin #1824)

American Council on Education, Washington, D.C.

A fact book on higher education, quarterly  
National Education Association, Washington, D.C.  
Estimates of school statistics

**Housing**

Indexes - Business Periodicals Index  
Housing and Planning References  
New York Times Index  
Public Affairs Information Service

Statistical Data Sources  
H.U.D. Annual Reports  
U.S. Census of Housing

**Institute for Advanced Studies in Justice**

Contact: Executive Associate Director

Activities: Conduct multidisciplinary research, evaluation, and technical assistance in areas of justice administration and public policy analysis

Publications: Technical Assistance Reports  
Handbooks

Bibliographies of Institute Publications

Address: American University, 4900 Massachusetts Ave., N.W., Washington, D.C. 20016

**Institute for Law and Social Research (InSlaw)**

Contact: W. A. Hamilton

Activities: Systems design, consulting, technical expertise; develops systems and procedures that support both criminal justice administration and research, and the transfer of such systems and procedures to the criminal justice system.

Address: 1125 15th St., N.W., Suite 625, Washington, D.C. 20005

**Institute of Contemporary Corrections and the Behavioral Sciences**

Contact: Dr. V. G. Strecher, Dr. L. M. Friel

Activities: Educational agency designed to serve institutions of higher learning and practitioners responsible for the administration of criminal and juvenile justice. It offers consultation and technical assistance, personnel training, and institutional management; the center provides a large reference library, films, instructional and research materials. Job information service is available.

Publications: Criminal Justice Monography

Address: Sam Houston State University, Huntsville, TX 77341

**International Association of Chiefs of Police Equipment Technology Center**

Contact: P. Ridgeway

Activities: Clearinghouse to disseminate new technology and equipment information to all criminal justice agencies; areas include communications, electronics section, a transportation section, and National Advisory committee

Address: 11 Firstfield Road, Gaithersburg, MD 20760

**International Personnel Management Association**

Contact: J. Berg

Activities: Limited to police personnel problems and issues; provide reference and advisory services

Publications: Agency Issues, IPMA News, Public Personnel Management

Address: 1850 K Street, N.W., Suite 870, Washington, D.C. 20006

## Labor and Economics

Indexes - Business Periodicals Index  
 Index of Economic Articles  
 Public Affairs Information Service  
 Wall Street Journal Index  
 Statistical Data Sources  
 Consumer Price Index  
 County Business Patterns  
 Editor and Publishers Market Guide  
 Employment and Earnings  
 Handbook of Labor Statistics  
 Occupational Outlook  
 U.S. Census of Business

## Labor

U.S. Government, Bureau of the Census  
 Current Government Reports: Public Employment, city employment, local government employment in selected metropolitan areas, county government employment  
 Bureau of Labor Statistics  
 Employment and earnings, monthly  
 Employment and earnings, states and areas, annual  
 Handbook of Methods for Surveys & Studies (Bulletin #1910)  
 Department of Labor  
 Areas trends in employment and unemployment, monthly  
 Employment and wages of workers, quarterly  
 Employment service statistics, monthly  
 Law Enforcement Assistance Administration  
 Expenditure and Employment Data for the Criminal Justice System, annual

## Law Enforcement Assistance Administration Library

Contact: L.M. Wienke  
 Activities: reference service and interlibrary loans  
 Address: 633 Indiana Ave., N.W., Washington, D.C. 20531

## Law Enforcement Standards Laboratory

Contact: R. Joel  
 Activities: Do scientific and engineering research on law enforcement, criminal justice; tests methods, evaluates equipment performance, writes guidelines, user manuals.  
 Address: National Bureau Standards, Washington, D.C. 20234

## Law Enforcement Training Research Associates, Inc. (LETRA)

Contact: Dr. J. A. Schwartz  
 Activities: develop and present training programs, publication of books, training curriculums, publishing and producing training files  
 Address: 618 National Avenue, Mountain View, CA 94043

## Market Opinion Research

Contact: Dr. B. E. Bryant  
 Activities: this is a survey research and consulting organization that conducts planning and evaluation studies on the criminal justice system.  
 Publications: Market Opinion Research Newsletter, 3 times per year.  
 Address: 28 West Adams, Detroit, MI 48226

## Midwest Research Institute

Contact: Principal Analyst and Manager, Justice Programs  
 Activities: Performs contract research for criminal justice agencies; results of prior studies are provided; pertain to many areas of criminal justice including standards and goals, training.  
 Address: 425 Volker Blvd., Kansas City, MO 64110

## National Association of Counties (NACO)

Contact: D. Murray, R. H. O'Connor  
 Activities: The Association provides technical assistance and information to county governments on trends and developments in criminal and juvenile justice. The Association conducts site visits, panel and workshop presentations as well as information on legislation and guidelines.  
 Publications: County News, weekly  
 Address: 1735 New York Ave., N.W., Washington, D.C. 20006

## National Conference of State Legislatures

Contact: Criminal Justice Project Director, Denver, CO  
 Activities: Publish monthly newsletter, CJ Monitor, which looks at criminal justice issues in the states; monitors various states and federal legislation affecting criminal justice agencies.  
 Address: 444 North Capitol Street, N.W., Washington, D.C. 20001

## National Criminal Justice Reference Service (NCJRS)

Activities: NCJRS is an international clearinghouse which fosters the exchange of information among criminal justice professionals.  
 Publications: Selected bibliographies, general information pamphlets, selective notification of information, current awareness materials  
 Address: Box 6000, Rockville, MD 20850

## National Employment Listing Service (NELS)

Contact: D. L. Carter, Managing Editor  
 Activities: Dissemination of current job/career opportunities to upgrade professionalism and quality of personnel in criminal justice system  
 Publications: NELS Criminal Justice Bulletin, Criminal Justice Educational Bulletin, Police Employment Guide  
 Address: Texas Criminal Justice Center, Sam Houston State University, Huntsville, TX 77341

## National Institute of Corrections (NIC)

Contact: N. E. Sabanosh

Activities: NIC provides and contracts training, technical assistance, and clearinghouse services, and funds projects in policy and standards formulation, implementation, and research and evaluation.

Address: 320 First Street, N.W., Washington, D.C. 20534

## National Referral Center

Contact: J. Feuler

Activities: Refers individuals making a request to the appropriate agency or organization for a response; computer file and data base of 12,000 organizations listed by name, subject, location.

Publication: Directory of Information Resources in the United States

Address: Library of Congress, Science &amp; Technology Division, Washington, D.C. 20540

## National Technical Information Service (NTIS)

Contact: Customer Inquiry

Activities: Central Source for U.S. Government-sponsored research, developments, and other analyses prepared by federal agencies, their contractors, grantees, or by special technology groups.

Publications: Government Reports Announcements and Index, NTIS Abstract Newsletter

Address: 5285 Port Royal Road, Springfield, VA 22161

## Police Foundation

Contact: T.V. Brady, H.M. Carrington

Activities: Non-profit organization that regularly publishes the results of its experiments and research efforts

Address: 1909 K Street, N.W., Suite 400, Washington, D.C. 20006

## Population

U.S. Government Bureau of the Census

The Geographic Mobility of Americans - An International Comparison, by L.H. Long and C.B. Boertlein

Bureau of Labor Statistics

U.S. Workers and Their Jobs: The Changing Picture (Bulletin #1919)

Community Services Administration

Poverty Facts and Figures - Technical Note No. 1

Poverty Program Information

Social Security Administration

Public Assistance Statistics Monthly

Public Assistance Recipients and Cash Payments by State and County Annual

## Rand Corporation

Contact: P. Greenwood

Activities: Private research concern that conducts research on selected areas of criminal justice system; publications available on request

Address: 1700 Main Street, Santa Monica, CA 90406

## Search Group, Inc.

Contact: S.E. Kolodney

Activities: A national forum to foster communication among states and the federal government in application of technology of justice systems

Address: 1620 35th Ave., Suite 200, Sacramento, CA 95822

## Section of Criminal Justice Administration

Contact: J. Blankenship

Activities: Concerned with the advancement of professional management as it relates to the criminal justice process; conducts a national conference yearly to promote information exchange.

Address: American Society for Public Administration, 1225 Connecticut Ave., N.W., Suite 300, Washington, D.C. 20035

## State and Local Governments

U.S. Government Advisory Commission on Intergovernmental Relations  
Measuring the Fiscal Capacity and Effort of State and Local Areas

Bureau of the Census

City Employment Annual (GE no. 2)

City Government Finances, annual (GF No. 4)

County Government Employment Annual (GE No. 4)

Expenditure and Employment Data for the Criminal Justice System, annual

U. S. Department of Justice, Bureau of Justice Standards, National Crime Surveys (NCS)

Surveys of criminal victimization using probability samples of households, the U.S. Bureau of the Census interviewed household members aged 12 and over about their experiences as victims of common crimes as assault, robbery, rape, larceny, burglary, and vehicle theft. Business personnel were also interviewed.

Tables show:

1. estimated nationwide number of personnel, household, and business victimizations by various characteristics of victims and events
2. estimated nationwide rates of personal victimization by age, sex, race, family income
3. estimated rates of household victimization
4. estimated rates of business victimization
5. changes in nationwide rates and distribution of victimization rates by households, personal, and business characteristics

## SUBJECT INDEX TO VOLUME III\*

- Ability requirement scales, 350-351
- Absenteeism, 481-482
- Agency analysts, 26-32
- Agency-based research, 11, 15-17
- Application blank, 218-226
- Appraisal rating errors, 305-307
- Aptitude tests, 247-248
- Arithmetic progression, 387-388
- Assessment centers, 297-303
- Assignments, 40, 41
- Behavior-centered data, 353
- Behaviorally-anchored rating scales, 303-305
- Bivariate analysis, 202
- Bounded rationality, 14-15
- Bureau of Labor Statistics, 468
- Causal-comparative research, 175-177
- Central tendency, 306
- Change-in-labor-force analysis, 474-475
- Checklists, 293-294
- Chi-square test, 278-284, 294, 296
- Cohort studies, 174
- Concepts, 49, 50, 51, 54
- Constraints, 410-411
- Correlational research, 175-176
- Crime data, 59-64
- Criterion reference test, 257
- Criterion variable, 235-236
- Critical incident method, 284-285  
351-354
- Critical path method, 413
- Cross sectional survey, 172
- Cross tabulation, 202-206
- Current resource analysis, 470-471
- Daily diary, 327-328
- Data, 36
- Data collection, 131-141,  
150-155
- Decision-banding method, 402
- Delphi technique, 434-436

\* This is a subject index to Volume III only. For an index to all of the volumes, see the Executive Summary.

*Preceding page blank*

Descriptive research, 171-172, 189  
 Document studies, 18-19, 127-128  
 Econometric models, 449-452  
 Economic and budget condition data, 64, 131-132  
 Element, 318  
 Employee-focused data, 80-82, 134  
 Environmental data, 56, 131  
 Equal Employment Opportunity Commission, 468  
 Essay form, 294  
 Evaluation, 22-25  
 Exogenous variables, 454-456  
 Experimental research, 177-188  
 Extrapolation, 439-440  
 Fact finding, 19  
 Factor comparison method, 392-398  
 Field reviews, 296-297  
 Forced-choice method, 294-296  
 Forced distribution method, 292  
 Forecasting, 407-409, 411-412, 421, 484-486  
 Forecasting demand, 420-421, 424, 425-428, 432-438, 483  
 Forecasting supply, 420, 421, 461, 467-470, 482  
 Forecasting techniques, 412, 413, 418, 419, 422  
 Frequency distribution, 189-194  
 Frequency polygon, 194-195  
 Functional job analysis, 336-343  
 Generating operational definitions, 52  
 Geometric progression, 388-389  
 Goal analysis, 18  
 Grade descriptions, 378, 380-381  
 Graphic rating scale, 272-284  
 Guide chart profile method, 399-401  
 Halo effect, 305-306  
 Histogram, 193-194  
 Identifying definition, 52  
 Implementation, 21-22  
 Information, 36  
 Intelligence tests, 239-247  
 Intentions forecasting, 433-434  
 Interest tests, 248-252  
 Interquartile range, 279-280, 292, 294, 296  
 Interval scales, 44-45  
 Interviews, 114-121, 228-233, 319, 328-333  
 IQ, 257  
 Job, 317  
 Job analysis, 313-317

Job analysts, 331-336  
 Job-behavior domain, 271  
 Job-centered data, 353  
 Job classification method, 378-381  
 Job description, 317, 372  
 Job elements, 354-356  
 Job element method, 366-371  
 Job evaluation, 371-372  
 Job factors, 383-385, 386  
 Job-focused data, 79-80, 133  
 Job ranking method, 372-374  
 Job specifications, 317, 372  
 Job title card, 372-373  
 Judgmental forecasting, 432, 434  
 JUSSIM, 464-467  
 Key jobs, 392, 396  
 Knowledge checklist, 343  
 Labor productivity ratio, 428-429  
 Leniency, 306  
 Longitudinal survey, 173  
 Management inventories, 472-474  
 Manpower estimates, 413-415  
 Manpower projections, 413-415  
 Markov chains, 441-444, 477-480  
 Mean, 196, 198-199  
 Measurement, 37, 38, 41-45, 48-49, 278-279  
 Measures of central tendency, 195-199  
 Median, 195-196  
 Missions and goals, 57-59, 132  
 Mode, 195-196  
 Models, 422-424  
 Moving averages, 444-445  
 Multiple correlation technique, 216  
 Multiple cutoff selection method, 216  
 Multiple tests, 254-255  
 National Manpower Survey, 416-418, 453-461  
 Nominal scales, 42-43  
 Norm-reference test, 257  
 Numerals, 39-40  
 Observation, 123-126, 328  
 Occupation, 317  
 Office of Education, 468  
 Office of Federal Contract Compliance, 468  
 Operational definitions, 49, 52, 55  
 Opinion-based forecasting, 432-433

Ordinal scales, 43-44, 279, 292

Organizational data, 56, 133-134

Paired comparison method, 289-291, 374-377

Panel studies, 174

Percentages, 190

Percentile rank score, 256

Performance data, 82-86, 135

Performance evaluation, 265-271, 307-308

Personal biases, 307

Personality tests, 252-254

Personnel selection, 215, 216-218

Physical-demands analysis, 233, 234

Physical examinations, 233-234

Planning, 18

Points rating method, 382-292

Position, 317

Position-analysis questionnaire, 354-357

Population characteristics, 64-72, 131

Prediction factor, 427-428

Predictor variable, 236

Preliminary interview, 226

Production factor, 426-427, 428, 429

Profile method, 398-399

Program development, 20-21

Project STAR, 416, 461-464

Proportions, 190

Public and political values, 72-74, 132

Qualitative data, 37-38

Quantitative data, 37

Quasi-experimental design, 181-188

Question pool, 236-237

Questionnaires, 91-115, 318-326

Range, 201

Ranking scales, 286-289

Ratio scales, 45

Rational decision-making, 12-14

Raw score, 256

Recent-behavior bias, 306

Reference checks, 227-228

Regression, 445-449, 477, 480

Relative time spent scale, 344, 348-349

Reliability, 145-155

Replacement charts, 437

Rules of correspondence, 39, 41

Rules of thumb, 436, 437-438

Sample Size, 168-171

Sampling, 156-177

Sampling frame, 158-160

Sampling units, 158-160

Scattergram, 440-441, 446

Selection tests, 235-239, 240-256, 257

Simulation models, 465, 466-467

Skills inventory, 471-472

Social accounting, 19-20

Standard deviation, 197-198

Standardized tests, 256

Stanine scores, 257

Study population, 158-159

Successive hurdles technique, 216

Systems data, 86-87, 135

Target population, 157-161

Task, 317

Task checklist, 343-350

Task inventory, 344-350, 357-366

Time span of discretion method, 401-402

Trend studies, 173

Triangle of reference, 49-51

Turnover analysis, 475-477

Uncertainty, 409

Uniform Crime Reports, 59-62

U.S. Census Bureau, 468

U.S. Employment Service, 468

Validity, 141-152

Variability, 197

Victimization surveys, 62-64

Worker function scale, 338-342

Work loads, 74-79

**END**