

# INDUSTRIAL PSYCHOLOGY

M-226

**Self Learning Material**



**Directorate of Distance Education**

**SWAMI VIVEKANAND SUBHARTI UNIVERSITY  
MEERUT-250005  
UTTAR PRADESH**

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# **SYLLABUS**

## **INDUSTRIAL PSYCHOLOGY**

**M-226**

### **Unit I**

Historical background of Industrial Psychology in India.  
Introduction to Industrial Psychology and its basic concepts.

### **Unit II**

Personnel Selection –I: Occupational Information  
Personnel Selection-II: Individual Differences  
Personnel Selection-III: Techniques, Application Blanks & Interview  
Personnel Selection-IV: Psychological tests, and Psychological Testing

### **Unit III**

Human Performance: Engineering Psychology

### **Unit IV**

Industrial Accidents and their Prevention, Morale and Monotony

### **Unit V**

Personnel Counselling.  
Psychological aspects of Labour Relations:

# UNIT – I

## INTRODUCTION

Introduction

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Concept of Industrial Psychology
- 1.4 History and Major Contributions
- 1.5 Scope and Fields of Industrial Psychology
  - Motivation
  - Organisational Communication
  - Group Behaviour, Teams and Group Conflict
  - Employee Satisfaction and Commitment
- 1.6 Topics in Industrial-Organisational Psychology
- 1.7 Summary
- 1.8 Review Questions
- 1.9 Further Readings

### 1.1 LEARNING OBJECTIVES

After going through this unit, students will be able to :

- state the fundamental concept of industrial psychology;
- explain the historical background of industrial psychology;
- discuss various important aspects of industrial psychology.

### 1.2 INTRODUCTION

The field of Industrial-Organizational psychology focuses on issues in business and industry. "I/O psychologists" conduct research, develop and evaluate programs, and try to improve productivity and the quality of work life. They deal with issues such as work morale, employee-management relations, and job stress. They may develop programs for selecting employees and choosing candidates with high managerial potential. I/O psychologists are also involved in advertising and marketing strategies and studies of consumer behaviour. Some are employed to design equipment that involves interaction between humans and machines, a subfield known as human factors psychology.

### 1.3 CONCEPT OF INDUSTRIAL PSYCHOLOGY

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Industrial psychology is a relatively new branch of psychology that was created for corporations and organizations that needed more structure. Industrial psychology is able to provide this structure by evaluating employee behaviour for the good of the company. It is often referred to as organizational psychology because of its emphasis on analyzing individuals who work for various organizations.

Essentially, industrial psychologists study the behaviour of employees in a work setting. Although industrial psychology didn't begin until the 1920's, the discipline has evolved rapidly and revolutionized the workplace within the last century. Because the workplace is a social system, the application of industrial psychology is useful in understanding its complexity.

For years, psychologists have studied how human beings have interacted with their environments and each other, but industrial psychology begins to evaluate the interaction between people and their jobs. Industrial psychologists can be used to improve job satisfaction as well as company productivity and is becoming vital to the success of many organizations.

There are certain things that industrial psychologists focus on when evaluating the relationship a person has with their work. They analyze the way a person works, their skills, duties, obligations, and general satisfaction with their job on a day-to-day basis. This information is extremely helpful to human resources departments and company overseers who must create training programs, feedback and rewards systems, and make hiring decisions as well as engage in recruitment practices. Most companies use industrial psychologists to train their own staff so that the organizations can run smoothly and at peak capacity.

One of the most interesting aspects of industrial psychology is how employee behaviour affects other individuals on the job and organization in general. Industrial psychology can be used to reduce counterproductive behaviour, enhance team effectiveness, and boost morale. It is also vital in conflict resolution. Many individuals find the brunt of their work dissatisfaction rooted in their relationships with managers and colleagues. Fortunately, industrial psychology provides solutions for this.

Although industrial psychology is a mixture of anthropology, counseling, sociology and industrial management, there are key components used in this type of psychology. Some of the key components include the evaluation of employee's personalities, perceptions, as well as the biological side of their behaviour. By documenting these key points, industrial psychologists have the ability to

help organizations improve their functionality and set up a system that promotes growth for the company and employees.

Industrial psychology also helps CEOs and executives adjust their way of thinking and their management style, which can impact the stress levels of the employees that they manage. By using psychology, many companies are able to retain their employees because they understand how to keep them happy. Organizations with a low retention rate and employee dissatisfaction benefit from the work and assessment of industrial psychologists.

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### 1.4 HISTORY AND MAJOR CONTRIBUTIONS

Industrial/Organisational psychologists are trained in the "scientist-practitioner" model. The training enables I-O psychologists to employ scientific principles and research-based designs to generate knowledge. They use what they have learned in applied settings to help clients address workplace needs. I-O psychologists are employed as professors, researchers, and consultants. They also work within organizations, often as part of a human resources department where they coordinate hiring and organizational development initiatives from an evidence-based perspective.

#### **HISTORY**

The "industrial" side of I-O psychology has its historical origins in research on individual differences, assessment, and the prediction of performance. This branch of the field crystallized during World War I, in response to the need to rapidly assign new troops to duty stations. After the War the growing industrial base in the US added impetus to I-O psychology. Walter Dill Scott, who was elected President of the American Psychological Association (APA) in 1919, was arguably the most prominent I-O psychologist of his time, although James McKeen Cattell (elected APA President in 1895) and Hugo Münsterberg (1898) were influential in the early development of the field. Organizational psychology gained prominence after World War II, influenced by the Hawthorne studies and the work of researchers such as Kurt Lewin and Muzafer Sherif.

It is not known exactly when Industrial organizational psychology began; however, in 1897, W. L. Bryan discussed how telegraphers learn the skill of sending and receiving Morse code messages. Six years later, Walter Dill Scott wrote *A Theory of Advertising* in which he applied psychology to business. Lillian Mollen Gilbreth announced in 1908 that human beings are the most important factors in industry and that they were not being acknowledged in the manner that they should. In 1911, engineer Frederick W. Taylor became conscious of how redesigning the workplace can achieve both higher efficiency within a company and higher compensation for employees. These people were the pioneers of the

industry and contributed immensely to the world of Industrial organizational psychology and to how it is used today.

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Although these individuals set the tone for the field, the onset of World War I had the first great impact on Industrial organizational psychology. Developed by then-American Psychological Association (APA) president Robert Yerkes and others, Army Alpha and Army Beta tests were used to determine the general intelligence of recruits so they could be placed in the appropriate positions, signifying the role of psychologists in work placement. The Alpha test was used for recruits who could read, and the nonverbal Beta test was used for those who could not read at all or who could not read English. These tests were used in placing recruits into appropriate positions.

As the war ended, it seemed that the use of Industrial organizational psychology was ending too. However, in 1920 the Hawthorne studies propelled I/O psychology by suggesting that employees' productivity improved because of the attention they were receiving from managers and employers, not the effects of the workplace lighting as the original research question suggested. This idea, referred to as the Hawthorne effect, had a significant impact in the history of Industrial organizational psychology, as it encouraged psychologists to focus more on human relations in the workplace and boosted the importance of this area of psychology.

As psychologists in the field polished their techniques on employee selection and placement, the Army again requested that psychologists develop a test that would divide recruits into groups based on their ability to learn the duties and responsibilities needed to be a soldier. Psychologists met this request by developing the Army General Classification Test (AGCT); other methods for selecting recruits for officer training, proficiency tests, and aptitude tests were also developed. As World War II continued, Industrial organizational psychologists also used their skills to keep the nation's workforce productive to support the war need. Industries were finally realizing that techniques and principles learned from social psychology were applicable in business in areas such as selection, training, and machine design.

As the United States evolved during the 1950s and 1960s, the civil rights movement made its impact on the field of psychology in general and specifically on Industrial organizational psychology. With the passage of the Civil Rights Act, business and industry came under scrutiny because they employed disproportionately few minority psychologists; however, because the law enforced the issue of discrimination in employment, the need for I/O psychologists increased. Industrial organizational psychology advanced greatly during the 1980s and 1990s, as more sophisticated research tools assisted psychologists in generating more information about psychology and the work world and in developing new

tools such as the Armed Services Vocational Aptitude Battery to assist in personnel selection and classification.

Another important factor in the development of Industrial organizational psychology is the changing demographics in the workforce. The number of employed women, Latino/as, and Asian Americans continues to increase, and more individuals, such as customers, workers, and vendors, have English as their second language. In addition, minorities such as women are entering higher level managerial positions. Industrial organizational psychologists are needed to help promote diversity in the work environment and to educate employees about navigating diverse environments and resolving conflict that may arise among different groups. With movements toward flexible, family friendly work schedules and policies, Industrial organizational psychology has come to be a cornerstone in keeping an organization running smoothly and efficiently.

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### 1.5 SCOPE AND FIELDS OF INDUSTRIAL PSYCHOLOGY

Industrial organizational psychology is relatable to human resource management (HRM) in selecting employees and managing the work environment. Although there are similarities in that both are involved in employee selection, Industrial organizational psychology focuses more on the use of psychological principles, psychological tests, behavioural interviews, work samples, bio data, and assessment centers rather than the use of unstructured interviews and reference checks that HRM professionals employ. Further, I/O psychology places more emphasis on the people of an organization (e.g., motivating and retaining, enhancing productivity) instead of the technicalities of actually running the organization (e.g., policy and procedure-enforcement, worker benefits). Finally, a misconception of I/O psychologists is that they provide psychotherapy for employees. Although there are psychologists who do provide in house psychotherapy to employees with a range of problems, such as those who work in Employee Assistance Programs (EAPs), I/O psychologists do not; instead, they often employ research and interventions with specific organizations to increase effectiveness of that organization.

Industrial Organisational psychologists provide several different services for those with whom they work, including selection and placement of employees, training and development, developing and evaluating performance appraisal systems, organizational development, enhancing quality of work life, and evaluating ergonomics to name a few. I/O psychologists who provide selection and placement services focus on methods for selection, placement, and promotion of employees by choosing and developing tests aimed at assisting clients in accomplishing these tasks. For example, a psychologist may use testing information to help a company choose who to hire for a manager position. In

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providing training and development services, I/O psychologists determine what skills and methods are needed to improve employees' job performance. For example, a psychologist may work with a company to implement a leadership development program for managers and potential managers. Those who provide performance appraisal services create ways to determine how well employees are actually performing their job. Last, I/O psychologists who provide services in relation to ergonomics are concerned with the equipment and machinery related to human skills as well as with how the organization is designed. These psychologists usually work with engineers and others in the technical profession to help make the workplace safer and enable employees to be more resourceful.

In addition to these areas, there are several services I/O psychologists provide that relate to the field of counseling psychology. These include (a) enhancing employee motivation; (b) improving organizational communication; (c) addressing group behaviour, team management, and conflict, (d) addressing employee satisfaction, and (e) executive coaching. These services are discussed in more detail below.

### MOTIVATION

In addressing motivation, Industrial Organisational psychologists call on psychological theories such as consistency theory and Maslow's hierarchy of needs to examine individual predispositions related to motivation. Factors that contribute to a motivated predisposition include self-esteem, intrinsic motivation tendency, and a need for power and achievement. More specifically, employees who have a high self evaluation will work harder so that their behavioural outcomes match their expectancies. Although individuals with high self-esteem may be likely to perform better than those with low self-esteem, this may be true only in cultures where superior job performance is socially valued. Individuals who are intrinsically motivated are those who receive satisfaction in accomplishing a goal or task in and of itself and not just in the rewards gained from doing so.

An individual's predisposition for motivation may also be affected by her or his need for achievement and power. For example, Michael Stahl found that individuals who scored high on both need for achievement and power on the Job Choice Exercise could be classified as having a high level of managerial motivation. Thus, individuals with a high need for power and achievement are more likely than those with a low need for power and achievement to be motivated to work for promotions that place them in a position of control and influence. Other factors that contribute to employee motivation include whether or not an individual's needs are being met, achievability of goals, and the incentives received for meeting work goals.

In addressing motivation, I/O psychologists may conduct assessment related to predisposing factors of motivation as mentioned above and assess employees'

goals or help employees develop achievable goals. Further, I/O psychologists may work with organizations to develop and assess evaluation and feedback systems and reward systems.

### **ORGANISATIONAL COMMUNICATION**

An important aspect of any group of individuals is communication. Within an organization, effective communication can increase employee satisfaction and commitment and can actually help increase the effectiveness of the organization itself. Within an organization, smaller social and functional groups exist in which communication occurs both within and between groups. Types of groups that exist include work teams, levels of management, committees, and social groups. Communication varies in the ways it is both sent and received depending on which groups or individuals are communicating.

Michael Aamodt defined four types of organizational communication: upward, downward, business, and informal communication. Upward communication is that which goes from subordinates to superiors, while downward communication goes from superiors to subordinates. Business information is the relay of information that is business-related and can occur among customers as well as managers and employees. The fourth type is informal communication and consists of unofficial information that is transmitted through groups of workers or the organization itself.

Just as communication occurs within and between groups, another important component is interpersonal communication. Interpersonal communication occurs from one person to another and includes actual spoken words as well as nonverbal cues such as body language and use of space. It is also important to note that much of interpersonal communication is greatly influenced by one's culture. While some cultures value an expressive style of communicating, others pay more attention to the factuality of what is stated.

Industrial Organisational psychologists address communication issues by assessing the current forms of organization communication through surveys, interviews, and reviews of materials such as manuals and memos. Further, I/O psychologists will work with organizations to improve communication, providing feedback on current communication systems and recommendations for improvement such as incorporating different forms of communication systems. In addition, I/O psychologists may provide training relating to communication skills, such as telephone and e-mail etiquette, interpersonal communication, and verbal and nonverbal communication.

### **GROUP BEHAVIOUR, TEAMS AND GROUP CONFLICT**

In order for individuals to be considered a group, they must meet the following four criteria: Members must see themselves as a unit, rewards must be

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provided to members, something that affects one member in turn affects the entire group, and members of the group must share a common goal. One of the factors that may affect group performance is group cohesion. An important component of group cohesion is having a shared set of attitudes and beliefs. Typically, members in a group perceive themselves as being more similar to other group members than to individuals not included in the group.

Similar to groups is the concept of teams. Teams are groups of three or more individuals who work together to achieve a specific work related task or goal. Work teams are distinguished from one another by their specific objectives. Susan Cohen and Diane Bailey defined four different types of teams. Work teams are fairly stable teams that have the objective of producing goods or providing a service. Within work teams, there are no supervisors; rather, each member plays an equal role in contributing to the goal of increasing product or service quality. Parallel teams are representative of different departments or units and are indeed parallel to the organization as a whole.

The objective of parallel teams is to work as a problem solving unit and to provide feedback or recommendations to superiors within the organization. The next type of team is project teams. These teams are formed for a limited time basis with the objective of completing one task or goal for the organization. Management teams are responsible for overseeing the work of units below them. For example, a group of managers of an organizational department may be responsible for supervising employees within that department to ensure optimal performance of the department.

Just as conflict occurs among individuals, it also occurs within and between groups. Conflict is a reaction that occurs when someone interferes with an individual's need to achieve a goal or accomplish a task, when rights have been violated, or when expectancies of a relationship are broken. Conflict can be either functional or dysfunctional. Dysfunctional conflict is harmful to the working environment and prevents goals from being achieved, while functional conflict can increase competition as well as prevent larger conflicts later on. Because conflict is unavoidable, the most important aspect of conflict is how it is dealt with. Members of a group should determine early on what attitudes toward conflict will be and how conflict should be handled.

In working with groups and teams, the I/O psychologist will assess the current functioning of the group in relation to its structure and function (e.g., leaders and followers; how work is accomplished), cohesion, communication, and conflict. The I/O psychologists may provide services such as communication skills training, feedback, and recommendations to enhance group functioning, activities to build group or team cohesion, and instruction and facilitation of conflict resolution.

## **EMPLOYEE SATISFACTION AND COMMITMENT**

Organizational commitment and employee satisfaction are important aspects of an organization that affect employee behaviour. Organizational commitment is the amount of allegiance felt by an individual toward an organization and can be broken down into three components: affective, continuance, and normative commitment. Affective commitment deals with the emotional ties to an organization and the extent that an individual cares about the organization. Continuance commitment is an employee's decision to stay with an organization due to time and effort already expended for the company. Normative commitment is commitment based on feelings of obligation toward an organization. The levels of each type of commitment may vary among individuals, and different combinations of strengths and types (affective, continuance, and normative) of commitment will result in differing employee behaviours.

Along with organizational commitment, job satisfaction plays a major role in employee attitudes and behaviours. Job satisfaction is influenced both by individual characteristics and the actual organization as well as by whether or not an individual is a good fit for an organization. Timothy Judge, Edwin Locke, and C. C. Durham proposed four personality characteristics that may contribute to a higher level of job satisfaction: emotional stability, self-efficacy, self-esteem, and an external locus of control. In order for an individual to be an appropriate fit with an organization, it is important that the values, skills, interests, personality, and lifestyle of the individual are similar to those of the organization. Because a great deal of satisfaction and commitment is related to personal characteristics, counseling psychologists can play an important role in helping assess an individual's wants and needs and in determining how they can contribute to job satisfaction.

## **EXECUTIVE COACHING AND CONSULTATION**

Executive coaching has been in existence since the 1940s but has only recently received a great deal of attention in research on the effectiveness of this practice. Richard Kilburg defines executive coaching as a relationship between a client and an executive coach (or consultant) who assists the client in identifying organizational goals and implementing interventions to achieve those goals based on a formal agreement. Executive consultants provide an outside perspective to organizational executives by helping organizational leaders during times of organizational transition, with problem employees, and with team and interpersonal conflicts and by improving performance levels.

It is important to distinguish executive coaching and consultation practices from the practices of counseling and psychotherapy. Although there are many similarities between counseling and consultation, consultation and executive coaching have an overarching goal to improve an organization or workplace rather

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than a single individual. Executive coaching covers a broad array of workplace issues and can last anywhere from a few minutes to several hours. Also, while counseling is dyadic in nature and focuses on personal issues, consultation is triadic and focused on work related issues.

**COUNSELING AND INDUSTRIAL ORGANISATIONAL PSYCHOLOGY**

Similar to I/O psychology, counseling psychology's historical roots are tied to the military and the world of work, helping individuals to make the most out of their potential and to develop throughout their work careers. As a specialty of psychology, counseling involves a philosophy and working approach that resemble those of many areas of I/O psychology. For example, Sandra Shullman identified many overlaps between counseling psychology and consultation, a service often provided by I/O and counseling psychologists, such as recognizing and building on strengths, assisting individuals to achieve optimal functioning, identifying and addressing the impact of systems, and empowering consultees or clients to foster change. Counseling psychologists, trained as professional psychologists, develop competency in (a) gathering information and making conclusions or diagnoses; (b) consulting at the individual, group, and system levels to solve problems; (c) providing interventions to address problems; and (d) developing new knowledge through designing, implementing, and evaluating research.

These foundational and functional competencies of professional psychology provide the groundwork on which counseling psychologists can offer services, as counseling psychology continues to expand to areas outside of traditional practice arenas and allows counseling psychologists to provide consultation services in areas such as health care, equal employment opportunity, safety, workers compensation, employee assistance programs, labor relations, employee outplacement, and recruitment. Clyde Crego notes that this overlap and generalization of competencies suggests that it is highly likely that counseling psychologists and students in training to become counseling psychologists can, with appropriate training, adapt their skills in order to provide I/O related services in a variety of settings.

**1.6 TOPICS IN INDUSTRIAL-ORGANISATIONAL PSYCHOLOGY**

Industrial and organizational psychology applies psychology to organizations and the workplace. These organizations and the workplace are a broad range of entities that may include for-profit businesses, non-profits, government agencies, and colleges and universities. Industrial-organizational psychologists contribute to an organization's success by improving the performance and well-being of its

people. An I-O psychologist researches and identifies how behaviours and attitudes can be improved through hiring practices, training programs, and feedback systems.

## **JOB ANALYSIS**

Job analysis is often described as the cornerstone of successful employee selection efforts and performance management initiatives. A job analysis involves the systematic collection of information about a job. Job-analytic methods are often described as belonging to one of two approaches. One approach, the task-oriented job analysis, involves an examination of the duties, tasks, and/or competencies required by a job. The second approach, a worker-oriented job analysis, involves an examination of the Knowledge, Skills, Abilities, and Other characteristics (KSAOs) required to successfully perform the work. These two approaches are not mutually exclusive. Various adaptations of job-analytic methods include competency modeling, which examines large groups of duties and tasks related to a common goal or process, and practice analysis, which examines the way work is performed in an occupation across jobs.

Job-analytic data are often collected using a variety of quantitative and qualitative methods. The information obtained from a job analysis is then used to create job-relevant selection procedures, performance appraisals and criteria, or training programs. Additional uses of job-analytic information include job evaluations for the purpose of determining compensation levels and job redesign.

## **PERSONNEL RECRUITMENT AND SELECTION**

I-O psychologists typically work with HR specialists to design (a) recruitment processes and (b) personnel selection systems. Personnel recruitment is the process of identifying qualified candidates in the workforce and getting them to apply for jobs within an organization. Personnel recruitment processes include developing job announcements, placing ads, defining key qualifications for applicants, and screening out unqualified applicants.

Personnel selection is the systematic process of hiring and promoting personnel. Personnel selection systems employ evidence-based practices to determine the most qualified candidates. Personnel selection involves both new hires and individuals who can be promoted from within the organization. Common selection tools include ability tests (e.g., cognitive, physical, or psychomotor), knowledge tests, personality tests, structured interviews, the systematic collection of biographical data, and work samples. I-O psychologists must evaluate evidence regarding the extent to which selection tools predict job performance, evidence that bears on the validity of selection tools.

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Personnel selection procedures are usually validated, *i.e.*, shown to be job relevant, using one or more of the following types of validity: content validity, construct validity, and/or criterion-related validity. I-O psychologists adhere to professional standards, such as the Society for Industrial and Organizational Psychology's (SIOP) Principles for Validation and Use of Personnel Selection Procedures and the Standards for Educational and Psychological Testing. The Equal Employment Opportunity Commission's Uniform Guidelines are also influential in guiding personnel selection although they have been criticized as outdated when compared to the current state of knowledge in I-O psychology:

**PERFORMANCE APPRAISAL/MANAGEMENT**

Performance appraisal or performance evaluation is the process of measuring an individual's work behaviours and outcomes against the expectations of the job.

Performance appraisal is frequently used in promotion and compensation decisions, to help design and validate personnel selection procedures, and for performance management. Performance management is the process of providing performance feedback relative to expectations and improvement information (*e.g.*, coaching, mentoring). Performance management may also include documenting and tracking performance information for organization-level evaluation purposes.

An I-O psychologist would typically use information from the job analysis to determine a job's performance dimensions, and then construct a rating scale to describe each level of performance for the job. Often, the I-O psychologist would be responsible for training organizational personnel how to use the performance appraisal instrument, including ways to minimize bias when using the rating scale, and how to provide effective performance feedback. Additionally, the I-O psychologist may consult with the organization on ways to use the performance appraisal information for broader performance management initiatives.

**INDIVIDUAL ASSESSMENT AND PSYCHOMETRICS**

Individual assessment involves the measurement of individual differences. I-O psychologists perform individual assessments in order to evaluate differences among candidates for employment as well as differences among employees. The constructs measured pertain to job performance. With candidates for employment, individual assessment is often part of the personnel selection process. These assessments can include written tests, physical tests, psychomotor tests, personality tests, work samples, and assessment centers.

Psychometrics is the science of measuring psychological variables, such as knowledge, skills, and abilities. I-O psychologists are generally well-trained in psychometric psychology.

### **REMUNERATION AND COMPENSATION**

Compensation includes wages or salary, bonuses, pension/retirement contributions, and perquisites that can be converted to cash or replace living expenses. I-O psychologists may be asked to conduct a job evaluation for the purpose of determining compensation levels and ranges. I-O psychologists may also serve as expert witnesses in pay discrimination cases when disparities in pay for similar work are alleged.

### **TRAINING AND TRAINING EVALUATION**

Most people hired for a job are not already versed in all the tasks required to perform the job effectively. Similar to performance management, an I-O psychologist would employ a job analysis in concert with principles of instructional design to create an effective training program. A training program is likely to include a summative evaluation at its conclusion in order to ensure that trainees have met the training objectives and can perform the target work tasks at an acceptable level. Training programs often include formative evaluations to assess the impact of the training as the training proceeds. Formative evaluations can be used to locate problems in training procedures and help I-O psychologist make corrective adjustments in the while the training is ongoing.

### **MOTIVATION IN THE WORKPLACE**

Motivation is a positive drive that forces a person to reach the goal. In a workplace the manager or supervisor has to know the needs or drive of individual and motivate according to it. In an organization, when an employee is doing good job or production is increased by him, he must be rewarded with respect to his needs.

### **ORGANIZATIONAL CULTURE**

Organizational culture can be described as a set of assumptions shared by the individuals in an organization that directs interpretation and action by defining appropriate behaviour for various situations. There are three levels of organizational culture: artifacts, shared values, and basic beliefs and assumptions. Artifacts comprise the physical components of the organization that relay cultural meaning. Shared values are individuals' preferences regarding certain aspects of the organization's culture (e.g., loyalty, customer service). Basic beliefs and assumptions include individuals' impressions about the trustworthiness

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and supportiveness of an organization, and are often deeply ingrained within the organization's culture.

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In addition to an overall culture, organizations also have subcultures. Examples of subcultures include corporate culture, departmental culture, local culture, and issue-related culture. While there is no single "type" of organizational culture, some researchers have developed models to describe different organizational cultures.

Organizational culture has been shown to have an impact on important organizational outcomes such as performance, attraction, recruitment, retention, employee satisfaction, and employee well-being. Also, organizations with an adaptive culture tend to perform better than organizations with an unadaptive culture.

### **GROUP BEHAVIOUR**

Group behaviour is the interaction between individuals of a collective and the processes such as opinions, attitudes, growth, feedback loops, and adaptations that occur and change as a result of this interaction. The interactions serve to fulfill some need satisfaction of an individual who is part of the collective and helps to provide a basis for his interaction with specific members of the group.

A specific area of research in group behaviour is the dynamics of teams. Team effectiveness refers to the system of getting people in a company or institution to work together effectively. The idea behind team effectiveness is that a group of people working together can achieve much more than if the individuals of the team were working on their own.

### **JOB SATISFACTION AND COMMITMENT**

Job satisfaction reflects an employee's overall assessment of their job particularly their emotions, behaviours, and attitudes about their work experience. It is one of the most heavily researched topics in industrial/organizational psychology with several thousand published studies. Job satisfaction has theoretical and practical utility for the field of psychology and has been linked to important job outcomes including attitudinal variables, absenteeism, employee turnover, and job performance. For instance, job satisfaction is strongly correlated with attitudinal variables such as job involvement, organizational commitment, job tensions, frustration, and feelings of anxiety.

Job satisfaction also has a weak correlation with employee's absentee behaviours and turnover from an organization with employees more likely to miss work or find other jobs if they are not satisfied. Finally, research has found that although a positive relationship exists between job satisfaction and

performance, it is moderated by the use of rewards at an organization and the strength of employee's attitudes about their job.

### **PRODUCTIVE BEHAVIOUR**

Productive behaviour is defined as employee behaviour that contributes positively to the goals and objectives of an organization. When an employee begins a new job, there is a transition period during which he or she is not contributing positively to the organization. To successfully transition from being an outsider to a full-fledged member of an organization, an employee typically needs job-related training as well as more general information about the culture of the organization. In financial terms, productive behaviour represents the point at which an organization begins to achieve some return on the investment it has made in a new employee. There are three common forms of productive behaviour in organizations: job performance, organizational citizenship behaviour (OCB), and innovation.

### **JOB PERFORMANCE**

Job performance represents behaviours employees engage in while at work which contribute to organizational goals. These behaviours are formally evaluated by an organization as part of an employee's responsibilities. In order to understand and ultimately predict job performance, it is important to be precise when defining the term. Job performance is about behaviours that are within the control of the employee and not about results (effectiveness), the costs involved in achieving results (productivity), the results that can be achieved in a period of time (efficiency), or the value an organization places on a given level of performance, effectiveness, productivity, or efficiency (utility).

To model job performance, researchers have attempted to define a set of dimensions that are common to all jobs. Using a common set of dimensions provides a consistent basis for assessing performance and enables the comparison of performance across jobs. While there is disagreement about the exact dimensions of job performance, there is agreement on two major categories of job performance: in-role (technical aspects of a job) and extra-role (non-technical abilities such as communication skills and being a good team member).

To assess job performance, reliable and valid measures must be established. The most commonly used measures are ratings of employee performance on specific tasks and on overall job performance. While there are many sources of error with performance ratings, error can be reduced through rater training and through the use of behaviourally anchored ratings scales. Such scales can be used to clearly define the behaviours that constitute poor, average, and superior performance. Additional factors that complicate the measurement of job

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performance include the instability of job performance over time and the restriction of variation in individual performance by organizational forces.

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The determinants of job performance consist of factors having to do with the individual worker as well as environmental factors in the workplace. According to Campbell's Model of The Determinants of Job Performance, job performance is a result of the interaction between declarative knowledge (knowledge of facts or things), procedural knowledge (knowledge of what needs to be done and how to do it), and motivation (reflective of an employee's choices regarding whether to expend effort, the level of effort to expend, and whether to persist with the level of effort chosen). Regardless of the job, three determinants stand out as predictors of performance: (1) general mental ability (especially for jobs higher in complexity), (2) job experience (although there is a law of diminishing returns), and (3) the personality trait of conscientiousness (people who are dependable and achievement oriented, who plan well). These determinants appear to influence performance largely through the acquisition and usage of job knowledge and the motivation to do well.

### *ORGANIZATIONAL CITIZENSHIP BEHAVIOUR*

Organizational citizenship behaviour (OCB) refers to productive behaviours that are not part of an employees' formal job description. There are five categories of organizational citizenship behaviours: (1) altruism, (2) courtesy, (3) sportsmanship, (4) conscientiousness, and (5) civic virtue.

There are three different explanations for why employees engage in organizational citizenship behaviour. The first has to do with positive affect, an overall positive mood increases the frequency of helping behaviour. The second explanation, which stems from the equity theory, is that employees reciprocate fair treatment that they have received from the organization. The third explanation is that some employees have personality traits that predispose them to participate in organizational citizenship behaviour. There are also employees who will perform organizational citizenship behaviour to influence how they are viewed within the organization. While these behaviours are not formally part of the job description, performing them can certainly influence performance appraisals.

### *INNOVATION*

Innovation is a form of productive behaviour that employees exhibit when they come up with novel ideas that further the goals of the organization. Innovation at an individual level is dependent on task-relevant skills (general mental ability and job specific knowledge), creativity-relevant skills (ability to concentrate on a problem for long periods of time, to abandon unproductive

searches, and to temporarily put aside stubborn problems), and task motivation (internal desire to perform task and level of enjoyment).

There are things that organizations can do in order to breed innovation in the workplace. Some of these items include providing creativity training, having leaders encourage and model innovation, allowing employees to question current procedures and rules, seeing that the implementation of innovations had real consequences, documenting innovations in a professional manner, allowing employees to have autonomy and freedom in their job roles, reducing the number of obstacles that may be in the way of innovation, and giving employees access to resources (whether these are monetary, informational, or access to key people inside or outside of the organization).

### **COUNTERPRODUCTIVE BEHAVIOUR**

Counterproductive behaviour can be defined as employee behaviour that goes against the goals of an organization. These behaviours can be intentional or unintentional and result from a wide range of underlying causes and motivations. It has been proposed that a person-by-environment interaction can be utilized to explain a variety of counter-productive behaviours (Fox and Spector, 1999). For instance, an employee who steals from the company may do so because of lax supervision (environment) and underlying psychopathology (person) that work in concert to result in the counterproductive behaviour.

The forms of counterproductive behaviour with the most empirical examination are ineffective job performance, absenteeism, job turnover, and accidents. Less common but potentially more detrimental forms of counterproductive behaviour have also been investigated including theft, violence, substance use, and sexual harassment.

### **LEADERSHIP**

Leadership is a process of influencing and supporting and motivating others to work enthusiastically or effectively towards achieving the objectives or goal. A leader acts as a catalyst, who identifies the potential of a worker and tries to put that into reality. A leader can be a positive leader or a negative leader.

A leader's influence within an organization or group has been said to stem from two primary sources, that person's personal characteristics and their position within the organization. Personal power, also made up of two factors called expert power and referent power, is derived from elements like an individual's personality, their knowledge base, their ability to effectively interact with others, and their demonstrated level of effort. Positional power, also often referred to as legitimate power, is derived from the leader's position within the organization, and the

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authority imbued in them either directly or indirectly by the organization's controlling parties to provide either rewards or sanctions for performance.

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The leader's role is to use this influence to encourage those within the organization to focus their actions toward the accomplishment of the organization's goals. Distinction should be noted between management v. leadership. Managers process administrative tasks that organize work environments. Leaders conduct those same tasks while also inspiring and motivating the workforce for which they oversee. Managers cope with complexity, leaders cope with change. Managers participate in stepwise tasks of planning and budgeting, organizing and staffing, and controlling and problem solving. In contrast, leaders approach these stages of business development through equivalent tasks of setting a direction or vision, aligning people or communication, and motivating and inspiring, respectively.

### **RELATIONSHIP TO OCCUPATIONAL HEALTH PSYCHOLOGY**

A separate but related discipline, Occupational Health Psychology (OHP) is a relatively new field that combines elements of industrial-organizational psychology, health psychology, and occupational health. Unlike I-O psychology, the primary emphasis in OHP is on the physical and mental health and psychological well-being of the person. For more detail on OHP, see the section on occupational health psychology.

### **1.7 SUMMARY**

- The field of industrial-organizational psychology focuses on issues in business and industry. "I/O psychologists" conduct research, develop and evaluate programs, and try to improve productivity and the quality of work life.
- Industrial psychology is a relatively new branch of psychology that was created for corporations and organizations that needed more structure. Industrial psychology is able to provide this structure by evaluating employee behaviour for the good of the company.
- Industrial/Organisational psychologists are trained in the "scientist-practitioner" model. The training enables I-O psychologists to employ scientific principles and research-based designs to generate knowledge.
- I-O psychologists typically work with HR specialists to design (a) recruitment processes and (b) personnel selection systems.
- Motivation is a positive drive that forces a person to reach the goal. In a workplace the manager or supervisor has to know the needs or drive of individual and motivate according to it.

## **1.8 REVIEW QUESTIONS**

1. Discuss the fundamental concept of industrial psychology.
2. Describe the historical background of industrial psychology.
3. What are the major features of industrial psychology?
4. Explain the important fields industrial psychology deals with.

## **1.9 FURTHER READINGS**

- Sharma, Ram Nath and Chandra S S, *Advanced Industrial Psychology* (Volume I), Atlantic Publisher, New Delhi.
- E. Riggio, Ronald, *Introduction to Industrial/Organizational Psychology*, Scott Foresman & Co Publisher; 4th edition (January 1990).

## **NOTES**

# UNIT – II

## NOTES

# PERSONNEL SELECTION

### STRUCTURE

- 2.1 Learning Objectives
- 2.2 Introduction
- 2.3 Occupational Information and Analysis
- 2.4 The Focus of Occupational/Job Analysis : Positions and Occupations
- 2.5 The Importance of Occupational Analysis
- 2.6 Methods of Occupational Analysis
- 2.7 Job Description and Job Specification
- 2.8 Techniques of Collecting Information for Job Analysis
- 2.9 Techniques of Writing Job Descriptions
- 2.10 Job Design
- 2.11 Effects of Work Flow on People
- 2.12 Different Work Systems
- 2.13 Psychological Testing
- 2.14 The Current Picture
- 2.15 Summary
- 2.16 Review Questions
- 2.17 Further Readings

### 2.1 LEARNING OBJECTIVES

After going through this unit, students will be able to:

- state the meaning and importance of personnel selection;
- explain the concept and need of occupational information;
- know the techniques and application of interview as well as psychological tests.

### 2.2 INTRODUCTION

All individuals have a large repertoire of behaviours, competencies, interests, and personality traits. Within this repertoire, an individual displays a range of strengths and weaknesses which help define that person as an individual and different from others. When an organization is confronted with the task of selecting new employees, it is charged with evaluating these individual differences among the job applicants in order to make selection decisions.

For this evaluation process to be effective, it is paramount that the evaluation tools assess only job-related behaviours, competencies, interests, and personality traits. An evaluation of capabilities that bear no relationship to the job or job-relevant training is meaningless. Only an assessment of one's job-related competencies will provide an organization with the power to truly distinguish among the abundance of individual differences and, in turn, select those individuals who ultimately will be successful on the job.

Effective personnel selection programs involve the implementation of systematic assessment tools to evaluate job-related capabilities, personality traits, and interests. The identification of job requirements provides the basic foundation for a valid selection system. This process, typically referred to as a job analysis, identifies the tasks performed on the job and the knowledge, skills, abilities, and other characteristics required to perform the job tasks successfully. Given the job analysis results, the next step involves identifying the most appropriate instruments so that as many of the job requirements as possible are assessed. Thus, it is likely that a selection process may include a number of assessment tools, each aimed at measuring different aspects of the job. While some procedures are geared toward assessing one's knowledge, others evaluate one's skills or abilities, and there are others that provide information on one's personality, work styles, work values, or interests. The ultimate goal is to identify the job requirements and implement the selection tools that provide an assessment of as many of those requirements as possible.

Typically, a selection process is aimed at identifying individuals who will successfully perform the target job. However, an organization also may be interested in predicting other types of organizational behaviours in addition to job performance. For instance, some personnel selection tools may be evaluated in terms of their ability to predict which applicants are: (a) more likely to remain on the job, (b) more likely to be satisfied on the job, or (c) have managerial potential. Although the ultimate criterion for evaluating a selection program is its ability to predict job performance, the power of assessment tools to predict these additional criteria is an added benefit.

The purpose of this unit is to provide a brief overview of the major issues associated with personnel selection. First, the process of identifying job requirements is presented. The next section provides a brief description of the different types of assessment procedures. This is followed by a discussion of the various issues to consider when making selection decisions. An overview of the procedures used to evaluate assessment methods is presented, followed by a discussion of issues associated with the administration and implementation of a selection program.

A comprehensive and current job analysis identifies the occupational information and, in turn, provides the foundation for numerous human resource

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programs, including selection as well as training program design. The most critical pieces of information collected from a job analytic effort include the: (a) tasks required on the job, (b) Knowledge, Skills, Abilities, and Other characteristics (KSAOs) required to perform those tasks, and (c) task/KSAO linkages which provide an explicit description of which KSAOs are required to perform each of the job tasks. The sources of information that can be used to identify those job tasks and KSAOs include job materials (e.g., position descriptions, performance appraisals), job observations, interviews with incumbents, workshops with incumbents and/or supervisors, and task and KSAO surveys. In many cases, the surveys are tailored and designed specifically for a particular job within a specific organization. However, there are generic job analysis surveys on the market that may be useful for collecting the requisite information.

Typically, the sequence of events in a job analysis study is as follows:

- Collect background information regarding the job and the organization.
- Interview job incumbents and conduct job observations.
- Conduct workshops with job incumbents to develop a job task list.
- Conduct workshops with job incumbents or supervisors to develop a KSAO list.
- Prepare and administer job task and KSAO surveys.
- Analyze the survey results to determine the important job tasks and KSAOs.
- Conduct a workshop with job incumbents to link the KSAOs to the important job tasks.

A comprehensive job analysis yields a detailed description of the job. Using the job analysis results as the basic framework for a selection process ensures that the program is identifying those individuals who meet the job requirements.

### 2.3 OCCUPATIONAL INFORMATION AND ANALYSIS

Emerging from years of downsizing and restructuring, and with a new appreciation for the value of their human resources, many organizations are moving rapidly to embrace a new approach to the management of human resource (HR) process. Job analysis helps to understand the qualities needed by employees, defined through behavioural descriptors, to provide optimum work performance. These qualities range from personality characteristics and abilities to specific skills and knowledge.

By linking HR activities through a common language and framework, by reflective the values and mission of the organization and by establishing clear expectations of performance for employees integrates HR practices, defines business strategy of the organization and maximizes the delivery of its services to clients.

The critical role of modern job analysis is in guiding, learning and development at activities of employees. Modern Job analysis address development through the provision of tools for employees that address:

- What it takes to do a job;
- What an individual brings to the job; and
- What the gaps (learning and development needs) are.

The purpose of this input is to clearly define the context and status of Job Analysis as an HR approach, situate its use within the organization and describe the issues that need to be addressed with respect to its growing application across departments and agencies.

It is hoped that this unit will serve as the common platform on the basis of which key decisions can be taken by departments, agencies to ensure a more collaborative and focused approach to the implementation.

### **PURPOSE AND DEFINITION OF JOB ANALYSIS**

Job analysis is the fundamental process that forms the basis of all human resource activities. The importance of job analysis has been well-established for years, dating back to at least the First World War. The United States government's Uniform Guidelines on Employee Selection Procedures (1978) and the American Psychological Association's Principles for the Validation and use of Personnel Selection Procedures stipulate that job analysis is essential to the validation of any and all major human resources activities.

In its simplest terms, a job analysis is a systematic process for gathering, documenting and analyzing data about the work required for a job. The data collected in a job analysis, and reflected through a job description, includes a description of the context and principal duties of the job, and information about the skills, responsibilities, mental models and techniques for job analysis. These include the Position Analysis Questionnaire, which focuses on generalized human behaviours and interviews, task inventories, functional job analysis and the job element method.

A job analysis provides an objective picture of the job, not the person performing the job, and as such, provides fundamental information to support all subsequent and related HR activities, such as recruitment, training, development, performance management and succession planning. Job analysis serves two critical functions with respect to these processes. Job analysis helps ensure that decisions made with respect to HR processes are good decisions *i.e.*, fair and accurate (*e.g.*, selection of the right person for the job, appropriate decisions about training, performance management, development, etc.) and it helps ensure the defensibility of decisions made to employee (resulting in good HR management) and to the courts (resulting in saving of costs, time and reputation).

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## **2.4 THE FOCUS OF OCCUPATIONAL/JOB ANALYSIS : POSITIONS AND OCCUPATIONS**

### **NOTES**

The unit of study in occupational analysis may be position or a job. A "position" is the most basic structural entity in the organization, representing the collection of duties assigned to a single person. One or more similar positions, each of which is interchangeable with the others in terms of work activities, makes up a "job." In fact, a "job" has been defined (Henderson, 1979) as "work consisting of responsibilities and duties that are sufficiently alike to justify being covered by a single job analysis." It has also been defined as "a collection of position similar enough to one another in terms of their work behaviours to share a common job title" (Harvey, 1991). The linkage positions in an organization provides a roadmap and tool for translating the organization's mission, values and business priorities into results.

Why is there a need to talk in terms of positions or jobs? It is because it is necessary to identify the results individual will be accountable for when they are hired, how their work fits in or relates to other work performed in the organization, how their work should be compensated for in relation to that of others, on what basis recruitment and training should be carried out, and so on.

## **2.5 THE IMPORTANCE OF OCCUPATIONAL ANALYSIS**

According to scientific management, the key to productivity is a precise understanding of the tasks that constitute a job. If the motions of workers are to become standardized and machine-like, then it is necessary to be certain about what is to be accomplished, as well as what abilities and materials are necessary to do the job. For many years, job analysis was considered the backbone of the scientific clipboards and stopwatches, was the method used to determine the most efficient way to perform specific jobs.

As the popularity of scientific management declined after World War II, however, so did the popularity of job analysis. With the new emphasis on human relations as the key to productivity job analysis was used primarily to set salary scales. But in the modern times workers and employers began to take renewed interest in this area because of concerns about two issues: unfair discrimination and comparable worth.

There are two areas where unfair discrimination in hiring can occur: in the standards set for being hired; and in the procedures used to assess the applicant's ability to meet those standards. Job analysis addresses the question of what tasks, taken together actually constitute a job. Without this information, standards for hiring may appear to be arbitrary – or worse, designed to exclude certain individual or groups from the workplace.

More recently, the issue of comparable worth has also contributed to a new interest in job analysis. Comparable worth refers to equal pay for individuals

who hold different jobs but perform work that is comparable in terms of knowledge required or level of responsibility. The major issue of the comparable worth controversy is that women who are employed in jobs that are comparable to those held by men are paid, on the average, about 65 percent of what a man would earn. In order to determine the comparability of job tasks so that salaries can also be compared, a proper job analysis is necessary. Comparable work is an issue of considerable interest to many people.

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### 2.6 METHODS OF OCCUPATIONAL ANALYSIS

Occupational analysis is the procedure for identifying those duties or behaviours that define a job. Aside from verifying the fairness of selection procedures, job analysis is the foundation of virtually every other area of industrial psychology, including performance appraisal, training and human factors. Additionally, job analysis is the basis of job evaluation, the procedure for setting salary scales. Figure 1 suggests some of the many uses of job analysis.

Information about jobs can be collected in a number of ways. McCormick (1976) lists the following as potential sources: observation, individual interview, group interview, technical conference, questionnaire, diary, critical incidents, equipment design information, recording of job activities, or employee records. Possible agents to do the collecting are professional job analysis, supervisors, job incumbents, or even a camera in the work-place.

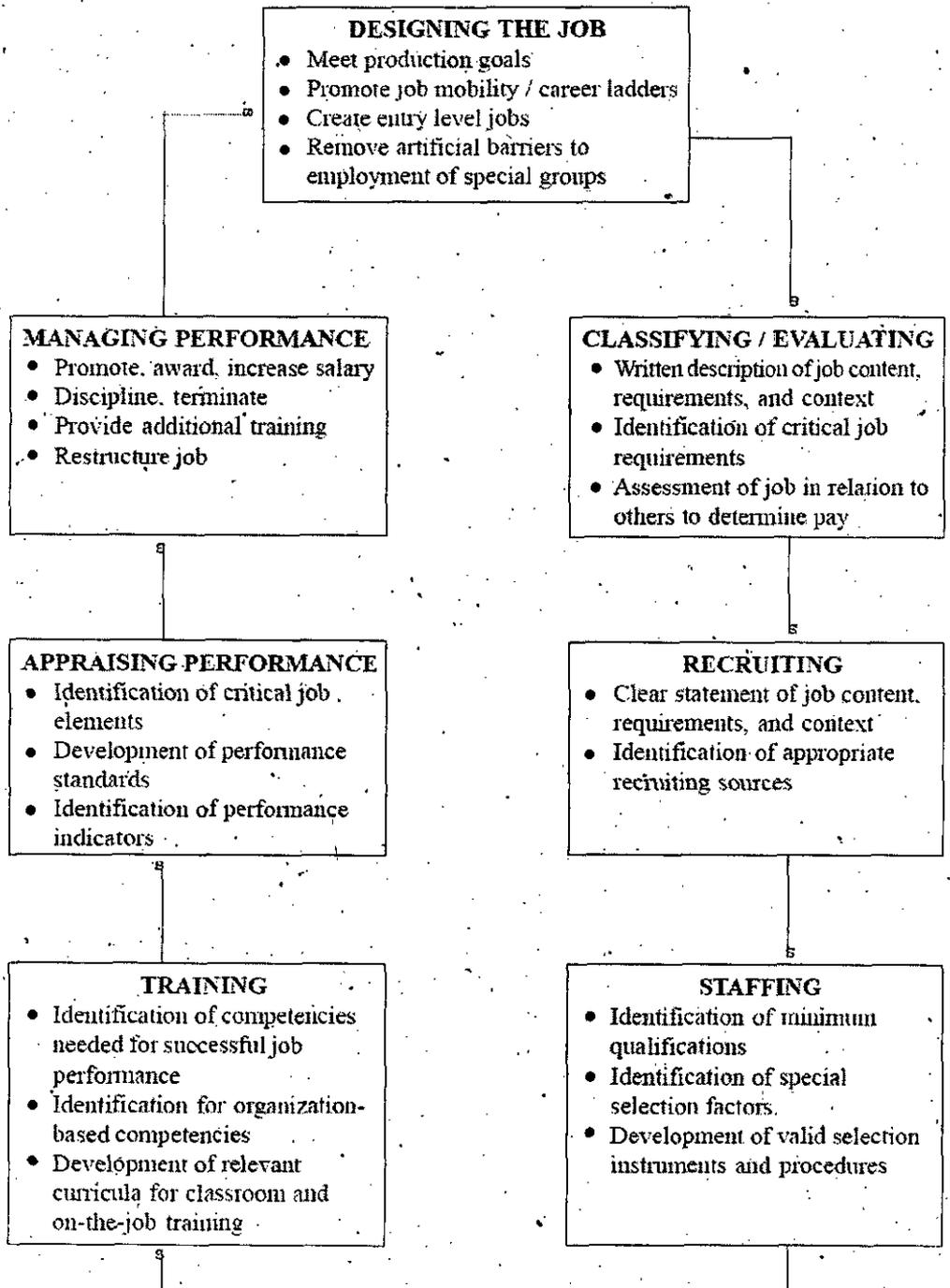
In spite of both its importance and the availability of data, however, the area of job analysis has not been studied in details. One reason for the lack of research is the nature of the data: Although qualitative information about jobs, collected through observations, is plentiful, translating this data into a quantitative form amenable to statistical analysis is often difficult.

Over time, different approaches to dealing with data of job description have been developed. Some methods designed to study jobs include functional job analysis (Fine, 1974), critical incidents (Flanagan, 1954), job elements (Primoff, 1975) the Position Analysis Questionnaire (McCormick, Jeanneret, & Mecham, 1972), and the physical abilities requirement approach (Fleishman, 1975).

#### *FUNCTIONAL JOB ANALYSIS*

The rationale behind Functional Job Analysis (FJA) is that jobs must be defined in terms of the interaction between the task, the individuals responsible for accomplishing the task, and the environment in which the task is to be performed. FJA was developed by Sidney A. Fine during the 1950s as part of the Functional Occupational Classification Project that resulted in the third edition of the Dictionary of Occupational Titles. As well as providing a system that identifies job tasks, functional job analysis also allows for the setting of performance standards and the identifications of materials for training workers.

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**Fig 1. Human Resource Management Cycle: Application of Job Analysis Data.**

**Source:** Bemis, S.E. Belenky, A.H, Soder, D.A. (1983). *Job Analysis: An effective management tool.* Washington, DC: Bureau of National Affairs.

FJA relies on trained professionals for its data. These professions use employee materials, training manuals, workers interviews, and direct observation to learn about a specific job. According to Fine (1974), these analysis study jobs in terms of five components. First, the purpose, goals and objectives of a specific job need to be identified, and second, analysis must identify and describe the tasks necessary to accomplish a job. In the third component of functional job analysis, the analysts determine the specific abilities necessary to perform the job successfully. In this stage of the analysis, jobs are reviewed along seven dimensions:

- (1) Data (worker's involvement with information and ideas);
- (2) People (communication and interaction);
- (3) Things (use of machines and tools);
- (4) Amount of autonomy in the tasks;
- (5) Reasoning (the use of concepts and decision-making);
- (6) Mathematics; and
- (7) Language (reading, writing, and speaking).

Fourth, from this information, performance standards are set and then, fifth, training needs are identified in the final stages of functional job analysis.

#### **Example of Functional Job Analysis**

Olson et.al. (1981) utilized a functional job analysis approach to study the work of heavy equipment operators that has been described as a model application of this method. Some workers had complained that the standards necessary to be hired—a high school diploma, language and mathematics tests, and a four-year apprenticeship—were too strict, often irrelevant to job performance, and excluded a disproportionate number of minority candidates. The union representing heavy equipment operators consequently authorized a job analysis to better understand the actual work of its members and to assess the relevancy of its selection criteria.

After clarifying the goals and objectives of the job, the analysis developed seven task statements for successful operation of a piece of heavy equipment. The basic tasks of heavy equipment operation were identified as follows:

- (i) Inspects of equipments (prior to operation);
- (ii) Services the equipment;
- (iii) Starts the equipment;
- (iv) Operates the equipment – basic, low difficulty, outputs;
- (v) Operates the equipment – intermediate difficulty outputs;
- (vi) Operates the equipments – difficult outputs; and
- (vii) Shuts down the equipment.

From the seven basic task statement, performance standards – more specific tasks within the broader category – were developed by groups of four to six subject matter experts or "SMEs" (SMEs are typically supervisors, job incumbents, or job

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analysts). Performance standards are expressed in terms of specific outputs and operator behaviours necessary to accomplish those outputs. The number of performance standards for any specific job can run into the thousands.

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At this stage of the analysis, the researchers had enough data to develop a test for assessing the abilities of heavy equipments operators. The analysts selected a few of the performance standards and assembled them into a work sample test designed to be a new standard for selecting operators. Table 1 lists some of the outputs tested. Scores from the work sample tests developed from the functional job analysis resulted in the successful prediction of the performance levels of heavy equipment operators. That is, individuals who had been identified by a committee of supervisors as having a high level of skill scored high on the work sample test, whereas those having a low level of skill did not do as well.

*Table 1: Outputs Tested for Each Piece of Equipment*

Bulldozer (3 hours)	Excavate for foundation, backfill Finish the Slope Push load scraper, run fill Cut and fill, build ramp
Backhoe (2 hours)	Excavate vertical wall trench Expose buried pipe Excavate sloping wall trench Excavate pier hole
Loader (1 ½ hours)	Excavate basement Form spoil pile Load haul vehicle from spoil stockpile
Grader (2 ½ hours)	Build maintenance road Cut rough ditches Level material and crown road Construct V-ditch to grade Finish grade to a flat surface
Scraper (varied)	Load scraper Haul material to fill area Unload scraper Return to cut area

*Source:* Olson, H.C., Fine, S.A., Myers, D.C., & Jennings, M.C. (1981). The use of functional job analysis in establishing performance standards for heavy equipment operators. *Personnel Psychology*, 34, 351-364.

## Evaluating Functional Job Analysis

From the foregoing analysis, it is easy to see that FJA yields an extremely detailed picture of what tasks constitute a specific job. Such detailed information can be used to identify erroneous and possibly damaging assumptions about job tasks: In the example just cited, FJA resulted in a major revision of employee selection procedures.

At the same time FJA also required a major commitment in terms of resources. Studying jobs, identifying tasks, developing performance standards, and testing operators involves large numbers of personnel in a major effort. For smaller organizations in particular, this approach may be too burdensome to be useful.

Another consideration with regard to FJA is its use of "experts" to analyse jobs. Since some of the experts are individuals who do not actually perform the tasks, it is possible that they may not have a full understanding of the job in question. On the other hand, the job incumbents may also introduce error into the analysis if they do not understand the importance of all the components of a job.

### *CRITICAL INCIDENTS TECHNIQUE*

In contrast to FJA, where experts make judgments about the content of job, the critical incidents technique (CIT) utilizes actual episodes of on-the-job behaviour. This job analysis method grew out of experiences with selecting candidates for flight school during World War II. Standards for acceptance or rejection were lax, and vague reasons such as "lack of inherent flying ability" were used to disqualify individuals who might have been good crew members.

In an attempt to avoid relying on the impressions of examiners to assess the suitability of candidates, the Air Force Aviation Psychology Program developed a series of standards for performance using examples of behaviour that had occurred in military situations. These "critical incidents" were defined as "extreme behaviour, either outstandingly effective or ineffective with respect to attaining the general aims of the activity" (Flanagan, 1954). In other words, CIT asks employees to describe specific examples of on-the-job behaviour that demonstrate both high and low levels of performance.

Sources for critical incidents include workers, co-workers, supervisors, managers, and others. Typically, the job analyst will ask informants to think of the most recent example of a worker performing at a very high level. Informants will describe what led to the incident, exactly what the employee did, the perceived consequences of the behaviour, and whether or not these consequences were within the control of the employee. (See Box 1).

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**Box 1**

*An example of a critical incident for a waiter might be as follows:*

When a waiter and a waitress walked off the job during lunchtime, Johan was left alone to serve a restaurant full of customers. Under incredible pressure, he waited on tables throughout the room rather than only in his own section. He moved quickly and efficiently and kept a pleasant smile on his face the entire time. As a result, customers experienced only minimal delays in getting their food.

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One advantage to the critical incident approach is that it can be used to gather large amounts of data in a short period of time. Workers are assembled in groups and asked to come up with incidents. According to Flanagan, an analysis of simple jobs would require from 50 to 100 incidents, skilled and semi-skilled jobs would require from 1000 to 2000 incidents, and supervisory jobs would require from 2000 to 4000.

After the incidents are collected, they are transferred to index cards, and job incumbents, supervisors, or analysts independently group similar incidents into broader categories. (Factor analysis is frequently used in this part of the analysis). These independent groupings are compared in order to establish categories may include "promptness of service," "accuracy of orders," or "interaction with customers." Raters discuss any differences in categorization in order to ensure agreement and the reliability of the ratings. From this procedure, a detailed outline of the content of a specific job will emerge.

**Example of Critical Incidents Techniques**

Aamodt and his associates (1981) used the critical incidents techniques to study successful and unsuccessful performance on the part of dormitory resident assistants (RAs). The researchers asked 93 RAs, head residents, and assistant head residents the following question :

Think of the best (worst) Resident Assistant that you have ever known. Now describe in details one incident that reflects why this person was the best (worst).

Three judges sorted the 312 incidents collected into the following categories: availability, fairness, discipline, self-confidence, interest in residents, authoritarianism, social skills, self-control, and self-adherence to the rules. After resorting the incidents as a check on the reliability of the raters' judgments, the researchers were able to identify qualities of good and poor resident assistants. Good RAs were fair in discipline, concerned about residents, planned additional programs, stayed around the hall more than was required, and were self-confident and self-controlled. Poor resident assistants, on the other hand, were seldom around the hall, disciplined residents but not their friends, broke rules, were not friendly, and had a personality style that was either excessively timid or authoritarian.

## Evaluating Critical Incidents Technique

Some authors have pointed out that one weakness of virtually all approaches to job analysis is their reliance at some time point on the opinions of a knowledgeable individual (e.g., Jones et al., 1982). In the critical incidents approach, this reliance of actual instances is at least focused on events that actually happen in the workspace. Reports of actual instances of behaviour gathered from a variety of sources may give the critical incidents analyst a more objective picture of what behaviour constitute a specific job. Supervisors are likely to be best informed about what levels of performance are expected, and job incumbents are probably the critical incidents technique, experts information is replaced by information from the workers.

Another important advantage of critical incident is that the data can be used for a number of other personnel functions, especially in performance appraisal, job design, human factors, and others areas.

On the other hand a disadvantage of this approach relates to one of its most attractive features — the use of employees as the source of data. Asking employees to stop work in order to meet in groups and record incidents that have accrued in the workspace is time-consuming expensive, and inefficient. It may have a negative effect on productivity. In a study comparing various methods of job analysis, Levine, Ash, and Bennett (1980) found CIT to be the most expensive.

In order for CIT be effective, unfortunately, this process cannot be shortened. If an insufficient number of incidents is collected, some aspects of jobs may be overlooked, or only the most important tasks may be identified (Bemis et al., 1983). Along the same lines, another problem with CIT is the subjective nature of the data. Workers' perceptions of effective and ineffective behaviour are likely to be influenced by factors such as their feelings toward co-workers, perceptions about the quality of their own performances, and their willingness to participate in the critical incidents study. To a certain degree — but not entirely — these subjective factors can be controlled by collecting large numbers of incidents.

## JOB ELEMENTS APPROACH

This method of job analysis was developed by Ernest Primoff at the Federal Office of Personnel Management and uses as its focus the elements that a worker uses in performing a specific job. Job elements include knowledge, skills, and abilities (KSAs), as well as willingness, interest, and personal characteristics (Primoff, 1975).

Like the critical incidents approach, job elements relies on the knowledge and experiences of supervisors and job incumbents. In the first step of a job elements approach to job analysis, these SMEs participate in a brainstorming session in which they identify as many of the elements of a particular job as possible.

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Next, the identified elements are rated on each of four factors :

- (1) *Barely acceptable*: What relative portion of even barely acceptable workers is good in the element?
- (2) *Superior*: How important is the element in picking out the superior worker?
- (3) *Trouble*: How much trouble is likely if the element is ignored when choosing among applicants?
- (4) *Practical*: Is the element practical? To what extent can we fill our job openings if we demand it?

Using a statistical procedure developed by Primoff, ratings on the above four factors are analyzed to determine what elements are most important in selecting superior workers. Box illustrates a rating blank for job elements. From this information, a "Crediting Plan," describing the KSAs necessary for successful job performance and used for evaluating applicants, can be developed.

#### Example of Job Element Approach

Ash (1982) used the job elements approach in a study of the job of condominium manager in Florida. In the initial part of the study, 159 task statements were collected from books, job descriptions, and surveys of supervisors and job incumbents. Through a statistical technique known as cluster analysis, the number of tasks was reduced to nineteen in the following five categories: administrative, fiscal, physical maintenance, legal, and social.

In the second part of the study, KSAs for each of the 11 tasks were generated by 18 SMEs. Each of the elements were then rated on Primof's four scales. From this analysis, a detailed picture of the job duties and tasks of the condominium manager emerged. Box 2 illustrates the elements under the broader category of personnel and general management, of the 11 tasks identified by Ash.

#### Evaluating Job Elements Approach

The job elements approach is an involved procedure that provides a detailed analysis of a particular job. A major advantage of job elements is that, in addition to identifying the tasks that constitute a particular job, it is particularly useful for developing training programs. On the basis of job elements analysis, curricula have recently been developed for professional training in engineering pharmacology, and cosmetology.

Like the other methods, however, job elements is time-consuming and costly to operationalise. Additionally, job analysts may have access to computer programs in order to complete an analysis. Nevertheless, although job elements has the possibility of becoming a bit unwieldy, it had had an important effect on developing other methods of job analysis. Primoff had developed a supplemental procedure (Primoff, Clark & Caplan, 1982) that combines the job elements method with functional job analysis and the critical incident technique.

## BOX 2

### Elements of Personnel and General Management for the Job of Condominium Manager

- Maintain 24-hour call service
- Hire employees
- Train employees
- Evaluate employees
- Establish job descriptions
- Develop fringe benefits package for employees
- Provide ongoing educational program for employees
- Monitor architectural control requirements
- Assign qualified property manager to supervise and administer the day-to-day on-site activities
- Coordinate volume purchasing
- Develop cost savings procedures

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### POSITION ANALYSIS QUESTIONNAIRE (PAQ)

The Position Analysis Questionnaire (PAQ) was developed by McCormick and associates (1972) on the assumption that there is an underlying taxonomy to all jobs. That is, in contrast to the other methods, the PAQ approach focuses on broad categories common to all jobs rather than on individual elements of specific jobs.

Given the thousands of tasks for one job that the other methods may identify, PAQ attempts to put this data into a more manageable form. PAQ reduces all jobs to 194 elements, which are classified in terms of six broader dimensions. These six dimensions are information input (35 elements), mental processes (14 elements), work output (49 elements), interpersonal activities (36 elements), work situation and job context (19 elements), and miscellaneous aspects (41 elements). Descriptions of these six divisions are presented in Box 3.

McCormick (1979) has suggested that the analysis of jobs through the PAQ approach is usually carried out by job analysts, methods analysts, personnel officers, or supervisors. Although job incumbents may use the PAQ form, this is usually restricted to managers and white-collar workers.

### Example of Position Analysis Questionnaire Approach

Robinson, Wahlstrom, and Mecham (1974) used the Position Analysis Questionnaire to evaluate 131 clerical, craft, and operative jobs to compare various methods of job evaluation and to determine salary fairness. Evaluation of these jobs was undertaken at the request of the workers' union, and since very limited funds were available for the project, the PAQ was chosen for the job analysis.

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## Outline of the Position Analysis Questionnaire

- (1) Information input. (Where and how does the worker get the information needed to perform the job?)  
*Examples:* Use of written materials  
Near-Visual differentiation.
- (2) Mental processes. (What reasoning, decision-making, planning, and information-processing activities are involved in performing the job?)  
*Examples:* Level of reasoning in problem solving  
Coding/decoding
- (3) Work output. (What physical activities does the worker perform and what tools or devices are used?)  
*Examples:* Use of keyboard devices  
Assembling/disassembling
- (4) Relationships with other persons. (What relationships with other people are required in performing the job?)  
*Examples:* Instructing  
Contacts with public, customers
- (5) Job context (in what physical or social contexts is the work performed?)  
*Examples:* High temperature  
Interpersonal conflict situations
- (6) Other job characteristics. (what activities, conditions, or characteristics other than those described above are relevant to the job?)

After receiving orientation about the jobs and the use of the PAQ, job analysts, supervisors, and some job incumbents rated the jobs. Overall, salaries were found to be fair and all methods of job evaluation had similar results. Interestingly, Robinson et al. found that the analyses done by the job incumbents were not as thorough as those done by the supervisors.

#### Evaluation of Position Analysis Questionnaire

There are several advantages inherent in the Position Analysis Questionnaire. First, PAQ is structured to allow for easy quantification. The format of the instrument facilitates both data collection and computer analysis and can yield results much faster than the other methods. Another advantage of quantitative basis of the instrument is that it has been shown to be extremely reliable. That is, results usually replicate on a second administration.

Another advantage is that the taxonomic approach of the PAQ makes comparison of jobs relatively easy. Along the same lines, the taxonomy allows the Position Analysis Questionnaire to be applied in a wide variety of situations without

modifications. Unlike the other methods discussed, not much time needed for this.

One of the major disadvantages of PAQ, however, is related to its taxonomic approach. In the previously cited study comparing several methods of job analysis, Levine and associates (1980) found that the PAQ system was the most disliked, probably because its language is not specific to particular jobs. Another criticism of the language used in PAQ is that its reading level is too difficult. Ash and Edgell (1975) have pointed out that the readability of the instrument is at college level, which may explain why the use of job incumbents as informants is limited in the PAQ approach.

### *PHYSICAL ABILITIES REQUIREMENTS APPROACH*

One limitation of all the methods discussed is that, with the exception of the PAQ, they are not very useful for determining the physical requirements for job performance.

Although these job analysis methods will identify those tasks that a worker is expected to accomplish, information about the physical requirements is usually inferred. For many jobs, qualities such as reaction time, manual dexterity, or trunk strength may be critical to successful job performance.

Lack of knowledge about physical requirements can lead to problems in many areas, but particularly in personnel selection and employee turnover. Employers who might assume that women are unable to accomplish tasks requiring physical strength and consequently avoid hiring them may be discriminating unfairly. Unless a thorough job analysis reveals specifically that most women do not have the physical abilities necessary for successful performance of the job in question (e.g., jackhammer operator), employers who hire only men may be violating laws governing fairness in personnel selection.

Uncertainty about physical requirements can also result in turnover or attrition that can be quite costly to the employer. When an employer or a job applicant is uncertain about the levels of strengths or flexibility necessary to perform a job, then the likelihood of the candidate not performing successfully is much greater.

Navy ordinance disposal divers, for example, face such physically demanding tasks that only 48 per cent of diver candidates even finish a training course (Quigley & Hogan, 1982). Additionally, poor match between applicant abilities and physical requirements is likely to lead to a higher accident rate.

Fleishman (1975) & Quaintance (1984) had developed a taxonomy of physical and cognitive abilities that is designed to describe the performance standards of any job. According to Fleishman, abilities are the foundation on which skills are built. Whereas operating heavy equipment is a skill, some of coordination, and rate control (Theologus, Romashko, & Fleishman, 1970). In

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contrast to the other methods, considering jobs from an abilities approach results in much greater generalisability of information across differently jobs.

Levels of physical ability are obviously important in many occupations in our society, but the analysis of jobs with regard to this area has not been widely explored in industrial and organizational psychology. As suggested, a lack of knowledge about physical requirements can lead to problems with selection or employee turnover.

**Example of Physical Abilities Requirements Approach**

In an important study of the validity of physical ability tests to predict job performance, Reilly, Zedeck, and Tenopyr (1979) considered the process by which telephone line technicians, splicers, and installers, were selected. Specifically, these researchers were interested in predicting the ability of applicants to perform tasks relating to pole climbing and ladder handling, two essential aspects of successful job performance.

Job analysis started with group interviews of outdoor craft supervisors in order to identify those tasks that demanded gross motor proficiency. From these interviews, a 24-item task list was developed. At the same time, the researcher also asked 58 job incumbents and supervisors to classify tasks in terms of sensory, perceptual, cognitive, psychomotor, and physical abilities scales contained in the Abilities Analysis Manual developed by Theologues, Romashko, and Fleishman.

**2.7 JOB DESCRIPTION AND JOB SPECIFICATION**

Job analysis is the examination of a job, its component parts and the circumstances in which it is performed. It leads to a job description which sets out the purpose, scope, duties and responsibilities of a job. From the job analysis and job description, a job specification may be derived, which is a statement of the skills, knowledge and other personal attributes required to carry out the job. Some of the uses are :

- (1) Recruitment and selection, where it is provided a basis for a specification of what the company is looking for.
- (2) Training, where by means of skills and task analysis it produces training specifications which set out training needs and are used to prepare training programmes.
- (3) Job evaluation, where by means of whole job or factor comparison, job descriptions can be compared and decisions made on the relative position of a job in the hierarchy.
- (4) Performance appraisal, where the job description resulting from job analysis is used to decide on the objectives and standards the job holder should reach against which his or her performance will be measured.

(5) Organization Planning, as part of the process of activity.

## **2.8 TECHNIQUES OF COLLECTING INFORMATION FOR JOB ANALYSIS**

Information about jobs can be collected by means of questionnaire and/or interviews.

### ***QUESTIONNAIRES***

Questionnaires, to be completed by job-holders and approved by job-holder's superiors, are useful when a large number of jobs are to be covered. They can also save interviewing time by recording purely factual information and by helping the analyst to structure his or her questions in advance to cover areas which need to be explored in greater depth.

Questionnaire should provide the following basic information :

- The job title of the job-holder.
- The title of the job-holder's superior.
- The job titles and numbers of staff reporting to the job-holder (best-recorded by means of an organization chart).
- A brief description (one or two sentences) of the overall role or purpose of the job.
- A list of the main tasks or duties that the job-holder has to carry out. As appropriate, these should specify the resources controlled, the equipment used, the contacts made and the frequency with which the tasks are carried out.

### ***INTERVIEW***

To obtain the full flavour of a job it is usually necessary to interview job-holders and to check the findings with their superiors. The aim of the interview is to obtain all the relevant facts about the job, covering the areas listed above in the section on questionnaires.

To achieve this aim job analysts should :

- (1) work to a logical sequence of questions which help the interviewee to order his or her thoughts about the job;
- (2) pin people down on what they actually do;
- (3) ensure that the job-holder is not allowed to get away with vague or inflated descriptions of his or her work; and
- (4) obtain a clear statement from the job-holder about his or her authority to make decisions and the amount of guidance received from his or her superior.

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## 2.9 TECHNIQUES OF WRITING JOB DESCRIPTIONS

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Job descriptions are based on the detailed job analysis and should be as brief and as factual as possible. The headings under which job descriptions are written are set out below.

#### **JOB TITLE**

The existing or proposed job title indicates as clearly as possible the function in which the job is carried out and the level of the job within that function.

#### **REPORTING TO**

The job title of the manager or superior to whom the job-holder is directly responsible is given under this heading.

#### **OVERALL RESPONSIBILITIES**

This part describes as concisely as possible the overall purpose of the job. The aim is to convey in no more than two or three sentences a broad picture of the job which will clearly distinguish it from other jobs and establish the role of job-holder.

#### **MAIN TASKS**

The steps taken to define the main tasks of the job are as follows :

- (1) Identify and list the tasks that have to be carried out. No attempt is made to describe in detail how they are carried out, but some indications is given of the purpose or objectives of each task.
- (2) Analyze the initial list of tasks and, so far as possible, simplify the list by grouping related tasks together so that no more than, say, seven or eight main activity areas remain.
- (3) Decide on the order in which tasks should be described. The alternatives include :
  - Frequency with which they are carried out (continually, hourly, daily, weekly, monthly, intermittently);
  - Chronological order;
  - Order of importance; and
  - The main process of management that are carried out, for example, setting objectives, planning, organizing, coordinating, operating, directing and motivating staff, and controlling.
- (4) Describe each main task separately in short numbered paragraphs. No more than one or at most two sentences are used for the description, but, if necessary, any separate tasks carried out within the task can be tabulated

(a, b, c, etc.) under the overall description of the activity. A typical sentence describing a task should :

- Start with an active verb to eliminate all unnecessary wording. Active verbs are used which express the actual responsibility to recommend, to do, ensure that someone else does something, or to collaborate with someone, e.g., prepares, completes, recommends, supervises, ensures that, liaises with;
- State what is done as succinctly as possible; and
- State why it is done: this indicates the purpose of the job gives a lead to setting targets or performance standards.

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### 2.10 JOB DESIGN

"We can say that the that assembly-line workers are fairly highly involved in the work, even though they have little autonomy." — Thomas M. Lodah

There are two basic ways in which work is organized. The first related to the flow of authority and is known as organization structure or merely organization. The second relates to flow of work itself from one operation to another and is known as procedure. Synonyms are method, system, and work flow. Alert managers usually recognize the behavioural aspects of organization structure because of the superior-subordinate relationship which it establishes, but more often than not they ignore or overlook the behavioural aspects of work flow. The reason that work flow and the lay out over which it flows are engineering factors, which are to be distinguished from human factors. In the usual case however, work flow has many behavioural aspects because it sent people interaction as they perform their work.

One management's most fundamental idea is systems and method improvement, by which it seeks to make optimum use of division of labor, and specialization and to achieve order and balance in the performance of work. However, as indicated in the quotation introducing this chapter, workers do not like to be "engineered" in methods improvement. They perceive that improvement is measure in technical terms and that the human dissatisfaction caused by the "improvement" are generally overlooked. The goal of methods improvement is greater productivity, but sometimes it brings human complications which reduce effectiveness and offset the technical advantages gained.

This part discusses different aspects of work methods. Emphasis is upon the flow of work among people, rather than the personal work methods of an isolated individual. Subjects discussed are flow of work and different work systems.

## 2.11 EFFECTS OF WORK FLOW ON PEOPLE

### NOTES

(a) **Initiation of Action.** One important aspect of work flow is that it determines who will "initiate" an activity and who will "receive" it. At each point in the flow of work one person gives material to the next person who will work on it. Along the way, staff experts give ideas and instruction. This process of sending work to another is an initiation of action on another person. When an initiation results from work flow, it is called a procedural initiation to distinguish it from an authority initiation, which comes from formal authority of a formal organization. The receiver of any initiation is psychological secondary, but the receiver of a procedural initiation is especially so because he may receive from a worker who is neither his supervisor nor an informal leader – from someone who "just shouldn't be pushing him around."

When procedural initiation comes from someone of distinctly less skill, someone much younger, or someone inferior by any measure of status, human problems can become serious. These problems tend to be compounded if any relationship involves pressure on the receiver, as in the following example from Whyte's study of restaurants.

Large restaurants sometimes use young boys as runners to communicate the needs of the serving pantry to the kitchen. This places the runner in the position of "telling" the cooks to prepare and send particular types of food. The result is that a young boy imitates action on high-status cooks. In essence, he is telling them what to do. Whyte found that this relationship was typically a trouble spot in the restaurants he studied.

Cooks resented the control exercised on them by young boys of inferior status.

Practical solutions included,

- (1) using a mechanical voice system which eliminated face-to-face contact, and
- (2) changing the initiator to someone of more status.

Further problems tend to arise when a procedural initiation affects "sensitive" areas such as how much work a man does (*e.g.*, time study) and his conclusion that procedural initiations which are from low-status to high-status person, place heavy pressures on the receiver, or affect sensitive parts of the receiver's work tend to be trouble spots. Management's responsibility is to discover these situations in its work processes and, if they cannot be avoided to plan them carefully.

Procedural, authority, and informal initiation of action come from person however, not all work imitations are identifiable as coming directly from some wherein people respond to cues implicit in the operation situation. For example, a

ceramic glaze has finished its baking cycle and the operator acts to remove it from the furnace, or the cellophane ribbon creases on cellophane machines and men act as a team to correct it.

In this instance, one cannot determine who initiates an event because it arises from the work itself. This kind of initiation not identifiable with persons is called a situational interactions. There is some evidence that persons get satisfaction from working in harmony with situational initiations and that teams have better moral when their teamwork primarily involves situational initiations instead of personal ones. The reasons appears to be what workers are less likely to resent and feel subordinate the impersonal requirements of the work itself.

**(b) Systems Design for better Teamwork.** Another important aspect of work procedure is that it should permit people to work together as a team whenever the work flow requires it. Teamwork can be engineered out of a work situation by means of layouts and job assignments which separate people so that it is impractical for them to work together, even though the work flow requirement teamwork. In one instance two operators, functionally interdependent, was unnecessarily on separate shifts, which prevented the operator fed parts to two spiral lines which were in competition, and each line regularly claimed that is favored the other. In another situation the operator of a continuous bottle forming machine was so far separated from the first inspection station on this line that he could never be sure whether his machine was producing satisfactory quality. The problem was met by continuously reporting inspection result from the inspector to an information panel in front of the operator. One of the best illustrations of teamwork engineered out of a job is Rice's study of textile mill in India. (Box 4).

#### **Box 4**

##### **(Illustration of Teamwork Engineered)**

The mill was intensively reengineered according to basic industrial engineering procedures. Each job had carefully assigned work loads based on engineering study. In one room there were 224 looms operated and maintained by twelve occupational groups. Each weaver tended twenty-four on thirty two looms, each battery filler served forty to fifty looms, and each smash had served and average of seventy-five looms. The other nice occupations were service and maintained, and each worker had either 112 or 224 looms.

Although the mill appeared to be superbly engineered, it failed to reach satisfactory output. Research disclosed that close teamwork of all twelve occupations was required to maintain production, yet work organization prevented this teamwork. Each battery filler served all looms of one weaver and part of the looms of a second weaver, which meant a weaver and battery filler were not a team unit even though the nature of the

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process required it. In effect, a weaver tending twenty-four looms and using a battery filler serving forty looms, worked with three-fifth of a battery filler, while another weaver shared two-fifths of him. The situation was even more confused with smash hands who tended seventy-five looms.

Eventually work was reorganized so that a certain group of workers had responsibility for definite number of machines. Workers then were able to set up interaction and teamwork which causes production to soar.

Work flow can also be setup in such a way that the job puts unreasonable pressure on a person. In a series of similar offices the secretary of each was required to prepare technical correspondence for five to seven managers, answer the telephone, greet visitors, and serve as group leader of a few clerks. The result was high turnover and more than a normal amount of nervous disorders among the secretaries. Another example is that of a hotel food checker who inspected food brought by waitresses on the telephone. Under conditions of this type it is useless to try to solve the problem by training the participants to understand each other better, to communicate better, or to apply good human relations. The first requirement is to reorganize the work flow then human relations training may not even be needed!

It is well known that plant layout and work flow have much to do with the opportunity which people have to talk to one another during work. In an insurance office, for example, the layout of desks was such that persons who needed to coordinate their work were unnecessarily separated by a broad aisle. Employee met the problem by loudly calling across the aisle, but this eventually had to be stopped because of the disturbance. The end result was poor communication. In another company sewing machines were located so that talking was discouraged but management soon discovered that another layout which permitted talking led to higher productivity because it relived the monotony of routine work.

Managers often overlook the fact that layout can also affect off-duty interaction of employees. Some years ago I visited a new factory which was a model of engineering efficiency. Although the lunchroom was spotless and efficiently designed, I ate an uneasily meal. I normally have an affinity for the factory environment, but his time it was too much — the cafeteria was located in the basement directly beneath stamping and light forging presses! Vibration was so terrific it stopped conversation. The floor and ceiling shook; the dishes settled; there was no sound-deadening tile on the ceiling. The space beneath the presses

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apparently was not needed for another function; so the cafeteria got it, but employee communication and relaxation were thereby excluded at mealtime. Lunch hours in the plant were staggered into four periods, which meant that the presses operated during the time most employees ate. When I asked my host, "Why?" his answer "The cafeteria is for eating only, and anyway, the noise shouldn't bother anyone."

The evidence is clear that work systems and layout have a substantial effect on human behaviour. They do this by :

- (1) Determining who initiates procedural action on whom, and some of the conditions in which the initiations occurs.
- (2) Influencing the degree to which employees performing interdependent functions can work together as a team.
- (3) Affecting the communication patterns of employees.

The general conclusion for management is that relationships among workers in a system can be just as important as relationships of the work in that system. In the design of any system it is folly to spend all time planning work relationships but ignoring worker relationships.

**(c) Control of Red Tape.** One aspect of procedure which is universally known as respected for its effect on people is red tape. It is the unnecessary procedure which delays and harasses people everywhere. The term originated from real red tape used to tie official government documents, many of which having long been challenged as unnecessary by those who prepare them. No doubt some of the work in government and in business as well is true red tape, but some is in reality "fictions red tape." It exists when those who perform the procedure do not know why they are doing it. They, consequently, think it is red tape, but from a broader viewpoint the work is both necessary and worthwhile. The remedy for fictitious red tape is improved communication and development of a broader perspective among those who perform the work.

Genuine red tape arises primarily because (1) managers are afraid to delegate and consequently set up all sorts of unnecessary approvals and checks, and (2) procedures, even though once useful, tend to persist long after their usefulness has passed. The first reason can be eliminated through good leadership and second reason deserves further attention at this point.

One cause of the "stickiness" of red tape is normal resistance to change. A procedure tends to become a habit, and people resist changing it. Since it is, in a sense, set up to eliminate thinking by giving its followers a routine to use without having to decide each step, they seldom think about changing it. They get "stuck in a rut." Another cause of useless procedure is that it is often determined by a higher authority who does not understand work problems, but his personnel hesitate to challenge the procedure because they did not participate in establishing

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it. In other cases, people do not know why they are performing a procedure; consequently they cannot know whether it is useless or not, and they do not dare to expose their "ignorance" by questioning a procedure with their boss may be able to prove essential beyond a shadow of a doubt. People do not like to get caught not knowing something about their work.

Another reason for useless procedures is that most of them cross lines of authority, jumping from one chain of command else worry about. "they know about this procedure, too - and it originates with them - so let them change it." An additional reason why procedures tend to outlive their usefulness is that the persons who created them are often supervisors all out of proportion to their real significance. Very often he focuses extremes attention on one or two of them. They become an obsession with him and this condition is known as obsessive thinking.

Where conditions permit obsessive thinking and the conditions cannot be changed, employee effectiveness is increased through the use of activities which occupy the mind and crowd out obsessive thinking. The more a worker's mind is kept busy, the less should be his obsessive thinking. This is one reason management provides music in routine and monotonous situations. For this same reason management permits -even encourages - talking across the aisle or workbench. Contests and recreational programs are other activities which occupy the mind, drive out obsessive thinking, and provide additional group solidarity.

In order to escape some of the human effects of poorly designed systems more companies are insisting that their systems experts and industrial engineers have human relations training. Where the stakes are high, even more stringent requirements may be set. One company which employed many persons with advanced degrees in its offices and in small lot of production established the policy of having all job design and systems work performed by a team of two men. On each team one person was an industrial engineer concerned with technical requirements, and the other was a human relations specialist dealing with human aspects of the work.

## 2.12 DIFFERENT WORK SYSTEMS

The way in which work is organized leads to different work systems. The following systems will be discussed because of their significant influence on employee behaviour: produced and functional work systems, labor pools, and assembly lines.

From the social point of view, we need to design systems which are as appropriate for people as possible, considering economic and other factors the situation. Regardless of what kind of system is developed, workers and their supervisors will try to adjust to it. In nearly all cases they will adjust reasonable

well, because people have a remarkable sense of adaptability. Following is an example of employee adaptability.

An air-conditioning manufacturer required his three final assembly departments to complete a specific daily quota of air conditioners. Supervisors soon learned that the ordinary uncertainties of production caused them to produce over their quota on some days and under their quota on other days. However, management was quite insistent that they must meet the quota every day that shipping schedules could be met. In response to this system established by management, each of the supervisors began his own, "system." Each started keeping a store of ten to fifty "almost-finished" air conditioners under tarpaulin in his department. When he saw that he was running short for the day, he took from this store a nearly finished air conditioner and ran it through final assembly steps in order to meet his standard of 7—air conditioners for each eight hours day. Then, when he produced over the standard on another day, he worked some of his production back into the store.

If a supervisor had a series of bad days, the other supervisors lent to him from their stores, if necessary, or they lent him a man from their group to help him catch up. In this way, management's needs for a standard output were met and supervisors' needs for acceptance by management were met.

(a) *Product and Functional Work Systems.* Two somewhat opposing work systems are product and functional organization of work. Manufacturing affords an interesting example. The product system is organized around a complete product to be made. The functional system is organized on the basis of specialized work activities rather than products. The two types of work systems in a pharmaceutical firm are as follows. (Box 5).

### Box 5

#### Work Systems in a Pharmaceutical Firm

The manufacture of pills and tablets is handled differently in one than in the other. In the product system all work on tablets is done in one department under one supervisor. He controls the mixing according to formula, pressing of the tablets, coating-machine operations, and packaging. He controls a varied set of activities which follow the product from beginning to completion. In the functional system tablets are mixed according to formula in the first department; then they are transported to another department for pressing, to another for coating, and finally to the packaging department.

The two types of work systems create different employee environments. In the product system the persons who work together are a conglomerate mix of skills. They lack a mutual occupational interest because their associates performing

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similar work are located throughout the plant. There are persons mixing formulas in all three departments – tablets, liquid and vaccines. Though product employees lack a mutual occupational interest, they do see a whole product made in their work area, so their role in the work process becomes more meaningful to them. Promotion in the product system usually is gained by learning a different occupation, such as moving from tablet packager to tablet presser to tablet coater; therefore the route of promotion is less certain and requires more versatility of skill. As a result, the workers become broader in experience and outlook.

The foreman in the product system cannot master all the skills in his department, so he is unable to comment respect of the workers through superior's ability in their specialty. He maintains leadership by means of skilled management and human motivation. He tends to be a broader, more versatile supervisor than the supervisor of a functional system. His supervision tends to be less punitive and directive, because natural team work develops as each man sees that his contribution is needed to make this whole product.

Look now at the functional work system. In the mixing department of the pharmaceutical firm the foreman probably is the senior man or is the mixed with greatest skill or knowledge of formulas. Emphasis is on technical skill rather than human skills. Workers in a functional system no longer are direct involved in the whole product and tend to feel less responsible for it. Since their work goes to one department and then another, potential conflict is increased. Bickering develops over whether work is done on time and with proper quality, because a breakdown in one department slows the work of all other departments. Disputes arise concerning who caused a mistake and at what point a department assumed control of a particular batch of work in process.

In the functional system, top management needs to devote extra attention to maintaining interdepartmental cooperation and developing broad, human-oriented supervisors. Both tend to be lacking.

(b) **Labour Pools.** Labour pools are also a special way of organizing work. Depending upon their objectives and manner of organization, different relationships develop. An example of this is discussed below (Box 6).

### Box 6

#### Labour Pool in Oil Refineries

Oil refineries are required to operate twenty-four hours a day because of the nature of the production process. One refinery established a central labour pool of skilled, versatile men to be sent to other departments to replace persons absent. Before the pool was established, engineers and cost experts carefully proved that the idea was workable and would reduce costs by reducing overtime and/or regular standby men in each

department. However, after a year of Herculean effort by management the pool had to be abandoned, for two reasons. First, management could not keep men in the pool. It lowered their status to be in the pool, and they objected to working for different foremen on different jobs. They disliked being without a specific work station which they could count as theirs. Some men chose to quit the company when transferred to the pool.

Second, the pool increased labour costs instead of decreasing them. Since pool men, lacked interest and motivation, foremen avoided them and started doubling shifts (working one of their own men sixteen hours) instead of using pool men.

This left pool men idle, further hurting their morale and increasing pool costs. It also increased department costs by requiring overtime.

If management had introduced the pool properly, perhaps it could have worked; but it failed because management was unaware of how the work system was affecting human relations.

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(c) *Assembly Lines.* Assembly lines are a type of product work system, because work is organized and simplified in terms of the product manufactured. An assembly line is based on the following concepts: (1) standardization (2) interchangeability of parts, (3) breakdown of jobs into simple motions, (4) an orderly progression of the product through a series of operations, and (5) mechanical movement of the product to and from workers.

## 2.13 PSYCHOLOGICAL TESTING

There are a variety of selection tests. They range from unstructured interviews to structured personality tests. The main goal of these tests is to predict job performance. Each test has its own relative strengths and weaknesses in this regard.

A very commonly employed selection test is a job interview. Job interviews can be structured or unstructured. In an unstructured interview, the interviewer engages in dialogue with the interviewee that does not follow a predetermined format, questions may vary from applicant to applicant, and there is usually no standardized scoring method. Consequently, validating this technique as a job performance predictor is quite difficult (One applicant may have the opportunity to respond favorably to a question that was not asked of another or vice versa). In contrast, a structured interview all applicants are judged on responses to the same questions asked in the same format. Structured interviews provide for more reliable and consistent scoring results.

Another tool used for selection is personality testing. Many personality tests now employ the five factor model of personality (FFM). These factors are

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conscientiousness, extraversion, neuroticism, agreeableness, and openness. A short description of each factor is listed below :

- **Neuroticism:** a tendency to easily experience unpleasant emotions.
- **Extraversion:** a tendency to seek stimulation and the company of others.
- **Agreeableness:** a tendency to be compassionate rather than antagonistic about others.
- **Conscientiousness:** a tendency to show self-discipline, act dutiful, and aim for achievement and competence.
- **Openness to experience:** a tendency to enjoy new intellectual experiences and ideas.

Of all the factors, conscientiousness has been found to positively correlate most with job performance ratings. This factor is highly related to self-discipline, attention to detail, and organization.

Mental ability tests measure intelligence and are the best predictor of job performance in all jobs and all organizations. Crystallized Intelligence relates to the ability of a person to use prior knowledge through learned processes to solve problems. Fluid Intelligence relates to a person's ability to solve a new problem utilizing novel or unlearned strategies. Employers employ both types of intelligence testing for varying job demands:

Much like IQ, EQ or emotional intelligence is used to predict job performance. This information is gained through emotional intelligence testing. Emotional intelligence is the ability to recognize and control the emotions of oneself and others. This is a relatively new area being studied for predicting job satisfaction.

The next testing technique is the biodata technique. Biodata uses personal background information to predict job performance. The type of information is job history, family history, gender, and things of that sort. These factors are then derived empirically instead of theoretically like other selection tests.

An area of selection testing that relates to motor skills are psychomotor ability tests. These tests measure fine motor skills and hand-eye coordination. These skills are important in jobs like carpentry where the worker needs to have control over a hammer to hit a small nail. Unlike psychomotor ability tests, physical ability tests measure gross motor skills, such as lifting and running. These skills are important in jobs like construction where strength is an important aspect.

Another selection test technique is taking a work sample of an applicant. During a work sample, an applicant completes a realistic job task. These tasks are highly realistic and are supposed to simulate the actual job one is applying for. One example of a work sample is a drivers test. During a drivers test simulates

realistic driving. The goal is to assess how well an applicant can perform the tasks, or how well an applicant can learn the task.

Tasks are also performed when an employee or applicant visits an assessment centers. These centers are used to assess applicants potential for high-level jobs. The testing takes multiple days and is costly to the organization providing the assessment and that is why it is seldom used for jobs other than those of high-level. The assessment consists of a battery of psychological tests. One example of a psychological test given is the leaderless group exercise, where a group is given a task to complete without a leader this task is testing if any of the applicants will take the role of leader, thus showing leadership skills. Another exercise completed at an assessment center is a role-playing exercise. In these exercises applicants are asked to take a role in a job-related situation in order to study how well the applicants handle the situation. Another example of a psychological test is the in-basket exercise. In this exercise, applicants have a number of jobs in a "basket" that need to be completed in an allotted time. Each job has requirements in order to complete and they take a certain set amount of time to complete. This tests the organizational ability of applicants, how well applicants work together, leadership, among other things.

Like the role playing task in assessment centers, another selection test is the situational judgment test. This test is a paper and pencil test where a participant is presented with a hypothetical situation and asked to write what they would do in that situation.

Unlike hypothetical situations, often, jobs require knowledge of the job. The job knowledge test is used for that purpose. These tests measure how much knowledge a person has in the field they want to work in. An example of this is the State Medical Board test that needs to be taken before a person can practice medicine in a state. Another example are certification tests, such as the A+ Certification test for people who wish to show they have basic hardware and software computer knowledge.

Often times, people need help making decisions about their career. Occupational counselors use vocational interest tests in order to help guide career decisions. These tests measure different occupational interests:

The last type of selection test are tests of mental illness. These tests measure if a person has a mental illness. However, due to the American's with Disabilities Act (ADA) they are illegal to give to job applicants. This is because it mental illness is considered a disability, and even if a person has one, it does not mean they cannot perform the job. If they can perform the job, then, in spite of their disability, the ADA protects them. Although, in some jobs mental illness can not be tolerated. This is because these jobs have interest in public welfare. One example of a job which where public welfare is at risk is a job as a police officer.

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**VALIDATING EMPLOYEE SELECTION TESTS****NOTES**

In order to use a selection test with confidence it must be validated. This validation process is important because it builds validity and reliability for using the test for a specific job. For example, if a fast food restaurant called Gopher Burger creates a selection test for employees by putting together a series of questions like "What is your favorite color?" it would have no basis for job performance theoretically nor empirically.

In order to establish validity in the select tests first, a job analysis must be conducted. A job analysis is a study that is used to determine the important tasks and skills needed for a specific job. In our example about Gopher Burger, the test creators would start brain storming about what skills a cook needs in the restaurant, such as manual dexterity for flipping the burgers, keen memory for remembering what goes on the burgers, and speed to make the food quickly.

The next step is to create a rudimentary test from the job analysis. This tests should then be administered to the employees or applicants. Then, predictive and concurrent validation would be calculated. The measures for the validation studies would be gotten from ratings (subjective measures) or objective measures. In Gopher Burger, an example of an objective measure would be the number of burgers the applicant can make it an hour; whereas, ratings can be gained from a supervisors observation of the applicant.

After the validation studies are complete, the test should be revised until validity and reliability are statistically significant in order to accurately predict job performance from the test.

**2.14 THE CURRENT PICTURE**

Organization seeking to maximize the value of competency – based management must apply it to several human resources functions, most particularly to learning and development, resourcing and performance management. Some organization have also applied it to compensation as well. Organization applying a common model use competencies as the common denominator in selection, developmental and performance management processes.

The majority of organization defines competencies in terms of knowledge, skills, abilities, and personal attributes or characteristics, some including values as part of their competency models. Common to most models is the use of observable and measurable behavioural descriptors to describe performance requirement for competencies and the use of scales to differentiate proficiency levels. The grouping of competencies by job families or generic job roles is also commonly applied. Frequently used approaches to competency identification include the use of focus groups of managers and employees as well as individual interviews with "average" and "superior " job performers. Behaviour – based interviews are sometimes used to from those high – performance behaviours

that differentiate successful job performances from other employees. Some competency models emphasize the "average" vs. "superior" performance distinction while others focus on identifying the competencies that result in "successful" performance on the job.

Among the products that result from competency projects include self assessment and 360 degree questionnaires, learning plans and learning resource information ("learning maps"), behaviour-based interview questions and other assessment tools.

Competency models vary in terms of the types of competency information they collect and reflect on "Competency Profiles", the documents that describe the particular set of competencies necessary to carry out the work. Some models focus on technical job – specific knowledge and skills while others emphasize very generic abilities and personal qualities. More recent models attempt to reflect all the types of competencies, including knowledge, skills, abilities and personal attributes, related to job success.

### ***THE SINGLE-JOB COMPETENCY MODEL***

Earlier competency models focused on single, critical jobs in an organization, which is still common. While such models have value – they provide a framework for describing key job requirements – they are costly to develop and once implemented, do not allow for comparisons of the requirements of the job profiled with other jobs in the organization. In addition, they cannot readily be tied in any consistent manner to existing HR processes that have been re-designed to accommodate a competency approach, resulting in fragmented HR practices.

For a broad range of jobs, for example, all managerial jobs or front-line jobs. Using similar techniques as for other competency efforts, a common set of competencies are developed which can then be used as the basis of HR processes. While cost-effective and permitting a consistent framework for a large number of employees, this approach does not clearly describe what is needed in any specific job. This is because seeking commonalities among different jobs requires that knowledge and skills to be down played and generic abilities and personal qualities be emphasized. As such, the competencies have more affinity with organization value than specific job skills or abilities.

The problem with the one-size-fits-all approach is expressed in the following quote: "Without the skills component in the model, users say it is often difficult to see the linkage of the model to Business result and the model doesn't fully answer the question, "What do have to know and to do to be considered for that job?" Additionally, because the model does not differentiate among the requirements of different jobs, it has limited use in guiding selection, training and other HR processes for specific jobs and for matching individuals to job assignments. This approach also shares a problem common to that noted for the

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single-job approach. That is, the competencies identified for the particular group of jobs profiled cannot be compared to other jobs in the organization that were not profiled.

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### THE MULTIPLE JOB APPROACH

What is being seen more frequently as an alternative to the above, is described as the "Multiple-Job Approach." This approach uses a common set of "building block" competencies, including technical competencies, which can be used to build profiles for any job. The approach allows for a common conceptual framework for an entire organization while permitting customization for individual jobs.

One of the greatest advantages of using a common language is that by entering competency information into a database, an organization can begin to capture information about skills gaps, identify training and development needs, collect qualitative employee data for human resource planning and match individuals to jobs.

This approach is more complex to implement because it covers many different types of jobs and therefore requires buy-in and effort from many key players. The framework and administrative processes required to implement it is also more complex. However, the multiple-job approach is more cost effective than the single-job approach if many competency models must be developed.

### 2.15 SUMMARY

- A comprehensive and current job analysis identifies the occupational information and, in turn, provides the foundation for numerous human resource programs, including selection as well as training program design. The most critical pieces of information collected from a job analytic effort include the: (a) tasks required on the job, (b) knowledge, skills, abilities, and other characteristics (KSAOs) required to perform those tasks, and (c) task/KSAO.
- As the popularity of scientific management declined after World War II, however, so did the popularity of job analysis. With the new emphasis on human relations as the key to productivity job analysis was used primarily to set salary scales.
- Occupational elements method of job analysis was developed by Ernest Primoff at the Federal Office of Personnel Management and uses as its focus the elements that a worker uses in performing a specific job. Job elements include knowledge, skills, and abilities (KSAs); as well as willingness, interest, and personal characteristics (Primoff, 1975).
- There are a variety of selection tests. They range from unstructured interviews to structured personality tests. The main goal of these tests is to

predict job performance. Each test has its own relative strengths and weaknesses in this regard.

## **2.16 REVIEW QUESTIONS**

1. What is the relevance of job analysis in the modern times?
2. Discuss the methods used job analysis.
3. Discuss the salient features of job analysis.
4. How relevant is the understanding of job design for developing organizational effectiveness?

## **2.17 FURTHER READINGS**

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## UNIT – III

NOTES

# HUMAN PERFORMANCE (ENGINEERING PSYCHOLOGY)

### STRUCTURE

- 3.1 Learning Objectives
- 3.2 Introduction
- 3.3 Concept of Engineering Psychology
- 3.4 The Need for a Psychology of Engineering
- 3.5 Demand-Resource Theory in Engineering Psychology
- 3.6 Perspectives on Engineering Psychology
- 3.7 The Scope and Future of Engineering Psychology
- 3.8 Summary
- 3.9 Review, Questions
- 3.10 Further Readings

### 3.1 LEARNING OBJECTIVES

After going through this unit, students will be able to:

- state the meaning and importance of marketing research;
- explain the trends of marketing research;
- know the functions of marketing research.

### 3.2 INTRODUCTION

Engineering Psychology is not the equivalent of Ergonomics. The fields overlap, but are not synonymous.

*Engineering Psychology* is a discipline that aims to improve socio-technical systems: driving cars, working on surgical teams, controlling nuclear power plants, improving consumer products, controlling air traffic. It does this by considering how human operators interact with technologies, with environments, and with other operators in particular contexts. Engineering psychology contributes to the understanding of human capabilities and limitations and directly or indirectly impacts the design of technologies that operators use. Cognates of Engineering psychology include human factors (see Human Factors Research, this volume),

ergonomics, applied experimental psychology, and cognitive engineering. All have the common goal of improving socio-technical systems, but each does so with a different approach, for example, focusing on the cognitive versus the physical factors that affect the operator. However, differences among disciplines are often subtle, and professionals in separate disciplines often conduct very similar work. In addition to the goal of improving the particular system, inducing general principles from the study of particular systems characterizes the scientific nature of what many engineering psychologists do.

Understanding any scientific paradigm beyond a cursory, dictionary definition is aided by consideration of six aspects of the paradigm: its intellectual antecedents, pretheoretical ideas, analogies, concepts and language, methodology, and subject matter, (Lachman, Lachman, & Butterfield, 1979).

### **INTELLECTUAL ANTECEDENTS**

Scholars differ in how far back the origins of engineering psychology should be traced, but there are, at least in hindsight, recognizable features in the field of scientific management of Frederick Winslow Taylor in the late 19th and early 20th century, although the focus on benefitting the human probably first emerged in the work of Lillian and Frank Gilbreth who were pioneers in industrial/organization (I/O) psychology and industrial engineering. To some extent World War I but certainly World War II led to rapid advances in engineering psychology (Moroney, 1995). The first textbook appeared shortly thereafter (Chapanis, Garner, & Morgan, 1949). Like other paradigms within scientific psychology, engineering psychology can lay claim to intellectual antecedents of behaviorism, functionalism, and gestalt psychology from which the canons of natural science and a focus on perception were inherited. I/O psychology and cognitive psychology helped shape the field's current focus on the social and mental factors critical in performing modern work (Hoffman & Deffenbacher, 1992). There are also intellectual antecedents from outside of psychology proper that influenced modern engineering psychology: Communication engineering lent much to our appreciation of limitations in human processing as well as important methodological tools, and systems engineering spawned the appreciation for the system in which the human-technical system is embedded.

### **PRETHEORETICAL IDEAS**

Like all disciplines, engineering psychology begins with a set of beliefs. Its ideology emerged from its history and the events it addressed, such as the world wars in which it proved its mettle. It also comes from the engineering psychologists who transitioned from other areas of psychology, such as cognitive and perceptual branches of experimental psychology. The lynchpin of this ideology is that the human operator is a part of a larger system and that the operator, like any other part of the system, has limitations and capabilities that must be considered.

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Human behavior is goal directed, variable, and takes place under specific (sometimes stressful) conditions within a particular system. Humans are active information processors well suited to perform some tasks in the system and ill suited to perform others. Failures in the system are multi-causal and the human can contribute to those failures, but engineering psychologists do not believe that focusing exclusively on "human error" and ignoring the system is productive. Engineering psychologists believe that things can be made better by improving components of the system. There is a preference to try to bring the technology in line with the human, although it is also possible through selection or training procedures to help bring the human in line with the technology. Engineering psychologists believe the way to understand the human and the human-technical system is to use the scientific method. They use a variety of empirical methods, including laboratory work, simulations, and field observation with the goal of producing theories, models, and principles that go beyond the particular system which gave rise to them.

### ANALOGY

Much of the ideology and the inheritance from intellectual antecedents is captured in the engineering psychologist's analogy of the human. The human is a biological information-processing control structure of the socio-technical system. She or he is an information sensor, filter, and interpreter; an active judge and decision maker; and ultimately an information transmitter.

### CONCEPTS & LANGUAGE

Although scientists in different disciplines refer to the same phenomena, the concepts and language they use to describe those phenomena often differ. These differences help distinguish one scientific paradigm from another and thus help us gain a better understanding of the paradigm. For example, the use of the term *operator* when referring to subjects or participants in a study reflects the notion that the subject is in control of a larger system and that he or she has particular goals that are to be maintained or reached. Similarly, calling a display an *automated aid* reflects the collaborative nature of humans and automation in operating the system.

Applied Experimental and Engineering Psychology is the application of psychological principles, knowledge, and research to improve the ability of humans to operate more effectively in a technological society.

## 3.3 CONCEPT OF ENGINEERING PSYCHOLOGY

Whilst Engineering is concerned with improving equipment from the point of view of mechanical and electrical design and Psychology is concerned with the study of the mind and behaviour, Engineering Psychology is concerned with adapting the equipment and environment to people, based upon their

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psychological capacities and limitations (Blum, 1952) with the objective of improving overall system performance (involving human and machine elements). As Sanders & McCormick (1987) put it, "... it is easier to bend metal than twist arms", by which they mean that the design of the device to prevent errors is likely to be more successful than telling people not to make errors. According to Wickens (1992) the role of Engineering Psychology is distinct from both Psychology and Engineering in that it arises from the intersection of the two domains. He also distinguishes Engineering Psychology from Ergonomics (see note 1) to suggest that "the aim of engineering psychology is not simply to compare two possible designs for a piece of equipment ... but to specify the capacities and limitations of the human ... from which the choice for a better design should be directly deductible" (pp. 3-4, Wickens, 1992 cites Poulton, 1966).

Ergonomics is distinct from Engineering Psychology in that it is multidisciplinary (incorporating Psychology, Engineering, Physiology, Environmental and Computer Science), but the boundaries are fuzzy and Ergonomics shares the overall goals of Engineering Psychology. The objectives of Ergonomics (cf. Human Factors) are shared by Engineering Psychology, which are to optimise the effectiveness and efficiency with which human activities are conducted as well as to improve the general quality of life through "increased safety, reduced fatigue and stress, increased comfort [and] ... satisfaction." (Sanders & McCormick, 1992, p. 4).

It is difficult to delineate the genesis of both Engineering Psychology and Ergonomics, but both can be traced back to a general interest in problems at munitions factories during the First World War (Osborne, 1982). Machines that were designed to be operated by men seemed to have production-related problems when operated by women. These difficulties were resolved when it was realised that the problems were related to equipment design rather than the people operating them, i.e. they were designed to be operated by men and not women. The mis-reading of altimeters by pilots in the Second World War stimulated further interest in Engineering Psychology.

A study by Grether (1949) illustrated that the traditional three needle altimeter (where the three pointers read 10,000s, 1,000s and 100s of feet respectively) not only took pilots over 7 seconds to interpret but nearly 12 percent of the readings contained errors of a 1000 feet or more. Grether showed conclusively that superior designs could dramatically reduce both reading time and error rates. This study, perhaps more than any other, indicates the importance of Psychology in the design of devices. Despite this evidence, it is sometimes difficult to gain acceptance from the Engineering community, and to change design, as the following quote from an accident report in 1958 (some 9 years after Grether's original study) shows:

"The subsequent investigation ... showed that the captain had misread his altitude by 10,000 feet and had perpetuated his misreading error until the aircraft struck the ground and crashed." Rolfe (1969) p.16

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### 3.4 THE NEED FOR A PSYCHOLOGY OF ENGINEERING

We are all familiar with the frustrations that accompany one's use of technology in the home and at work. Norman (1988) provides an abundance of examples on this subject. The Information Technology revolution has led to computers pervading almost every aspect of our lives from programming Video Cassette Recorders (VCRs) and Microwave Ovens, to withdrawing cash from Automatic Teller Machines, to purchasing rail tickets, to performing most aspects of our work. Yet why do these devices, which are supposed to make our lives easier, seem to thwart our best intentions? One reason is that users of these devices perceive the problem to be with themselves rather than with the technology. People often blame themselves when failing to comprehend the manufacturer's instructions or when errors occur (Reason, 1990). Also, the problems are usually of a small, relatively trivial and individual nature, and do not affect other people. These problems are often only minor hassles compared to major events, such as incidents in the aviation and nuclear industries. On the face of it there is little comparison between errors with VCRs and errors on the flightdeck of an aircraft. However, Reason (1990) argues that at the basic level of interfacing human thought processes with technology there are many similarities. Despite the obvious differences in training, level of skill and knowledge in operating VCRs and aircraft, basic error types such as 'mode error' (*i.e.* errors that occur when devices have different modes of operation and the action appropriate for one mode has different consequences in other modes: Norman, 1986) have been found to occur in both environments.

There has been some concern in recent years about safety (Stanton, 1996). The incidents at Three Mile Island (in the USA) and Chernobyl (in the former USSR) are often cited in the press and technical literature. A recent near-incident at a nuclear utility in the UK has seemingly reinforced this concern. Whilst these nuclear power plants employ different technologies there is one common factor to these, and other, incidents: namely human beings. Reason (1990) reports that 92% of all significant events in nuclear utilities between 1983-1984 were caused by people and of these only 8% were initiated by the control room operator.

Thus, the scope of Engineering Psychology needs to consider all aspects of the human-technology system. Consideration of the human element of the system has been taken very seriously since the publication of the President's commissions report on Three Mile Island (Kemeny, 1979) which brought serious problems to the forefront. The summary of the main findings of the report highlights a series of "human, institutional and mechanical failures." It was concluded that the basic

problems were people-related, *i.e.* the human aspects of the systems that design, build, operate and regulate nuclear power. Some reports have suggested 'operator error' as the prime cause of the event. However, the failings at Three Mile Island included:

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deficient training which left operators unprepared to handle serious accidents; inadequate and confusing operating procedures that could have led the operators to incorrect actions; design deficiencies in the control room, for example in the way that information was presented and controls were laid out; serious managerial problems within the Nuclear Regulatory Commission.

None of the deficiencies explain the root cause of the incident in terms of 'operator error', which is an all too familiar explanation in incidents involving human-technology systems. Reason (1987), in an analysis of the Chernobyl incident, suggested two main factors of concern. The first factor relates to the cognitive difficulties of managing complex systems: people have difficulties in understanding the full effects of their actions on the whole of the system. The second factor relates to a syndrome called 'groupthink': small, cohesive and elite groups can become unswerving in their pursuit of an unsuitable course of action. Reason cautions against the rhetoric of "it couldn't happen here" because, as he argues, one of the basic system elements (*i.e.* people) is common to all nuclear power systems.

### 3.5 DEMAND-RESOURCE THEORY IN ENGINEERING PSYCHOLOGY

Solutions to the problems raised in people interacting with technology come in two main forms; either to reduce demand or to increase resources in situations of work overload or vice versa in situations of work underload. The dual concepts of demands and resources are prevalent in Engineering Psychology and particularly pertinent when considering the capacities and limitations of people in technological 'environments. Wickens (1992) proposes a theory of multiple pools of attentional resources in relation to different information processing demands - speech and text utilise a verbal information processing code and draw upon a different pool of attentional resources to tones and pictures which utilise a spatial processing code. Wickens argues that when the attentional resources assigned to the verbal processing code are exhausted, workload demands may be increased further by using the alternative spatial information processing code through the presentation of tones or pictures (although these pools are not wholly mutually exclusive).

The concept of demands and resources provides a conceptual framework for Engineering Psychology. Demands and resources could come from the task, the device and the user. For example, user resources (*e.g.* knowledge, experience,

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and expertise) and demands (e.g., user goals and standards) interact with task demands (e.g., task goals and standards) and task resources (e.g., instruction manuals and training). This interaction is mediated by demands (e.g., device complexity) and resources (e.g., clarity of the user-interface, which could reduce demands) of the device being operated.

This is a familiar concept in discussions of task workload, and it is implied that demand resource imbalance can occur as both task underload and task overload, both of which are detrimental to task performance. An illustration of the relationship between demands and resources is provided by the Tale of Procrustes (Osborne, 1982). In Greek mythology, Procrustes was an ingenious robber who conned travellers into parting with their gold. His trick was very simple. He offered weary travellers all the food and wine they wanted and they could either pay for what they had consumed or accept his hospitality without payment and take a bed for the night. Most travellers opted for latter, at which point Procrustes added one more clause: that the traveller had to fit one of his two spare beds exactly. Most accepted without question and ate and drank their fill. When it came time for them to bed down for the night Procrustes showed them the two beds, one was very long and the other very short. At this point Procrustes threatened to make them fit the bed by either cutting off their legs to fit the short bed or stretching them to fit the long bed. Most traveller opted to pay the exorbitant bill instead! Osborne (1982) suggests that the Procrustean approach often appears to be taken by designers, who design tasks that either stretch people beyond their physical and/or mental capacities or tasks that are physically and/or mentally constrictive. Both ends of the spectrum result in a dissatisfactory outcome for the individual, as well as poor performance of the system. So we end up paying for poor design in terms of discomfort, errors, dissatisfaction and poor performance. Some times the price can be counted in terms of human life.

### **3.6 PERSPECTIVES ON ENGINEERING PSYCHOLOGY**

Three different perspectives on Engineering Psychology are offered, Engineering Psychology as:

- Ergonomics
- Human Computer Interaction
- Cognitive Engineering

Shackel (1996) starts by distinguishing Psychology from Ergonomics, to propose that Ergonomics is about fitting the device to the individual. He argues that industrialisation has exacerbated many of the problems associated with device use. First there is the problem of operating industrialised systems: Second there is the problem of tailoring mass produced devices to individual needs. Tailoring every device to everyone's needs may seem like an impossible goal, but if we

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know what the range of needs are we may be able to design flexibility into devices so that they meet most people's needs most of the time. For example, in a relatively simple device, like a chair, we can offer height and backrest adjustments. The challenge is either to offer the same degree of customisation for other more complex devices, like computer interfaces, or to design a standard interface that can be used by all.

Shackel argues that Ergonomics, like Psychology, suffers from being labelled a Science of Common Sense. All too often, designers seem to prefer to consult their own intuitions rather than a professional ergonomist. Device testing tends to be very informal, only involving the designers themselves, rather than being based upon a sample of the end-user population and subjected to the rigour of statistical analysis. If, indeed, good design were common sense then we would not witness the extent of disasters due to poor design in human terms (see Reason, 1990). Shackel argues that a systematic and scientific approach to the analysis and design of devices is needed. Even apparently well design devices (such as the example given by Shackel) appear to benefit from this approach, although performance problems are normally the indication of poor Ergonomics. Shackel considers the role of Ergonomics in different kinds of work and this shows the links between Engineering Psychology and Ergonomics (specifically both concerned with human-machine interaction and system performance).

Payne (1996) argues that technology and Psychology have mutually beneficial relationship, but that advances in either can exist without the other. Payne thus suggests a situation of mutual benefit but not mutual dependence. However, the one without the other may lead to a poorer outcome for both. Payne asks the question of whether advances in Psychology lead to advances in technology or vice versa? He suggests that we witness more of the latter, *i.e.* technological insights offer new insights for psychology. For example, the development of the Graphical User Interface (GUI: *e.g.* the use of Windows, Icons, Menus and Pointing devices: WIMP) owes little to psychological theory, but has enabled applied cognitive psychologists to develop greater explanations for the phenomenon of why the GUI is easier to use than character-based user interfaces (Norman & Draper, 1986). Payne argues that psychology is good at providing explanations for this kind of phenomenon but has not yet revolutionised technology. The WIMP/GUI interface might be considered to be a technological revolution, not a psychological one, whereas Psychology can offer small evolutionary improvements.

Payne cites two examples where Psychology has had modest success: in the development of the Super Book and the application of the GOMS model. In the first example, on-line versions of books are generated automatically with additional features that enable the book to be used with enhanced functionality.

This functionality was based upon psychological research on human language to design a word search facility.

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In the second example, the GOMS model (based on a cognitive theory developed by Card, Moran & Newell, 1982) was used to determine the effectiveness of a new workstation. The theory-driven evaluation (*i.e.* "to specify the capacities and limitations of the human from which the choice for a better design should be directly deductible" Wickens, 1992) led to the company rejecting the new design.

Payne also notes the problem of coupling between Cognitive Psychology research and engineering concerns – this has led to a new, but related discipline: Human-Computer Interaction (HCI) – which is more closely aligned to engineering concerns than Cognitive Psychology. Payne indicates that HCI is rather more unifying than Cognitive Psychology. The former is largely concerned with whole tasks, such as the operation of a device, from a Video Cassette Recorder to a Nuclear Power Station, whereas the latter tend to focus on isolated processes such as perceptual categorisation, word recognition, etc.

Additionally, Payne suggests that Cognitive Psychology can benefit from advances in technology. The study of human interaction with technology (which Payne proposes is the domain of Human Computer Interaction) supplies Cognitive Psychology with phenomena which require explanation. As in the earlier example of the GUI, the success of the interface was poorly understood until Applied Cognitive Psychologists addressed this conundrum. Development of theory in this area could lead to prediction of new technology. Whereas, design in the absence of theory leads to Psychology chasing technology.

Long & Dowell (1996) argue that operational problems (such as the problems associated with the computerisation of the London Ambulance Service) has led to a shift in emphasis from addressing technology to addressing human-device interaction problems. According to Long & Dowell, the link between Psychology and Engineering is more than a marriage of convenience, it has become essential in the wave of technological advancement that requires humans to interact with devices. As Shackel (this volume) suggests, the need to address problems has led to the emergence and shaping of the discipline. Long & Dowell argue for a problem-led approach and propose that the objective of this discipline should be to get human-computer systems to work effectively. Like Payne, Long & Dowell argue that the link between Cognitive Psychology and Information Technology is far from straightforward and they suggest that even Applied Cognitive Psychology fails to link these two disciplines together (coupling). Rather, Long & Dowell argue for a separate and distinct discipline of Cognitive Engineering which is analogous to the relationship that Software Engineering shares with its allied disciplines of Computer Science and Engineering.

Long & Dowell argue that this view proposes two different ways of conceiving the link between Cognitive Psychology and Information Technology (IT). The one-stream perspective suggests a direct link between Cognitive Psychology, Applied Cognitive Psychology and IT whereas the two-stream view suggests that Cognitive Psychology and Applied Cognitive Psychology exist in parallel to Cognitive Engineering and Information Technology (this is similar to the argument that Payne puts forward in favour of HCI). They are cautious about the relationship between these two streams. However, they show that the two-stream view is more realistic as developments in Cognitive Psychology do not directly translate into developments in IT even when mediated by Applied Cognitive Psychology. They suggest that this is because the initial developments in Cognitive Psychology did not directly address a problem in IT, whereas the focus of Cognitive Engineering is directly upon design problems in IT. Long & Dowell show that Cognitive Engineering and Software Engineering are very similar in principles, practices and approach but for one subtle and important difference: Cognitive Engineering emphasises that the design focus is upon the requirements of user populations whereas Software Engineering emphasises the design in terms of the functioning of the computer.

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### 3.7 THE SCOPE AND FUTURE OF ENGINEERING PSYCHOLOGY

Engineering psychologists work on a wide variety of topics ranging from the micro (local or individual) level to the macro (global or systems) level (see Durso, Nickerson, Dumais, Lewandowsky, & Perfect, 2007; Salvendy, 2005). They work to understand the abilities and limitations of the human operator, but also work from the development of systems to the testing and evaluation of those systems. Engineering psychologists, unlike physical ergonomists, tend to focus on topics that are considered "above the neck" (cognitive) rather than biomechanical but whereas this characterizes the prototype of the engineering psychology paradigm there are exceptions throughout the research areas described below.

In aerospace, researchers study the socio-technical system in the milieu of aviation and space. They may help develop displays and controls in the modern cockpit of the passenger plane with the aim of reducing pilot workload and increasing pilot situational awareness. Indeed, conventional flights require only two pilots to handle what previously required three people in the cockpit, because of engineering psychology. Engineering psychologists also may develop and test flight simulators and their usefulness in pilot training, explore the information needed by air traffic controllers, or the work environment of astronauts in the shuttle.

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In healthcare environments such as medicine, nursing, hospital, ambulatory and long-term care, engineering psychologists study a variety of socio-technical systems. For example, they may help develop medical devices used by healthcare providers and patients so that the proper dose of medicine is administered. They may also help design the environmental layout of a hospital unit to decrease the time nurses spend on walking and searching and thereby increase efficiency.

In human-computer interaction, engineering psychologists study the interaction between the user and the computer (hardware and software) in contexts from work to recreation. For example, they would help develop websites to make airline reservations on the Internet. Or they may help design screens used on personal digital assistants or cell phones. Finally, engineering psychologists must consider the characteristics of all users and may help design computer devices on multiple levels allowing it to be used both the young and old and by users with disabilities.

Engineering psychologists in consumer products focus on the design of products from the user's perspective. For example, they would help develop products and tools that are safe and enjoyable for consumers to use. This area would require the psychologists to develop prototypes of the products and test them on pilot groups of users to get feedback in an iterative process.

Engineering psychologists in manufacturing and process control systems study performance in the context of complex control systems. For example, they may help develop the operator components of a nuclear power plant. A recent advance in this area is automation and expert systems. An early example is the cruise control on a car or the autopilot on an airplane. This technology has become more sophisticated and is being considered in more and more systems such as air traffic control. With the air traffic anticipated to double in the next 20 years, automation is considered as a possible solution to monitoring air traffic.

Engineering psychologists in surface transportation study issues pertaining to ground, rail, and water, and pedestrian travel. For example, they may help develop in-vehicle warning systems to alert drivers that they are in danger of a collision or study the distracting effects of using a cell phone. They may assess technologies that measure the physiological reactions of the driver, such as fatigue, and use these measures to control the vehicle directly.

The vision offered by the perspectives are of a problem-driven focus of Engineering Psychology with concerns about the performance of human-device systems. Technological advances are likely raise issues in the areas of advanced transportation, co-operative work, teleworking, health, pollution and leisure. Recent research effort has called for more theory-based approach from the discipline, in the design practices and processes, in the evaluation and understanding of the way in which devices support human thought. There is an inextricable link between Engineering Psychology and the Science of Technology and is up to Engineering Psychologists to rise to these challenges.

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consistently high fatal accident rates in developing countries emphasize the need for occupational health and safety education programmes that focus on prevention. It is equally important to promote the development of occupational health services, including the training of doctors to recognize work-related diseases in the early stages.

### DISEASES

Some occupational diseases have been recognized for many years, and affect workers in different ways depending on the nature of the hazard, the route of exposure, the dose, etc. Some well known occupational diseases include:

- asbestosis (caused by asbestos, which is common in insulation, automobile brake linings, etc.);
- silicosis (caused by silica, which is common in mining, sandblasting, etc.);
- lead poisoning (caused by lead, which is common in battery plants, paint factories, etc.);
- and noise-induced hearing loss (caused by noise, which is common in many workplaces, including airports, and workplaces where noisy machines, such as presses or drills, etc. are used).

There are also a number of potentially crippling health problems that can be associated with poor working conditions, including :

- heart disease;
- musculoskeletal disorders such as permanent back injuries or muscle disorders;
- allergies;
- reproductive problems;
- stress-related disorders.

Many developing countries report only a small number of workers affected by work-related diseases. These numbers look small for a variety of reasons that include :

- inadequate or non-existent reporting mechanisms;
- a lack of occupational health facilities;
- a lack of health care practitioners who are trained to recognize work-related diseases.

Because of these reasons and others, it is fair to assume that in reality, the numbers of workers afflicted with occupational diseases are much higher. In fact, overall, the number of cases and types of occupational diseases are increasing, not decreasing, in both developing and industrialized countries.

### Identifying the Cause of Occupational Disease

The cause of work-related diseases is very often difficult to determine. One factor is the latency period (the fact that it may take years before the disease

underlying causes surface. Once the causes are identified, the investigator should recommend any changes indicated by the findings.

Safety committees often oversee organizations' safety functions. Consisting of both management and non-management personnel, committees perform the following tasks :

**NOTES**

1. Assist with inspections and accident investigations.
2. Conduct safety meetings.
3. Answer workers' questions about safety programs.
4. Bring workers' safety concerns to management's attention.
5. Help develop safety incentive programs.
6. Develop ideas to improve workplace safety.
7. Prepare evacuation plans.
8. Prepare procedures for disasters such as tornadoes, hurricanes, etc. and contingency plans following the disaster.

Safety in the workplace works most effectively with a combination of employer attentiveness and employee responsibility. Costs, both financial and physical, can be decreased and injuries reduced with proper training, employer involvement.

#### **4.5 EXTENT OF THE PROBLEM WORLDWIDE**

In general, health and safety in the workplace has improved in most industrialized countries over the past 20 to 30 years. However, the situation in developing countries is relatively unclear largely because of inadequate accident and disease recognition, record-keeping and reporting mechanisms.

It is estimated that at least 250 million occupational accidents occur every year worldwide. 335,000 of these accidents are fatal (result in death). (Since many countries do not have accurate record-keeping and reporting mechanisms, it can be assumed that the real figures are much higher than this.) The number of fatal accidents is much higher in developing countries than in industrialized ones. This difference is primarily due to better health and safety programmes, improved first-aid and medical facilities in the industrialized countries, and to active participation of workers in the decision-making process on health and safety issues. Some of the industries with the highest risk of accidents worldwide are: mining, agriculture, including forestry and logging, and construction.

#### **Identifying the Cause of an Accident**

In some cases, the cause of an industrial injury is easy to identify. However, very often there is a hidden chain of events behind the accident which led up to the injury. For example, accidents are often indirectly caused by negligence on the part of the employer who may not have provided adequate worker training, or a supplier who gave the wrong information about a product, etc. The

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Accident investigations determine accident causes so that changes can be made to prevent the future occurrence of similar accidents. "Near misses" should also be investigated so that problems can be corrected before serious accidents occur. Supervisors always play a key role in accident investigations. For minor accidents, investigation may be limited to the supervisor meeting with the injured worker and filing a report. In large-scale investigations, the supervisor is usually part of a team of experts, which may also include an engineer, maintenance supervisor, upper-level manager, and/or safety professional.

Accident investigations should be performed in the following manner. When an accident occurs, the investigator's first responsibility is to ensure the safety of all employees by :

- making sure the injured are cared for and receive medical attention, if necessary;
- guarding against a more dangerous secondary event by removing danger sources and evacuating other personnel from the area if necessary; and
- restricting access to the area so no one else will be harmed, and so the scene will not be disturbed.

You should then begin an investigation to identify both the immediate and underlying causes of the accident. The immediate cause is the event that directly led to the accident, such as a slippery floor, failure to wear safety gear, or failure to follow proper procedures.

Immediate causes, while easily found, are not always very helpful in suggesting how future incidents of this nature can be avoided. To accomplish this aim, the investigator must discover the underlying cause of the accident. For example, suppose a worker slips and falls on spilled oil. The oil on the floor is the immediate cause of the accident, but you need to know why it was not cleaned up and why a machine was leaking oil in the first place. Poor training, lack of rule enforcement, low safety awareness, poor maintenance, or crowded work areas commonly underlie accidents.

The investigator should ensure the accident scene is kept intact until the investigation is finished, as this will be the only chance to view the scene exactly as it was at the time of the accident. If a camera is available, photographs of the scene should be taken. Nothing related to the incident should be destroyed or discarded. The investigator should inspect the location (e.g., check for chemicals, broken pieces of machinery) and interview injured or affected workers, eyewitnesses, and anyone else who may be familiar with the accident area. Interviews should be conducted immediately, while the incident is still fresh in everyone's mind. Individuals should give their own account of the incident; by letting them tell their stories without interruption, the investigator can determine if the various responses corroborate one another. Continue asking why until the

department would receive an incentive reward, usually in the form of a cash bonus or merchandise.

Safety incentive programs often work quite well.

## **4.4 SAFETY AUDITS**

Because employees who "know better" often continue to engage in accident-causing behavior, many employers have redirected their focus from accident prevention to the prevention of unsafe acts that could lead to an accident. To do so, firms conduct safety audits. A safety committee or supervisor's who observe employees on the job and correct unsafe behaviors generally conduct such audits.

Each employee should be monitored according to a planned schedule, generally on a weekly basis, as follows :

### ***OBSERVATION***

Stop in the work area for a few moments and observe worker's activities, looking for both safe and unsafe practices. Use the following guide :

- Be alert to unsafe practices that the employee corrects immediately upon seeing you enter the area (putting on protective equipment, such as gloves or goggles).
- Note whether appropriate protective clothing is being worn.
- Observe how employees use tools.
- Scrutinize the safety of the work area. For instance, is the floor slippery?
- Determine whether rules, procedures, and operating instructions are being followed.

### ***EMPLOYEE DISCUSSION***

These discussions should help employees recognize and correct their unsafe acts. When engaging in them, adhere to the following advice:

- If you spot an unsafe act, be non-confrontational. Point out the violation and ask the worker to state what he or she was doing and what safety-related consequences may arise if such behavior continues. Your goal is to help, not blame. Audits should not result in disciplinary actions unless an individual consistently violates safety rules.
- As you observe your employees, encourage them to discuss any safety concerns they may have and ask them to offer any ideas for safety improvement.
- Commend any good performance that you observe.

### ***RECORDING AND FOLLOW-UP***

Findings should be recorded in writing. Pursue any item discussed during the audit that requires follow-up.

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discovered that individuals with certain personality characteristics are more likely than others to be involved in industrial accidents. For instance, one study found that people with higher accident rates tend to be impulsive and rebellious, and they tend to blame outside forces, rather than themselves, for their mishaps. Another study identified the following four "high-risk" personality characteristics:

- **Risk taking:** high risk-takers actually seek out danger rather than trying to minimize or avoid it.
- **Impulsiveness:** impulsive individuals fail to think through the consequences of their actions.
- **Rebelliousness:** rebellious individuals tend to break established rules, including safety rules.
- **Hostility:** hostile individuals tend to lose their tempers easily and thus engage in aggressive acts, such as kicking a jammed machine.

Many organizations now use personality tests to screen out individuals with accident-prone tendencies. For example, some companies use a test (called the Personnel Selection Inventory-Form ) to assess applicants' safety consciousness. One part of the test measures the degree to which individuals perceive a connection between their own behavior and its consequences. As noted earlier, individuals unable to see this connection are at greater risk for accidents.

Employers who provide all new employees with training on safe and proper job procedures experience fewer accidents. Employees should learn how to perform each of their tasks as safely as possible. Training should be very specific, as illustrated in the example that follows. This example covers the procedures to be followed by employees working at a large food manufacturing plant :

- When picking up pans from the conveyor belt, pick up no more than two pans before you place them on the pan rack.
- Stack roll pans no higher than the rear rail of the pan rack.
- When you lift or lower the dough, keep both hands on the dump chain.
- When you pull the dough trough away from the dough mixer, hold both hands on the front rail and not on the rail sides.

While safety training is essential, employees do not always apply what they have learned. Just as many automobile drivers know it is wrong to exceed legal speed limits, but do it anyway, workers may choose to ignore instructions and carry out procedures in their own, unsafe way. One way to mitigate this problem is to implement a safety incentive program. Such programs aim to motivate safe behavior by providing workers with incentives for avoiding accidents. The organization formulates safety goals (usually on a department-wide basis) and rewards employees if these goals are met. For example, a particular department may establish the goal of reducing lost-time accidents by 50 percent over the next three months. If this goal were to be met, all employees within that

There are many methods of preventing or reducing industrial injuries, including anticipation of problems by risk assessment, safety training, control banding, personal protective equipment safety guards, mechanisms on machinery, and safety barriers. In addition, past problems can be analyzed to find their root causes by using a technique called root cause analysis.

### **4.3 INDUSTRIAL ACCIDENT AND THEIR PREVENTION**

An accident is an unwanted event that is never scheduled or planned. Many factors contribute to accidents' occurrence; significant losses and even bodily injury can result following each incident. These basic facts are well understood, yet accidents continue to occur, property damage accumulates, work schedules remain interrupted, and injuries reduce personal income.

Are accidents inevitable? Do they occur as a natural consequence of a daily routine? Can they be avoided?

All accidents are caused. They are the result of human error, and they involve unsafe behavior or an unsafe condition, or a combination of both. Process improvement opportunities are always identified following an accident, and prompt corrective measures are scheduled. Unfortunately, the inherent ability of the environment or behavior that initially caused the accident is seldom addressed in its entirety.

Despite laws designed to ensure safety at the workplace, Companies' accident rates are alarmingly high. What causes all of these industrial injuries? These causes can be divided into three categories: employee error, equipment insufficiency, and procedure insufficiency. Examples of causes falling within each category are listed here:

- Employee error—misjudged situations; distractions by others; neuromuscular malfunctions; inappropriate working positions; and knowingly using defective equipment;
- Equipment insufficiency—use of inappropriate equipment; safety devices being removed or inoperative; and the lack of such things as engineering controls, respiratory protection, and protective clothing;
- Procedure insufficiency—failure of procedure for eliciting warning of hazard; inappropriate procedure for handling materials; failure to lock out or tag out; and a lack of written work procedures.

Workplace accidents pose serious problems for employees and for a firm's competitive advantage, but employers can prevent most of them. Many preventive strategies work.

Some people just seem to be accident prone. If some people do have inherent tendencies toward accidents, then organizations should be able to lower their accident rates by screening out accident-prone applicants. Research studies have

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# UNIT – IV

## NOTES

# INDUSTRIAL ACCIDENT

### STRUCTURE

- 4.1 Learning Objectives
- 4.2 Introduction
- 4.3 Industrial Accident and Their Prevention
- 4.4 Safety Audits
- 4.5 Extent of the Problem Worldwide
- 4.6 Importance of Management Morale Commitment
- 4.7 Principles to Prevent Accident
- 4.8 Safety Inspection Procedures
- 4.9 Summary
- 4.10 Review Questions
- 4.11 Further Readings

### 4.1 LEARNING OBJECTIVES

After going through this unit, students will be able to:

- state the meaning and importance of marketing research;
- explain the trends of marketing research;
- know the functions of marketing research.

### 4.2 INTRODUCTION

An industrial injury is bodily damage resulting from working. The most usual organs involved are the spine, hands, the head, lungs, eyes, skeleton, and skin.

Common causes of industrial injury are poor ergonomics, manual handling of heavy loads, misuse or failure of equipment, exposure to general hazards, inadequate safety training and clothing, jewellery or long hair that becomes tangled in machinery.

General hazards in a work environment include electricity, explosive materials, fire, flammable gases, heat, height, high pressure gases and liquids, hot gases and liquids, powerful or sharp moving machinery, oxygen-free gases or spaces, poisonous gases, radiation, toxic materials, work on, near or under water, work on, near or under weak or heavy structures.

### 3.8 SUMMARY

- Engineering Psychology is not the equivalent of Ergonomics. The fields overlap, but are not synonymous.
- *Engineering Psychology* is a discipline that aims to improve socio-technical systems: driving cars, working on surgical teams, controlling nuclear power plants, improving consumer products, controlling air traffic.
- Applied Experimental and Engineering Psychology is the application of psychological principles, knowledge, and research to improve the ability of humans to operate more effectively in a technological society.
- Solutions to the problems raised in people interacting with technology come in two main forms; either to reduce demand or to increase resources in situations of work overload or vice versa in situations of work underload.

### NOTES

### 3.9 REVIEW QUESTIONS

1. Define engineering psychology.
2. What is the significance of engineering psychology?
3. What is the scope of engineering psychology?
4. Discuss demand-resource theory of engineering psychology.

### 3.10 FURTHER READINGS

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produces an obvious effect on the worker's health). By the time the disease is identified, it may be too late to do anything about it or to find out what hazards the worker was exposed to in the past. Other factors such as changing jobs, or personal behaviours (such as smoking tobacco or drinking alcohol) further increase the difficulty of linking workplace exposures to a disease outcome.

Although more is understood now about some occupational hazards than in the past, every year new chemicals and new technologies are being introduced which present new and often unknown hazards to both workers and the community. These new and unknown hazards present great challenges to workers, employers, educators, and scientists, that is to everyone concerned about workers' health and the effects that hazardous agents have on the environment.

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### Box 1

#### Points to remember about the extent of the problem worldwide

1. There are at least 250 million occupational accidents every year worldwide, at least 335,000 of which result in death.
2. Developing countries have more fatal accidents than industrialized nations, emphasizing the need for health and safety education programmes that focus on prevention.
3. Some occupational diseases have been recognized for many years and affect workers in different ways. Such diseases are still problems in all parts of the world.
4. The numbers of work-related diseases in developing countries are much higher in reality than the numbers that are reported.
5. The numbers of cases and types of occupational diseases are increasing in both developing and industrialized countries.
6. It is often difficult to identify the cause of both occupational accidents and diseases.

### THE RANGE OF HAZARDS

There is an unlimited number of hazards that can be found in almost any workplace. There are obvious unsafe working conditions, such as unguarded machinery, slippery floors or inadequate fire precautions, but there are also a number of categories of insidious hazards (that is, those hazards that are dangerous but which may not be obvious) including :

- chemical hazards, arising from liquids, solids, dusts, fumes, vapours and gases;
- physical hazards, such as noise, vibration, unsatisfactory lighting, radiation and extreme temperatures;
- biological hazards, such as bacteria, viruses, infectious waste and infestations;

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- psychological hazards resulting from stress and strain;
- hazards associated with the non-application of ergonomic principles, for example badly designed machinery, mechanical devices and tools used by workers, improper seating and workstation design, or poorly designed work practices.

Most workers are faced with a combination of these hazards at work. For example, it is not difficult to imagine a workplace where you are exposed to chemicals, unguarded and noisy machines, hot temperatures, slippery floors, etc. all at the same time. Think about your own workplace. Are there various hazards there that you can think of?

Workers do not create hazards - in many cases the hazards are built into the workplace. The trade union position on occupational health and safety is to ensure that work is made safer by modifying the workplace and any unsafe work processes. This means that the solution is to remove the hazards, not to try to get workers to adapt to unsafe conditions. Requiring workers to wear protective clothing which may not be suited or designed for the climate of your region is an example of forcing workers to try to adapt themselves to unsafe conditions, which is also shifting the responsibility from management to the worker.

It is important for unions to maintain this position because many employers blame workers when there is an accident, claiming that the workers were careless. This attitude implies that work can be made safer if workers change their behaviour or if employers only hire workers who never make mistakes. Everyone makes mistakes — it is human nature, but workers should not pay for mistakes with their lives. Accidents do not stop simply by making workers more safety conscious. Safety awareness may help but it does not remove unsafe work processes or conditions. The most effective accident and disease prevention begins when work processes are still in the design stage, when safe conditions can be built into the work process.

#### **4.6 IMPORTANCE OF MANAGEMENT MORALE COMMITMENT AND TRAINING**

In order to develop a successful health and safety programme, it is essential that there be strong management commitment and strong worker participation in the effort to create and maintain a safe and healthy workplace. An effective management addresses all work-related hazards, not only those covered by government standards.

All levels of management must make health and safety a priority. They must communicate this by going out into the worksite to talk with workers about their concerns and to observe work procedures and equipment. In each workplace, the lines of responsibility from top to bottom need to be clear, and workers should know who is responsible for different health and safety issues.

Workers often experience work-related health problems and do not realize that the problems are related to their work, particularly when an occupational disease, for example, is in the early stages. Besides the other more obvious benefits of training, such as skills development, hazard recognition, etc., a comprehensive training programme in each workplace will help workers to:

- recognize early signs/symptoms of any potential occupational diseases before they become permanent conditions;
- assess their work environment;
- insist that management make changes before hazardous conditions can develop.

### ***ROLE OF THE HEALTH AND SAFETY REPRESENTATIVE***

As health and safety representative your role is to work proactively (this means taking action before hazards become a problem) to prevent workers from being exposed to occupational hazards. You can do this by making sure management eliminates hazards or keeps them under control when they cannot be eliminated.

Steps to help you reach your goals are :

1. Be well informed about the various hazards in your workplace and the possible solutions for controlling those hazards.
2. Work together with your union and the employer to identify and control hazards.
3. Although these Modules have been developed for the protection of workers, you may occasionally need to share some of this information with your supervisors and employer in the process of working towards a safe and healthy workplace.

## **4.7 PRINCIPLES TO PREVENT ACCIDENT**

The importance of industrial safety was realized because every millions of industrial accidents occur which result in either death or in temporary disablement or permanent disablement of employees and involve large amount of losses resulting from danger to property, wasted man hours and wasted hours.

Accident prevention is highly essential in an industry, in order to

- Prevent injury to and premature death of employees.
- Reduce operation and production costs.
- Have good employee employer relations.
- High up the morale of employees.

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Above all the prevention of accidents is a true humanitarian concern. Accident prevention does not occur by itself; there should be consistent of safety measures and safety programmers emphasizing the need for —

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- Safe workplace layout and working condition
- Safe material handling.
- Personal protective devices.
- Safety activities in organization.

There are following accident preventations:

### **Legal:**

In the industrially developed countries, there exist very well defined and highly stringent punitive codes and statutes, which are designe to maintain and improve safety, health and welfare of employed persons. Even the developing countries have such laws, albeit still in a some what elementary form which make them anachronistic with the requirements of modern technology and the hazards generated as a consequences there of. These laws at their best only impose a minimum standard of conduct defining them to be the absolute duty of the employer.

Traditionally, the safety specialists have been using this legal argument for accident prevention on the basis that by being conscious about the safety or the employees, the employer can avoid attracting prosecution.

The economic argument also becomes relevant at this point because of the fines that has been imposed as the result of statutory breaches, or because of the production loss, which may result due to the closure of the enterprise ordered as a punishment for the breach of these statutes.

In the same context, employers feel threatened about the image of the company being tarnished and the effect of the adverse publicity received as a consequence of prosecution and subsequent punishment under the safety laws. This indirectly could also impact adversely in the revenues and hence the profits of the company.

In the civilized societies it must be remembered, that one of the prime social objectives of any company is to gerarate a safe plan of work for its employees.

### **Humanitarian:**

The humanitarian argument derives its strength from a universally accepted ethical and moral axiom that it is the duty of every man to ensure the physical well being of his fellow man. This automatically holds the employer responsible, in the eyes of every member of the society to provide a safe and healthy working environment for this employees.

The safety specialist can therefore appeal to the conscience of the management by emphasizing upon them that it is immoral for the employer not to give due consideration to the safety and well being of the employees by taking measures which could protect them against pain and suffering as a consequence of unsafe practices and procedures allowed in their enterprise.

#### *Economic:*

The economic argument very simply, is based on accident costing the company money. It must however be appreciated that in order that this argument may have an effective impact on the management. It is imperative that the costs of the accidents occurring to the company must be accurately quantified. If this is done, accident prevention is then seen by the senior management as good business, which motivates the management to strive more and more to ameliorate their safety system in the interest of maximization of the profit.

The safety specialists thus, use the economic argument as the most powerful tool for ensuring a very elaborate and sophisticated accident prevention and safety program. This is the foundation stone upon which the concepts or theories of risk management/accidents prevention are based. These concepts unfortunately are hardly known in our country.

It is high time that these most powerful tools may be introduced in our country, both for making its industrial enterprises safer for the workers and for making their operations more cost effective.

## **4.8 SAFETY INSPECTION PROCEDURES**

Across the industry and commerce there are a multiplicity of safety inspection procedures, each developed to identify the hazard within a particular business. However they do fall into a number of broad categories.

Following are various procedures for the safety

### **SAFETY AUDIT**

A safety audit subjects each area of a company's activity to a systematic critical examination with the object of minimizing loss. Every component of the total system is included. For example management policy, attitudes training, features of the process and of the design, layout and construction of the plant, operating procedures, emergency plans, personal protection standards, accident record etc.

### **SAFETY SURVEY**

A safety survey is a detailed examination in depth of a narrower field of activity. For example major key areas revealed by safety audits, individual plans and procedures, or specific problems common to a works as a whole. These surveys are followed by formal report, action plan and subsequent monitoring.

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## **SAFETY INSPECTION**

### **NOTES**

A routine scheduled inspection of a unit or department, which may be carried out by someone ( may be a safety representative ) from within the unit, possibly accompanied by the safety advisor. The inspection would check maintenance standards, employee involvement, working practices, fire precaution, use of guards and adherence to safe working procedures etc, and be more immediate than the wide-reaching or in-depth approach taken by audits and surveys.

## **SAFETY TOURS**

A safety inspection around a predetermined route or area of the work place carried out by any one of a range of personnel from works directors to safety representatives to ensure that for example standards of housekeeping are at an acceptable level, or that obvious hazards are removed or to ensure that generally safety standards are observed. Typically tours last only fifteen minutes and are conducted at weekly intervals.

## **SAFETY SAMPLING**

A particular application of a safety inspection or tour designed to check on one specific pre-selected safety aspect only, within the workplace or an agreed part of it. This focuses attention on the particular safety matter and highlights the observation of possible hazards.

The safety sample chosen can be concerned with plant, equipment, guarding, methods of operation, lack of adherence to safe systems of work, non use of permit to work system, forklift truck driving and training or any other. Safety samples should be carried out regularly but with a random selection of the subject each time.

## **HAZARD AND OPERABILITY STUDY**

The application of a formal critical examination to the process and engineering intentions of new facilities to assess the hazard potential from mal operation or malfunction of individual items of equipment and the consequential effects on the facility as a whole. Remedial action can then be planned at a very early stage of the project with maximum effectiveness and at minimum cost. The techniques can also be applied to existing plants and processes.

Whilst unsuspected hazards may be revealed by any of the above techniques, the use of a formal checklist in project engineering design helps to ensure that the plant complies with statutory requirements, and that account is taken of the best current safety techniques and practices. Health and safety requirements should also be incorporated at the design stage rather than taken on as an afterthought once the plant or process is in full operation.

The safety adviser has a contribution to make and should be a member of both the design and hazard and operability teams.

#### Fire:

Fire like industrial accident is rarely experienced by most individuals on the other hand fire is likely to affect directly large no. of people. The main causes of fire in industries are

1. Electrical equipment.
2. Smoking.
3. Gas equipments.
4. Gas cutting and welding.
5. Oil and petrol equipments.
6. Rubbish burning.
7. Spontaneous combustion.

As per report of fire prevention association (FPA). The 0.26% of total accidents was caused by the fire.

#### *Fire Prevention and Control:*

To prevent and control the accidents, it is necessary to act upon the following guidelines.

1. Management must accept that a fire prevention policy must be set up and regularly revised.
2. An estimate should be made of possible effects of fire in loosing buildings, plant work in progress, workers, customers, plans and records.
3. Identifying the fire risks, considering sources of ignition, combustion material and means where by fire could spread.
4. Estimate the magnitudes of the risks to establish priorities.
5. Establish clear lines of responsibilities for fire prevention.
6. Appoint a fire officer responsible to the board.
7. Set up a fire protection drill for each development.
8. Set up a program which will be maintained at appropriate intervals.

#### *Common Precautions*

Following are the common precautions —

- Daily at the start of the business the doors which may be used for escape purposes be unlocked and escape routes unobstructed.
- Daily at closing, down fire doors and fire shutters should be closed.
- All out side doors, windows and other means of access secured against intruders and replaced if broken.
- Heating apparatus and main switches turned off daily at close down.
- Furnaces and boilers safety out daily at close down.

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- Inspection of whole premises, especially store rooms and other parts rarely visited daily at closedown.
- Smoking only is permitted where adequate no. of ash trays available and no smoking during last half hour of working day.
- Naked lights prohibited daily at closedown.
- Combustible materials kept well clear from heaters and other burning parts.
- Gluecattles pressing and soldering and similar appliances clear off combustible material, and with non combustible stand holders.
- Flame able liquids containers be closed and kept away from sources of ignitions.
- Waste bins ash trays and waste paper baskets emptied at regular intervals and always at end of working days.
- Drip trays implied daily at close down.
- Workmen's clothes and overalls kept in special place.
- Electric motors kept clear of all accumulations of material daily.
- Gangways kept unobstructed daily.
- Special care with cutting and welding equipment used by maintenance men or contractors daily.
- Fire appliances like fire buckets be filled weekly.
- Fire instructions, fire exit and no smoking notices clearly be displayed weekly.
- Cords on the factory floor be clearly stored so as not to impede fire at different intervals.
- Inspection of fire extinguishers periodically as required.
- Check of lighting conductors as required.
- Machinery and plant maintenance as required.
- Maintenance of special extinguishing system e.g. dry powders CO<sub>2</sub> daily.

**Electrocution and its Precautions**

The term electrocution is used when worker come into electrical shock. The three electrical factors which are come in the categories of the electrocution. *i.e.*, Resistance, Current, Voltage. Electric resistance is opposition to the flow of current and measured in ohms. There is wide degree of variation in body resistance. A shock may fatal to any person may only discomfort to an other.

Voltage is the pressure that causes the flow of electric current in a circuit; its unit is V. generally above 30 V is considered dangerous. Electric current I is the rate of flow of electrons in a circuit and its unit is amperes (A).

Following precaution must be observed while working on electrical works to protect against shocks.

1. Before working on the main lines first switch off the supply of electricity.
2. If it is not possible to switch off the main see that your hands and feet are not wet.
3. If a person gets an electric shock rescue him with the help of insulator. If the insulator is not available use your feet not hands to rescue him.
4. While working on high voltage, stand on bad conducting material.
5. If any person who is shocked by the electricity is in contact with the electrical machine or an apparatus then one person for saving him should stand on a dry wooden chair while removing the victim other wise pull him with the help of a dry coat , dry rope etc.
6. Don't close any switch unless you are familiar with the circuit that it controls and know the reason for its being open.
7. Avoid touching any or working on live circuits as much as possible.
8. Keep material or equipment at least 10 feet away from high voltage overhead power lines.
9. Don't reach into energized equipment while it is being operated. This is particularly important in high voltage circuits.
10. When installing new machinery, ensure that all metal frame work is efficiently and permanently founded.

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### Duties of the Employer (Training and Education)

For a safe and smooth running system an employer may give trainings and education to the worker to work safe and accordingly. Following are the duties on employer :

- Provide and maintain plant and system of work that are safe and without risks to health. Plant covers any machinery equipment or appliances including portable power tools and hand tools.
- Insure that the use, handling, storage and transport articles and substances is safe and with out risk.
- Provide such information, instruction, training and supervision to ensure that employees can carry out their jobs safety.
- Ensure that any work shop under his control is safe and healthy and that proper means of access and egress are maintained. Particularly in respect of high standards of house keeping, cleanliness, disposal of rubbish and the stacking of goods in the proper place.
- Keep the work place environment safe and healthy so that the atmosphere is such as not to give rise to poisoning, gassing or the encourage met of the development of diseases. Adequate welfare facilities should be providing.

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- To prepare and keep up to date a written safety policy supported by information on the organization and arrangements for carrying out the policy. The safety policy has to be brought to the notice of employees.
- To consult with any safety representatives appointed by recognized trade unions to enlist their cooperation in establishing and maintaining high standards of safety.
- To establish a safety committee if required by two or more safety representatives.

### Safety Equipment

The following equipments are used in the industries for the safety purpose.

- Goggles
- Glasses
- Hand gloves
- Apron
- Safety shoes
- Anti fire gas cylinders

### 4.9 SUMMARY

- An accident is an unwanted event that is never scheduled or planned. Many factors contribute to accidents' occurrence; significant losses and even bodily injury can result following each incident. These basic facts are well understood, yet accidents continue to occur, property damage accumulates, work schedules remain interrupted, and injuries reduce personal income.
- Because employees who "know better" often continue to engage in accident-causing behavior, many employers have redirected their focus from accident prevention to the prevention of unsafe acts that could lead to an accident. To do so, firms conduct safety audits.
- It is estimated that at least 250 million occupational accidents occur every year worldwide. 335,000 of these accidents are fatal (result in death).
- In order to develop a successful health and safety programme, it is essential that there be strong management commitment and strong worker participation in the effort to create and maintain a safe and healthy workplace. An effective management addresses all work-related hazards, not only those covered by government standards.
- A safety survey is a detailed examination in depth of a narrower field of activity. For example major key areas revealed by safety audits; individual plans and procedures, or specific problems common to a works as a whole. These surveys are followed by formal report, action plan and subsequent monitoring.

## 4.10 REVIEW QUESTIONS

1. What are the basic causes of industrial accidents?
2. Define safety audit.
3. What is the importance of safety survey?
4. What are the morale responsibilities of management to prevent accident?
5. State the principles of accident prevention.

## 4.11 FURTHER READINGS

- Juergens, J. "Safety First." *Occupational Health & Safety* 73, no. 6 (2004): 94-96.
- Kleiman, L.S. *Human Resource Management: A Tool for Competitive Advantage*. Cincinnati: South-Western College Publishing, 2000.

## NOTES

# UNIT – V

## NOTES

# PERSONNEL COUNSELLING

## STRUCTURE

- 5.1 Learning Objectives
- 5.2 Introduction
- 5.3 Counselling in Industry
- 5.4 Objectives of Counselling
- 5.5 Need and Characteristics of Counselling
- 5.6 Functions of Counselling
- 5.7 Benefits of Counselling
- 5.8 Types of Employee Counselling
- 5.9 Methods of Employee Counselling
- 5.10 The Process of Counselling : Sequential Steps
- 5.11 Effective Counselling
- 5.12 Types of Problem for Employee Counselling
- 5.13 Summary
- 5.14 Review Questions
- 5.15 Further Readings

## 5.1 LEARNING OBJECTIVES

After going through this unit, students will be able to:

- state the meaning and importance of marketing research;
- explain the trends of marketing research;
- know the functions of marketing research.

## 5.2 INTRODUCTION

Counselling has been practiced in one form or other since the evolution of mankind. In every field which requires dealing with people, counselling is essential. Counselling is a dyadic relationship between two persons; a manager who is offering help (counsellor) and an employee whom such help is given (counseelee). It may be formal or informal. Formal counselling is a planned and systematic way of offering help to subordinates by expert counsellors. Informal counselling is concerned with day to day relationship between the manager and his subordinates where help is readily offered without any formal plan.

Every manager has a responsibility to counsel his subordinates. When individual managers are unable to deal with specific problems, the counselling services of a professional body is required. An organization can either offer the services of a full-time in-house counsellor or refer the employee to a community counselling service.

Counselling occasionally is necessary for employees due to job and personal problems that subject them to excessive stress. Counselling is discussion of a problem that usually has emotional content with an employee in order to help the employee cope with it better. Counselling seeks to improve employee's mental health. People feel comfortable about themselves and about other people and able to meet the demands of life when they are good in mental health.

The counselling need not be limited to work-related issues. Marital problems, problems with children, financial difficulties or general psychiatric problems may not be directly related to the job, however, we recognize that individuals cannot completely separate their life away from the job from their life on the job. Therefore personal problems do affect a worker's job performance. So counselling is also necessary for personal problems along with work-related issues.

Performance counselling involves helping an employee understand his own performance, find where he stands in relation to others and identify ways to improve his skills and performance. It focuses, essentially, "on the analysis of performance of the job and identification of training needs for further improvement".

An increasingly popular form of counselling involves employees who are about ready to retire. Pre-retirement counselling prepares individuals to deal with the realities of leisure, as well as outlining details about social security benefits and company pension provisions.

### **5.3 COUNSELLING IN INDUSTRY**

It is required of every manager to help his subordinate in the free exploration of his strengths, abilities, competence, interests and other related positive features. It requires participation from both the parties in the performance review and goal-setting process. Thus, performance counselling has become an important feature not only in performance review but also in the implementation of the appraisal system in the organization.

It is natural that subordinates need guidance, coaching or help of an experienced person. This role may be played by the immediate superior or the personnel manager. The managers or superiors who have to play the role of 'counsellor' can play it successfully if they develop the skill for counselling. Such a skill would be useful in understanding subordinates, assisting them in their

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efforts to grow and develop, and in improving their interpersonal relations both at work and in the society at large.

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Counselling is a two-way process in which a counsellor provides help to the workers by way of advice and guidance. There are many occasions in work situations when a worker feels the need for guidance and counselling. The term "counselling" refers to the help given by a superior to his subordinate in improving the latter's performance.

It is in effect a process of helping subordinates to achieve better adjustment with his work environment, to behave as a psychologically mature individual, and help in achieving a better understanding of others so that his dealings with them can be effective and purposeful.

### 5.4 OBJECTIVES OF COUNSELLING

Counselling helps a person overcome emotional problems and weaknesses relating to performance.

It involves the following objectives :

1. Provide empathic atmosphere of genuine concern about his difficulties, tensions, worries, problems, etc., so that he can freely discuss and share his views with counsellor;
2. Understand himself better and to gain knowledge about his potential, strengths and weaknesses;
3. Gain an insight into the dynamics of his behaviour by providing necessary feedback;
4. Have better understanding of the environment in which he functions;
5. Increase his personal and interpersonal effectiveness by assisting him in analyzing his interpersonal competence;
6. Prepare alternate action plans for improving on his performance and behaviour.

### 5.5 NEED AND CHARACTERISTICS OF COUNSELLING

Need for employee counselling arises due to various causes in addition to stress. These causes include: emotions, inter-personal problems and conflict at place, inability to meet job demands, over-work load, confrontation with authority, responsibility and accountability, conflicts with the superiors, subordinates and management and various family problems, health problems, career problems etc.

Followings are the important characteristics of counselling :

1. Counselling is an exchange of ideas and feelings between two people.
2. It tries to improve organizational performance by helping the employees to cope with the problems.

3. It makes organization be more human and considerate with people's problems.
4. Counselling may be performed by both professionals and non-professionals.
5. Counselling is usually confidential in order to have free talk and discussions.
6. It involves both job and personal problems.

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### 5.6 FUNCTIONS OF COUNSELLING

The general objective of counselling is to help employees to improve their mental health and develop in self-confidence, understanding, self-control and ability to work effectively. This objective can be achieved by performing various counselling functions. They are :

#### *ADVICE*

One of the important functions of counselling is offering advice to the counselee. The counsellor has to understand the problem of the counselee completely, before offering advice and suggesting a course of action.

#### *REASSURANCE*

In order to give courage to face a problem confidently, counselling provides employees with reassurance. Normally reassurance is not acceptable to the counselee. However, it is useful in some situations.

#### *COMMUNICATION*

Counselling will improve both upward and downward communication abilities of the counsees.

#### *RELEASE OF EMOTIONAL TENSION*

Releasing emotional tension is an important function of counselling. People feel emotional release from their frustration after counselling. Release of tension may not solve the entire problem, but run over mental blocks to the solution.

#### *CLARIFIED THINKING*

Release of tension and thereby removal of mental blocks to the solution through counselling allows the counselee to think freely and objectively. Thus, clarified thinking tends to be the result of emotional release.

#### *REORIENTATION*

Reorientation is not just emotional release or clear thinking, but it involves a change in the counselee's psychic self through a change in the basic goals and values.

## 5.7 BENEFITS OF COUNSELLING

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Performance counselling takes a positive approach. The underlying philosophy is quite simple : People can grow and improve their competence and performance with timely help and proper coaching. 'An effective counsellor-manager is one who helps his employees to become more aware of their strengths and weakness and helps them to improve further on the strong points and overcome weaknesses'. Counselling, generally speaking, offers the following benefits to the counselee:

1. He learns to respond and adjust more positively to people and situations.
2. He is able to improve his personal effectiveness.
3. He is able to clear the mind of emotional irritants; overcome his personal weaknesses and work more effectively.
4. He feels more relaxed when he is able to share his concerns and problems with a trusted friend, the counsellor who assures confidentiality and extends a helping hand readily.

## 5.8 TYPES OF EMPLOYEE COUNSELLING

In attempting to help an employee who has a problem, a variety of counselling approaches are used. All of these approaches, however, depend on active listening. Sometimes the mere furnishing of information or advice may be the solution to what at first appeared to be a knotty problem. More frequently, however, the problem cannot be solved easily because of frustrations or conflicts that are accompanied by strong feelings such as fear, confusion, or hostility. A manager, therefore, needs to learn to use whatever approach appears to be suitable at the time. Flexibility is a key component of the counselling process.

### DIRECTIVE COUNSELLING

It is full counseling. It is the process of listening to an employee's problem, deciding with the employee what should be done and telling and motivating the employee to do it. This type of counselling mostly does the function of advice, reassurance and communication. It may also perform other functions of counselling.

### NONDIRECTIVE COUNSELLING

In nondirective counselling, the employee is permitted to have maximum freedom in determining the course of the interview. It is the process of skillfully listening and encouraging a counselee to explain troublesome problems, understand them and determine appropriate solutions. Fundamentally, the approach is to listen, with understanding and without criticism or appraisal, to the problem as it is described by the employee. The employee is encouraged,

through the manager's attitude and reaction to what is said or not said, to express feelings without fear of shame, embarrassment, or reprisal.

The free expression that is encouraged in the nondirective approach tends to reduce tensions and frustrations. The employee who has had an opportunity to release pent-up feelings is usually in a better position to view the problem more objectively and with a problem-solving attitude.

### ***PARTICIPATIVE COUNSELLING***

Both directive and non-directive methods suffer from limitations. While the former is often not accepted by independent employees, the latter needs professionals to operate and hence is costly. Hence, the counselling used in most situations is in between these two. This middle path is known as participative counselling. Participative is a counselor-counselee relationship that establishes a cooperative exchange of ideas to help solve an employee's problems. It is neither wholly counsellor-centred nor wholly counselee-centred. Counsellor and counselee mutually apply their different knowledge, perceptions, skills, perspectives and values to problem into the problems and find solutions.

These methods of counselling can be used depending upon the problem, employee, situation, availability and ability to employ professional counsellors.

<b>Non-directive Counselling</b>	<b>Participative Counselling</b>	<b>Directive • Counselling</b>
<b>Low Direction</b>	<b>Medium Direction</b>	<b>High Direction</b>

*Source* : Keith Davis and John, W. Newstrom, op. cit., p.498.

## **5.9 METHODS OF EMPLOYEE COUNSELLING**

Effectiveness of counselling largely depends on the methods and techniques as well as the skills used by the counsellor. Methods and techniques change from person to person and from situation to situation. Some of the assessment tools are psychological testing, statistical methods, Attitude Measurement, Caring Relationship Inventory, Interpersonal Behaviour Surveys, Observation, Taylor-Johnson Temperament Analysis, etc.

It involves the following methods :

### ***DESENSITIZATION***

According to Desensitization, once an animal has been shocked in a particular situation, it will continue to avoid it indefinitely. This is quite true in respect of human beings also. Once an individual is shocked in a particular situation, he gives himself no chance for the situation to recur.

This method can be used to overcome avoidance reactions, so as to improve the emotional weak-spots.

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If an employee is once shocked by the behaviour, approach or action of his superior, he would continue to avoid that superior. It is difficult for such superiors to be effective counsellors, unless such superiors prove otherwise through their behaviour or action on the contrary. Similarly, once an employee is shocked by a particular situation, he can be brought back to that situation only if he will be convinced through desensitization that the shock will not to take place further.

Counsellor can make use of desensitization in such situations.

### **CATHARSIS**

Discharge of emotional tensions can be called catharsis. Emotional tensions can be discharged by talking them out or by relieving of the painful experience which engendered them. It is an important technique as a means of reducing the tensions associated with anxiety, fear, hostility, or guilt. Catharsis helps to gain insight into the ways an emotional trauma has been affecting the behaviour.

### **INSIGHT**

With the help of insight one may find that he has devalued himself unnecessarily, or his aspirations were unrealistic, or that his childish interpretation of an event was inaccurate. Then he can overcome his weakness.

### **DEVELOPING THE NEW PATTERNS**

Developing new patterns becomes very often necessary when other methods to deal with weak spots remain ineffective. In order to develop new, more satisfying emotional reactions, the individual needs to expose himself to situations where he can experience positive feelings. The manager who deals with such individuals may motivate or instigate them to put themselves into such situations, so that their self-confidence may increase.

Every counsellor must concentrate his full attention on two aspects viz., using of assessment tools, and utilizing counselling methods, choice of which differs from person to person, situation to situation, and from case to case.

## **5.10 THE PROCESS OF COUNSELLING : SEQUENTIAL STEPS**

The counselling process has three phases: rapport building, exploration and action planning, these are discussed below :

### **1. RAPPORT BUILDING**

Initially the counsellor-manager should level himself with his employee and tune himself to his orientations. General opening rituals like offering a chair, closing the door to indicate privacy, asking the secretary not to disturb are all important in demonstrating the manager's genuine interest in employee's problems. The counsellor must listen to the feelings and concerns of the employee

carefully and attentively. Leaning forward and eye contact are important signs of active listening. The employee must feel that he is wanted and the counsellors are interested in him genuinely.

## 2. *EXPLORATION*

Besides active listening, the counsellor should help the employee find his own weaknesses and problems through open and exploring questions. He should be encouraged to open up fully and talk more on the problem. This would enable both parties to uncover various dimensions of the problem clearly. Once the key issue is identified, (e.g., inability to get along with colleagues, not being promoted despite hard work, boss does not like his work etc.,) it should be diagnosed thoroughly. Open questions like- why do people pick arguments with you? On what occasions did you try to get ahead in the race? Who are coming in your way and why? – may help the employee visualize the problem from different angles. The whole exercise is meant to generate several alternative causes of a problem.

## 3. *ACTION PLANNING*

Counselling should finally help the employee find alternative ways of resolving a problem. The list of alternatives could be generated after two or three brain storming sessions. The merits and limitations of each course of action could also be identified and the best course of action picked up- keeping the background factors (boss, colleagues, work-related issues, competitive pressures etc.) in mind. The employee should be encouraged to self-monitor the action plan without seeking further helps from the counsellor. The counselling sessions could be monitored and reviewed at regular intervals later on.

## 5.11 EFFECTIVE COUNSELLING

Counselling is an art. It requires serious effort on the part of the counselee to learn from each situation and stand on his own. The counsellor is there to lend a helping hand, clarify things, enable the counselee look at the picture himself clearly, show the alternative paths and suggest action plans for improvement.

The prerequisites for effective counselling are as follows :

1. Open two-way communication between the counsellor and the worker.
2. Genuine concern of the counsellor for providing necessary help to the worker and develop him further; and
3. Influence by the counsellor. by recognizing worker's feelings, by sharing his experience and ideas, by posing questions that stimulate his thinking, and by helping him to solve his problems.

The counsellor should give sufficient importance to the communication process by listening carefully to what the subordinate has to convey and by being responsive to the same. Any movement which distracts the subordinate's attention

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should be controlled *e.g.*, fidgeting with paper weight, clip, pencil, rubber and etc. Moreover, it is essential to generate the necessary confidence in the subordinate and to assure him the counsellor's interest in helping him.

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### 5.12 TYPES OF PROBLEM FOR EMPLOYEE COUNSELLING

A manager has to deal with various types of problems in dealing with his subordinates, employees and particularly problem employees. Basically no employee is a problem employee, except hereditary and inborn perversions, criminal tendencies, addictions, and nervous and psychological breakdowns. Once an employee turns to be a problem employee, the employer has mainly two options *viz.*, repair and recover, or replace. For the purpose of repairing and recovering and rehabilitating, counselling has an important role to play. Problems are generally associated with the causes like :

#### *INFERIORITY AND LOW SELF-ESTEEM*

Inferiority feeling of an employee may play great havoc in individual life and work. Though a mild form of inferiority in certain persons may help them to work hard and overcome the inferiority. But very often, inferiority complex may lead a person to utter disappointment and depression leading to withdrawal perversion, absenteeism and even psychosomatic and psychotic problems.

Inferiority is a feeling of inadequacy in comparison with others, or a feeling of being inferior to others. When the inferiority feelings in a person become overwhelming and persisting, it may develop into a state which Adler called "inferiority complex". Recently thinkers started believing that inferiority can be overcome with the help of self-esteem, and effective counselling helps in gaining self-esteem.

Self-esteem is closely linked with self-image, self-worth and self-concept. Self-concept and self-image are the terms which represent the picture which we have of ourselves. Self-image and self-concept may include a list of character traits, physical features, attitudes, feelings, strengths, weaknesses etc. Self-esteem refers to the evaluation which an individual makes of his worth, competence, value and significance.

When a person loses self-esteem, he develops inferiority in him, which grows into an inferiority complex. Such people do not feel worth of themselves. Hence, the basic task of a counsellor is to improve self-esteem in such counselees.

#### *INJUSTICE OR ILL-TREATMENT*

Very often injustice or ill-treatment make considerable impact in their minds resulting in behavioural problems, inferiority and low self-esteem. Depriving an employee of adequate wages, leave, or any perks, giving him an arrogant

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treatment, depriving a legitimate promotion, promoting somebody overlooking the legitimate candidate; may such incidents take place in organizations very often which may result in inferiority feeling or feeling of low self-esteem and low morale affecting the efficiency of the aggrieved employee. As far as possible such incidents must be avoided. Once such a situation arises and an employee is aggrieved, it is better to rectify it. However, if the aggrieved employee is counselled and rectification is promised at a later date, he or she can be brought back to the proper track.

### ***PREMARITAL ANXIETIES AND SEXUAL PERVERSIONS***

Premarital anxieties are common in many young employees. Once the marriage is arranged and the person is engaged, his anxiety increases. Two people of different family backgrounds, different cultures, different environments, etc., are bound to have anxieties before they come together. If one happens to wait unmarried after a particular age too, one's anxiety is bound to increase. Similarly, there are possibilities for sexual perversions in not only young employees but even in married employees. There are people with broken relationships who are tempted to be subject to sexual perversions and resulting guilty conscious. In all such cases the concerned employee needs counselling before a total breakdown and collapse of personality. Such people can be spiritually motivated, educated, kept under the close contact of an influence group, and so on.

### ***ALCOHOLISM***

Alcoholism is, perhaps, the largest threat to the human element of organization. In fact, alcoholism is a serious social, moral and health problem. It ruins careers, disrupts families, affects productivity and efficiency, destroys bodies, and leads to untold human misery. Many traffic accidents are caused by alcohol abuse.

#### **Causes of Alcoholism**

There are many causes which lead to alcoholism. Prominent among them are : (i) Hereditary drinking; (ii) Executive culture; (iii) Executive stresses; (iv) Physiological reasons; (v) Broken family set up; (vi) Environmental influence; (vii) Low job satisfaction and morale; (viii) Tasks involving strenuous physical exertion; (ix) Perpetuating influences ; (x) Feelings of depression and stagnation; and (xi) Feeling of isolation and loneliness. A counsellor's job is not easy as far as an alcoholic is concerned.

One or a few counselling sessions may not yield any considerable effect. However, a sincere effort on the part of an executive-counsellor may help an alcoholic employee, at least in the long-run. Some medical intervention may also be helpful along with counselling.

**THE PROBLEM OF ADDICTIONS****NOTES**

Another important employee problem which deserves counselling is addictions. Addiction is a very dangerous problem which torments the social and work environment of today. Drug addiction has gone beyond proportions among youngsters now-a-days. Not only drug addiction, many people are addicted to alcohol, pornographic materials, television, sexual immorality, smoking, compulsive spending, overeating, gambling, and so on. There are some people who are addicted to earning money and amassing wealth by hook or by crook. There are workaholics who have addiction to work, due to which there are many broken families in the urban society.

Addiction is any habit, practice, behaviour or even thinking which is habitually or compulsively attached to a person, which exerts more and more control and power over him. There can be many causes for addiction; some of which are : (i) Inadequate parental care; (ii) Broken family atmosphere; (iii) Bad company; (iv) Peer or other social influence; (v) Feeling of emptiness in life; depression or stresses; (vi) Low self-esteem and deception; and (vii) Psychological problems.

Both drug addiction and alcohol abuse involve behaviour change, physical deterioration, family stresses, financial problems, career destruction, increasing psychological disintegration, lawlessness and so on. Addiction affects both the victim and his family.

Even the psychologists and counsellors may exhaust and drain themselves out by constant pressure of dealing with addicts. Hence, it is not an easy task for executives to deal with such cases. However, very tactful approach on the part of the executives and managers may make a considerable effect in helping them if they act in time. "A stitch in time saves nine."

**MENTAL CONFLICT IN UNION RIVALRIES**

In recent times, there are many employees who lose their confidence, mental peace, job satisfaction and productivity due to union rivalries. Many right thinking and unattached employees become the victims of such rivalries. Some militant trade union leaders and their henchmen even manhandle assault and ill-treat such employees. Their legitimate promotions and claims are blocked by such trade unionists. Sometimes even management becomes helpless in doing justice to such employees due to the obstructions and resistances created by such union leaders.

In such situations victims are bound to be disappointed, disgruntled and aggrieved resulting in depression and stress. Executive counsellors and human resources executives have great role to play in rebuilding the personality and career through counselling and timely intervention. They can be recovered, and

revitalized through counselling and timely guidance. They can then be exposed and developed through training followed by redeployment and a change in placement.

### ***BREAKDOWN IN INTERPERSONAL RELATIONSHIPS***

### **NOTES**

Breakdown in interpersonal relationships is another important problem which creates low morale and depression in work-life which deserves timely intervention and counselling. There are many stress situations in one's work life. Organizational causes of stress are occupational demands, role conflict, role ambiguity (stress from uncertainty), stresses from overload and under load, responsibility for others, stresses from evaluation, poor working conditions, unwanted changes, and such other factors lead to personal stresses. Interpersonal stresses make more impact in work life.

Strains and breakdowns in interpersonal relationships have direct relationship with individual stresses. When cordial relationships exist in the work place, impact of other stresses may get effectively tackled. But when stresses from strained interpersonal relationship in the work environment increase, the individual's effectiveness, balance and productivity can get affected. In all such occasions, counselling and guidance would become necessary to help the individual to control his problem emotions and sustain himself to be effective in the group.

### ***LOW JOB SATISFACTION AND MORALE***

Another important cause which affects the human behaviour in organization is low job satisfaction backed by low morale. Low job satisfaction leads to low morale and vice versa. According to Kolasa, "morale and job satisfaction are closely tied to the basic concepts of attitudes and motivation". Katz and associates have identified four measures of general job satisfaction *viz.*, (1) Pride in work group; (2) Intrinsic job satisfaction; (3) Company involvement; and (4) Financial and job status satisfaction.

Wages have been found to be the basic determinant of job satisfaction. However, once the monetary needs are considerably met by the wages, other aspects like self-actualization, fulfillment, working conditions, security of employment, prestige, agreeability of the job, group cohesiveness, expertise, etc., also determine the job satisfaction. Some researchers (for example Hoppock) have thrown light on the positive relationship between occupational level and job satisfaction. Accordingly to Morse, job satisfaction has a considerable relation with the promotion possibility. Superior-subordinate relationship and cooperative and affectionate attitude and approach of the superior may also influence the job satisfaction level of the subordinates, though much empirical work has not been done in this area.

**NOTES**

Low job satisfaction and low morale must be tackled at the root. Immediate supervisor or superior may first come to know about the problem in his subordinate and initiate timely and sincere counselling efforts. At times, assistance of professional counsellors can be sought. Every manager must make up his mind to nip in the bud all such problems which adversely affect job satisfaction and morale with the help of skillful counselling.

***BREAKDOWN IN FAMILY LIFE***

Every individual, rich or poor, has to face many family problems, some of which can seriously affect the peace of mind, happiness, achievement motivation and efficiency. Those who have broken family lives and serious family problems may possibly become unsuccessful in their work life too. Very often problem which affect the family life can convert a good employee into a problem employee. Studies have already proved that some alcoholics and drug addicts are the products of broken families. In fact, breakdown in family life very often affects the work life.

Hence, if such employees are provided with ways to release their tension, their efficiency can be improved. Counselling is of great importance in such cases once such employees can be brought to proper track with the help of counselling, their personality, behaviour and performance can be improved with the help of exposure in training, T-group formation, etc., so that better sense of cohesion and commitment to organization can be ensured.

**5.13 SUMMARY**

- Counselling has been practiced in one form or other since the evolution of mankind. In every field which requires dealing with people, counselling is essential. Counselling is a dyadic relationship between two persons; a manager who is offering help (counsellor) and an employee whom such help is given (counselee).
- It is required of every manager to help his subordinate in the free exploration of his strengths, abilities, competence, interests and other related positive features.
- In nondirective counselling, the employee is permitted to have maximum freedom in determining the course of the interview. It is the process of skillfully listening and encouraging a counselee to explain troublesome problems, understand them and determine appropriate solutions.
- A manager has to deal with various types of problems in dealing with his subordinates, employees and particularly problem employees. Basically no employee is a problem employee, except hereditary and inborn perversions, criminal tendencies, addictions, and nervous and psychological breakdowns.

## **5.14 REVIEW QUESTIONS**

1. What is counselling?
2. What are the primary objectives of counselling in an industry?
3. What are the basic characteristics of counselling?
4. How is employee counselling conducted?
5. What are the principal features of effective counselling?
6. Discuss the major problems taken up while counselling an employee.

## **5.15 FURTHER READINGS**

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## **NOTES**





