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Title: FIRST-LINE SUPERVISOR COMPETENCIES IN OREGON MANUFACTURING INDUSTRIES AS IDENTIFIED BY THREE EMPLOYMENT LEVELS

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Purpose of the Study

The purpose of this study was to identify common competencies needed by first-line supervisors as perceived by three levels of employment: first-line supervisors; management personnel; and workers with no supervisory responsibility. Two other purposes were to (1) determine the major clusters, and (2) determine if differences existed among the three levels of employment and the degree to which their responses varied.

Methods

A survey questionnaire of 35 competency statements was constructed and validated through the Delphi technique and field tested. Instruments were distributed to participating firms randomly drawn from the Directory of Oregon Manufacturers.

A one-way analysis of variance was applied for analysis of data and hypothesis testing. The Student-Newman-Keul's test was used

where appropriate. R-mode Factor analysis was used to cluster competencies.

Findings and Conclusions

The one-way analysis of variance indicated that no differences existed in 19 of the 35 competencies.

An eight(8) factor solution generated 31 competencies with factor loadings of +.48 or higher.

As a result of findings, the following conclusions were drawn:

1. Thirteen competencies attained mean values at or above 4.0 and were considered required items for first-line supervisor training program content; nine (9) competencies reached mean scores of 3.5 to 3.99 and were recommended elements; 11 competencies with mean scores of 3.0 to 3.49 should be suggested items; and the remaining three (3) competencies with mean values below 2.8 should be optional inclusions.
2. Those competencies selected as needing the most emphasis related to communications and the functions of management. These were also areas where most agreement occurred among all groups.
3. More differences existed between first-line supervisor scores and management personnel scores than existed among other groupings.

Recommendations

1. This study should be replicated using additional and more detailed competency statements, and include demographic characteristics of subjects.
2. The clusters of competencies should provide a framework for developing curriculum for first-line supervisor training programs.
3. The 13 competencies with highest means scores were considered the most important and should be incorporated in training program content.

First-Line Supervisor Competencies in Oregon Manufacturing Industries as Identified by Three Employment Levels

by

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"I can do all things through Christ which strengthens me."

Philippeans 4:7

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I. INTRODUCTION

First-line supervisors in industry and commerce are a significant force in the American economy. The industrial revolution, with its division of labor, mass-production technique, and its accelerated mechanization, have contributed to the complexity of the supervisor's role (Bittel, 1980). In the past, a good supervisor was an individual who could understand the job requirements and had the ability to work with other employees. The expanded role of the modern supervisor requires training and education in management skills and techniques, in addition to job knowledge and the ability to work with other employees (Eckles, 1975).

BACKGROUND STATEMENT

The federal laws of the United States provide two definitions of a supervisor. The Taft-Hartley Act of 1947 defines a first-line supervisor as any individual having authority, in the interest of the employer, to hire, transfer, suspend, layoff, recall, promote, discharge, assign, reward, or discipline other employees, or responsibility to direct them, adjust their grievances, or effectively to recommend such action, if in connection with the foregoing exercise of such authority is not of a merely routine or

clerical nature, but requires the use of independent judgment.

The Fair Labor Standards Act of 1938 (a Minimum Wage Law) specifies that supervisors must spend no more than 20 percent of their time doing the same type of work as the employees they direct. It also stipulates that supervisors be paid a salary rather than an hourly wage. This latter provision makes supervisors exempt from overtime pay. The thrust of these two laws was to make the supervisor a part of the management scheme.

Most supervisors do not begin on a management level, but rise from the ranks of the organization in which they serve. Typically, they are long-service employees. They have greater experience, have held more different jobs in the organization, and have significantly more education than do the men and women they supervise. Usually it is apparent that supervisors are chosen from among the best and most experienced employees in the organization (Northrup, 1978).

The job of supervisor is so demanding that higher management seeks well-qualified individuals to fill the role. Many organizations establish criteria against which supervisory candidates are judged. These qualities include: leadership potential, technical competence, initiative, and the ability to get along with others (Northrup, 1978). Adequate numbers of qualified individuals are not always available; in fact, many firms have difficulty finding persons who measure up to the supervisory criteria they have established. Fortunately, however, many of these attributes can be

acquired or improved through supervisory training and development programs (Bittel, 1980).

The new supervisor has crossed from one way of thinking to another. As an employee, an individual's concerns are with self-satisfaction in terms of pay and the work itself. As a manager, this same person is expected to place the organization's goals above all other job-related concerns. The supervisor must meet quotas, quality, and cost standards above all else, then be concerned about the employees who do the work; and, finally, consider himself.

The new supervisor has usually spent time and effort reaching the top of the employee ranks. Now the individual must cross over to a new field of achievement, namely management. For many, however, it will be the beginning of another long climb, this time to the top of the management heap (Benson, 1978).

Keith Davis has likened the role of supervisor to a keystone in the organizational arch.

> The keystone takes the pressure from both sides and uses this pressure to build a stronger arch. The sides can be held together only by the keystone, which strengthens, not weakens the arch. The keystone position is the important role of supervisors in organization. (Davis, 1976)

The supervisory role is most successfully performed when certain key qualities or competencies are present (Culbertson and Thompson, 1980; Barr, 1980; Braun, 1979; and Calhoun and Jerder, 1975). These include: intelligence, creativity, initiative and leadership potential (DeLong, 1977).

Research indicates that most first-line supervisors view the technical aspects of their jobs as more important than the human relations aspect (Stogdill, 1974).

Too often first-line supervisors are placed in a position of responsibility with absolutely no training or experience managing people. In many cases, no basic courses on motivation, leadership, or supervisory methods are made available. First-line supervisors are not aware that people are their most important resource (Culbertson and Thompson, 1980).

Labor and industry agree the first-line supervisor must undergo appropriate training and experience in order to meet the high performance standards of the supervisory position. However, before manufacturing organizations can properly develop first-line supervisor training programs, empirical data regarding the identification of common competencies (a characteristic) must be readily available. The present study was designed to inquire into the process of developing such programs by focusing on the identification of common supervisory competencies in Oregon manufacturing industries.

THE PROBLEM

The central problem of this study was the identification and validation of selected competencies of first-line supervisors in manufacturing industries in Oregon. From these competencies, a base for supervisory training programs can be established.

Steps in the Solution of the Problem

The steps taken to solve the problem were:

1. Develop a basic list of competencies from various studies (Culbertson and Thompson, 1980; Barr, 1980; Braun, 1979; Calhoun and Jerder, 1975) and additions suggested by Pat Wells, Professor of Business, Oregon State University, and by the local business community.
2. Construct a survey instrument to determine the acceptance of content and level of importance for emphasis in training program development.
    a. Using the list of competencies, develop an instrument to measure their content acceptance and level of importance of each competency.
    b. Present the list to a jury of experts for evaluation of content, coverage, clarity, and format.
    c. Conduct a pilot study to test the instrument.
    d. Revise the final instrument based on the results of the pilot study.
3. Administer the final instrument to a random sample of manufacturing firms in Oregon as drawn from the Directory of Oregon Manufacturers.
    a. Three levels of personnel were tested in each firm: first-line supervisors, management personnel, and workers with no supervisory responsibility.

4. Factor analyze the data to determine the underlying pattern of relationships by condensing the listed competencies into a set of factors for simple interpretation.
5. Analyze the data by mean score comparison and ranking, and a one-way analysis of variance.
6. Formulate recommendations and implications to be considered in the development of supervisory training programs.

IMPORTANCE OF THE STUDY

Organizations are recognizing the first-line supervisor as a vital and integral part of the management team. Additional authority is being delegated to this key position in order to increase the organization's efficiency. As a result, a new and more challenging role for the contemporary supervisor is emerging.

In taking on the new responsibility of the position, the modern supervisor must develop, enhance, and update skills in dealing with people as well as the technical aspects of the job. Regardless of the technical specialties of particular organizational conditions that may exist, there are managerial aspects which are common to every supervisory position. However, in many organizations, supervisory training and development in management have not kept pace with technical and scientific progress and change (Haimann and Hilgert, 1977). Increasingly, higher management is becoming aware of the need

for capable, knowledgeable and broadly trained supervisors who are able to manage their departments competently and efficiently.

Studies have been conducted which include first-line supervisors, second-line supervisors, and management personnel. Few studies have been conducted to compare the response of the employee who has had no supervisory responsibility. This study provided the importance level of thirty-five (35) competencies being proposed for inclusion in first-line supervisor training programs.

The development of supervisory training programs is necessarily constrained by the available time devoted to training. The most important concepts need to be identified and recommended as necessary for inclusion in all programs. The present study provided data for recommending competencies by priority of importance level.

a. Companies vary in their selection of competencies. This study was developed to assist personnel departments in meeting first-line supervisors' needs in training.

b. Although it is recognized that every manufacturing firm may place varying emphasis on the learning competencies for supervisory training, the study has been structured to identify the most important competencies for any first-line supervisor, as well as offer a range of alternatives in designing a training program specific to one company.

c. Training program goals are developed according to company goals, which in turn affect supervisory competencies. By validating the importance of supervisory competencies, a

potential exists for acceptance of essential, common competencies.

Before 1975, most training content and evaluation was purely subjective and not substantiated by data (Strong, 1975). More recent studies have examined the organization perception of the training needs of the first-line supervisor. However, these have only emphasized upper managements' reaction (Culbertson and Thompson, 1980; Braun, 1979; Calhoun and Jerder, 1975).

The present study developed a compilation of empirically derived information leading to a list of first-line supervisor competencies. This provides useful information for current and innovative efforts of supervisory training. The results add to the knowledge necessary for design, development, and implementation of curriculum content, performance objectives, and training strategies that will improve the extent and quality of first-line supervisor training.

ASSUMPTIONS

The sampling was directed to first-line supervisors, management personnel, and workers with no supervisory responsibility from randomly drawn Oregon manufacturing firms. The conclusions are based on the assumptions that:

1. The respondents were a representative sample of the population of which they were a part, and that the sample was adequate to justify wide applications of the findings.
2. The responses given were valid so far as the total group was concerned.
3. Companies that responded were no different than those who failed to respond.

DEFINITION OF TERMS

The following definitions were included for purposes of standardizing the use of terms in the study. Other terms or phrases used were considered to be self-explanatory.

Analysis of Variance has as its objective, the identification of independent variables which affect the response (or dependent variable). This procedure partitions the total variation into a set of data according to the various sources of variations.

Common Variance is defined as the sharing of variance by two or more elements. In such a sharing, the elements are highly correlated and measure some trait in common.

Competency is the specific ability or capability needed to perform a particular duty or action.

Factor is a matrix of competencies whose intercorrelations are positive or negative (with factor loadings of +.48 or higher for this study). A factor is also referred to as a cluster.

Factor Analysis is a statistical method which consists essentially of (1) giving a rather large number of tests (competencies) which are presumed to measure some aspects of the general trait (first-line supervisor training) and which will represent a wide range of elements that might enter into the trait; (2) evaluating inter-correlations among these tests (competencies) to find those which tend to measure the same element or factor; (3) deducing what this trait measures in common.

First-Line Supervisor - An individual in the first level of management having authority and responsibility for getting employees to carry out the plans and policies of higher level management.

Manager, Facilitating Services (any industry) - A term applied to workers in industrial organizations who plan, organize, and direct overhead services, such as employment, public relations, and safety. Classifications are made according to work performed as MANAGER, EMPLOYMENT (professional and kindred occupations); PUBLIC-RELATIONS REPRESENTATIVE (profess. & kin.); SAFETY ENGINEER (profess. & kin.).

Proficiency--The level or degree of expertness required in the performance of a professional education competency.

R-technique--A factor analytic method which examines the relationship of every competency with every other competency and provides for a clustering of common competencies. The technique orders competencies. The literature frequently refers to the R-technique as the R-mode.

Supervisor--Any industry boss; chief; head; leader; manager; overlooker; overseer; principal; section chief; section leader. Supervises and coordinates activities of workers engaged in one or more occupations. Studies production schedules and estimates worker-hour requirements for completion of job assignment. Interprets specifications, blueprints, and job orders to workers, and assigns duties. Establishes or adjusts work procedures to meet production schedules, using knowledge of capacities of machines and equipment.

Recommends measures to improve production methods, equipment performance, and quality of product, and suggests changes in working conditions and use of equipment to increase efficiency of shop, department, or work crew. Analyzes and resolves work problems, or assists workers in solving work problems. Initiates or suggests plans to motivate workers to achieve work goals. Recommends or initiates personnel actions, such as promotions, transfers, discharges, and disciplinary measures. May train new workers. Maintains time and production records. May estimate, requisition, and inspect materials. May confer with other SUPERVISORS (any industry) to coordinate activities of individual departments. May confer with workers' representatives to resolve grievances. May set up machines and equipment. When supervising workers engaged chiefly in one occupation or craft, is required to be adept in the activities of the workers supervised. When supervising workers engaged in several occupations, is required to possess general knowledge of the activities involved. Classifications are made according to process involved, craft of workers supervised, product manufactured, or according to industry in which work occurs. Classifications are made according to workers supervised.

Task - The specific responsibility and action that takes place as an employee fulfills the demands of one's position.

II. THE RELATED LITERATURE

The review of literature focused on five (5) areas pertinent to this study: (1) training and development research, (2) the Delphi technique, (3) factor analysis, (4) instrumentation design, and (5) analysis of variance.

The future holds an increasing challenge for supervisors who are capable of managing in more complex situations. Higher management is acutely aware of the need for capable, knowledgeable, and broadly trained supervisors (Haimann and Hilgert, 1977).

TRAINING AND DEVELOPMENT

The need for an upgraded quality of supervision was demonstrated in a study reported by Doud and Miller (1980). The significance of the supervisors' influence over employees and their perceptions of the work environment was clearly shown. The scope of the study was quite broad, and resulted in the implementation of specific supervisory training.

Calhoun and Jerder (1975) investigated the training needs of first-line supervisors. The results provided strong evidences of the need to approach training by examining and fostering supervisory skills at all levels of management, especially the first-line supervisor level.

A needs analysis was conducted in the Department for Human Resources of Kentucky to determine supervisory training needs

(Culbertson and Thompson, 1980). First-line supervisors and middle managers indicated the degree of need they felt existed for supervisory training. As a result of this analysis, training curriculum was determined for first-line supervisors.

The Bell System took the Culbertson-Thompson study one step further. Generic managerial skills were investigated and performance deficiencies diagnosed. This led to a more accurate design of training curricula (Barr, 1980). The training program was eventually implemented within the company.

Braun (1979) investigated supervisory training needs to determine their effectivenss. The study involved a task analysis of the first-line supervisor. As a result, an extensive list of knowledges, skills, and abilities particular to the first-line supervisor was developed. The list was utilized as the basis for determining training needs.

The International Labour Organization conducted a study during the 1970's that spanned numerous countries. Its objective was to identify the principle supervisory development problems. The project ultimately determined a training and development policy to reduce the gap between real and desirable competence of first-line supervisors. The study illustrated the conflict of expectations that supervisors must integrate into their performance. The results recommended further analysis of supervisory functions and job methods in order to supply precise information in designing supervisory training and development curricula. The study stressed the need for

education and training to expand supervisory knowledge and skills to match the ability required (Prokopenko and Bittel, 1981).

The cited studies point out that industry has identified the need for first-line supervisor training programs. They also suggest attaining practical and meaningful training curricula by working closely with the first-line supervisors. Rapidly developing technology and increasing responsibilities of the first-line supervisor position demand precisely designed training programs to maximize training effectiveness.

Delphi Technique

The Delphi technique is a method of assessing group opinion by individuals, through responses to a number of successive questionnaires rather than through group meetings. The Rand Corporation, under the direction of Olaf Helmer and his colleagues, developed the Delphi method in the 1950's. The basis of the Delphi method is expert, informed intuitive judgment. This is accomplished without face-to-face group meetings (Helmer, 1966).

To increase the credibility and accuracy of a testing outcome, specialists or experts in the designated field should optimumly be used, with each opinion carrying the same weight of decision.

The approach provides a more objective means to (1) assess the range of ideas about goals and objectives, (2) give priority ranking

to these goals and objectives, and (3) establish the degree of consensus about the goals and objectives (Hostrop, 1975).

The Delphi technique was developed as a means of circumventing potential problems associated with group opinion. The Delphi procedure as described by Hostrop is as follows:

1. Participants are asked to respond to prepared questionnaires (example: future predictions, activities).
2. Participants evaluate their statements against a stated criterion.
3. The investigator receives statements.
4. Participants receive a refined list from the investigator, which includes a summary of responses. Participants may be asked to revise prior opinion.
5. The investigator receives statements, and examines them for clarity. The responses are then summarized.
6. Participants receive a refined list that is inclusive of a current summary of responses and a summary of minority opinions. Revision of a participant's opinion is optional at this point.
7. The investigator summarizes all opinions into a final report.

The Delphi process, soliciting opinions and examining opposing responses from other participants, is designed to minimize misinterpretation of the questions and feedback. This technique attempts attainment of a factual consensus of expert opinion while

avoiding the common opinion of small groups and the diffused opinions usual in larger groups.

The Delphi technique provides a means for forecasting the future as well as investigating history. It is also used for evaluating organizational conditions, goals, and objectives.

Hostrop contends the Delphi technique can be used successfully in forecasting future curricular developments which would affect training programs, enrollments, and evaluation of programs.

Stamps (1980) used this method to assess the expert opinion of competencies for personal finance teachers in Oregon. A modification of this technique was employed by Bittel (1981), Barr (1980), and Braun (1979) in their respective studies of first-line supervisor competencies.

Factor Analysis

The application of factor analysis is varied, with three primary uses: (1) exploratory uses--viewing of variable patterns for detection of new concepts and reduction of data, (2) confirmatory uses--testing of hypothesis and, (3) measuring device uses--constructing indices for use as variables for further study and analysis (Kim, 1975; Cattell, 1952).

Factor analysis is a method for determining the number and nature of the underlying variables among larger numbers of measures.

It is a method for extracting common factor variances from sets of measures, according to Kerlinger (1973).

Kim has a similar understanding of factor analysis and states:

> Given an array of correlation coefficients for a set of variables, factor analytic techniques enable us to see whether some underlying pattern of relationship exists such that data may be rearranged or reduced to a smaller set of factors or components that may be taken as source variables accounting for the observed interrelations in the data (Kim, 1975).

While terminology of definitions may vary slightly, the uses of factor analysis are widely accepted as valid statistical tests for application to behavioral data for research problems (Kim, 1975; Kerlinger, 1973; Cattell, 1952).

Industry has used factor analysis for the purpose of clustering competencies in training programs. Another area of emphasis has been vocational education, with a direct application of task analysis. Gunderson (1971), Lindahl (1971), and Miller (1971), conducted studies at Oregon State University to determine professional educational competencies needed by community college vocational instructors. One dimension of their studies was the application of factor analysis to data with the purpose of extracting factors into common clusters of competencies which are needed by vocational instructors. In each of the studies the sample consisted of 40 community colleges and 160 participants in California, Colorado, Oregon, and Washington.

The factor analysis R-mode yielded five groupings in Miller's study, five groupings in Lindahl's study, and four in Gunderson's.

It was concluded that it is possible for factor analysis to "generate factors containing clusters." Gunderson (1971), Lindahl (1971), and Miller (1971), also applied the Q technique of factor analysis, which determined that vocational community college instructors resembled one another in relation to education competencies. These studies determined the needs and proficiency requirements of a specific group.

Braun (1979) conducted a study to determine the identification and validation of competencies needed by first-line supervisors of the Civil Service Commission within a national forest in California. A list of 37 competencies, divided into two questionnaire forms, was responded to by 30 of the sample group, representing a 63 percent return rate. One dimension of the study was to conduct a factor analysis using the R-mode to cluster the 37 competencies; 37 competencies merged into seven factors: Planning; Directing; Problem Solving and Decision Making; Communication; Training; Hiring; and Performance Review. Out of the 37 competencies, the highest priority listed by the first-line supervisors was to conduct OJT (on-the-job training) effectively. The second-level supervisors identified "effective time use" as a critical competency. Based on the results of the study, Braun made the recommendation that identified clustered competencies be used for planning the conceptual structuring of a competency based training program for the first-line supervisor.

Barr (1980) conducted a study investigating the generic managerial skill needs of newly appointed first-line supervisors. A

sample of 460 first-line supervisors were included in the study. A factor analysis resulted in identifying 14 factors: Career Counseling; Coaching; Communication; Controlling; Create and or Maintain a Motivative Atmosphere; Feedback; Formal Oral Communication; Informal Oral Communication; Knowledge of Company; Planning; Problem Solving; Self-Development; Time Management; and Written Communication. These 14 factors were viewed as deficiencies. In order to determine the criticality of taking remedial action within each factor, a formula was used that translated data related to eight factors into a common mathematical language for each of the 14 previously stated factors. These could then be given ranks based on a comparison of the eight factors.

The formula gave each of the 14 factors a possible total weight ranging from zero points (least important to address) to 48 points (most important to address). The analysis of the 14 factors gave specific guidance for appropriate curriculum planning.

Instrumentation Design

Various studies have been conducted in an effort to validate competencies associated with industrial training programs. The methods most commonly reported in research studies are the analysis of documents for the purpose of identifying and developing competencies; review by a jury of experts for the purpose of identifying and developing competencies; review by a jury of experts

for the purpose of modifying and validating competencies; and development and dissemination of a questionnaire utilizing an ordinal or continuum scale (Likert-type), for the purpose of gathering data from a sample of a population for statistical analysis.

In the study by Barr (1980), several steps were used to validate competencies needed by first-line supervisors. A task force of subject matter experts was appointed. This group constructed a "mastery model" detailing sequential steps of skills and knowledge of the management process and administered a diagnostic test to measure the actual performance of the target population against the mastery model. The first draft of the mastery model was submitted for critique to a group of subject matter experts who endorsed, added and deleted items. Two groups were tested: supervisors who were considered master performers and supervisors who were newly appointed. The final diagnostic test and mastery model were sent to outside consultants for assessment of the test's content validity. Reliability testing continued until less than a .05 difference was reached. The analysis of test scores provided 14 factors to be used in the determination of supervisory training needs. The competencies were ranked according to priority need.

Braun (1979) worked to develop a system which would identify appropriate training experiences based on a careful assessment of supervisory competency needs. After gaining top level managerial support, nine second-level supervisors conducted a task analysis of the first-line supervisor. As a result of the task analysis, an

extensive list of knowledges, skills, and abilities was developed. The questionnaire was based on 37 supervisory/management competencies. These were grouped into seven clusters through "arbitrary choice" as defined by Cattell (1952). The respondents were asked to determine the degree of importance on a 5-point scale (1=least important and 5=most important) and to indicate whether or not they perceived a need for training in each competency. A draft of the questionnaire was sent to a subject matter specialist for review. The sample consisted of 18 respondents (first-line supervisors) and 12 respondents from their supervisors. The 5-point scale was treated as ordinal data. The competencies were ranked according to percentiles based on the median scores to identify those of greater or lesser importance as perceived by respondents.

Culbertson and Thompson (1980) developed a questionnaire to determine content for a first-line supervisor training course. Twenty-three items were available for selection as possible training needs for first-line supervisors. The supervisors and middle managers indicated the degree of need they felt existed for training in each skill listed. There were three columns for selection: great need, some need, and little need. Analysis was based on a numerical value assigned to each judgment (great need was assigned a 3, some need was given a 2, and little need a 1). Each item was ranked in order of degree of need. A mean average was also calculated for each item. The survey was randomly distributed to 400 of a possible population of 12,000. The response rate was 78 percent. The content

indicated as being needed or desired was recommended for inclusion in first-line supervisor training courses.

Analysis of Variance

The analysis of variance technique treats all data concurrently and a general hypothesis of no difference among the means of the groups is tested. If the groups tested are random samples from the same population, the two variances within and between, are unbiased estimates of the same population variance (Downie and Heath, 1974).

In three studies of competencies needed by vocational instructors, Gunderson (1971), Lindahl (1971), and Miller (1971) developed 95 competency items through a literature review using an instrument previously developed through a research procedure by Halfin and Courtney (1970) as the foundation. These competencies were subjected to a seven member (Gunderson), ten member (Miller), and five member (Lindahl) jury of experts for evaluation. A questionnaire containing 99 compentencies was field tested on 21 instructors. After some revision, the instrument was sent to 160 participants from 48 institutions in California, Colorado, Oregon, and Washington. In addition to the factor analysis, the data were subjected to a one-way analysis of variance using the F-statistic. It was applied to each of the hypotheses, one for each competency. Out of the 99 tests, only one null hypothesis was rejected in Gunderson's research, three in Miller's study, and three in Lindahl's study. The investigators

recommended their methodology be replicated in further studies of competencies and curriculum development.

Stamps' study (1980) followed a similar procedure. She used a modification of an instrument already devised. A five-point Likert scale for content acceptance and hierarchial structure of Personal Finance competencies. The instrument was tested with a pilot group. After minor revisions, the instrument was sent to educators and business persons. The data were factor analyzed.

Calhoun and Jerder (1975) studied first-line supervisor competency needs to determine content for training courses. A sample of 1521 employees was asked their views on first-line supervisor training needs. The employees were separated into two groups according to employment level. A one-way analysis of variance indicated significant differences (at the .01 level) in the rating of importance level between the groups in 13 of the 56 competencies. Factors emphasized by second-level supervisors dealt with supervisory relations with subordinates or superiors, whereas factors emphasized by first-line supervisors covered largely techniques or information.

SUMMARY

The philosophical as well as practical views of education and industry impact training programs. All aspects of learning applied in an educational institution should be applied as well in an industrial setting. Research reveals that statistics have been

useful in defining competencies relevant to industrial training programs. Populations who are knowledgeable of the subject matter were used to analyze and to recommend suggested competencies for curriculum decision making. Additionally, factor analysis has proven to be a useful and effective tool in determining curriculum structure for content, organization, and inclusion. The use of various statistical tools to analyze success in training program curriculum has made it apparent that participant progress is not consistent and further research needs to be done in this area. It may be concluded that the content in training programs generally focuses on the practical application of skills and knowledge. It is evident that the emphasis on content varies according to industry, the perceived need, and the dissemination process. Thus, the inconsistency of industrial training program content and participant progress affects the specific business as well as societal productivity. Empirical studies should be conducted regularly for the purpose of creating effective training programs. This should be of major concern to business and industry.

III DESIGN OF THE STUDY

The study was an empirical investigation of first-line supervisory competencies to provide information for the design and development of curricula in industrial training. The procedures that were followed throughout this study are presented in this section under five major topics: 1. Preparation of the Instrument, 2. The Dependent Variable, 3. Selection of the Sample, 4. The Statistical Design, and 5. Collection of the Data.

PREPARATION OF THE INSTRUMENT

The development of the questionnaire was accomplished by a review of related literature on professional education competencies and industrial supervisory training.

The instruments developed by Barr (1980), Culbertson and Thompson (1980), Braun (1979) provided the base for the first-line supervisor questionnaire. The format was revised to meet the needs of this study. Each item was checked to determine its appropriateness to industrial training needs, and items which appeared to be redundant or inappropriate were deleted. An initial questionnaire containing 45 items was developed.

The questionnaire was presented to a jury of experts for the purpose of establishing validity of the instrument. Each of the seven members (Appendix A) was asked to evaluate it in relation to format, content, clarity, and comprehensiveness. The composition of

the committee included representatives from business and industry as well as education. The members were initially contacted by telephone and the instrument and cover letter were forwarded at a later date. The "Jury of Experts Revision Form" used by the members of the jury is found in Appendix B.

After the jury evaluated the questionnaire, suggestions and recommendations were compiled and reviewed with graduate committee members. Several items were revised for clarity; some items were deleted. The changes resulted in a one-page questionnaire containing 35 competencies.

The instrument used in this study was a mail survey questionnaire containing 35 first-line supervisor competencies, together with a five-point Likert scale which enabled the respondent to judgmentally score the level of importance necessary for each competency. Recent studies utilizing the mail survey technique in vocational education and business have been conducted by Stamps (1980) and Braun (1979).

The third step was to field test the questionnaire. Eighteen employees from a random selection of local businesses were asked to complete the questionnaire. They were asked to identify any competencies which were not clear or which were difficult to understand. Following the field-test phase, minor revisions were made prior to the preparation of the final draft of the instrument. The instrument used in the study is found in Appendix C.

THE DEPENDENT VARIABLE

The dependent variable in the study was the score assigned by respondents to each competency item indicating perceived importance to first-line supervisor training. Respondents, representing first-line supervisors, management personnel, and workers with no supervisory responsibility from a random selection of Oregon industry, were asked to evaluate the importance of each competency, based upon their own experience. Each of the 35 competencies was assigned a score for importance based upon the following Likert-type scale: 1. Least Important, 2. Slightly Important, 3. Important, 4. Very Important, and 5. Extremely Important. A copy of the instrument is included in the Appendix.

SELECTION OF THE SAMPLE

The population from which the sample was drawn consisted of persons employed in Oregon industry. Identification of participant companies was made using the Directory of Oregon Manufacturers 1981 provided by the Oregon Department of Labor. A random selection was conducted including firms of 200 employees or more, using a table of random numbers (Downie and Heath, 1974), in order to obtain the initial participants. Of the 30 contacted, six consented to participate in the study.

A contact person was identified in each of the six companies involve, and was asked to distribute the questionnaire to all company

employees. Questionnaires were returned at variable rates, and acceptance was made of 351 usable responses.

THE STATISTICAL DESIGN

The major focus of this study was to determine the needed competencies for first-line supervisors in Oregon industry. This section describes the statistical procedures used to test the hypothesis of the study, which deals with differences of opinion among respondents about the importance of content for each competency.

The population for the study consisted of employees within the manufacturing industry in the state of Oregon. A random sample of six companies provided 351 employees who, in turn, provided data by completing and returning a 35-item questionnaire distributed through each company.

Respondents were asked to react to each of the 35 competencies in the questionnaire by recording the level of importance required for inclusion in a first-line supervisor training course. The responses were recorded on a five-point Likert-type scale. Response values ranged from a low of 1.0 to a high of 5.0. Means for level of importance were computed by assigning a weight of 5 to "Extremely Important," 4 to "Very Important," 3 to "Important," 2 to "Slightly Important," and 1 to "Least Important."

There was an interest in learning if differences existed among groups (levels of employment) on the competency mean scores for level of importance. The hypothesis tested in this study was that there is no significant difference among the three levels of employment (first-line supervisors, management personnel, and workers with no supervisory responsibility) responding to the questionnaire.

$$H_o : \mu_1 = \mu_2 = \mu_3$$

The one-way Analysis of Variance was applied to each of the 35 competencies for the level of importance. For testing the hypothesis, the one factor, fixed effects design utilized the mathematical component model suggested by Gaito (1973).

$$Y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

where

μ = is a fixed constant.

α_i = is a differential effect associated with factor one.

ε_{ij} = is a random variable with NID $(0, \sigma^2)$.

Table 1 shows the Analysis of Variance arrangement (Fixed Model) used for this study.

TABLE 1. Analysis of Variance Layout (Fixed Model)

Source of Variation	df	SS	MS	F
Between	2	A	A/2	$\frac{MS_A}{MS_B}$
Error (Within)	348	B	B/348	
TOTAL	350	C		

The F statistic was utilized to test for significance among means. The .05 level of significance was selected as the basis for acceptance or rejection of the null hypothesis.

When the F test indicated significance at the .05 level, the Student-Newman-Keuls' procedure was used to ascertain individual mean differences. The Student-Newman-Keuls' is a multiple comparisons test which has the advantage of simplicity and applicability.

Data were factor analyzed through the use of the R-mode. The R-mode was used to condense the large number of competencies into a few interpretable factors for level of importance. Based on the responses for the level of importance the factor matrix was computed in three major steps:

1. Correlation coefficients--computation of the correlation coefficients for all possible pairs.
2. Principal components--extraction of the initial factors.
3. Varimax rotation--rotation to a terminal solution.

This form of analysis examined the relationship of every competency with every other competency and provided for a clustering of the common first-line supervisors' competencies.

COLLECTION OF DATA

Several steps were involved in the collection of data. Because of the implications this study could have for curriculum development in first-line supervisor training programs, vocational education, and extension education, Oregon State University contributed support and assistance in the collection of the data. Support was provided in the form of printing the questionnaire, supplying envelopes and postage for the study.

A representative of each of the six businesses selected for the study was contacted by phone as well as letter and asked to encourage participation by employees. The instrument, together with the cover letter and return envelopes, were mailed or hand delivered to the companies. The cover letter, shown in Appendix E, explained the purpose of the request and the use to be made of the data collected.

No follow-up was necessary, as all companies were prompt in returning the questionnaires.

The final step in the collection of data was to check each questionnaire for completeness and clarity of markings before the key punching of the data. The data from each of the 351 questionnaires were key punched and verified by the staff at Oregon State University Computer Center.

IV. PRESENTATION OF FINDINGS

The analysis of data collected for the study have been presented in three sections. The first section explains the Analysis of Variance techniques which tested for differences among the competency means of the employment levels. The second part outlines the Results of the Factor Analysis, and the third portion examines the R-technique Analysis of the 35 competencies.

RESULTS OF ANALYSIS OF VARIANCE TECHNIQUE

A major purpose of this study was to measure differences in the judgment of respondents about the level of importance of 35 first-line supervisor competencies. The null hypothesis, that there was no significant difference in mean scores pertaining to the level of importance of 35 first-line supervisor competencies among three employment levels in Oregon industry, was tested. The one-way analysis of variance using the F statistic tested the null hypothesis for each competency. In all, 35 individual hypotheses were tested, one for each competency.

The computed F value was less than the critical value of 3.02 at the .05 level for 19 competencies and equal to or greater than the critical value of 3.02 at the .05 level for 16 competencies. Thus, the null hypothesis was retained for 19 competencies and rejected for 16 competencies. The results of the analysis of variance tests are

shown in Appendix D. Appendix E shows the 16 rejected competencies, the mean rank, computed F, the mean for each group, and the differences among groups as determined by the Student-Newman-Keuls' procedure. The Student-Newman-Keuls' test was used to compare the mean of each group with the mean of every other group.

In order to determine differences in judgments, the following hypothesis was tested: There is no significant difference among competency mean scores for three designated employment levels (first-line supervisors, management personnel, and workers with no supervisory responsibility) in Oregon manufacturing industries. Table 3 in this section presents mean ranks, F ratios, group means, and significant results for competencies which have overall means of 4.0 or above. Of the 13 competencies, seven had significant comparisons among means.

Respondents in the employment level of first-line supervisor tended to rate the level of importance for the competencies highest while the managerial personnel rated them lowest.

Competency 5, Preventing accidents, had the largest difference in means between first-line supervisors and management. All participants considered the competency important, but the degree of importance differed.

First-line supervisors rated the following competencies significantly higher than did the management personnel: 10, Maintaining quality of production; 5, Preventing accidents; and 3, Training employees. First-line supervisors rated 5, Prevent accidents; 2,

Motivating employees; 11, Maintaining quality of production; and 12, Improving work or production methods higher than did the workers with no supervisory resonsibility.

Only competency 2, Motivating employees was ranked significantly higher by managers than employees with no supervisory responsibility. Management scored significantly lower than employees with no supervisory responsibilities on competency 3, Training employees.

All groups assigned like or similar importance to the following competencies: 35, Displaying fairness/objectivity with employees; 27, Communicating with employees; 22, Making decisions; 15, Promoting teamwork and cooperation; 28, Communicating with other managers; 31, Exercising leadership qualities; and 34, Maintaining consistency.

The hypothesis that there was no significant difference among competency mean scores for three designated employment levels (First-line supervisors, Management Personnel, and Workers with no Supervisory Responsibility) in Oregon Manufacturing Industries was rejected for six of the competencies having an overall mean of 4.00 or above. The hypothesis of no significant differences was retained for seven competencies; namely, 35, 27, 22, 15, 28, 31, and 34.

Table 3 presents rank, competency statements, F ratios, group means, and significant difference results for competencies which had overall means between 3.5 to 3.9. Of the eight competencies, six were significantly different and four of these had significant comparisons among means.

The first-line supervisor group tended to rate the level of

importance for the competencies highest, while the managerial personnel rated them lowest.

Competency 18, Maintaining an adequate work force, had the largest difference in means between the first-line supervisor group and management group. The group consisting of employees with no supervisory responsibility scored similarly with the first-line supervisor group, rating 18, Maintaining an adequate work force much higher than the management group.

First-line supervisors rated the following competencies significantly higher than management personnel: 9, Planning and scheduling production; 13, Keeping costs within budgets; 18, Maintaining an adequate work force; and 4, Managing absence and lateness. First-line supervisors rated 9, Planning and scheduling production; and 13, Keeping costs within budgets higher than did the workers with no supervisory responsibility.

Employees with no supervisory responsibility ranked 18, Maintaining an adequate work force; and 4, Managing absence and lateness higher than did management personnel.

Competency 13, Keeping costs within budgets had significant differences indicated by the F test but not verified by the Student-Newman-Keul's test.

The hypothesis that there was no significant difference among competency mean scores for three designated employment levels (first-line supervisors, management personnel, and workers with no supervisory responsibility) in Oregon manufacturing industry was rejected

for four of the competencies having overall means of 3.5 to 3.9. The hypothesis of no significant difference was accepted for four competencies; 26, 20, 21, and 1.

Table 3 presents rank, the competency statements, F ratios, group means, and significant difference results for competencies which had overall means between 3.0 to 3.49. Of these 11 competencies, five had significant comparisons among means.

Respondents in the group consisting of first-line supervisors tended to rate the level of importance for the competencies highest while the group of management personnel, rated them lowest.

Competency 14, Inspecting and caring for tools and equipment, had the largest difference in means between the first-line supervisor group and management group. The group consisting of employees with no supervisory responsibility scored similarly to the first-line supervisor group, rating this competency significantly higher than did the management group.

First-line supervisors rated the following competencies significantly higher than management personnel: 8, Keeping records; 17, Maintaining good housekeeping on the job; 14, Inspecting and caring for tools and equipment; 16, Check/posting employees' time records; and 19, Maintaining good community relations. First-line supervisors rated 8, Keeping records; 17, Maintaining good housekeeping on the job; and 14, Inspecting and caring for tools and equipment higher than did the employees with no supervisory responsibility.

Employees with no supervisory responsibility ranked 14, Inspecting and caring for tools and equipment; 16, Checking/posting employees' time records; and 19, Maintaining good community relations higher than did management personnel.

The hypothesis that there was no significant difference among competency mean scores for three designated employment levels (first-line supervisors, management personnel, and workers with no supervisory responsibility) in Oregon manufacturing industries was rejected for five of the 11 competencies having an overall mean of 3.0 to 3.49.

The hypothesis of no significant difference was accepted for six competencies, including 24, 30, 7, 29, 25, and 6.

Table 3 presents rank, the competency statements, F ratios, group means, and significant difference results for competencies which had overall means between 2.4 to 2.99. Of these three competencies, one had significant comparisons among means.

Respondents in the group consisting of first-line supervisors tended to rate the level of importance for the competencies highest while the group of management personnel rated them lowest.

Competency 23, Counseling employees in personal matters, had the largest difference in means between the first-line supervisor group and the group consisting of employees with no supervisory responsibility. The group of management personnel scored similarly to the first-line supervisor group, rating this competency signifi-

cantly higher than did the group of employees with no supervisory responsibility.

There were no significant comparisons between means of first-line supervisors and management personnel. There was, however, an observed difference in competency mean scores between the supervisors' group and the group consisting of employees with no supervisory responsibility on item 23, Counseling employees in personal matters.

The hypthesis was rejected for one of the three competencies having an overall mean of 2.4 to 2.99. The hypothesis of no significant difference was retained for two competencies 33, and 32.

In summary, the null hypothesis that there was no significant difference in mean scores due to the judgment of the respondents from three employment levels in Oregon manufacturing industries were retained for 19 competencies and were rejected for 16 competencies.

RESULTS OF FACTOR ANALYSIS

Factor analysis was employed to determine the statistical relationships among 35 competencies included in the research. The procedure clustered the competencies, according to generated factor loadings, that had highly correlated variances, resulting in the extracted factors. Only those competencies with factor loadings of +.48 or higher were considered for inclusion in a factor.

The R-Mode factor analysis was used to examine the statistical

relationship of every competency with every other competency included in the study. This technique clustered the competencies according to the respondents' scores on the included competencies.

The eight-factor solution accounted for 31 competencies with factor loadings of +.48 or higher. The first factor extracted six competencies with factor loadings of +.48 or higher. The second factor had six competencies with factor loadings of +.48 or greater. Five competencies were clustered under Factor III with factor loadings of +.48 or greater. The fourth factor included four competencies with factor loadings of +.48 or greater. A total of four competencies were generated for Factor V with factor loadings of +.48 or higher. Factor VI had two competencies with factor loadings of +.48 or higher. The seventh factor extracted three competencies with factor loadings of +.48 or higher. Factor VIII included two competencies with factor loadings of +.48 or greater.

The cumulative percentage of the common variance accounted for in the analysis increased as additional factor solutions were drawn. As the eighth factor was identified, 59.9 percent of the total variance was accounted for. Table 4 presents the common variance accounted for in the eight (8)-factor R-mode solution.

The results of the R-mode analysis for eight-factor solutions are presented in Tables 5 through 12. Each factor solution was defined to summarize the pattern of competencies with factor loadings of +.48 or higher. Competencies with factor loadings under +.48 were considered as spurious competencies and were listed under factors

where their highest loading occurred. The overlapping competency was the result of the loading of a competency on more than one factor. For the study, overlap across factors occurred only one time. The means, standard deviations, factor loadings, and rankings of the 35 competencies, based upon data collected from 351 respondents are presented in Tables 5 through 12.

The factors were arbitrarily titled after the data were analyzed and were assumed to be indicative of the general nature of the competencies which loaded under each factor.

Factor I: Managerial Functions

A total of six competencies (items 20, 21, 22, 31, 34, and 35) with factor loadings of +.48 or higher were generated for Factor I. The competencies included in Factor I pertain directly to managerial job responsibilities of prioritizing, delegating, and decision making, as well as displaying leadership qualities, fairness, and consistency. Two spurious competencies (items 15 and 26), with loadings of +.42, were identified under Factor I. Mean rankings were relatively high, with low standard deviations (Table 5).

Factor II: Utilization of Resources

Six competencies (items 2, 9, 10, 11, 12, and 13) with factor loadings of +.48 or greater were clustered in Factor II. These competencies relate directly to the optimum utilization of human and

material resources. One of the six competencies had to do with motivating employees. Four competencies pertained to production standards. One of the competencies included economic investment.

Factor II was rather homogeneous (most of the competencies being related to resources utilization), and it had high means and low standard deviations (Table 6). There are no spurious competencies clustered in Factor II. There was one overlap, on competency 9, Planning and scheduling production, between Factors II and III.

Factor III: Administrative Activities

Five competencies (items 6, 8, 9, 32, and 33) were clustered under Factor III with loadings of +.54 or higher. No spurious competencies were identified under Factor III. Factor III accounted for 6.0 percent of the common variance. This factor was rather heterogeneous and included items related to administrative duties. Competencies 9, 6, and 8 dealt with reports, records, planning, and scheduling. These competencies had moderate to high means, and high standard deviations. Competencies 32 and 33 focused on functioning in the organization and conducting meetings, respectively. Both had very low mean scores and high standard deviations. Three of the five competencies in Factor III fell in the lower 11 percent of all mean scores (Table 7).

Factor IV: Personnel Procedures

A total of four competencies (items 25, 25, 29, and 30) with factor loadings of +.56 or greater were extracted for Factor IV. Three of the four competencies related directly to personnel procedures and were homogeneous. One competency (item 24, Adhering to planned work schedule) was somewhat related. This factor contained two spurious competencies (items 13 and 19) with factor loadings of +.42 or higher. Factor IV accounted for 4.6 percent of the common variance. Factor IV had moderate mean scores with rather high standard deviations (Table 8).

Factor V: Safety and Maintenance

Four competencies (items 5, 14, 17, and 19) with factor loadings of +.49 and higher were found in Factor V. This factor accounted for 4.6 percent of the common variance. Three of the competencies (items 5, 14, and 17) related to preventing accidents and caring for equipment, and the other (item 19) pertained to maintaining good relations with the community. Competencies 5, 14, and 17 had moderate to high mean scores and high standard deviations. Competency 19 had a low mean and high standard deviatiion (Table 9).

Factor VI: Communications

Two competencies (items 27 and 28) were clustered under Factor VI with loadings of +.74 or higher, and one spurious competency (item

15) with a factor loading of +.42 or higher loaded on the same factor. Factor VI accounted for 3.2 percent of the common variance. This factor was highly homogeneous and included content related to communications and teamwork within the organization. The competencies had very high means and very small standard deviations, and high mean rankings (Table 10).

Factor VII: Advice and Counseling

Three competencies (items 1, 7, and 23) with factor loadings of +.50 or higher were generated by Factor VII. Factor VII accounted for 3.0 percent of the common variance. All the competencies included in this factor were concerned with counseling employees and dealing with complaints and grievances. All three elements were relatively homogeneous. Two competencies (items 1 and 7) and moderate means and high standard deviations, while item 23 had a low mean score and high standard deviation (Table 11).

Factor VIII: Training and Development

Factor VIII consisted of two competencies (items 3 and 4) with factor loadings of +.48 and higher. Factor VIII accounted for 3.0 percent of the common variance; the two competencies pertained to employee training and development. The elements were homogeneous and had relatively high means and high standard deviations. The results are displayed in Table 12.

In summary, eight (8) factors were extracted from the analysis. Of the 35 competencies generated from the analysis, 31 had factor loadings higher than +.48, with one item loading on two factors. Five competencies had factor loadings of +.42 with two items loading on two factors. The highest factor loading of +.77 occurred on item 1 in Factor VII, and the lowest factor loading of +.42 occurred on item 13 (a spurious competency) in Factor IV. Fourteen competencies had means greater than 4.00, twenty had means higher than 3.00, and three had means below 3.00. Eleven competencies had standard deviations of 1.00 or higher, and 26 had a standard deviation below 1.00.

TABLE 2

Mean Ranking of First-line Supervisor Training Competencies

Mean Ranking	Title of Competency	Factor Loading	Mean	Standard Deviation	Item Number*
1.	Displaying fairness/objectivity with employees	.679	4.5564	.6559	35
2.	Communicating with employees	.745	4.3927	.6930	27
3.	Maintaining quality of production	.678	4.3382	.7866	10
4.	Preventing accidents	.669	4.3309	.9683	5
5.	Making decisions	.558	4.2945	.7716	22
6.	Training employees	.634	4.2909	.8166	3
7.	Promoting teamwork and cooperation	.425	4.2327	.7763	15
8.	Communicating with other managers	.769	4.2073	.7670	28
9	Exercising leadership qualities	.648	4.1600	.8478	31
10.	Motivating employees	.522	4.160	.8607	2
11.	Maintaining consistancy	.707	4.0836	.8263	34
12.	Maintaining quantity of production	.754	4.0582	.8609	11
13.	Improving work or production methods	.559	4.0255	.8079	12
14.	Managing time (using SCHEDULED hours effectively)	.425	3.9891	.8261	26
15.	Planning and scheduling production	.484	3.9636	.9583	9
15.	Planning and scheduling production	.543	3.9636	.9583	9
16.	Setting priorities	.620	3.8691	.9068	20
17.	Delegating responsibilities	.488	3.8655	.8629	21
18.	Keeping costs within budgets	.492	3.8436	.9746	13
19.	Maintaining an adequate work force	.350	3.6873	.9649	18
20.	Handling minor complaints and employee grievances	.771	3.5491	.9668	1
21.	Managing absence and lateness	.487	3.5200	1.0299	4
22.	Keeping records	.603	3.4909	1.0158	8
23.	Maintaining good housekeeping on the job	.736	3.4691	1.0225	17
24	Adhering to planned work schedule	.582	3.4582	.8718	24
25.	Inspecting and caring for tools and equipment	.576	3.4509	1.0218	14
26.	Conducting performance appraisals	.569	3.3745	.9636	30
27.	Settling differences among workers	.607	3.3709	1.0220	7
28.	Hiring/terminating procedures	.656	3.2945	1.0993	29
29.	Supporting affirmative action/EEO	.642	3.1782	1.0503	25
30.	Checking/posting employees' time records	.366	3.0945	1.2666	16
31.	Maintaining good community relations	.496	3.0727	1.1598	19
32.	Writing and submitting reports	.699	3.0545	.9594	6
33.	Conducting meetings	.576	2.7891	.9811	33
34.	Functioning in the organization (politicking)	.543	2.4873	1.1849	32
35.	Counseling employees in personal matters	.507	2.4873	1.1474	23

* Item 9 loads on Factors II and III.

TABLE 2a

First-line Supervisors (Group 1)

Mean Ranking	Title of Competency	Mean	Standard Deviation	Item Number
1.	Preventing accidents	4.6148	.7017	5
2.	Displaying fairness/objectivity with employees	4.5368	.6767	35
3.	Maintaining quality of production	4.4706	.6986	10
4.	Making decisions	4.3778	.7418	22
5.	Training employees	4.3433	.8326	3
6.	Communicating with employees	4.3088	.7455	27
7.	Maintaining quantity of production	4.2667	.8030	11
8.	Promoting teamwork and cooperation	4.2556	.7751	15
9.	Motivating employees	4.2519	.7699	2
10.	Planning and scheduling production	4.2059	.8266	9
11.	Exercising leadership qualities	4.1791	.8212	31
12.	Improving work or production methods	4.1691	.8125	12
13.	Maintaining consistency	4.1259	.8414	34
14.	Communicating with other managers	4.1037	.8576	28
15.	Keeping costs within budgets	4.0074	.9545	13
16.	Managing time (using SCHEDULED hours effectively)	3.9925	.8747	26
17.	Setting priorities	3.9179	.8139	20
18.	Delegating responsibilities	3.8284	.8274	21
19.	Maintaining an adequate work force	3.8148	.9634	18
20.	Maintaining good housekeeping on the job	3.7852	.9255	17
21.	Inspecting and caring for tools and equipment	3.7111	.9840	14
22.	Managing absence and lateness	3.6912	1.0001	4
23.	Keeping records	3.6866	.9842	8
24.	Handling minor complaints and employee grievances	3.5882	.9543	1
25.	Adhering to planned work schedule	3.4815	.8090	24
26.	Conducting performance appraisals	3.4015	.9639	30
27.	Settling differences among workers	3.3897	.9597	7
28.	Checking/posting employees' time records	3.3209	1.2238	16
29.	Maintaining good community relations	3.2963	1.1659	19
30.	Hiring/terminating procedures	3.2148	1.1089	29
31.	Supporting affirmative action/EEO	3.1493	1.0075	25
32.	Writing and submitting reports	3.0593	.9365	6
33.	Conducting meetings	2.9037	.9374	33
34.	Counseling employees in personal matters	2.6269	1.1612	23
35.	Functioning in the organization (politicking)	2.4394	1.2248	32

TABLE 2b

Management Personnel (Group 2)

Mean Ranking	Title of Competency	Mean	Standard Deviation	Item Number
1.	Displaying fairness/objectivity with employees	4.4875	.6749	35
2.	Communicating with employees	4.3418	.6772	27
3.	Motivating employees	4.2625	.7588	2
4.	Promoting teamwork and cooperation	4.2564	.7286	15
5.	Maintaining quality of production	4.2000	.7860	10
6.	Communicating with other managers	4.1772	.7639	28
7.	Making decisions	4.1646	.8538	22
8.	Exercising leadership qualities	4.1250	.8325	31
9.	Training employees	4.0633	.8218	3
10.	Maintaining quantity of production	4.0506	.8305	11
11.	Preventing accidents	4.0375	1.0607	5
12.	Improving work or production methods	3.9747	.8912	12
13.	Maintaining consistency	3.9500	.8845	34
14.	Managing time (using SCHEDULED hours effectively)	3.9125	.7826	26
15.	Planning and scheduling production	3.8625	1.0761	9
16.	Delegating responsibilities	3.8375	.8182	21
17.	Setting priorities	3.8354	.9665	20
18.	Keeping costs within budgets	3.6835	.9812	13
19.	Handling minor complaints and employee grievances	3.5750	.8969	1
20.	Keeping records	3.3750	.9857	8
21.	Adhering to planned work schedule	3.3671	.8649	24
22.	Settling differences among workers	3.3125	.8508	7
23.	Conducting performance appraisals	3.3000	1.0238	30
24.	Managing absence and lateness	3.2875	1.0212	4
25.	Maintaining good housekeeping on the job	3.2750	.9137	17
26.	Hiring/terminating procedures	3.2625	.9775	29
27.	Maintaining an adequate work force	3.2125	1.0637	18
28.	Inspecting and caring for tools and equipment	3.0875	.9961	14
29.	Writing and submitting reports	3.0250	.9137	6
30.	Supporting affirmative action/EEO	2.9367	1.1585	25
31.	Conducting meetings	2.7975	.9790	33
32.	Maintaining good community relations	2.6500	1.1149	19
33.	Counseling employees in personal matters	2.5443	1.0102	23
34.	Checking/posting employee time records	2.5375	1.1794	16
35.	Functioning in the organization (politicking)	2.3924	1.1142	32

TABLE 2c

Workers With No Supervisory Responsibility (Group 3)

Mean Ranking	Title of Competency	Mean	Standard Deviation	Item Number
1.	Displaying fairness/objectivity with employees	4.6045	.6939	35
2.	Communicating with employees	4.4222	.7867	27
3.	Training employees	4.3409	.8809	3
4.	Maintaining quality of production	4.2836	.9145	10
5.	Preventing accidents	4.2748	1.0157	5
6.	Communicating with other managers	4.1832	.8209	28
7.	Promoting teamwork and cooperation	4.1742	.8242	15
8.	Making decisions	4.1729	.8573	22
9.	Maintaining consistency	4.0840	.8324	34
10.	Exercising leadership qualities	4.0382	.9719	31
11.	Managing time (using SCHEDULED hours effectively)	4.0226	.8480	26
12.	Motivating employees	3.9773	.9921	2
13.	Maintaining quantity of production	3.9701	.9089	11
14.	Delegating responsibilities	3.8806	.9262	21
15.	Improving work or production methods	3.8571	.8973	12
16.	Maintaining an adequate work force	3.7444	.9346	18
17.	Setting priorities	3.7313	1.0561	20
18.	Planning and scheduling production	3.7218	1.0614	9
19.	Keeping costs within budgets	3.6870	1.0604	13
20.	Managing absence and lateness	3.6031	1.0354	4
21.	Adhering to planned work schedule	3.5299	.9553	24
22.	Conducting performance appraisals	3.4586	.9575	30
23.	Inspecting and caring for tools and equipment	3.4104	1.0983	14
24.	Settling differences among workers	3.3835	1.1916	7
25.	Hiring/terminating procedures	3.3759	1.1389	29
26.	Handling minor complaints and employee grievances	3.3684	1.0623	1
27.	Keeping records	3.3333	1.0959	8
28.	Maintaining good housekeeping on the job	3.2985	1.0763	17
29.	Maintaining good community relations	3.2687	1.1836	19
30.	Supporting affirmative action/EEO	3.2672	1.0364	25
31.	Checking/posting employee time records	3.2180	1.2633	16
32.	Writing and submitting reports	3.0308	1.0487	6
33.	Conducting meetings	2.6642	1.0473	33
34.	Functioning in the organization	2.4962	1.1910	32
35.	Counseling employees in personal matters	2.2256	1.2590	23

TABLE 3
Results of the Tests for Significant Difference

Rank	Competency	Item Number	Computed F	Mean Scores: Supervisor n=136	Mean Scores: Manager n=80	Mean Scores: Worker n=135	Significant differences in means
1.	Displaying fairness/objectivity with employees	35	0.786	4.5368	4.4875	4.6045	$\mu_1=\mu_2=\mu_3$
2.	Communicating with employees	27	0.811	4.3088	4.3418	4.4222	$\mu_1=\mu_2=\mu_3$
3.	Maintaining quality of production	10	3.311	4.4706	4.2000	4.2836	$\mu_2=\mu_3$, $\mu_3=\mu_1$, $\mu_1>\mu_2$
4.	Preventing accidents	5	10.694	4.6148	4.0375	4.2748	$\mu_2=\mu_3$, $\mu_1>\mu_2$, $\mu_1>\mu_3$
5.	Making decisions	22	2.698	4.3778	4.1646	4.1729	$\mu_1=\mu_2=\mu_3$
6.	Training employees	3	3.284	4.3433	4.0633	4.3409	$\mu_3=\mu_1$, $\mu_3>\mu_2$, $\mu_1>\mu_2$
7.	Promoting teamwork and cooperation	15	0.440	4.2556	4.2564	4.1742	$\mu_1=\mu_2=\mu_3$
8.	Communicating with other managers	28	0.363	4.1037	4.1772	4.1832	$\mu_1=\mu_2=\mu_3$
9.	Exercising leadership qualities	31	0.851	4.1791	4.1250	4.0382	$\mu_1=\mu_2=\mu_3$
10.	Motivating employees	2	4.303	4.2519	4.2625	3.9773	$\mu_1=\mu_2$, $\mu_1>\mu_3$, $\mu_2>\mu_3$
11.	Maintaining consistency	34	1.112	4.1259	3.9500	4.0840	$\mu_1=\mu_2=\mu_3$
12.	Maintaining quantity of production	11	4.275	4.2667	4.0506	3.9701	$\mu_3=\mu_2$, $\mu_2=\mu_1$, $\mu_1>\mu_3$
13.	Improving work or production methods	12	4.453	4.1691	3.9747	3.8571	$\mu_3=\mu_2$, $\mu_2=\mu_1$, $\mu_1>\mu_3$
14.	Managing time (using SCHEDULED hours effectively)	26	0.432	3.9925	3.9125	4.0226	$\mu_1=\mu_2=\mu_3$
15.	Planning and scheduling production	9	8.547	4.2059	3.8625	3.7218	$\mu_3=\mu_2$, $\mu_1>\mu_3$, $\mu_1>\mu_2$
16.	Setting priorities	20	1.301	3.9179	3.8354	3.7313	$\mu_1=\mu_2=\mu_3$
17.	Delegating responsibilities	21	0.134	3.8284	3.8375	3.8806	$\mu_1=\mu_2=\mu_3$
18.	Keeping costs within budgets	13	4.254	4.0074	3.6835	3.6870	$\mu_3=\mu_2$, $\mu_1>\mu_2$, $\mu_1>\mu_3$
19.	Maintaining an adequate work force	18	10.570	3.8148	3.2125	3.7444	$\mu_3>\mu_2$, $\mu_1>\mu_2$, $\mu_3=\mu_1$
20.	Handling minor complaints and employee grievances	1	1.301	3.5882	3.5750	3.3684	$\mu_1=\mu_2=\mu_3$
21.	Managing absence and lateness	4	4.105	3.6912	3.2875	3.6031	$\mu_3=\mu_1$, $\mu_3>\mu_2$, $\mu_1>\mu_2$
22.	Keeping records	8	4.461	3.6866	3.3750	3.3333	$\mu_3=\mu_2$, $\mu_1>\mu_3$, $\mu_1>\mu_2$
23.	Maintaining good housekeeping on the job	17	10.515	3.7852	3.2750	3.2985	$\mu_2=\mu_3$, $\mu_1>\mu_2$, $\mu_1>\mu_3$
24.	Adhering to planned work schedule	24	0.857	3.4815	3.3671	3.5299	$\mu_1=\mu_2=\mu_3$
25.	Inspecting and caring for tools and equipment	14	9.352	3.7111	3.0875	3.4104	$\mu_3>\mu_2$, $\mu_1>\mu_3$, $\mu_1>\mu_2$
26.	Conducting performance appraisals	30	0.661	3.4015	3.3000	3.4586	$\mu_1=\mu_2=\mu_3$
27.	Settling differences among workers	7	0.160	3.3897	3.3125	3.3835	$\mu_1=\mu_2=\mu_3$
28.	Hiring/terminating procedures	29	0.756	3.2148	3.2625	3.3759	$\mu_1=\mu_2=\mu_3$
29.	Supporting affirmative action/EEO	25	2.420	3.1493	2.9367	3.2672	$\mu_1=\mu_2=\mu_3$
30.	Checking/posting employees' time records	16	11.153	3.3209	2.5375	3.2180	$\mu_3>\mu_2$, $\mu_1>\mu_2$, $\mu_3=\mu_1$
31.	Maintaining good community relations	19	9.165	3.2963	2.6500	3.2687	$\mu_3>\mu_2$, $\mu_1>\mu_2$, $\mu_3=\mu_1$
32.	Writing and submitting reports	6	0.042	3.0593	3.0250	3.0308	$\mu_1=\mu_2=\mu_3$
33.	Conducting meetings	33	1.972	2.9037	2.7975	2.6642	$\mu_1=\mu_2=\mu_3$
34.	Functioning in the organization (politicking)	32	0.199	2.4394	2.3924	2.4962	$\mu_1=\mu_2=\mu_3$
35.	Counseling employees in personal matters	23	4.245	2.6269	2.5443	2.2256	$\mu_3=\mu_2$, $\mu_2=\mu_1$, $\mu_1>\mu_3$

TABLE 4

Percentage of Common Variance for the R-mode Analysis

Factor Solution	Percentage	Cumulative Percentage
1	29.1	29.1
2	7.0	36.1
3	6.0	42.1
4	4.6	46.8
5	3.9	50.6
6	3.2	53.9
7	3.0	56.9
8	3.0	59.9

TABLE 5

Factor I - Managerial Functions

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
20	Setting priorities	.620	3.8691	.9068	16
21	Delegating responsibilities	.488	3.8655	.8629	17
22	Making decisions	.588	4.2945	.7716	5
31	Exercising leadership qualities	.648	4.1600	.8478	9
34	Maintaining consistancy	.707	4.0836	.8263	11
35	Displaying fairness/objectivity with employees	.679	4.5564	.6559	1
	Spurious Competencies				
15	Promoting teamwork and cooperation	.425	4.2327	.7763	7
26	Managing time (using SCHEDULED time effectively)	.425	3.9891	.8261	14

TABLE 6

Factor II - Utilization of Resources

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
2	Motivating employees	.522	4.1600	.8607	10
9	Planning and scheduling production	.484	3.9636	.9583	15
10	Maintaining quality of production	.678	4.3382	.7866	3
11	Maintaining quantity of production	.754	4.0582	.8609	12
12	Improving work or production methods	.559	4.0255	.8079	13
13	Keeping costs within budgets	.492	3.8436	.9746	18

TABLE 7

Factor III - Administrative Activities

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
6	Writing and submitting reports	.699	3.0545	.9594	32
8	Keeping records	.603	3.4909	1.0158	22
9	Planning and scheduling production	.543	3.9636	.9583	15
32	Functioning in the organization (politicking)	.543	2.4873	1.1849	34
33	Conducting Meetings	.576	2.7891	.9811	33

TABLE 8

Factor IV - Personnel Procedures

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
24	Adhering to planned work schedule	.582	3.4582	.8718	24
25	Supporting affirmative action/EEO	.642	3.1782	1.0503	29
29	Hiring/terminating procedures	.656	3.2945	1.0993	28
30	Conducting performance appraisals	.569	3.3745	.9636	26
	Spurious Competencies				
13	Keeping costs within budgets	.422	3.8436	.9746	18
19	Maintaining good community relations	.427	3.0727	1.1598	31

TABLE 9

Factor V - Safety and Maintenance

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
5	Preventing accidents	.699	4.3309	.9683	4
14	Inspecting and caring for tools and equipment	.576	3.4509	1.0218	25
17	Maintaining good housekeeping on the job	.736	3.4691	1.0225	23
19	Maintaining good community relations	.496	3.0727	1.1598	31

TABLE 10

Factor VI - Communications

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
27	Communicating with employees	.745	4.3927	.6930	2
28	Communicating with others	.769	4.2073	.7670	8
	Spurious Competency				
15	Promoting teamwork and cooperation	.425	4.2327	.7763	7

TABLE 11

Factor VII - Advice and Counseling

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
1	Handling minor complaints and employee grievances	.771	3.5491	.9668	20
7	Settling differences among workers	.607	3.3709	1.0220	27
23	Counseling employees in personal matters	.507	2.4873	1.1474	35

TABLE 12

Factor VIII - Training and Development

Item Number	Title of Competency	Factor Loading	Mean	Standard Deviation	Mean Ranking
3	Training employees	.634	4.2909	.8166	6
4	Managing absence and lateness	.487	3.5200	1.0299	21

V. SUMMARY AND CONCLUSIONS

This study was based upon an empirical investigation conducted to determine the common competencies needed by first-line supervisors in Oregon manufacturing industry. A related purpose was to determine appropriate clusters of common competencies for application to first-line supervisor training program curricula. A second purpose of the study was to determine if differences existed among employment levels according to scores participants assigned to each of the 35 competencies.

To collect the data for study, a survey questionnaire was developed by a review of related literature. A jury of experts was chosen to evaluate the questionnaire for the purpose of establishing validity and clarity of format, as well as to assess its comprehensiveness. The revised questionnaire was field tested with cooperation from the business community. The final questionnaire contained 35 competency statements and a scale designed to determine the level of importance of each competency.

The questionnaire was developed so that the three levels of employment included in the study could respond to the level of importance for each competency. Their responses indicated whether the competencies were least important, slightly important, important, very important, or extremely important. Response value were assigned Likert-type scale values of 1-5.

A random sample of manufacturing firms in Oregon was drawn from the Directory of Oregon Manufacturers. Three levels of personnel were tested in each firm; namely, first-line supervisors, managers, and workers with no supervisory responsibility. The groups consisted of 136, 80, and 135 subjects respectively for a total of 351 respondents.

The one-way analysis of variance, the Student-Newman-Keuls' procedure, and the factor analytic technique (R-mode) were used to interpret the data.

One hypothesis was tested for each competency statement using a one-way analysis of variance; hence, a total of 35 F-tests were conducted. The 95 percent confidence level was selected as the criterion for retaining or rejecting the null hypothesis. It was determined that if the computed F value was less than the critical tabular value, the null hypothesis was retained. The hypothesis tested in the study is as follows:

H_0: There is no significant difference among competency mean scores for three designated employment levels (first-line supervisors, management personnel, and workers with no supervisory responsibility) in Oregon manufacturing industry (i.e., $\mu_1 = \mu_2 = \mu_3$).

Factor analysis was utilized to ascertain the groupings of competency statements.

SUMMARY OF FINDINGS

The one-way analysis of variance was used to test the hypothesis that there was no significant difference among competency mean scores for three designated employment levels (first-line supervisors, management personnel, and workers with no supervisory responsibility) in Oregon manufacturing industry. The test revealed that no differences existed for 19 competencies.

Thirty-five competencies were analyzed at the .05 significance level. Of the 35 compentencies, six were significantly different out of the 13 (35, 27, 10, 5, 22, 3, 15, 28, 31, 2, 34, 11, 12) that had overall means of 4.0 or above; four were significantly different out of the eight (26, 9, 20, 21, 13, 18, 1, 4) that had overall means of 3.5 to 3.9; five were significantly different of the 11 (8, 17, 24, 14, 30, 7, 29, 25, 16, 19, 6) that had overall means of 3.0 to 3.49; one was significantly different that had overall means of 2.8 or below (33, 32, 23).

Thus, the hypothesis that there was no significant difference in the mean scores for 35 first-line supervisor competencies among three groups was retained for 19 competencies and rejected for 16 competencies.

Eight dimensions of common training competencies were identified by the R-technique of factor analysis. It was concluded that competencies which clustered in each of the eight factors represented meaningful groups of competencies as typified by the study's sample

population. The eight factor solution extracted 31 competencies with factor loadings of +.48 or higher. The eight factors extracted were identified as follows:

Factor I	-	Managerial Functions
Factor II	-	Utilization of Resources
Factor III	-	Administrative Activities
Factor IV	-	Personnel Procedures
Factor V	-	Safety and Maintenance
Factor VI	-	Communications
Factor VII	-	Advice and Counseling
Factor VIII	-	Training and Development

CONCLUSIONS

The first question to which the present study was directed was the determination of needed content that should be emphasized in first-line supervisor training programs for Oregon manufacturing industry. The responses were calculated for mean scores for each of the 35 competencies, and analyzed by the mean scores, the rank order of the means, and the analysis of variance test. These mean scores were rank ordered for the purpose of determining which of the competencies should be emphasized.

For the purposes of planning first-line supervisor training curricula, the highest 13 competencies (with mean scores of 4.0 or higher considered as the criterion) should be required for inclusion

in first-line supervisor training programs. Those competencies having means between 3.5 to 3.99 indicate competencies which are recommended for inclusion into training programs for first-line supervisors; competencies with mean scores of 3.0 to 3.49 were regarded as suggested elements; and those with values below 3.0 were optional.

From the available data, those competencies selected as needing the most emphasis related to communications. Competencies needing the next amount of emphasis related to the functions of management.

A related question to which this study was directed was that of determining meaningful clusters of common competencies for the appropriate application to first-line supervisor training programs. The results of the R-mode indicated that 35 first-line supervisor competencies clustered into eight primary factors. It was observed that the clusters of competencies in each factor had meaningful interpretations. In determining the appropriate clusters for deciding on first-line supervisor program curricula, it was concluded that factor analysis is an effective technique.

The second question was concerned with the determination of differences among three levels of employment and the degree to which their responses varied. On the basis of analysis, 19 null hypotheses were retained and 16 were rejected. It was determined that more differences existed between first-line supervisors and management personnel than existed among other groupings. As a general rule, first-line supervisors tended to rate competencies the highest while

the management personnel tended to rate them the lowest. Most agreement occurred among all groups in the areas of communications and functions of management.

An important conclusion of the study resides in the demonstration that the development, administration, and factor analysis of a competency questionnaire does contribute to the identification of common factors among different competencies and employment levels. Thus, it is a viable method of obtaining much of the information essential for designing and developing curricula.

IMPLICATIONS

Based upon the review of literature, the information drawn from this study, and the conclusions derived from the analysis, the following implications emerged for the development of first-line supervisor training programs for Oregon manufacturing industry.

1. Competencies with high factor loadings that clustered under a factor should be viewed as competencies sharing common characteristics and should be considered for first-line supervisor training program curriculum development. It is important to note that high loaded competencies vary in importance, depending upon their mean score values.
2. The three levels of employment included in this study had common viewpoints on Communication Needs and Managerial Functions. Therefore, competencies clustered under these

two factors should be considered as important components when designing curricula.

3. There were no significant differences between levels of employment included in this study for those competencies which clustered with Factor I, concerning managerial functions, and Factor VI, concerning communications. Therefore, competencies under these factors should receive special emphasis in first-line supervisor training program curricula. All included competencies had mean scores of 3.86 or above.
4. Competencies clustered with Factor II were homogeneous in regard to the high mean values, but were heterogeneous as to significant differences which were due to the various levels of employment of the respondents. Due to the high mean values, these should be included as elements in planning training programs for first-line supervisors.
5. Curricula for first-line supervisor training programs should utilize educational theory, current and related literature, as well as employee opinion, to develop the most appropriate content.
6. Based on the factors identified in this study, behavioral objectives and learning activities could be prepared.
7. The 13 highest competencies with mean scores of 4.0 or higher were considered the most important and should be

required for inclusion in first-line supervisor training programs.

8. Competencies with mean values of 3.5 to 3.99 should be recommended for first-line supervisor program curriculum.
9. The 11 competencies with mean scores of 3.0 to 3.49 should be suggested for use in curriculum planning of first-line supervisor training programs.
10. The remaining competencies, those with mean values below 2.7, should be viewed as optional inclusions.
11. The application of factor analysis to this type of competency questionnaire can provide a structure for organizing competencies within a factor and evaluating them. The results tend to support the view that a wide range of competencies could be identified, clustered, and ranked and that first-line supervisor training curricula might be developed with greater simplicity, efficiency, and economy in terms of a smaller number of relatively independent dimensions.

SUGGESTIONS FOR FURTHER STUDY

The following suggestions were made for further study as a result of findings and conclusions of this investigation:

1. Had more than 35 competencies been included in the questionnaire, it is possible that additional factors may

have emerged. The consideration of this possibility raises the important question of whether some of the unexplained variance could be accounted for by other kinds of factors which might come from adding other types of competencies to the original 35.

2. The possibility of the factor structures changing over time needs to be recognized. Therefore, the present study should be replicated in order to verify the reliability of the findings.
3. While the particular findings of the present study may be restricted to the population in which the data were collected, the method has been sufficiently suggestive to warrant its further use in the study of common competencies and for curriculum development for other training programs as well.
4. The present study focused on comparing responses of levels of employment. A study should be conducted to determine if differences exist among companies.
5. Since the economy and technology are in constant flux, the need for curriculum change in training programs is evident. This study should be periodically replicated as standard procedure to verify the first-line supervisor training program curriculum.
6. The present study utilized a random sample of six manufacturing firms in Oregon. A study of different types of

industry may prove to be useful comparative data for making decisions in curriculum for first-line supervisor training programs.

7. Competencies which are identified as extremely important, and which are included in training, should be tested in terms of participant outcomes over a period of time.
8. Studies of the participants' demographic characteristics, such as the number of years with the firm, number of years in position, age, highest grade completed, and geographical background, should be done to learn if these factors influence opinions about which competencies are essential for first-line supervisor training programs.
9. Studies on the various methods of training should be conducted to learn what effects, if any, different instructional styles have on the learners' use of the competencies taught.

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APPENDICES

APPENDIX A

MEMBERS OF JURY

1. Dick Anderson	Personnel Manager Hewlett-Packard 1000 NE Circle Blvd. Corvallis, Oregon 97330
2. Carol Davis	Postmaster Corvallis Post Office Corvallis, Oregon 97333
3. Jean Mater	Vice President Mater Engineering 520 SW 1st Street Corvallis, Oregon 97333
4. Sally Moertel	Personnel Director Mail-Well Envelope Co. 2515 SW Mailwell Drive Milwaukee, Oregon 97222
5. Sally Plumley	Owner Sizzler Restaurant 9th and Circle Corvallis, Oregon 97330
6. James Riggs	Director, Oregon Productivity Center Head, Industrial Engineering Department Oregon State University Corvallis, Oregon 97331
7. Pat Wells	Professor, School of Business Oregon State University Corvallis, Oregon 97331

APPENDIX B

JURY OF EXPERTS REVISION FORM/ LETTER OF INTRODUCTION

FIRST LINE SUPERVISOR COMPETENCY QUESTIONNAIRE

Name_____ Department_____

Position_____ Company_____

CIRCLE THE RATING (1,2,3,4,5) WHICH MOST CLOSELY REPRESENTS YOUR JUDGMENT ABOUT THE IMPORTANCE OF THE ITEM IN FIRST LINE SUPERVISOR TRAINING. PLEASE ANSWER EVERY ITEM. THERE ARE NO RIGHT OR WRONG ANSWERS.

N.I. = Not Important S.I.= Slightly Important I=Important V.I.= Very Important
E.I. = Extremely Important

	N.I.	S.I.	I.	V.I.	E.I.
1. Handling complaints, settling employee grievances.	1	2	3	4	5
2. Motivating employees.	1	2	3	4	5
3. Training employees.	1	2	3	4	5
4. Controlling attendance: absence and lateness	1	2	3	4	5
5. Preventing accidents.	1	2	3	4	5
6. Writing and submitting reports.	1	2	3	4	5
7. Keeping workers informed.	1	2	3	4	5
8. Keeping management informed.	1	2	3	4	5
9. Maintaining discipline.	1	2	3	4	5
10. Settling differences among workers.	1	2	3	4	5
11. Keeping records.	1	2	3	4	5
12. Planning and scheduling production.	1	2	3	4	5
13. Maintaining quality of production.	1	2	3	4	5
14. Maintaining quantity of production.	1	2	3	4	5
15. Improving work or production methods.	1	2	3	4	5
16. Keeping costs down. (within budgets)	1	2	3	4	5
17. Requisitioning tools, equipment and materials.	1	2	3	4	5
18. Inspecting and caring for tools and equipment.	1	2	3	4	5
19. Cooperating with other supervisors and units.	1	2	3	4	5
20. Promoting teamwork and cooperation.	1	2	3	4	5
21. Keeping employees' time records.	1	2	3	4	5
22. Maintaining good housekeeping on the job.	1	2	3	4	5
23. Maintaining an adequate work force.	1	2	3	4	5
24. Taking an interest in the employees.	1	2	3	4	5
25. Maintaining good public contacts.	1	2	3	4	5
26. Setting priorities.	1	2	3	4	5
27. Delegating responsibilities.	1	2	3	4	5
28. Decision making.	1	2	3	4	5
29. Counseling.	1	2	3	4	5
30. Planning work schedule/organizing work teams.	1	2	3	4	5
31. Adhering to work schedule/organizing work teams.	1	2	3	4	5
32. Affirmative action/EEO	1	2	3	4	5
33. Time management	1	2	3	4	5
34. Communicating with employees	1	2	3	4	5
35. Communicating with other managers	1	2	3	4	5
36. Interviewing potential employees	1	2	3	4	5
37. Hiring/terminating procedures.	1	2	3	4	5
38. Conducting performance appraisals	1	2	3	4	5
39. Exercising leadership qualities.	1	2	3	4	5
40. Exercising managerial qualities.	1	2	3	4	5
41. Functioning in the organization.	1	2	3	4	5

42. Conducting meetings.	1	2	3	4	5
43. Listening.	1	2	3	4	5
44. Maintaining consistency.	1	2	3	4	5
45. Allocating resources (men and equipment)	1	2	3	4	5

JURY OF EXPERTS REVISION FORM

From: _____ _____ _____
Name Position Institution

Subject: Suggested revisions to Professional Education Competencies Instrument.

Item No. Suggested Revisions

_____ _____

_____

_____ _____

_____

_____ _____

_____

_____ _____

_____

Suggested Additions
(New Items)

_____

_____

_____

_____

Item No. Suggested Deletions

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

NOTE: If additional space is needed, please attach sheet to this memo.

June 25, 1981

Dear :

Thank you for consenting to help review this first line supervisor competency survey. Your input and expertise will be greatly appreciated.

Please review the enclosed questionnaire and make any revisions and comments necessary. Feel free to add, delete or change the individual competencies accordingly. A self addressed, stamped envelope has been provided for the immediate return of the questionnaire.

Again, thank you for your time and assistance.

Sincerely,

Rita L. Hammer

Enclosures

APPENDIX C

FIRST-LINE SUPERVISOR COMPETENCY QUESTIONNAIRE

FIRST LINE SUPERVISOR COMPETENCY QUESTIONNAIRE

Name_____ Department_____

Position_____ Company_____

CIRCLE THE RATING (1,2,3,4,5) WHICH MOST CLOSELY REPRESENTS YOUR JUDGMENT ABOUT THE IMPORTANCE OF THE ITEM IN FIRST LINE SUPERVISOR TRAINING. PLEASE ANSWER EVERY ITEM. THERE ARE NO RIGHT OR WRONG ANSWERS.

L.I. = Least Important; S.I. = Slightly Important; I = Important
V.I. = Very Important; E.I. = Extremely Important

	L.I.	S.I.	I.	V.I.	E.I.
1. Handling minor complaints and employee grievances	1	2	3	4	5
2. Motivating employees	1	2	3	4	5
3. Training employees	1	2	3	4	5
4. Managing absence and lateness	1	2	3	4	5
5. Preventing accidents	1	2	3	4	5
6. Writing and submitting reports	1	2	3	4	5
7. Settling differences among workers	1	2	3	4	5
8. Keeping records	1	2	3	4	5
9. Planning and scheduling production	1	2	3	4	5
10. Maintaining quality of production	1	2	3	4	5
11. Maintaining quantity of production	1	2	3	4	5
12. Improving work or production methods	1	2	3	4	5
13. Keeping costs within budgets	1	2	3	4	5
14. Inspecting and caring for tools and equipment	1	2	3	4	5
15. Promoting teamwork and cooperation	1	2	3	4	5
16. Checking/posting employees' time records	1	2	3	4	5
17. Maintaining good housekeeping on the job	1	2	3	4	5
18. Maintaining an adequate work force	1	2	3	4	5
19. Maintaining good community relations	1	2	3	4	5
20. Setting priorities	1	2	3	4	5
21. Delegating responsibilities	1	2	3	4	5
22. Making decisions	1	2	3	4	5
23. Counseling employees in personal matters	1	2	3	4	5
24. Adhering to planned work schedule	1	2	3	4	5
25. Supporting affirmative action/EEO	1	2	3	4	5
26. Managing time (using SCHEDULED hours effectively)	1	2	3	4	5
27. Communicating with employees	1	2	3	4	5
28. Communicating with other managers	1	2	3	4	5
29. Hiring/terminating procedures	1	2	3	4	5
30. Conducting performance appraisals	1	2	3	4	5
31. Exercising leadership qualities	1	2	3	4	5
32. Functioning in the organization (politicking)	1	2	3	4	5
33. Conducting meetings	1	2	3	4	5
34. Maintaining consistency	1	2	3	4	5
35. Displaying fairness/objectivity with employees	1	2	3	4	5

Additional Comments:

APPENDIX D

RESULTS OF THE ANALYSIS OF VARIANCE USING THE F STATISTIC

APPENDIX D

RESULTS OF THE ANALYSIS OF VARIANCE USING THE F STATISTIC

Competency	Computed F	Hypothesis*
1	1.965	Retain
2	4.303	Reject**
3	3.284	Reject**
4	4.105	Reject**
5	10.694	Reject**
6	0.042	Retain
7	0.160	Retain
8	4.461	Reject**
9	8.547	Reject**
10	3.311	Reject**
11	4.275	Reject**
12	4.453	Reject**
13	4.254	Reject**
14	9.352	Reject**
15	0.440	Retain
16	11.153	Reject
17	10.515	Reject
18	10.570	Reject
19	9.165	Reject
20	1.301	Retain
21	0.134	Retain
22	2.698	Retain
23	4.245	Reject**
24	0.857	Retain
25	2.420	Retain
26	0.432	Retain
27	0.811	Retain
28	0.363	Retain
29	0.756	Retain
30	0.661	Retain
31	0.851	Retain
32	0.199	Retain
33	1.972	Retain
34	1.112	Retain
35	0.786	Retain

* The level of significance was .05 percent level and the critical region was $F \geq 3.02$.

** The Student-Newman-Keuls' Procedure was used to compare means for the rejected items.

APPENDIX E

RESULTS OF THE STUDENT-NEWMAN-KEULS' PROCEDURES FOR THE REJECTED HYPOTHESIS

APPENDIX E
Results of the Student-Newman-Keuls' Procedure for the Rejected Hypothesis

Item Number	Competency	Rank	Computed F*	Mean Scores #1 Supervisor n=136	#2 Manager n=80	#3 Worker n=135	Significant differences in means
1.	Handling minor complaints and employee grievances	20	1.301	3.5882	3.5750	3.3684	$\mu_1=\mu_2=\mu_3$
2.	Motivating employees	10	4.303	4.2519	4.2625	3.9773	$\mu_1=\mu_2$, $\mu_1>\mu_3$, $\mu_2>\mu_3$
3.	Training employees	6	3.284	4.3433	4.0633	4.3409	$\mu_3=\mu_1$, $\mu_3>\mu_2$, $\mu_1>\mu_2$
4.	Managing absence and lateness	21	4.105	3.6912	3.2875	3.6031	$\mu_3=\mu_1$, $\mu_3>\mu_2$, $\mu_1>\mu_2$
5.	Preventing accidents	4	10.694	4.6148	4.0375	4.2748	$\mu_2=\mu_3$, $\mu_1>\mu_2$, $\mu_1>\mu_3$
6.	Writing and submitting reports	32	0.042	3.0593	3.0250	3.0308	$\mu_1=\mu_2=\mu_3$
7.	Settling differences among workers	27	0.160	3.3897	3.3125	3.3835	$\mu_1=\mu_2=\mu_3$
8.	Keeping records	22	4.461	3.6866	3.3750	3.3333	$\mu_3=\mu_2$, $\mu_1>\mu_3$, $\mu_1>\mu_2$
9.	Planning and scheduling production	15	8.547	4.2059	3.8625	3.7218	$\mu_3=\mu_2$, $\mu_1>\mu_3$, $\mu_1>\mu_2$
10.	Maintaining quality of production	3	3.311	4.4706	4.2000	4.2836	$\mu_2=\mu_3$, $\mu_3=\mu_1$, $\mu_1>\mu_2$
11.	Maintaining quantity of production	12	4.275	4.2667	4.0506	3.9701	$\mu_3=\mu_2$, $\mu_2=\mu_1$, $\mu_1>\mu_3$
12.	Improving work or production methods	13	4.453	4.1691	3.9747	3.8571	$\mu_3=\mu_2$, $\mu_2=\mu_1$, $\mu_1>\mu_3$
13.	Keeping costs within budgets	18	4.254	4.0074	3.6835	3.6870	$\mu_3=\mu_2$, $\mu_1>\mu_2$, $\mu_1>\mu_3$
14.	Inspecting and caring for tools and equipment	25	9.352	3.7111	3.0875	3.4104	$\mu_3=\mu_2$, $\mu_1>\mu_3$, $\mu_1>\mu_2$
15.	Promoting teamwork and cooperation	7	0.440	4.2556	4.2564	4.1742	$\mu_1=\mu_2=\mu_3$
16.	Checking/posting employees' time records	30	11.153	3.3209	2.5375	3.2180	$\mu_3>\mu_2$, $\mu_1>\mu_2$, $\mu_3=\mu_1$
17.	Maintaining good housekeeping on the job	23	10.515	3.7852	3.2750	3.2985	$\mu_2=\mu_3$, $\mu_1>\mu_2$, $\mu_1>\mu_3$
18.	Maintaining an adequate work force	19	10.570	3.8148	3.2125	3.7444	$\mu_3>\mu_2$, $\mu_1>\mu_2$, $\mu_3=\mu_1$
19.	Maintaining good community relations	31	9.165	3.2963	2.6500	3.2687	$\mu_3>\mu_2$, $\mu_1>\mu_2$, $\mu_3=\mu_1$
20.	Setting priorities	16	1.301	3.9179	3.8354	3.7313	$\mu_1=\mu_2=\mu_3$
21.	Delegating responsibilities	17	0.134	3.8284	3.8375	3.8806	$\mu_1=\mu_2=\mu_3$
22.	Making decisions	5	2.698	4.3778	4.1646	4.1729	$\mu_1=\mu_2=\mu_3$
23.	Counseling employees in personal matters	35	4.245	2.6269	2.5443	2.2256	$\mu_3=\mu_2$, $\mu_2=\mu_1$, $\mu_1>\mu_3$
24.	Adhering to planned work schedule	24	0.857	3.4815	3.3671	3.5299	$\mu_1=\mu_2=\mu_3$
25.	Supporting affirmative action/EEO	29	2.420	3.1493	2.9367	3.2672	$\mu_1=\mu_2=\mu_3$
26.	Managing time (using SCHEDULED hours effectively)	14	0.432	3.9925	3.9125	4.0226	$\mu_1=\mu_2=\mu_3$
27.	Communicating with employees	2	0.811	4.3088	4.3418	4.4222	$\mu_1=\mu_2=\mu_3$
28.	Communicating with other managers	8	0.363	4.1037	4.1772	4.1832	$\mu_1=\mu_2=\mu_3$
29.	Hiring/terminating procedures	28	0.756	3.2148	3.2625	3.3759	$\mu_1=\mu_2=\mu_3$
30.	Conducting performance appraisals	26	0.661	3.4015	3.3000	3.4586	$\mu_1=\mu_2=\mu_3$
31.	Exercising leadership qualities	9	0.851	4.1791	4.1250	4.0382	$\mu_1=\mu_2=\mu_3$
32.	Functioning in the organization (politicking)	34	0.199	2.4394	2.3924	2.4962	$\mu_1=\mu_2=\mu_3$
33.	Conducting meetings	33	1.972	2.9037	2.7975	2.6642	$\mu_1=\mu_2=\mu_3$
34.	Maintaining consistency	11	1.112	4.1259	3.9500	4.0840	$\mu_1=\mu_2=\mu_3$
35.	Displaying fairness/objectivity with employees	1	0.786	4.5368	4.4875	4.6045	$\mu_1=\mu_2=\mu_3$

* The level of significance was set at the .05 level and tabular F was 3.02.

APPENDIX F

COVER LETTER FOR FIRST-LINE SUPERVISOR QUESTIONNAIRE

August 18, 1981

Dear_____:

Just a note to thank you for your offer of assistance in my quest to finish my dissertation. Identifying enough people to survey is the immediate challenge I am facing.

It is going to be a tremendous help to be able to work with the _____ employees. The survey form will take no more than 5-10 minutes and will prove useful to future supervisory training, something every level of employee will benefit from.

I have enclosed a sample survey form for your perusal. Once again, _____, thank you for your time and consideration. I am anxiously awaiting your response regarding scheduling.

Sincerely,

Rita L. Hammer

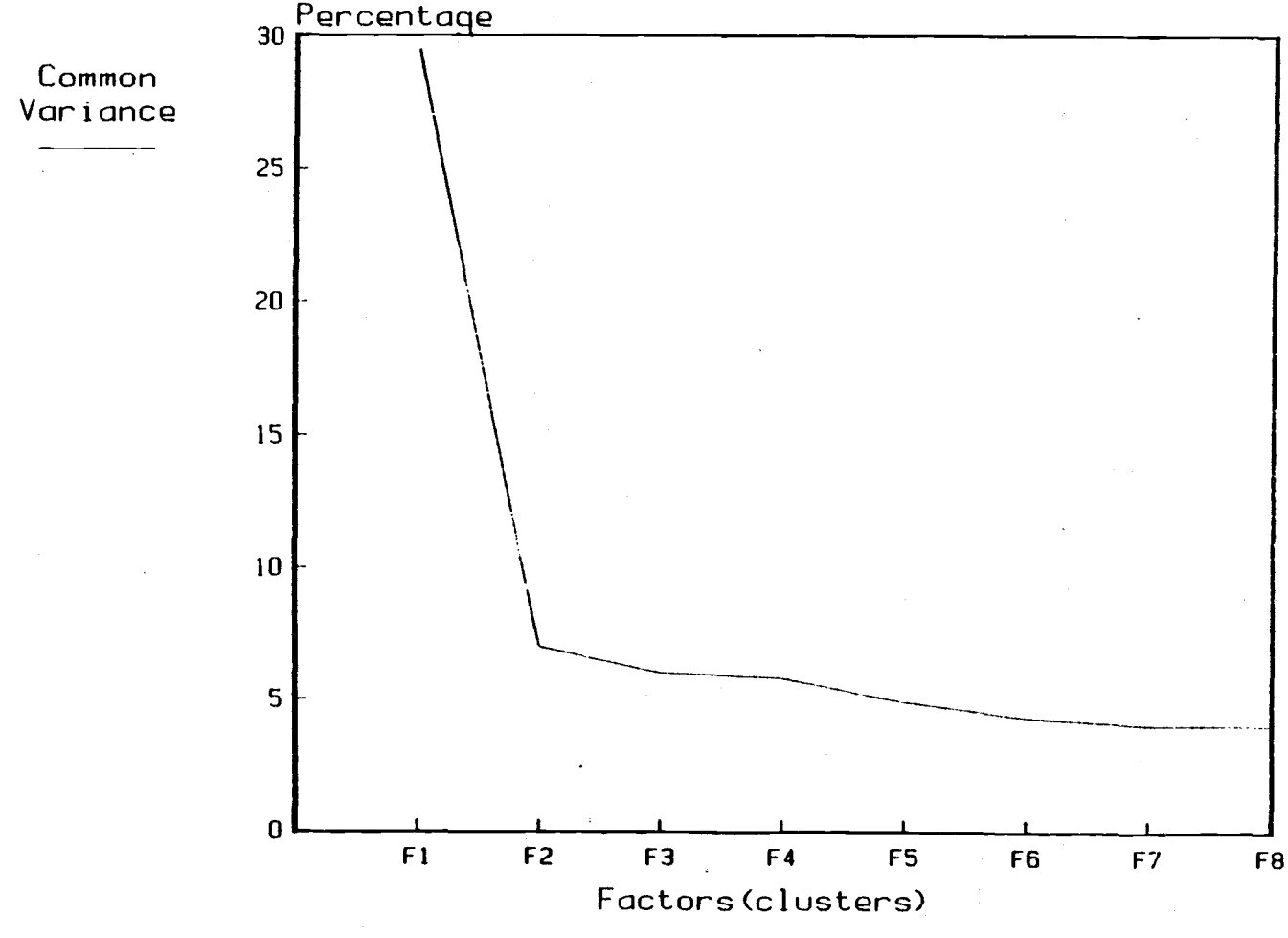
Enclosure

APPENDIX G

Graphic Plot of Cumulative Percentages of Common Variance

GRAPHIC PLOT OF CUMULATIVE

PERCENTAGES OF COMMON VARIANCE



APPENDIX H

PARTICIPATING MANUFACTURERS

PARTICIPATING MANUFACTURERS

1. Agripac, Inc.
   P.O. Box 5346
   Salem, Oregon 97304

2. International Paper Company
   Gardner, Oregon 97441

3. Mailwell Envelope Company
   2515 SW Mailwell Drive
   Milwaukee, Oregon 97222

4. Teledyne Wah Chang
   1600 Old Salem Rd., NE
   Albany, Oregon 97321

5. Truitt Brothers, Inc.
   P.O. Box 309
   Salem, Oregon 97308

6. Weyerhaeuser Company
   P.O. Box 389
   SW Oregon Region
   North Bend, Oregon 97459