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Competency training for the purchasing profession: The relationship between perceived competency significance and training received by purchasing personnel

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COMPETENCY TRAINING FOR THE PURCHASING PROFESSION: THE RELATIONSHIP BETWEEN PERCEIVED COMPETENCY SIGNIFICANCE AND TRAINING RECEIVED BY PURCHASING PERSONNEL

A Dissertation

Presented to

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Clemson University

In Partial Fulfillment

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Doctor of Education

Vocational/Technical Education

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by

Gary Lynn Newkirk

December 1992

December 10, 1992

To the Graduate School:

This dissertation entitled "Competency Training for the Purchasing Profession: The Relationship between Perceived Competency Significance and Training Received by Purchasing Personnel" and written by Gary Lynn Newkirk is presented to the Graduate School of Clemson University. I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education with a major in Vocational/Technical Education.

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We have reviewed this dissertation and recommend its acceptance:

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ABSTRACT

The purpose of this research was to determine if there is a positive linear relationship between the perceived significance of forty-eight purchasing competencies and the amount of training received by purchasing professionals in each of the competencies. A hierarchy of competencies was constructed using Q-sort methodology and a panel of six experts (three practitioners and three academicians). This process established the mean perceived significance for each of the competencies.

To determine the quantity of training purchasing practitioners had received in each competency, a questionnaire was developed and mailed to five hundred members of the Purchasing Management Association of Carolinas - Virginia (PMAC-V). Three hundred and fifty-six usable questionnaires (75.9% return rate) were analyzed to establish the mean amount of training received for each of the forty-eight competencies.

Regression analysis was used to test the first null hypothesis that there is not a positive linear relationship between the perceived significance of the competencies and the mean amount of training received in each competency. T-test results (.05 significance) suggested that there is a positive linear relationship between the perceived significance of the competencies and the amount of training

received in each competency. The coefficient of determination was 0.13, suggesting that 87% of the amount of training received is explained by variables other than the experts' perception of the significance of the competencies.

T-tests were used to determine if personnel in the manufacturing and non-manufacturing segments received (for each competency) significantly different amounts of training. Eleven of the forty-eight competencies were significantly different at the 5% level, suggesting that there are differences in the training received for specific competencies by personnel in the two segments.

Factor analysis reduced the raw data to eight factors that described the characteristics of the training received by the participants. Factor scores were tested by analysis of variance for significant differences in the amount of training between the manufacturing, service, and government segments. The factors that were designated as "Accounting Concepts Applicable to Purchasing" and "Analytical Applications for the Profession" indicated that for these factors, there are significant differences in the amount of training received by purchasing personnel from the manufacturing, service, and government segments. One of the recommendations that resulted from this study was that future research attempt to identify other variables that influence the content and quantity of training received by purchasing professionals.

DEDICATION

This work is dedicated to my loving and supportive wife, Kathryn. Her sacrifices, encouragement and enthusiasm always provided the necessary momentum to keep the wheels of progress turning, even when the researcher was touring the mire.

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CHAPTER I

INTRODUCTION AND PROBLEM STATEMENT

Introduction

Commercial enterprises in the United States face severe competition posed by both domestic and international firms. Domestic firms are increasingly automated, lean, quality conscious, and stoked with renewed purpose. Additionally, foreign competitors have found the American market more and more attractive. The Commerce Department reported record imports of merchandise totaling $500 billion in 1990. Successful business managers of both foreign and domestic firms are constantly alert to exploit opportunities for greater sales and improved profitability. However, expanded sales are not always necessary to improve profits.

Within most commercial enterprises there are significant opportunities to increase profits by focusing on the purchase of materials and services. External purchases of raw materials, supplies, and services represent a significant cost and a significant profit opportunity for businesses. In 1987 the typical U.S. manufacturer spent 60% of its total income from sales to purchase materials and services; top executives expect the ratio to climb still further (Krajewski and Ritzman 1990).

Opportunities to enhance profitability through more effective purchasing are available to American businesses

when buying equipment, services, supplies, and particularly materials, but these opportunities have not been maximized. Every dollar saved by purchasing professionals adds one dollar to profits; however, each additional dollar of sales contributes only a few cents to profit after all applicable expenses are deducted. As noted by Dobler, Lee, and Burt:

> Purchasing and the materials function is sometimes described as 'the last gold mine' for business managers. Indeed, it is among the last of the specialized business functions to be centralized and singled out for making major contributions to profit. Yet, throughout the U. S. industry in general, sophisticated management in this area is still in its infancy. (Dobler, Lee, and Burt 1984, xiii)

Thus, for the discriminating executive, the purchasing function represents an opportunity to improve corporate profitability. While management has been slow to recognize the contributions of the purchasing area, there are encouraging indications that business managers have begun to appreciate the economic gains which may be realized by focusing more attention and resources on "the last gold mine."

Background and Significance of the Problem

Purchasing is generally regarded as a function common to most types of business. Dobler, Lee, and Burt have asserted that:

> All businesses are administered or managed by coordinating and integrating these six functions:
>
> 1. *Creation*, the idea or design function,
> 2. *Finance*, the capital acquisition and financial records function,

3. *Personnel*, the human resources and labor relations function,

4. *Purchasing*, the acquisition of required materials, services, and equipment,

5. *Conversion*, the transformation of materials into economic goods,

6. *Distribution*, the marketing and selling of goods produced.

> By its very nature purchasing is a basic and integral part of business management. It is impossible for any organization to achieve its full potential without a successful purchasing activity. (Dobler, Lee, and Burt 1984, 5)

While purchasing professionals have comprehended the significance of their crucial role in the operation of the business entity, upper management has been slow to recognize the past contributions and the potential contributions. As recently as twenty-five years ago, a job in the purchasing department was regarded as mundane, routine, and lackluster. Banville (1978) stated that most members of the purchasing profession were stereotyped as unimaginative, unresponsive, and generally past mid-life. Ammer (1974) found that the purchasing function was rather isolated and its managers were not generally regarded as members of the corporate team. Only 21% of the 750 firms he surveyed indicated that their purchasing managers participated in decisions outside the purchasing area. He concluded from this survey that the purchasing professional was not a participating member of the corporate team. Purchasing, unlike the finance and marketing functions, was generally not integrated with the top management/executive team.

During the early 1980s the complexity of the purchasing function increased significantly, and it became more important to employ skilled purchasing professionals. Purchasing managers and buyers were required to be proficient in the use of computers, to have a holistic business perspective, and to cultivate integrated business partnerships with high-quality suppliers. A corporation's key suppliers were increasingly regarded as partners, rather than adversaries.

During an assignment (from 1983 to 1987) as a machinery buyer in the Corporate Purchasing Department of a major textile manufacturer, this researcher witnessed the retirement of several senior buyers, who were regarded as "hard-nosed" and "old school" by their peers. They were replaced by analytical, business-minded persons who comprehended the growing complexity of the purchasing function. Brady and Willetts (1985) noted that the purchasing position was elevated in significance because top management recognized the positive impact the area could have on profits. As a result, purchasing personnel in most companies have earned a more professional image and are now typically respected members of the management team.

The advancement of the purchasing profession has been accompanied by an expansion of the responsibilities encompassed in the purchasing function. As a result, most purchasing activities have increased in complexity, and consequently, the skills required of purchasing personnel

are more sophisticated. Henke and Martin noted that "this functional evolution required that procurement personnel update and acquire new skills, knowledge, and capabilities" (1989, 27).

While several studies have identified the key competencies required for effective purchasing, research has not been undertaken to confirm that training and development programs are focusing on the most significant competencies. Training and development personnel realize that management is continually assessing the value and return-on-investment of training expenses. Compressed schedules and time constraints also pose a challenge to trainers.

Meaden, a past manager of purchasing training for Shell Oil Company, noted: "The problem is that there just simply isn't enough time in a purchasing program to do justice to the material, even with the help of outside consultants" (1984, 80). Because of the restrictions posed by limited time and money, it is imperative that training be targeted to the most significant competencies required by purchasing personnel. The ability to identify critical competencies and deliver competency-specific training is crucial for improving purchasing effectiveness and enhancing the cost conscious image of the department. Researchers have conducted several studies to identify and rank purchasing competencies.

Two excellent articles in the Journal of Purchasing and Materials Management addressed the need to identify and rank

the relative importance of job factors and competencies for purchasing practitioners. Both Naumann (1983) and Moore, Luft, and Eckrich (1984), identified purchasing competencies, used a survey instrument, and sampled practitioners to establish a priority of purchasing competencies (these articles are reviewed in detail in Chapter II). The researchers in both of these articles recommended that the lists of job factors and competencies become the basis for developing a more cost-effective purchasing training program. Research has not been conducted to confirm that purchasing training has been focused on the competencies perceived as most significant.

Statement of the Problem

To date there is *no* evidence in the literature that organizations use a systematic approach (such as the competency list) to organize and implement training for purchasing personnel. One contemplates an obvious question: Are buyers and purchasing managers receiving training that is purposefully focused on the most significant competencies? Seeking definitive answers to this question became the basis for the present research.

Research Problem and Purpose

The purpose of this study was to determine if purchasing professionals were provided with training (from January 1, 1990 to May 12, 1992) that was purposefully directed toward those competencies judged by experts to be

most critical for performance enhancement. Was there a relationship between the amount of training received in specific competencies and the perceived significance of the competencies (hierarchy) as determined by experts?

The following questions were addressed:

1. During the period from January 1, 1990 to May 12, 1992, what competencies did experts regard as the most important for the professional development of purchasing personnel?

2. Was there a relationship between the perceived importance of the competencies and the amount of training allocated to each competency? Did purchasing personnel receive proportionally more training in those competencies that were perceived as the most significant in the hierarchy?

Subsidiary Questions

Additional questions, subsidiary to the main question, included the following:

1. Did purchasing personnel within the manufacturing and non-manufacturing segments receive significantly different amounts of training in each competency?

2. Was there evidence that the relationship between the perceived importance of the competency and the amount of training allocated to each competency was more substantial in either the manufacturing, service, or government segments?

3. Was there evidence that certain industries were engaged in purchasing training that indicated a stronger relationship between the perceived significance of the competencies and the amount of training provided in those competencies?

4. Which evaluative/assessment techniques were employed by organizations to determine the training needs of their purchasing personnel?

Assumptions

Before the study was initiated, the following assumptions were made:

1. A group of six purchasing experts would be able to rank order a list of purchasing competencies (based on their importance during 1990, 1991, and until May 12, 1992).
2. A survey instrument could be written that would measure the amount of training (in hours) respondents received in each of the competencies during the specified time period.
3. Respondents would recall, or have access to records to determine, the amount of training they received in each competency.
4. Assured of confidentiality, the respondents would accurately complete the demographic and personal sections of the instrument.
5. A sufficient number of survey instruments would be returned to facilitate a meaningful statistical analysis.

Hypothesis

Based on a review of the literature, discussions with educators, and interviews with several buyers, the following hypothesis was developed:

> There is a significant positive relationship between experts' perceptions of the most significant purchasing competencies and the amount of time allocated to training purchasing professionals in specific competencies.

Importance of the Study

Purchasing educators and researchers have been slow to respond (in terms of research and publications) to the elevated status of the purchasing function. A review of the articles in the Journal of Purchasing and Materials

Management, other appropriate purchasing and training journals, and the Dissertation Abstracts International provided strong evidence that there was a lack of similar studies; therefore, opportunities abound for meaningful research on the topic of training and developing buyers and purchasing managers. This was an excellent opportunity to initiate a research effort focusing on training competencies, their perceived importance, and whether instruction has been purposefully targeted to the most significant competencies.

Increasing sophistication in areas such as electronic data interchange with vendors, computer driven requisition systems, "paperless" purchase orders using EDI (electronic data interchange), and JIT (just-in-time) buying and deliveries are examples of the advances supporting the claim that purchasing professionals must possess a wide variety of skills. These skills must be developed and expanded to meet the growing technological advances experienced by business.

Definition of Key Terms

Competencies
The specific knowledge, skills, and abilities that are judged to be significant in accomplishing a task or job.

Industry Segment

Manufacturer - An organization designed to convert materials into finished goods or higher order components. Manufactured goods are physical, durable products.

Service - An organization that is designed to consume materials in order to provide an intangible or perishable product, such as ideas, concepts, or

information. This segment is characterized by frequent customer contact and the inability to inventory the product that is offered, i.e., the service (Krajewski and Ritzman, 1990).

Government - An organization that has legal authority over a specific territory and/or group of people. Government purchasing involves the acquisition of equipment, supplies, goods, and services.

Non-Manufacturing - Service and government organizations as defined above.

Purchasing Agent/Buyer
A member of the purchasing department whose activities include interviewing salespeople, negotiating with vendors, analyzing bids and making awards, selecting suppliers, issuing purchase orders, making adjustments with suppliers, and keeping appropriate records (Dobler, Lee, and Burt, 1984).

Purchasing Personnel, Experienced
A purchasing agent or manager who has been in the purchasing department for at least one year.

Purchasing Department
An organizational unit of a firm whose duties include some part or all of the purchasing function.

Purchasing Function
The business function or unit responsible for the acquisition of required materials, services, equipment, land, facilities, and supplies.

Purchasing Manager
The individual or individuals in the Purchasing Department designated to have major responsibility for the development of policies, procedures, and for the overall supervision of the purchasing activity (Moore, Luft, and Eckrich, 1984). Purchasing managers generally have buying responsibilities.

Training
To instruct so as to make more proficient or qualified. To improve the knowledge, skills, and abilities of employees, especially at specific tasks related to their jobs.

Scope and Limitations

The study was limited to a sample of the 1860 purchasing professionals who were members of the Purchasing

Management Association of Carolinas-Virginia (PMAC-V) on April 15, 1992. Purchasing personnel who were not members of this professional association were not included. Also, the information analyzed in the study was restricted to the written responses of the participants on the survey instrument and to the expert's recorded perceptions of the significance of selected purchasing competencies.

CHAPTER II

LITERATURE REVIEW

The review of the literature begins with an overview of the material in the textbooks relating to purchasing and training. This section is followed by a discussion of the salient journal articles.

Review of Purchasing Textbooks

Six major purchasing texts (Aljian, 1982; Dobler, Lee, and Burt, 1984; England, 1962; Farmer, 1985; Heinritz, 1949; and Parsons, 1982) were reviewed to ascertain content recommendations for purchasing training programs. In each of these texts, the content recommendations were very broad, and the chapter pertaining to training was devoted to training methods and techniques rather than to specific skills and competencies. As the texts were being reviewed, a structural commonality became apparent. Whether by coincidence or design, five of the texts located the training chapter at, or very near, the end of the book. Even the respected authors Dobler, Lee, and Burt (1984) appeared to be disinterested or exhausted by the time they expound on training for purchasing professionals; moreover, their coverage can be characterized as brief and very general.

The Purchasing Handbook, edited by Aljian (1982), is the one exception to the sparsity of material offered in

most textbooks. This text, providing more than fifty pages of excellent material in the training and development area, includes recommendations for deriving content through training needs analysis techniques such as questionnaires, in-depth interviews, and task analyses. In Chapter 26, Murphy (1982) described task analysis as a method of coming to grips with the determination of specific skills and content. He summarized training content in the traditional manner as the attitudes, skills, and knowledge needed for one to perform effectively as a buyer. There is additional material in the chapter that provides direction to the trainer for implementing and evaluating purchasing training programs.

Of all the texts reviewed, this one alone offered exemplary coverage of training and development. However, there remained a void concerning specific content and recommendations for determining competencies. A review of these major textbooks provided a cursory understanding of the significance of purchasing competencies, but none of the material provided specific direction to enable one to determine which competencies were most significant now, or in the future. It became evident, in the preliminary stages of reviewing applicable journal articles, that this source of information would provide greater detail than textbooks in determining and prioritizing purchasing competencies.

Journal Articles

Perhaps the first article to focus on purchasing needs and competencies appeared in the Harvard Business Review in 1974. The article, "Is Your Purchasing Department a Good Buy?" by Ammer, asserted the implicit perception of senior business executives that purchasing managers were lacking in the significant qualities of perseverance, imagination, decisiveness, analytical ability, and interpersonal skills (1974). Regrettably, although Ammer was able to focus on specific needs, his prescription for improvement was not better training and development of current personnel, but rather identification and recruitment of more and better qualified people to join the purchasing department. One would have expected that the importance of human resource development (such as enhancing the purchasing skills of existing personnel) was better understood.

While Ammer's article was directed at the shortcomings of purchasing managers, it should be recognized as a unique contribution for focusing attention on personal characteristics and purchasing skills which had been identified by senior managers as generally requiring improvement. In his conclusion, Ammer cast a pall over the purchasing profession by noting:

> It is not surprising, then, that top management generally considers purchasing managers to be lower-echelon people. What is surprising is that a substantial number of purchasing managers *agree* with this overall assessment, and, I would guess that a majority accept it. (Ammer 1974, 42)

Purchasing professionals did not respond to Ammer with rebuttals or with training and development prescriptions in their professional periodical, Journal of Purchasing and Materials Management. In 1987 Williams and Oumlil classified all of the articles that appeared in the Journal between 1960 and 1982. Their study established that there were no training and development articles published (in the JPMM) between the years 1974-1982. Not until 1983 were articles published that focused on identifying and ranking the significance of purchasing competencies.

The first significant article appeared in 1983 under the title "Purchasing Training Programs." In this article Naumann (1983) acknowledged that the unstable economic conditions of the 1970s had reordered the priority list of significant skills required in the profession. He advised that the content of purchasing training programs be reviewed in light of current and projected job factors and skills.

As part of his research, Naumann developed a comprehensive list of twenty-seven job factors which were derived from the content of purchasing books, articles, and professional development material (see Appendix A). Naumann used these twenty-seven factors in a questionnaire distributed to 220 purchasing personnel in a variety of firms (electronics, manufacturing, construction, lumber, and food) throughout the Northwestern United States.

The questionnaire asked the respondents to indicate (using a five-point Likert scale) how important each job

factor/competency was in becoming an effective buyer. Naumann received 104 usable questionnaires for a marginal response rate of 47%. He calculated the mean for each of the twenty-seven competencies and arranged the competencies in a rank-ordered list, from the highest to lowest mean score. While acknowledging that all of the job factors were important, Naumann stated that:

> Training programs in virtually all organizations should place major emphasis on the top nine factors. These issues appear to be almost uniformly important in all organizations. (Naumann 1983, 22)

Naumann's article was a significant contribution to the profession because it represented the first time that the individual job factors of the purchasing function were analyzed by practitioners and rank ordered by degree of importance. Naumann concluded his article on a positive note by observing that the purchasing function had achieved increased importance and that there was a long-term need for additional purchasing professionals who were more effectively trained. He stated:

> In most organizations there is a need for improved purchasing performance. The results of this research identify certain job factors and concepts that appear to be almost uniformly important, as well as others that are less important. These results should be useful to managers and consultants who are responsible for developing new training programs and refining those currently in use. (Naumann 1983, 22)

A second noteworthy article, by Moore, Luft, and Eckrich, appeared in The Journal of Purchasing and Materials Management in the spring of 1984. The article, "A Hierarchy of Purchasing Competencies," established a prioritized list

of ninety-three competencies that were identified through interviews with selected purchasing representatives from twenty Chicago and St. Louis based businesses. The primary objective of the researchers was to validate the competencies and to determine their perceived importance to practitioners.

The competencies were assembled in a questionnaire that was distributed to 120 purchasing representatives in the St. Louis area. Sixty-seven of the questionnaires (56%) were returned and used in the data analysis. The researchers asked the participants to rank the importance of each competency on a seven-item Likert scale. The responses were compiled and the mean for each competency was calculated. Six competencies were identified in this study as "extremely important," compared to nine in Naumann's research. Additionally, the respondents were divided into three groups: government buyers, manufacturing buyers, and purchasing directors and managers. A one-way ANOVA was applied to the results to determine if differences existed (between the three groups) in their perceptions of the importance of specific competencies. In this study seven out of the ninety-three competencies exhibited statistically significant differences, all above the 95% level. These competencies and the mean scores are provided in Appendix A. The researchers concluded that the government buyers exhibited the greatest difference in perception of competency importance, while manufacturing buyers' and

purchasing directors' perceptions were virtually identical with one another (Moore, Luft, and Eckrich, 1984).

The express purpose of the study was to assist both educators and practitioners in the development of optimal purchasing training programs. The article represented the second time that researchers had identified purchasing competencies and evaluated the significance of each using a comparison of the mean for each response. It was significant that Moore, Luft, and Eckrich concluded that "only minimal variation needs to exist between purchasing programs designed for government buyers and those for manufacturing buyers." (Moore, Luft, and Eckrich 1984, 14)

The third study to evaluate purchasing competencies was performed by Robert Shealy and appeared in The Journal of Purchasing and Materials Management in 1985. The purpose of the research was to evaluate the extent to which purchasing jobs in manufacturing and service businesses required similar or different competencies. The list of job skills was expanded to 135 in Shealy's research. The participants were members of the purchasing departments of the operating divisions of a large, decentralized, multi-national corporation. One-hundred and seventy questionnaires (an 84% return rate) were evaluated, and the study confirmed that there were not major differences in prioritized competencies between the manufacturing and service segments of this company. Shealy concluded that:

> This study reveals that the industrial buying job is quite similar in the different types of businesses

> studied. Over 85% of the purchasing tasks were rated similarly in importance by buyers in different types of businesses. Therefore, training and education programs for purchasing professionals, for the most part, do not have to be tailored for a specific business. (Shealy 1985, 20)

Summary

A review of the purchasing literature indicated that beginning in 1983 there was an increased awareness of the need to provide adequate training for purchasing professionals. In addition, members of the purchasing department were increasingly perceived as significant contributors to company goals and objectives. Shealy noted that:

> Awareness among top level managers regarding the importance of the purchasing function to their respective firms continues to grow. In most progressive companies of any size, purchasing is viewed as a significant contributor to the accomplishment of business goals and the improvement of profitability. (Shealy 1985, 19)

The purchasing department has been gradually recognized as an equal (or near equal) to the other functional areas of the organization.

The literature also documented that it was possible and practical to identify and prioritize purchasing competencies. As successive articles were written, the competency list was expanded to almost unmanageable proportions (from twenty-seven competencies in Naumann's work to 135 in Shealy's study). The researchers calculated a mean for each competency and ranked them in descending order, thus developing a numerical order that was defined as a hierarchy of purchasing competencies. Certain

competencies (six for Naumann; nine for Moore, Luft, and Eckrich) were judged to be of greater importance (to the trainer) based on their higher mean values.

While the researchers recommended that businesses use the hierarchy to guide future training and development of purchasing personnel, a review of the literature indicated that researchers have not investigated the degree to which organizations have focused their training efforts on the competencies perceived to be most important. Given that an updated hierarchy was established, would research confirm that there was a positive relationship between the perceived significance of the competencies and the amount of training received by experienced purchasing personnel?

CHAPTER III

METHODOLOGY

Introduction

This study was conducted to determine if there was a positive linear relationship between the perceived significance of forty-eight purchasing competencies and the amount of training received by purchasing professionals in each of the competencies. The independent variable (x) is the mean perceived significance of each competency, and the dependent variable (y) is the mean amount of training received in each competency.

The objectives were to:

1. develop a hierarchy of purchasing competencies through the application of the Q-sort technique by a panel of six experts,

2. ascertain the amount of training that experienced purchasing personnel have received in each competency,

3. test the sample means ($\bar{x}$ and $\bar{y}$) of the forty-eight competencies for a positive linear relationship,

4. measure the strength of the relationship between the perceived significance of the competencies and the amount of training received in the competencies,

5. determine for each competency if there were significant differences in the amounts of training received by personnel in manufacturing and non-manufacturing (government and service) businesses,

6. gather and analyze the demographic data, organizational characteristics, and data on purchasing training specific to the level of satisfaction, the training decision maker, and training needs assessment.

The Null Hypotheses

Based on the objectives of this study, the null hypotheses were:

1. There is no significant degree of positive correlation between the independent variable, the ranked importance of the purchasing competencies (competency hierarchy), and the dependent variable, the amount of training received in each competency by purchasing personnel. That is, there is no relationship between the perceived importance of the subject matter and the amount of training received by purchasing personnel.

2. There is no significant difference in the amount of training (by competency) received by the purchasing professionals in manufacturing and non-manufacturing (government and service) businesses.

The methodology of this study consisted of constructing a hierarchy of purchasing competencies using the Q-sort technique; developing a survey instrument to measure training time for each competency in the hierarchy; sampling a population of purchasing practitioners and measuring the amount of training received in each competency; and performing statistical analyses to either reject or fail to reject the null hypotheses.

Constructing the Purchasing Hierarchy

A hierarchy of purchasing competencies was developed based on the Q-methodology devised by Stephenson (1953) and later presented with a more applied emphasis by Best and Kahn (1989) and by Kerlinger (1986). Purchasing competencies were assembled from two extensive studies published by Moore, Luft, and Eckrich (1984) and Naumann (1983) (these articles were reviewed in Chapter II and the

competencies are presented in Appendix A). The competencies resulting from these two investigations were analyzed and consolidated into a comprehensive list of forty-eight competencies (see Appendix B). The researcher used personal purchasing experience to combine "over-lapping" or redundant competencies which might result in confusion for the respondents. The work of Kerlinger (1986) was used to determine the minimum number of items required for an acceptable Q-sort. Kerlinger (1986) noted that the number of items in a Q-sort is determined by convenience and statistical demands. Good results have been obtained from as few as forty items, when they were culled from a larger pool.

The consolidated list of forty-eight competencies was distributed to a panel of six experts consisting of three educators in the purchasing field and three experienced purchasing managers. Best and Kahn (1989) noted that the Q-sort can be used to solicit the composite judgment of a selected panel of experts. For this research, the members of the panel were selected based on the recommendations of the current and two past presidents of PMAC-V and a review of the articles presented by purchasing scholars. The Q-sort panel was composed of:

1. two purchasing managers from manufacturing companies and one from a utility company,

2. three educators who have written articles and books in the field of purchasing (see Appendix C for the professional credentials of the panelists).

The panelists were directed to sort the list of forty-eight competencies based on the premise:

> If you were responsible for the training and development of purchasing personnel in the United States from January 1, 1990 to May 12, 1992, what are the priorities you would assign to the forty-eight competencies to increase the effectiveness of these professionals?

The panelists were asked to sort the forty-eight competencies into nine different categories according to the perceived importance of each. Lorr (1983) noted that when using the Q-sort technique with nine categories and a specified number of items in each category, a quasi-normal distribution is formed. Kerlinger (1986) wrote that when this technique is followed, the resulting distribution is normal or quasi-normal. The distribution of competencies in this research was based on an example from the work of William Stephenson (1953).

	Most Important						Least Important		
Score	8	7	6	5	4	3	2	1	0
Frequency (n=48)	2	4	5	8	10	8	5	4	2

The forty-eight competencies were ranked-ordered from "Most Important" (8) to "Least Important" (0), with seven degrees of importance between these extremes (7 through 1). To facilitate the sorting, each panelist was given a deck of forty-eight cards with one competency listed per card, a score sheet to record the final results of the sort, and a set of instructions that described the process of sorting the cards (Appendix D contains the material, excluding the cards, provided to each panelist).

The ratings of the six panelists were consolidated and processed to determine the mean for each competency (Appendix E). Best and Kahn cited the following application of the Q-sort: "The mean value of the positions assigned to each item indicates the composite judgment of the panel as to its relative importance" (Best and Kahn 1989, 205). The purchasing hierarchy was developed by listing the forty-eight competencies in descending order according to the mean value of each. The forty-eight competencies were then incorporated into the survey instrument.

The Survey Instrument

An eight page questionnaire was designed according to the guidelines recommended in Dillman's (1978) book, Mail and Telephone Surveys. The questionnaire consisted of two parts: one to measure the training time for each of the forty-eight competencies and the second to determine the respondents' attitudes toward their training and to assess their demographic characteristics. The questionnaire was developed in this sequence because, as noted by Babbie (1979) and Dillman (1978), requests for demographic data are best placed at the end of a questionnaire.

The forty-eight competencies were grouped into five content categories: Human Relations Skills, Communication Skills, Analytical Skills, Personal, and Other Professional. Within each category the competencies were listed in random order to avoid possible bias. This section of the questionnaire directed the survey respondents to indicate

the hours of training received in each competency since January 1, 1990. The questions in the second part of the survey were used to gather demographic data about the respondents and to measure their attitude regarding the purchasing training they had received. Other questions were used to assess respondents' attendance at monthly and quarterly PMAC-V association meetings. A copy of the questionnaire is provided in Appendix F.

Instrument Validity

Best and Kahn (1989) noted that asking the most appropriate questions in the least ambiguous manner was basic to the validity of a questionnaire. Validity is enhanced when the questions sample a significant aspect of the purpose of the investigation. The validity of the competencies used in this survey was established in the research of Moore, Luft, and Eckrich (1984) and Naumann (1983).

The Moore, Luft, and Eckrich investigation identified ninety-three important competencies through in-depth interviews with twenty purchasing managers. The ninety-three competencies were incorporated into a questionnaire (mailed to 120 purchasing professionals) that asked the respondents to validate and rank order the competencies. The researchers noted: "Although the degree of importance varies, the ratings provide a general validation for all identified competencies" (Moore, Luft, and Eckrich 1984, 9). The competency list may be found in Appendix A.

In the Moore, Luft, and Eckrich study six competencies were rated extremely important, sixty-nine quite important, and eighteen slightly important. The range of the means (based on a Likert scale from 7 for extremely important to 1 for extremely unimportant) of the competencies was from 6.612 to 4.552.

Naumann (1983) developed a list of twenty-seven purchasing activities and job factors after an extensive review of purchasing books and professional articles. He distributed his list to 220 purchasing personnel, requesting that each activity be ranked based on its importance in developing an effective buyer. Using a 5-point Likert scale (5 was very important and 1 was very unimportant), the means for the competencies in Naumann's study ranged from a high of 4.62 to a low of 3.08. The results of this study are presented in Appendix A.

The competencies in these two studies were carefully grouped, combined, and consolidated into a comprehensive list of forty-eight items. It was critical to maintain high validity in this study by consolidating overlapping and redundant competencies. The resulting forty-eight competencies were independent, concise and succinct descriptions of purchasing activities.

To insure questionnaire validity, Best and Kahn (1989) stated that the meaning of key terms must be clearly defined so they convey a common meaning to respondents. They recommended careful research and consultation with

knowledgeable practitioners in the field. Essential to the validity of this research was establishing a standard definition of the term "training" that would be consistently applied by the respondents.

The researcher developed the following definition of training (which was provided to respondents on the questionnaire) after a review of training literature and consulting with practitioners:

1. any structured or formal learning experience conducted by another person, such as an instructor or facilitator, or,

2. training conducted by your supervisor if the supervisor had training materials such as a lesson outline, learning objectives, and/or a lesson plan, or,

3. organized instruction such as the National Association of Purchasing Management's Phase program or other materials designed for the certified purchasing managers examination, even if you worked alone.

Finally, the researcher must strive to improve content validity in the questionnaire.

Kerlinger (1986) noted that content validation consists essentially of judgment. Generally, the representativeness of the items should be determined by competent judges working either independently or with others. To improve the validity of this survey instrument, the researcher requested the Q-sort panelists to review critically the competencies and indicate those they thought were ambiguous, confusing, or invalid (see the letter to the Q-sort panelists in Appendix D).

Additionally, the draft of the questionnaire was reviewed by selected practitioners as a final check for possible problems with wording or comprehension. Several changes were made to the draft of the questionnaire based on the recommendations of those "experts."

Population

The population for this study consisted of the 1860 members of the Purchasing Management Association of Carolinas-Virginia (PMAC-V) as of April 15, 1992. This organization was chosen for the population because it provided a means of selecting a representative sample of purchasing professionals by name, from the PMAC-V membership file at the regional headquarters in Greensboro, North Carolina.

The less desirable alternative for the population was a random selection of businesses from state commerce directories. The questionnaire would be mailed to the "Manager of Purchasing." The manager would be asked to give the questionnaire to one of the buyers, thus removing an element of random selection from the process and perhaps jeopardizing the confidentiality of the survey. Also, follow-up on unreturned questionnaires would be extremely difficult under this method. The researcher anticipated that a cooperative effort with the PMAC-V would increase the questionnaire return rate and result in more meaningful research and recommendations.

The researcher took the following action before the initial mail-out to emphasize the significance of the research and to improve the questionnaire return rate:

1. obtained the endorsement and financial support of the President and Directors of PMAC-V;
2. capitalized on pre-survey publicity by publishing a description of the study and its anticipated benefits in the bi-monthly PMAC-V journal, Southern Purchasor [sic]; and,
3. referenced the support and cooperation of the President of PMAC-V in the survey cover letter and and journal article.

This material is presented in Appendix G.

The researcher reasoned that the rate of return from this population would be economically enhanced through pre-survey publicity in the PMAC-V journal. Also, the credibility and significance of the study would be improved by stating in the cover letter that the survey was endorsed and supported by PMAC-V.

Sample Technique

Utilizing systematic sample techniques, the researcher selected 500 PMAC-V members to participate in the survey. Initially, a sample of 619 names was obtained by selecting every third person from the alphabetical listing of members maintained by the PMAC-V headquarters. The sample was reduced to 500 by randomly selecting 119 names to be removed from the list of 619. While somewhat laborious, Henry (1990) recommends this combination technique when an exact sample size is desired.

Data Collection

The data collection was performed in three iterations or "waves," according to the procedures recommended by Dillman (1978) in Mail and Telephone Surveys.

Wave One

After the selection process was completed, the survey questionnaire (Appendix F) and cover letter (Appendix H) were mailed to the prospective participants at their business addresses. The wording of the cover letter was carefully selected to emphasize the importance of the survey and the significance of each participant's responses. The participants were assured of complete confidentiality and told that the number on their questionnaire would be used only for follow-up mailings.

One week after the initial mail-out, a follow-up postcard was sent to each participant to thank those who had returned their questionnaire and to encourage non-respondents to complete and return their questionnaires. A copy of the postcard is found in Appendix H. The total number of questionnaires that could not be delivered to the addressee was noted and deducted from the sample size for the purpose of calculating the return rate.

Wave Two

Three weeks after the initial mail-out, another questionnaire and modified cover letter were mailed to non-respondents (see Appendix H). Dillman (1978) noted that after three weeks there is a good likelihood that the

original questionnaire has been lost or misplaced. The convenience of having a questionnaire "at hand" would appear to increase the probability of a return.

Wave Three

Seven weeks after the initial mail-out, the non-respondents were sent a final cover letter and questionnaire by certified mail (See Appendix H). Dillman (1978) cited tests that indicated this increases the perceived importance of the questionnaire and increased the response rate by 10-15%. Two weeks after the certified letters were mailed, data collection was considered complete.

Response Rate

The response rate is defined by Dillman (1978) as: Response rate = number returned / (number in sample - the number unusable). Babbie (1979) characterized response rates: 50 % as adequate for analysis and reporting, 60 % or more as good, and 70 % or more as very good. The response rates for the research articles reviewed in Chapter II ranged from 47% for Naumann (1983) to 84% for Shealy (1985).

Confidentiality

Confidentiality of the respondents was emphasized in the Southern Purchasor [sic] article, in the survey instructions and in the cover letter. Respondents were assured that anonymity of individuals and their employers would be maintained. Numerical codes were assigned to the

questionnaire for follow-up purposes only, and the researcher was the only individual with access to the codes.

Data Processing and Analyses

Testing the First Null Hypothesis

The independent (x) variable for this study was the mean perceived competency significance determined by the Q-sort analysis. For each competency, a mean perceived significance was calculated: (Sum of the scores for the six panelists)/ 6. The dependent (y) variable was the average training time per competency based on the responses to the questionnaire. For each training competency the average time was: (Sum of the training times of the respondents) / n respondents. The first order linear model for this study is: $y = a + bx$.

The slope of the model (b) was analyzed for positive linearity by using a t-test. The strength of the relationship between the mean perceived significance (x) and the mean training times (y) of the competencies was analyzed by calculating and interpreting the coefficient of correlation (r), the coefficient of determination (r^2), and the coefficient of variation (C.V).

Two additional regression analyses were performed after sorting the responses by: (1) manufacturing, service, and government segments, and (2) industry sectors according to the number of respondents. The objective of these analyses was to identify specific segments and business sectors that

provided training in quantities which had a stronger relationship to the experts' perceptions of significance.

Testing the Second Null Hypothesis

The training times for all respondents were sorted into two segments: manufacturing and non-manufacturing (service and government); then an average training time was calculated (by segment) for each of the forty-eight competencies. The t-test was used to determine those competencies in which the statistical evidence indicated the two segments were providing significantly different amounts of training.

As noted in Chapter II, the research of Naumann (1983); Moore, Luft, and Eckrich (1984); and Shealy (1985) provided evidence that there were not significant perceived differences between business segments in terms of their competency hierarchies. Moore, Luft, and Eckrich for instance, found that there were seven (out of ninety-three) competencies for which the participants exhibited statistically (.05 level) different perceptions between the segments.

Whereas prior research has been focused on the perceptions of the significance of purchasing competencies for business segments, the second null hypothesis tested for differences in terms of actual training delivered to participants. This test was an interesting parallel to prior research, but it was more significant because it transcended the concept of testing for perceived differences

(of prior research) and tested that which had actually transpired in terms of training per competency.

Factor Analysis

Factor analysis was used to analyze the training times of the respondents. Factor analysis grouped training competencies into major categories (factors) according to the training received by the respondents. Those competencies that constitute a factor were weighted and provided insight into the composition of major training categories. Additionally, an analysis of variance was performed for each factor (after sorting the respondents into government, service, and manufacturing segments) by testing the factor scores of the participants from each segment.

Regression analysis was used to determine how much of the variation in training between the three segments attributed to the variation of each factor. Regression analysis determined which factors (clusters of purchasing competencies) contributed the most to the variation or differences between the segments.

Demographic Data

The data for the eighteen demographic questions were sorted and analyzed using acceptable descriptive techniques: mean, median, range, standard deviation, and the sum of the responses in each category for questions involving nominal and ordinal data. The demographic data will provide insight

into the participants' attitudes toward the quality and quantity of training they have received.

CHAPTER IV

ANALYSIS AND EVALUATION

Overview

The analyses and evaluations for this chapter are discussed in the following order: data collection procedures (survey response rate, response bias, data audit), hypothesis testing of raw data, and hypothesis testing using factor scores. For this latter part of the research, factor analysis reduced the forty-eight competencies to eight factors that succinctly describe the characteristics of the training delivered to purchasing professionals. Factor weighted scores were generated, and analysis of variance was used to test each factor for significant differences among the participants in the government, service, and manufacturing segments. Regression analysis was then used to estimate how much of the variability between these segments was due to the variability of the factor scores.

Data Collection

Survey Response Rate

As the questionnaires were returned, they were coded to indicate the return wave. As described in Chapter III (Data Collection) a wave represented the period of time between mailing a cover letter and questionnaire to the prospective participant and a deadline for receiving the completed

questionnaire. A detailed description of the three waves was presented in Chapter III.

Methods proposed by Dillman (1978) were used to calculate the survey response rate. Accordingly, response rate is defined as the proportion of the eligible respondents in the sample who submitted usable questionnaires. For this calculation, the number of ineligible respondents was deducted from both the number of questionnaires returned and from the sample size (500). Thirty-one (31) persons were classified as ineligible based on the following criteria: retired (11), in the profession for less than one year (1), not in a purchasing position (16), and not reachable by mail (3). An additional fifteen (15) questionnaires were not included in the analysis because of obvious patterns in the responses (12) and because the respondent declined to participate (3). At the end of wave 3, there were 356 usable questionnaires to be analyzed for this research. Table 1 summarizes the results for each wave and shows that the response rate for the study was 75.9%.

TABLE 1

QUESTIONNAIRE RETURNS BY WAVE

Wave	No. Analyzed	No. Eligible	Response Rate
1	212 (231-19)	488 (500-12)	
2	97 (112-15)	479 (488-9)	
3	47 (59-12)	469 (479-10)	
Total	356	469	75.9% (356/469)

Poor response rates are often cited as a major limitation of mail-surveys. The researcher who uses a mail-questionnaire must exercise care to insure that the response rate is adequate to insure meaningful data analysis. Babbie noted that:

> a response rate of at least 50 percent is *adequate* for analysis and reporting. A response rate of at least 60 percent is *good*. And a response rate of 70 percent or more is *very good*. You should bear in mind, however, that these are only rough guides; they have no statistical basis, and a demonstrated lack of response bias is far more important than a high response rate. (Babbie 1979, 335)

The response rate of 75.9% indicated broad interest in the research and a willingness to cooperate in the study on the part of PMAC-V members.

Data Audit

To confirm that the data were accurately transferred from the questionnaires to the computer data file, 20% of the response sheets (71) were randomly selected for data

entry verification. The audit indicated that three keystroke errors were made out of the 9,017 keystrokes used to enter the data from the seventy-one questionnaires, for an estimated error rate of 0.033% (3/9017).

Response Bias

A t-test was used to test for a significant response difference between the first and third (last) waves. The average training times for each of the forty-eight competencies were statistically compared between participants from wave 1 and wave 3. As noted in Table 2 the only significant difference (at the .05 level) between the mean training times of waves 1 and 3 was for competency number 40: "Understand legal considerations." The results of the t-tests are shown in Appendix I. For this research it can be concluded that there were no significant differences between the mean training times of respondents in the first and third waves. When combined with the high response rate of 75.9%, the t-test results provided strong evidence that non-response bias was minimized for this research.

TABLE 2

SIGNIFICANT t-TEST FOR WAVE 1 AND WAVE 3

	Competency	$\bar{y}$ Wave 1	$\bar{y}$ Wave 3	prob>|t|
40.	Understand legal considerations	3.97	2.19	.038**

**Significant at the .05 level

Hypotheses Testing of Raw Data

The primary objective of this research was to determine whether there is a relationship between the perceived significance of each of the forty-eight purchasing competencies (as determined by a panel of six experts) and the amount of training received by purchasing practitioners (all participants) in each of the competencies.

The survey responses were used to calculate the mean amount of training respondents received (by competency) from January 1, 1990 to May 12, 1992. Means and standard deviations for training received are presented in Table 3.

TABLE 3

MEAN AND STANDARD DEVIATION OF THE TRAINING RECEIVED FOR 48 PURCHASING COMPETENCIES

	Competency	Mean Training Received-y (bar) In Hours	Std. Dev.
1.	Strengthen vendor relations	2.83	4.78
2.	Negotiate with salespeople	3.45	5.72
3.	Network with key non-sales personnel in the vendor's organization	0.76	2.57
4.	Train and develop new buyers	1.53	4.32
5.	Maintain good relations with facilitating agencies, i.e., transportation, warehousing, receiving	1.80	4.54
6.	Respect the salesperson's position and time	0.92	2.19
7.	Develop a team concept with personnel in other departments and locations within your company	6.02	10.39
8.	Develop professional rapport with salespeople	1.07	2.22
9.	Communicate firmly, politely, and professionally	2.80	5.05
10.	Acquire needed information: specs, prices, competitors, etc.	1.31	2.62
11.	Develop and improve listening skills	2.04	3.64
12.	Use the telephone to communicate effectively and efficiently	0.81	2.02

TABLE 3 (Continued)

	Competency	Mean Training Received-y (bar) In Hours	Std. Dev.
13.	Locate and evaluate alternate sources of supply which are competitive	1.50	3.28
14.	Apply Materials Requirements Planning	2.65	6.67
15.	Think more objectively	2.16	5.93
16.	Perform and use vendor analyses	1.80	3.87
17.	Apply pricing concepts: discount schedules: 2/10,net 30, etc.	0.77	1.62
18.	Improve problem solving skills	3.50	7.59
19.	Insure accuracy in defining and describing needs	0.82	1.85
20.	Analyze buying mistakes and failures	0.79	2.72
21.	Assess opportunities and risks	1.00	3.15
22.	Anticipate and plan for contingencies, strikes and shortages	0.61	1.62
23.	Establish goals and efficient means for achievement	2.57	4.80
24.	Perform supplier price/cost analyses	1.81	3.46
25.	Perform ABC inventory analyses	0.98	2.50
26.	Perform post-purchase product evaluations	0.54	1.56
27.	Apply standardization procedures	1.06	2.75
28.	Identify and maximize computer applications	2.92	8.01
29.	Forecast appropriate economic quantities	1.15	5.62
30.	Analyze ordering costs and carrying charges	0.89	1.89
31.	Conduct cost-to-benefit analyses	0.75	1.74
32.	Perform value analysis	1.38	2.98
33.	Perform make vs buy analyses	0.81	2.00
34.	Analyze strengths and weaknesses of products and services	0.87	2.67
35.	Evaluate and select efficient and economical transportation modes and carriers	0.91	2.94
36.	Understand and apply high ethical standards	2.07	4.33
37.	Apply judicious judgment and common sense	1.70	4.36
38.	Establish efficient time management habits	2.32	3.77
39.	Respect the confidentiality of certain communications	0.85	1.66
40.	Understand legal considerations	3.50	5.55
41.	Apply competitive bidding procedures	1.64	3.97
42.	Interpret and implement company buying policies	1.46	4.93
43.	Understand and formulate sales contracts	0.83	2.14
44.	Follow up and insure delivery as promised	0.93	1.83
45.	Determine and insure quality of incoming product	1.71	4.84
46.	Use special procedures (blanket orders/ consignment inventories)	1.31	2.95
47.	Use lease arrangements	0.64	1.99
48.	Obtain trial/test equipment for evaluation at no/minimal cost	0.43	1.23

Testing the First Null Hypothesis

The first null hypothesis for this study is: There is no positive relationship between the perceived importance of

the purchasing competencies and the amount of training received by purchasing personnel. That is, there is no connection between the perceived importance of the subject matter (as determined by a panel of experts) and the amount of training received by purchasing personnel.

The alternate, or research hypothesis is: There is a positive relationship between the perceived importance of the purchasing competencies and the amount of training received by purchasing personnel.

The t-test was used to evaluate B_1, the population parameter for the slope, at the .01 level of significance. Keller, Warrack, and Bartel (1990) noted that the process of testing hypotheses about B_1 is identical to testing any other parameter. The slope of the regression equation for this data is B_1. Assuming that the error variance *e* is normally distributed, the test statistic follows a Student t distribution with n-2 degrees of freedom. The statistics for testing this hypothesis are based on the regression analysis in Table 4.

The Test

The null hypothesis is	H_o: $B_1 <$ or $= 0$.
The alternate hypothesis is	H_a: $B_1 > 0$.
The test is	reject H_0 if $t_c > t_1$.
The calculated t_c is	$t_c = 2.622$.
The test limit is $t_1 = 2.413$	($p<.01$, 46 df).

Since 2.622 **is** > 2.413, reject H_0.

Conclude that at the .01 level of significance there is evidence to suggest a positive relationship between the perceived importance of the purchasing competencies and the amount of training received by practitioners in those competencies.

TABLE 4

REGRESSION ANALYSIS FOR ALL RESPONDENTS

Variable	DF	Parameter Estimate	Standard Error	t for HO: Parameter=0	Prob>|t|
Intercept	1	0.494	0.455	1.087	0.2829
X	1	0.282	0.107	2.622	0.0118

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	7.01	7.01	6.874	0.0118
Error	46	46.92	1.02		
C Total	47	53.93			

Root MSE:	1.010	r^2:	0.130
Dep Mean:	1.623	Adj. R-square:	0.111
C.V.:	62.23	r:	.360

Interpretation of the Regression Analysis of Raw Data

The strength of the positive linear relationship was assessed by evaluating r and r^2 from Table 4. The regression analysis indicated that the strength of the x-y relationship, which is the coefficient of correlation (r),

was 0.360. Best and Kahn (1989) classified the strength of an x-y relationship as low when the coefficient of correlation is between 0.20 and 0.40. It is, however, incorrect to attempt to interpret r in precise terms.

The coefficient of determination (r^2) provides a better explanation of the variation in y due to variation in x. The r^2 value of 0.130 means that approximately 13.0% of the variation in quantity of training received is explained by variation in the significance of the competencies. The remaining 87.0% of variation in the training received is attributable to other variables. Compared to the perceived significance of the competencies, these variables contribute significantly to the amount of training received by purchasing professionals. As a result of this analysis, the researcher concluded that the perceived significance of the competency may not be a major factor in determining the amount of training delivered in that competency.

Correlation Analysis for Each Segment

As described on page 33 of Chapter III, an additional regression analysis was performed to determine the strength of the x-y relationship for the each segment--manufacturing, service, and government. Participants were sorted by segment and mean training times were calculated (by competency) for each segment. The mean values for each segment, and the means (perceived significance) derived from Q-sort analysis, were used to compute the regression results for each segment (Table 5).

The mean training times of respondents in the service and government segments correlated with the perceived significance of the competencies at the .01 level (probabilities of .009 and .008 respectively); that for the manufacturing segment correlated with the significance of the competencies at the .05 level. The r^2 for each segment's correlation was less than 14.4%. Consistent with the conclusions of the regression analysis for all participants, this analysis indicated that only a small portion of the variability in the amount of training presented to purchasing personnel can be explained by the perceived significance of the purchasing competencies.

TABLE 5

SUMMARY OF REGRESSION ANALYSIS FOR THE MANUFACTURING, SERVICE, AND GOVERNMENT SEGMENTS

	Manufacturing	Service	Government
Observations	262	67	14
t_c	2.40	2.74	2.78
t_1 ($p<.01$, 46 df)	2.41	2.41	2.41
C.V.	70.98	43.95	85.39
r^2	0.111	0.140	0.144
r	0.333	0.374	0.379
Prob> |t|	0.0206	0.009	0.008

Regression Analysis of the Seven Largest Sectors

The final regression analysis was performed using the seven industry sectors with the most survey participants. The purpose of this analysis was to evaluate the x-y relationships for these sectors to determine if there were major differences in the coefficients of determination (r^2). The results of this analysis are summarized in Table 6.

TABLE 6

SUMMARY OF REGRESSION ANALYSIS FOR THE SEVEN LARGEST SECTORS

Sectors	Respondents	Root MSE	r^2	Prob>[t]
Textiles	44	1.51	.026	.139
Chemicals	23	1.21	.101	.016
Electronics	18	1.44	.012	.213
Distribution and Transportation	17	0.67	.059	.053
Paper and Pulp	16	2.31	.080	.051
Medical	15	0.85	.139	.009
Machinery	15	1.50	.157	.005

This analysis indicated that the participants from the medical and machinery sectors had higher r^2 values, but again, none of the groups had a strong relationship. The coefficient of determination for the machinery industry (.157) indicated the strongest relationship between the amount of purchasing training delivered to participants and the perceived importance of the competencies.

Summary

Based on the regression analyses, the results indicate evidence to support the hypothesis that there is a positive linear relationship between the amount of training presented to purchasing personnel and the perceived significance of the purchasing competencies. Purchasing training, as measured by this study, did not appear to be focused on the competencies that the panel of experts regarded as significant. The analyses all indicated that no more than 15.7% of the variation in the amount of training is explained by variation in the perceived significance of the competencies.

Testing the Second Null Hypothesis

The second purpose of this research was to compare the mean training times for each competency when the participants were sorted into two segments: manufacturing and non-manufacturing. The mean amounts of training received in each competency by the two segments were tested for statistical differences using the t-test to analyze the two means for each competency.

The segments had unbalanced sample sizes: manufacturing had 262 participants and non-manufacturing had 81 (13 respondents failed to indicate their segment). A major concern that must be addressed when comparing populations with unequal sample sizes is the magnitude of the range between the largest and smallest variances. When

testing the means of two or more populations, there is an upper limit to this range. Howell noted:

> If the populations can be assumed to be either symmetric or at least similar in shape and if the largest variance is no more than four or five times the smallest, the analysis of variance is likely to be valid. (Howell 1985, 246)

The variances of the two groups were compared to confirm that the range of variances for each competency was not greater than five. These figures, shown in Appendix J, indicate that the range of variances for only three competencies exceed the maximum of five recommended by Howell (1985). Testing proceeded for the second null hypothesis.

The second null hypothesis for this research is: There is no significant difference in the amount of training received (in each competency) by purchasing professionals in the manufacturing and non-manufacturing segments.

The alternate hypothesis is: There is a significant difference between the mean amount of training received (in a given competency) between the participants in the manufacturing and non-manufacturing segments. The t-test was used to analyze the means at the .05 level of significance.

The Test

The null hypothesis is $H_0: u_1 = u_2$.

The alternate hypothesis is $H_a: u_1 \neq u_2$.

The test is reject H_0 if $|t_{test}| > t_{limit}$.

The results for each competency are shown in Table 7.

TABLE 7

t-TEST RESULTS FOR THE MEAN TRAINING TIMES OF THE MANUFACTURING AND NON-MANUFACTURING SEGMENTS

	Competency	t-Calculated	Prob>|t|
1.	Strengthen vendor relations	0.03	.874
2.	Negotiate with salespeople	1.42	.234
3.	Network with key non-sales personnel in the vendor's organization	1.82	.179
4.	Train and develop new buyers	1.77	.184
5.	Maintain good relations with facilitating agencies, i.e., transportation, warehousing, receiving	0.00	.998
6.	Respect the salesperson's position and time	4.06	.044*
7.	Develop a team concept with personnel in other departments and locations within your company	2.71	.101
8.	Develop professional rapport with salespeople	0.71	.399
9.	Communicate firmly, politely, and professionally	1.67	.197
10.	Acquire needed information: specs, prices, competitors, etc.	3.00	.084
11.	Develop and improve listening skills	1.30	.254
12.	Use the telephone to communicate effectively and efficiently	7.30	.007*
13.	Locate and evaluate alternate sources of supply which are competitive	0.31	.580
14.	Apply Materials Requirements Planning	6.43	.011*
15.	Think more objectively	0.00	.970
16.	Perform and use vendor analyses	0.00	.994
17.	Apply pricing concepts: discount schedules: 2/10,net 30, etc.	5.11	.024*
18.	Improve problem solving skills	0.35	.554
19.	Insure accuracy in defining and describing needs	2.35	.126
20.	Analyze buying mistakes and failures	0.17	.685
21.	Assess opportunities and risks	0.06	.800
22.	Anticipate and plan for contingencies, strikes and shortages	3.37	.067
23.	Establish goals and efficient means for achievement	0.50	.479
24.	Perform supplier price/cost analyses	0.72	.396
25.	Perform ABC inventory analyses	1.54	.215
26.	Perform post-purchase product evaluations	3.76	.053
27.	Apply standardization procedures	13.80	.0002*
28.	Identify and maximize computer applications	0.02	.897
29.	Forecast appropriate economic quantities	0.09	.764
30.	Analyze ordering costs and carrying charges	8.38	.004*
31.	Conduct cost-to-benefit analyses	7.65	.006*
32.	Perform value analysis	1.56	.212
33.	Perform make vs buy analyses	0.12	.727
34.	Analyze strengths and weaknesses of products and services	3.67	.056
35.	Evaluate and select efficient and economical transportation modes and carriers	0.04	.851

TABLE 7 (Continued)

	Competency	t-Calculated	Prob>|t|
36.	Understand and apply high ethical standards	0.16	.693
37.	Apply judicious judgment and common sense	0.02	.888
38.	Establish efficient time management habits	1.51	.220
39.	Respect the confidentiality of certain communications	0.88	.349
40.	Understand legal considerations	2.61	.107
41.	Apply competitive bidding procedures	6.92	.009*
42.	Interpret and implement company buying policies	0.33	.564
43.	Understand and formulate sales contracts	0.59	.443
44.	Follow up and insure delivery as promised	4.75	.030*
45.	Determine and insure quality of incoming product	0.01	.940
46.	Use special procedures (blanket orders/ consignment inventories)	0.00	.955
47.	Use lease arrangements	10.52	.001*
48.	Obtain trial/test equipment for evaluation at no/minimal cost	9.65	.002*

* Significant difference at the .05 level

Summary

The results of the forty-eight t-tests suggested that eleven competencies had significantly different mean training times at the .05 level for the two segments. This represents 23% of the competencies and suggests that there are systematic differences in the amount of training received by purchasing professionals in the manufacturing and non-manufacturing sectors. Ten of eleven differences were due to significantly larger amounts of training by the non-manufacturing segment. These competencies and the mean training times for each segment are shown in Table 8.

As noted in Chapter II, the research of Shealy (1985) and Moore, Luft, and Eckrich (1984), indicated insignificant differences in the perceived importance of most purchasing competencies. Both researchers concluded that only minimal variation needs to exist between purchasing training

programs designed for manufacturing, service, and government purchasing professionals. The results of this analysis of the manufacturing and non-manufacturing segments indicate that purchasing professionals are receiving significantly different quantities of training in one out of four competencies.

TABLE 8

SIGNIFICANT DIFFERENCES BETWEEN SEGMENTS

Competency	$\bar{y}$ Mfg	$\bar{y}$ Non-Mfg
6. Respect the salesperson's position	0.81	1.38
12. Use the telephone to communicate	0.66	1.36
*14. Apply Materials Requirements Planning	3.24	1.07
17. Apply pricing concepts: discount schedules, 2/10, etc.	0.69	1.16
*27. Apply standardization procedures	0.79	2.09
30. Analyze ordering costs and carrying charges	0.74	1.44
31. Conduct cost to benefit analyses	0.63	1.25
41. Apply competitive bidding procedures	1.32	2.65
44. Follow up and insure delivery as promised	0.81	1.32
47. Use lease arrangements	0.43	1.14
48. Obtain trial/test equipment for evaluation at no/minimal cost	0.32	0.80

* Indicates a competency that exceeded Howell's recommended difference between the largest and smallest variances.

Hypothesis Testing of Factor Scores

Factor analysis was used to reduce the forty-eight variables (competencies) to a smaller number of relatively independent and easy to interpret factors. The competency training times of the 356 respondents constituted the data matrix that was analyzed with factor analysis. The analysis determined eight factors that could describe the variables in this research. Analysis of variance was used to determine if there were significant differences in training received by professionals in the government, manufacturing, and service segments for each of the eight factors. Then, a stepwise regression analysis was performed to determine which factors had the strongest relationship to the training received by the participants. The initial evaluations necessary for factor analysis are discussed in the next section.

Test For Sample Adequacy

As required, the data were first analyzed to confirm sample adequacy and to test sphericity. Kaiser noted that:

> The sampling efficiency for the total composite of variables, total matrix sampling adequacy (MSA), should be greater than 0.50 in order to assume that Guttman's requirements have been minimally met (qtd. in the StatView II Manual 1987, 201).

Guttman's requirements were based on the homogeneity of the data. The degree of homogeneity of a matrix of variables determines the appropriateness of the factor analysis approach.

For this research the matrix sampling adequacy of the forty-eight variables was 0.86, which suggests that the data did represent a homogeneous collection of variables suitable for factor analysis. The Matrix of Sampling Adequacy is presented in Table 9.

TABLE 9

MEASURES OF VARIABLE SAMPLING ADEQUACY

Total matrix sampling adequacy: .86

Y01	.867	Column 37	.919	Column 53	.879
Column 22	.875	Column 38	.745	Column 54	.859
Column 23	.729	Column 39	.9	Column 55	.853
Column 24	.747	Column 40	.871	Column 56	.881
Column 25	.621	Column 41	.813	Column 57	.847
Column 26	.854	Column 42	.934	Column 58	.833
Column 27	.733	Column 43	.877	Column 59	.925
Column 28	.913	Column 44	.904	Column 60	.758
Column 29	.854	Column 45	.882	Column 61	.861
Column 30	.895	Column 46	.9	Column 62	.746
Column 31	.86	Column 47	.88	Column 63	.823
Column 32	.885	Column 48	.738	Column 64	.948
Column 33	.876	Column 49	.693	Column 65	.79
Column 34	.651	Column 50	.927	Column 66	.798
Column 35	.852	Column 51	.907	Column 67	.744
Column 36	.862	Column 52	.901	Y48	.886

Bartlett Test of Sphericity- DF: 1175 Chi Square: 9581.561 P: •

Test for Sphericity

The second evaluation that must be performed is associated with the statistical significance of the correlations. The Bartlett test of sphericity was used to

determine if the collection of correlation values in the correlation matrix are different from 0. The StatView II (StatView II is the registered name of a statistical software program) manual (1987, 202) noted that:

> Ideally, a significant Chi-square value is determined, thereby suggesting that the collections of correlations are different from 0 and most likely do not occur as a function of chance.

The Chi-square value for this test was 9581.561, which is significant at the p=0 level. Thus, the correlations in this analysis are significantly different from 0 correlations, and therefore factor analysis is appropriate. As noted by Harmann (1976), the test developed by Bartlett was a valuable contribution for assessing the statistical significance of the unreduced correlation matrix.

Eigenvalues

Determining the number of factors appropriate for the final solution was the last critical evaluation of the method default data. The method default procedure determines the number of factors to retain in the solution. The number of factors for method default (principle components) is the larger value that emerges based on two criteria--the 75% variance rule or the root curve analysis. Some factor analysts, such as H. F. Kaiser, have recommended retaining all factors corresponding to eigenvalues greater than one (qtd. in Cureton and D'Agostino 1983, 161). Other experts analyze the contribution of the nth factor to the cumulative variance explained by the preceding (n-1)

factors. Table 10 contains the eigenvalues and variance proportions for the twenty-four factor solution of Method Default.

TABLE 10

EIGENVALUES AND VARIANCE PROPORTION FOR METHOD DEFAULT

	Magnitude	Variance Prop
Value 1	12.814	.267
Value 2	2.874	.06
Value 3	2.39	.05
Value 4	2.005	.042
Value 5	1.941	.04
Value 6	1.75	.036
Value 7	1.544	.032
Value 8	1.438	.03
Value 9	1.314	.027
Value 10	1.26	.026
Value 11	1.126	.023
Value 12	1.109	.023
Value 13	1.022	.021
Value 14	.977	.02
Value 15	.933	.019
Value 16	.883	.018
Value 17	.846	.018
Value 18	.82	.017
Value 19	.787	.016
Value 20	.714	.015
Value 21	.647	.013
Value 22	.611	.013
Value 23	.585	.012
Value 24	.546	.011

Determining the Number of Factors

Cureton and D'Agostino (1983) recommended several quantitative techniques to determine the optimal number of factors to be considered in the final solution. One method, the Scree technique, analyzes the differences between succeeding eigenvalues. They stated:

> When the differences decrease regularly up to a point, followed by a substantially larger difference, and the later differences are all small (usually less than 0.10), the Scree test suggests that the last salient factor is the one immediately preceding the substantially larger difference. (Cureton and D'Agostino 1983, 159)

The differences between eigenvalues are listed in Table 11.

TABLE 11

DIFFERENCES IN EIGENVALUES FOR METHOD DEFAULT

Pair	Difference	Pair	Difference
1-2	9.940	12-13	.087
2-3	.484	13-14	.045
3-4	.385	14-15	.044
4-5	.064	15-16	.050
5-6	.191	16-17	.037
6-7	.206	17-18	.026
7-8	.106	18-19	.033
8-9	.124	19-20	.073
9-10	.054	20-21	.067
10-11	.134	21-22	.036
11-12	.017	22-23	.026
		23-24	.039

This approach produced inconclusive results, as the data did not follow the pattern described by Cureton and D'Agostino (1983). While the differences do exhibit an irregular downward trend, estimates of the number of factors resulting from applying this technique would be suspect and subject to doubt.

Another quantitative approach, a variation of the Scree technique, is called the percent of trace method.

Recommended by Cureton and D'Agostino (1983), it requires the calculation of a cumulative value for the eigenvalues, beginning with the first, and adding successive eigenvalues until the sum of "n" values divided by the initial percent of variance (26.7) is very close to unity. That is, the researcher should sum the first eigenvalues and divide the sum by the variance proportion for eigenvalue number one. Cureton and D'Agostino (1983) stated that when this quotient is close to 1, (.95 to 1.05) the researcher has used the appropriate number of factors, and should stop and consider "m" factors as the number of salient factors for the final solution.

Using the eigenvalues listed in Table 10, the researcher accumulated eigenvalues beginning with 12.814 and followed the recommended procedure until the sum of eight eigenvalues resulted in a quotient of approximately unity. This calculation was: 26.756 (sum of the first 8 eigenvalues) / 26.7 (variance proportion for the first eigenvalue) = 1.002.

Based on these results the researcher chose eight factors as the ideal solution. Cureton and D'Agostino (1983) noted that when the results of a Scree test are clear, it is probably the best single test for the number of salient factors. The data were again processed with factor analysis and eight factors were specified in the program.

Factor Names

Determining appropriate names for the factors was an important process in the analysis. Rummel (1970) noted that this may be one of the most important steps in the factoring process. He said that the names reflect the researcher's evaluation of the results of the factor analysis and serve as easily understood concepts which ease communication and discussion. Rummel presented three approaches to naming the factors:

> One perspective considers the factors as *descriptive* of the interrelationships in the data. The descriptive label is meant to be typological--to categorize the conceptual characteristics of the findings. The second perspective is a *causal* approach, in which the factors are looked at as underlying causes of the interrelationships delineated and are causally labeled. The third perspective is *symbolic*, that is, the factors represent new concepts or variables that are designated by algebraic symbols only. (Rummel 1970, 473)

The descriptive approach was selected because it appears to be the most practical method and because it reflects the substance of the variables. Rummel (1970) recommended that the researcher focus on the variables that have higher loadings. The name, he noted, should capsulize the substantive nature of the factor and enable others to grasp its meaning.

Factor loadings play a significant role when considering the appropriate name for a factor. A factor loading expresses the correlation between a variable and a factor. Factor loadings describe the correlations between the factors emerging from a factor analysis and the original variables used to develop the factors. For this analysis

variables receiving a 0.35 or higher loading value were listed in descending order for each of the eight factors.

The researcher considered the nature of the variables and the loading values of each. While most factors contained variables that appeared to be "outliers," all of the factors consisted of several variables that meshed and conveyed a central concept. The labeled factors and their loading values are listed in Table 12.

TABLE 12

THE NAMES AND LOADING VALUES FOR THE EIGHT FACTORS

Variable	Factor Loading
Factor 1--Accounting Concepts Applicable to Purchasing	
-Perform post-purchase product evaluations	.662
-Analyze ordering costs and carrying charges	.656
-Obtain trial/test equipment for evaluation at no/minimal cost	.579
-Apply pricing concepts: discount schedules, 2/10,net 30, etc.	.567
-Perform ABC inventory analyses	.555
-Conduct cost-to-benefit analyses	.478
-Follow up and insure delivery as promised	.454
-Anticipate and plan for contingencies, i.e. strikes and shortages	.430
-Insure accuracy in defining and describing needs	.385
-Interpret and implement company buying policies	.385
Factor 2--Communication and Self-Direction Skills	
-Develop and improve listening skills	.721
-Establish goals and efficient means for achievement	.589
-Apply standardization procedures	.536
-Communicate firmly, politely, and professionally	.533
-Establish efficient time management habits	.436
-Analyze buying mistakes and failures	.432
-Identify and maximize computer applications	.422
-Think more objectively	.403

TABLE 12 (Continued)

Variable	Factor Loading
Factor 3--Nurturing Relations with the Vendor	
-Respect the salesperson's position and time	.749
-Apply competitive bidding procedures	.574
-Network with key non-sales personnel in the vendor's organization	.567
-Analyze strengths and weaknesses of products and services	.504
-Strengthen vendor relations	.446
-Understand legal considerations	.388
-Develop professional rapport with salespeople	.368
Factor 4--Managing the Future	
-Forecast appropriate economic quantities	.749
-Train and develop new buyers	.576
-Assess opportunities and risks	.553
-Understand and formulate sales contracts	.452
-Apply Materials Requirements Planning (MRP)	.375
-Identify and maximize computer applications	.351
Factor 5--Analytical Applications for the Profession	
-Perform and use vendor analyses	.697
-Perform value analysis	.586
-Evaluate and select efficient and economical transportation modes and carriers	.578
-Perform make vs buy analyses	.566
-Conduct cost-to-benefit analyses	.383
Factor 6--Application of Ethical Standards	
-Apply judicious judgment and common sense	.595
-Understand and apply high ethical standards	.566
-Think more objectively	.469
-Respect the confidentiality of certain communications	.457
-Negotiate with salespeople	.417
-Use lease arrangements	.377

TABLE 12 (Continued)

Variable	Factor Loading
Factor 7--Enhancing Human Relations	
-Maintain good relations with facilitating agencies, i.e., transportation, warehousing, receiving	.716
-Improve problem solving skills	.619
-Develop a team concept with personnel in other departments and locations within your company	.441
-Interpret and implement company buying policies	.427
-Network with key non-sales personnel in the vendor's organization	.372
Factor 8--Instilling Price/Quality Consciousness	
Perform supplier price/cost analyses	.456
Determine and insure quality of incoming products	.454
Understand legal considerations	.424
Apply Materials Requirements Planning (MRP)	.364

Hypotheses Testing

The next phase of this analysis was to determine if, for each factor, there were statistically significant differences in the quantity of training received by purchasing professionals in the government, manufacturing, and service segments. Analysis of variance was performed for each factor to test the participants' factor scores (grouped into the three segments) for statistically significant differences.

Factor scores were calculated for each participant based on factor weights, which are the standardized values of the factor loadings (the loading values of the variables for each factor are shown in Table 12). The factor scores

for the participants were tested by analysis of variance to determine (for each factor) if there were significant differences in the quantity of training between the three segments. Each of the eight factors were tested as distinct null hypotheses. The analysis of variance results appear in Tables 13 through 20.

Null Hypothesis for Factor 1

The null hypothesis for factor 1 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 1--Accounting Concepts Applicable to Purchasing.

Using the factor scores that were calculated by factor analysis, the three segments were compared for factor 1 by the analysis of variance technique. As indicated in Table 13 below, there was a significant difference (at the .05 level) in the training received by individuals in the government and service segments, and in the manufacturing and service segments. The null hypothesis for factor 1 was rejected (p>.0003); there are significant differences between the segments for factor one.

TABLE 13

ANOVA RESULTS FOR FACTOR 1

DF: 342 F-ratio: 8.309 Probability: .0003

Segment	Count	Mean	Variance	Std.Error
Government	14	-.159	.806	.240
Manufacturing	262	-.102	.922	.059
Service	67	.509	2.509	.194
Comparison		Fisher PLSD		
Govt. vs Mfg.		.597		
Govt. vs Service		.640*		
Mfg. vs Service		.298*		

* Significant at .05

Null Hypothesis for Factor 2

The null hypothesis for factor 2 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 2--Communication and Self-Direction Skills.

The results of this analysis, as indicated in Table 14, supported the null hypothesis that there were no significant differences in training received between the segments for factor 2--Communication and Self-Direction Skills.

TABLE 14

ANOVA RESULTS FOR FACTOR 2

DF: 342 F-ratio: 0.499 Probability: .6073

Segment	Count	Mean	Variance	Std.Error
Government	14	.197	.503	.189
Manufacturing	262	-.022	1.190	.067
Service	67	.098	1.774	.163

Comparison	Fisher PLSD
Govt. vs Mfg.	.610
Govt. vs Service	.653
Mfg. vs Service	.304

Null Hypothesis for Factor 3

The null hypothesis for factor 3 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 3--Nurturing Relations with the Vendor.

Because the range of variance for this factor was greater than five, the results of the analysis are suspect and can not be interpreted. The calculations for factor 3 are presented in Table 15.

TABLE 15

ANOVA RESULTS FOR FACTOR 3

DF: 342 F-ratio: 15.367			Probability: .0001	
Segment	Count	Mean	Variance	Std.Error
Government	14	1.522	*14.700	1.025
Manufacturing	262	-.074	.604	.048
Service	67	-.055	* .428	.080

* Range of variance too great to draw conclusions.

Null Hypothesis for Factor 4

The null hypothesis for factor 4 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 4--Managing the Future.

The results of this analysis, as indicated in Table 16, supported the null hypothesis that there were no significant differences in training received between the segments for factor 4--Managing the Future.

TABLE 16

ANOVA RESULTS FOR FACTOR 4

DF: 342 F-ratio: .603 Probability: .5475

Segment	Count	Mean	Variance	Std.Error
Government	14	.251	.731	.228
Manufacturing	262	.016	1.380	.073
Service	67	-.081	.252	.061

Comparison	Fisher PLSD
Govt. vs Mfg.	.575
Govt. vs Service	.616
Mfg. vs Service	.287

Null Hypothesis for Factor 5

The null hypothesis for factor 5 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 5--Analytical Applications for the Profession.

As indicated in Table 17 below, there was a significant difference (p>.0049) in the training received by individuals in the government and service segments, and in the government and manufacturing segments. The null hypothesis for factor 5 was rejected; there were significant differences in the quantity of training between the three segments for factor 5--Analytical Applications for the Profession.

TABLE 17

ANOVA RESULTS FOR FACTOR 5

DF: 342 F-ratio: 5.407 Probability: .0049

Segment	Count	Mean	Variance	Std.Error
Government	14	-.901	1.149	.287
Manufacturing	262	.070	1.355	.072
Service	67	-.072	.778	.095

Comparison	Fisher PLSD
Govt. vs Mfg.	.592*
Govt. vs Service	.634*
Mfg. vs Service	.295

* Significant at .05

Null Hypothesis for Factor 6

The null hypothesis for factor 6 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 6--Application of Ethical Standards.

The results of this analysis, as indicated in Table 18, supported the null hypothesis that there were no significant differences in the quantity of training received between the three segments for factor 6--Application of Ethical Standards.

TABLE 18

ANOVA RESULTS FOR FACTOR 6

DF: 342 F-ratio: 0.190 Probability: .8271

Segment	Count	Mean	Variance	Std.Error
Government	14	-.134	.477	.185
Manufacturing	262	.005	1.418	.074
Service	67	-.064	.643	.098

Comparison	Fisher PLSD
Govt. vs Mfg.	.599
Govt. vs Service	.642
Mfg. vs Service	.299

Null Hypothesis for Factor 7

The null hypothesis for factor 7 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 7--Enhancing Human Relations.

Because the range of variance for this factor was greater than five, the results of the analysis were suspect and not interpreted. The analysis for factor 7 is presented in Table 19.

TABLE 19

ANOVA RESULTS FOR FACTOR 7

DF: 342 F-ratio: 0.715 Probability: .4901

Segment	Count	Mean	Variance	Std.Error
Government	14	-.174	* .098	.084
Manufacturing	262	.049	*1.392	.073
Service	67	-.100	.514	.088

* Range of variance too great to draw conclusions.

Null Hypothesis for Factor 8

The null hypothesis for factor 8 was: there is no significant difference in the amount of training received by the purchasing professionals in the government, manufacturing, and service segments for factor 8--Instilling Price/Quality Consciousness.

The results of this analysis, as indicated in Table 20, supported the null hypothesis that there were no significant differences in the amount of training received between the three segments for factor 8--Instilling Price/Quality Consciousness.

TABLE 20

ANOVA RESULTS FOR FACTOR 8

DF: 342 F-ratio: 1.440 Probability: .2383

Segment	Count	Mean	Variance	Std.Error
Government	14	.226	1.071	.277
Manufacturing	262	.013	1.149	.066
Service	67	-.191	.764	.107

Comparison	Fisher PLSD
Govt. vs Mfg.	.558
Govt. vs Service	.598
Mfg. vs Service	.279

The analysis of variance for the factor scores, as shown above, provided evidence that there was a significant difference in training received by participants in the government, service, and manufacturing segments for two of the six factors (factors 1 and 5) that could be analyzed. When the raw scores of the forty-eight competencies were earlier evaluated for the manufacturing and non-manufacturing segments, there were significant differences on eleven of the competencies by t-tests (see Table 8). Five of the eleven competencies for which significant differences were found are also part of factor 1, Accounting Concepts Applicable to Purchasing.

Based on factor analysis the evidence indicates that there are significant differences in specific areas of training received by the purchasing professionals in the manufacturing, service, and government segments. The competencies that comprise factor 1 are significant because they suggest where the segments differ in terms of the quantity of training received.

Regression Analysis

Regression analysis was used to measure the amount of variation among the three segments that can be explained by the eight factors. Factor 1 (Accounting Concepts Applicable to Purchasing) was used as the first independent variable in the equation: y (estimate) $= a + B_1x_1$. As shown in Table 21 the coefficient of determination (r^2) for this relationship was 0.04. Four percent of the variation in

quantity of training among the segments is explained by the variation of factor 1.

TABLE 21

REGRESSION ANALYSIS FOR FACTOR 1

Stepwise Regression Y 1 :Segment 8 X variables

STEP NO. 1 VARIABLE ENTERED: X 1 : Acct

R	R-squared:	Adj. R-squared:	RMS Residual:
.199	.04	.037	.453

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	2.889	2.889	14.091
RESIDUAL	341	69.921	.205	
TOTAL	342	72.81		

The analysis was expanded to include (in addition to factor 1) factor 3 (Nurturing Relations with the Vendor). As shown in Table 22 the combined r^2 value for the two factors was 0.053. This provides evidence that 1.3% of the variation in the three segments is due to variation in factor 3. While factors 1 and 3 (combined) explain 5.3% of the variation in the segments, variation in the other factors does not significantly contribute to variation in the segments.

TABLE 22

REGRESSION ANALYSIS FOR FACTORS 1 AND 3

Stepwise Regression Y 1 :Segment 8 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X 3 : Nutr

R:	R-squared:	Adj. R-squared:	RMS Residual:
.23	.053	.047	.45

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	3.861	1.931	9.52
RESIDUAL	340	68.949	.203	
TOTAL	342	72.81		

Demographic Summary

Based on the data for this survey, one-third of the purchasing professionals in the PMAC-V region are women. The respondents in this survey had an average of twelve years' experience in purchasing, and almost 75% have at least a community college education (51% have a four-year degree).

While 65% of the respondents classified the amount of training they received as minimal or none, only 13% thought that the quality of their training was poor or very poor. The mean amount of training received per participant in this study was 77.0 hours (from January 1, 1990 to May 12, 1992). The demographic data are summarized in Appendix K.

CHAPTER V

CONCLUSIONS

Summary

This research focused on the relationship between the content and the quantity of training received by purchasing professionals. Prior studies have investigated the perceived significance of purchasing competencies, but there has been no research to determine how much training practitioners actually received in individual competencies. Nor has there been research to measure the degree of relationship between the perceived significance of each competency and the training received (per competency) by purchasing professionals. Estimating the strength of this relationship was the objective of this research.

Three previous studies each established a hierarchy of purchasing competencies to guide educators and trainers in determining significant course content. Using analysis of variance prior research provided evidence that the perceived importance of most purchasing competencies is not significantly different for professionals in the manufacturing, service, and government segments. These studies concluded that the content of training programs for purchasing personnel in each of the three segments could be, with minor variations, essentially the same. Additionally, the researchers concluded that experienced purchasing

professionals could move between businesses in different segments with little additional competency training.

Objectives of the Study

The purpose of this study was to determine if empirical evidence would confirm a positive linear relationship between the perceived significance of a hierarchy of purchasing competencies and the amount of training received by purchasing professionals in each competency. The objectives for this study were to:

1. apply Q-sort methodology, using a panel of six experts, to develop a hierarchy of forty-eight purchasing competencies which established the perceived significance of each competency,

2. determine the amount of training that experienced purchasing personnel received in each competency, from January 1, 1990 to May 12, 1992,

3. test (for positive linearity) the relationship between the perceived significance of the competencies and the amount of training received in each competency,

4. measure the strength of the relationship specified in objective three,

5. estimate for each competency if there were significant differences in the amounts of training received by personnel in the manufacturing and non-manufacturing (service and government) segments,

6. use factor analysis to transform the raw data (respondents' estimates of the hours of training in each competency) into factors that were comprised of several related competencies, and

7. analyze each factor and determine if participants in the manufacturing, service, and government segments received significantly different amounts of training for (the competencies that comprised) each factor.

Study Conclusions

First Research Hypothesis

The first research hypothesis was:

> There is a positive linear relationship between the perceived significance of the purchasing competencies and the amount of training received by purchasing professionals in each competency.

Based on analysis of the data for this research, the conclusions are:

1. Regression analysis of the raw data for this study provided evidence to support the hypothesis that there is a positive linear relationship between the perceived significance of the purchasing competencies and the quantity of training received by practitioners in the competencies. The calculated value of t for the test was significant at the .01 level. The coefficient of correlation (r^2) for the data was 0.13, suggesting that 13% of the quantity of training received is explained by the perceived significance of the competencies.

2. The regression analyses for the manufacturing, service, and government segments supported the research hypothesis that there is a positive linear relationship between the perceived significance of the purchasing competencies and the quantity of training received in each competency. The r^2 values for the three segments were only slightly different (0.144 for government, 0.140 for service, and 0.111 for manufacturing). There was insufficient evidence to conclude that one segment is significantly better at providing (amounts of) training more closely related to the perceived significance of the purchasing hierarchy.

3. The regression analyses of the seven largest sectors suggested that the medical and machinery industries are doing the most effective job of training purchasing personnel relative to the perceived significance of the competencies. The r^2 values of the medical (.139) and machinery (.157) businesses were the highest, especially compared to textiles (.026) and electronics (.012). T-test results for linearity suggest that the textile and electronic sectors do not exhibit linearity between the perceived significance of the competencies and the quantity of training received.

4. After factor analysis had transformed the raw data into factor scores, regression analysis was used to measure the amount of variation among the three segments which can be explained by the eight factors. Analyses of the eight factors indicated that 4% of the variation among the segments is explained by the variation in Factor 1, Accounting Concepts Applicable to Purchasing. The regression equation was expanded to include the third factor--Nurturing Relations with the Vendor. Factor 3 added an additional 1.3% to the r^2 value for the analysis, suggesting that 5.3% of the total variation in the segments is accounted for by Factor 1 and Factor 3. The other six factors did not contribute significantly to the coefficient of determination for this analysis.

Second Research Hypothesis

The second research hypothesis was:

> There is a significant difference in the quantity of training received (in the purchasing competencies) by professionals of the manufacturing and non-manufacturing (government and service) segments.

Based on analysis of the data for this research, the conclusions are:

1. T-tests (of the raw data) were used to analyze the mean hours of training for each competency for the manufacturing and non-manufacturing (service and government) segments. The mean training times of eleven competencies were significantly different for the two segments. Ten of the significant differences resulted from higher mean training times in the non-manufacturing segment. Prior research has suggested that there are minimal differences in the perceived significance of purchasing competencies between the manufacturing and service segments, and the manufacturing and government segments. The analyses for this research, however, provide evidence that suggests that purchasing personnel within these two segments are receiving significantly different quantities of training in specific competencies.

2. Factor analysis was used to process the raw data (training times for the competencies for all survey respondents) and to reduce the forty-eight

competencies to eight factors that described the variables for this research. Factor analysis transformed the raw data into factor scores for each participant for each of the eight factors. The factor scores of the participants were sorted into three segments: manufacturing, service, and government. Analysis of variance (of the factor scores) was used to make inferences about differences in the quantity of training received by the participants in each segment for each factor. The statistical evidence suggested that there were significant differences in the training received for factors "Accounting Concepts Applicable to Purchasing" ($p=.0003$) and "Analytical Applications for the Profession" ($p=.0049$). The evidence suggests that there are significant differences between the segments in the quantity of training received in the competencies comprising the two factors.

Recommendations

Recommendations for Practice

This study concludes that there is a linear relationship between the perceived significance of the purchasing competencies and the quantity of training received by practitioners. The finding that only 13% of the variation in quantities of training is explained by the variation of the significance of the competencies suggests a need for more deliberate planning of purchasing training at the practitioner level. Trainers and purchasing managers should increase their use of appraisals and needs assessments to guide the training of individuals. Results of this study suggest that 1.1% of training is based on appraisals and 13.8% is based on assessments. Increased use of training needs assessments and appraisals could result in training tied more closely to significant purchasing competencies.

Concomitantly, the course offerings for purchasing professionals need to be driven by this hierarchy of purchasing competencies. Conventual wisdom indicates that practitioners can take only courses that are offered, and more deliberate planning at the macro level would strengthen the relationship between training and perceived significance of the competencies.

A third recommendation suggests that purchasing training needs to be individualized as a function of the number of years of purchasing experience. This planning needs to be integrated with the training needs assessments previously recommended.

Fourth, an important influence on the direction of purchasing training is the certification examination which results in the professional being a Certified Purchasing Manager. The content of the examination is determined by the National Association of Purchasing Managers (NAPM)--the coordinating and governing arm of the profession. The current examination was developed by a committee of academicians and practitioners after analyzing the results of a 1989 job analysis performed nationally by the NAPM. The research for this study support continued collaboration between NAPM and local providers of purchasing training.

Recommendations for Future Research

This study, involving a retroactive assessment of training from January 1, 1990 to May 12, 1992, provides baseline data for assessing the relationship between

competency significance and amount of training. Future purchasing training would be strengthened by drawing on this research and by conducting a proactive study for training needs in the next five to ten years. Experts would use the Q-sort methodology to identify future significant competencies which could then be incorporated into future training programs. Subsequent studies then need to replicate this research to monitor adherence to the training plan and to determine the coefficients of determination (r^2) for the region and the industry segments based on the new competency hierarchy.

Third, this study investigated training needs on a regional basis, for North Carolina, South Carolina, and Virginia. Given that the results of this study suggest that 75% of the purchasing professionals in this region work in the manufacturing segment, subsequent research needs to be conducted on a national basis to determine if there are significantly different training programs for regions with different economic bases.

Fourth, while 13% of the variation in training was explained by the variation in the significance of the competencies, 87% remains unexplained. Future research needs to be conducted to ascertain the other variables influencing training. Additional research is needed to identify and analyze the other variables that contribute to the quantity of training received by purchasing professionals.

APPENDICES

Appendix A

Competency Studies

Appendix A includes: (1) the results of Naumann's (1983) competency study, and (2) the results of the Moore, Luft, and Eckrich (1984) competency study.

Naumann Study

Rank	Concept or Technique	Mean	Std. Dev.
1	Vender Relations	4.62	.63
2	Negotiation Techniques	4.55	.64
3	Ethical Considerations	4.55	.70
4	Competitive Sourcing	4.40	.72
5	Legal Considerations	4.30	.75
6	Material Requirements Planning (MRP)	4.26	1.06
7	Competitive Bidding Procedures	4.23	.87
8	Vendor Analysis	4.21	.79
9	Knowledge of Organization's Policies, Procedures, Guidelines	4.19	.83
10	Knowledge of Specifications	4.15	.77
11	Internal Demand Forecasting	4.15	.93
12	Quality Control of Incoming Products	4.15	.95
13	Supplier Price/Cost Analysis	4.08	.87
14	Market/Supply Trends	4.04	.96
15	ABC Inventory Analysis	4.00	1.08
16	Traffic/Transportation Considerations	3.92	.78
17	Postpurchase Product Evaluation	3.90	.89
18	Standardization Procedures	3.82	.93
19	Computer Applications	3.81	.94
20	Financial Analysis	3.79	.84
21	Purchasing Research Techniques	3.68	.83
22	Cost Accounting	3.60	.82
23	Salvage and Scrap Considerations	3.58	.95
24	Value Analysis	3.47	1.22
25	Economic Order Quantity (EOQ) Models	3.19	1.12
26	Make-or-Buy Analysis	3.15	1.13
27	Break-even Analysis	3.08	1.19

Moore, Luft, and Eckrich Study

Rank	Competency	Mean
1	Skill in listening	6.612
2	Ability to effectively negotiate with salespeople	6.606
3	Ability to understand and apply high ethical standards	6.591
4	Ability to apply judicious judgment and common sense	6.567
5	Ability to communicate via the telephone in an effective, efficient, and professional manner	6.515
6	Ability to understand the buying process	6.500
7	Ability to communicate firmly, politely, and professionally	6.448
8	Ability to understand and buy within legal boundaries	6.409
9	Ability to identify and locate sources of supply	6.373
10	Ability to interpret, understand, and implement company buying policies and practices	6.364
11	Ability to communicate problem situations to others	6.343
12	Ability to think objectively	6.328
	Ability to communicate in clear, precise, simple, and professional terms	6.328
13	Skill in developing and maintaining a professional and continuing rapport with salespeople and personnel in using departments	6.313
	Skill in objectively evaluating sources of supply	6.313
14	Ability to respect the confidentiality of certain communications	6.303
15	Ability to understand and relate to different types of salespeople	6.284
16	Ability to seek wisdom and skills to avoid repeating buying mistakes	6.258
17	Ability to anticipate needs and develop alternative sources of supply	6.254
18	Skills in being direct and practical in communications	6.239
19	Ability to see the whole of a situation	6.224
20	Ability to establish efficient time management habits	6.179
	Skill in acquiring needed information	6.179
	Ability to disagree in a professional manner	6.179
21	Ability to understand sales contracts	6.152
22	Ability to understand and apply pricing concepts: discount schedules, datings, etc.	6.149
23	Skill in securing price information	6.119
24	Skill in solving problems	6.104
25	Ability to organize and effectively use catalogs, price sheets, etc.	6.091

26	Ability to insure accuracy in describing needs	6.090
	Ability to follow up and insure delivery as promised	6.090
27	Ability to speak fluently, enthusiastically, and use good grammar	6.076
	Ability to work with others in training new buyers	6.076
28	Ability to discipline self to read, study, and apply new techniques for professional growth	6.075
29	Skill in exemplifying emotional stability and maturity	6.060
30	Ability to formulate and apply meaningful and effective buying steps needed in achieving objectives	6.015
31	Ability to formulate and apply meaningful and effective buying objectives	5.985
	Ability to formulate contracts	5.985
32	Ability to analyze buying failures	5.970
	Skill in assessing opportunities and risks	5.970
	Ability to anticipate and plan for contingencies, i.e., strikes	5.970
33	Ability to understand and adapt to different selling methods	5.925
34	Ability to establish goals and efficient means for achievement	5.910
35	Ability to take charge and control situations	5.909
	Skills in effecting harmonious relations with all channel components and facilitating agencies, i.e., transportation, warehousing	5.909
	Ability to anticipate potential problems and rank them by severity and probability	5.909
36	Ability to organize and maintain adequate files and records	5.896
37	Ability to fill out needed reports and records--vendor, purchase, contract files, etc.	5.894
	Skill in analyzing strengths and weaknesses of products, services, and processes	5.894
38	Skill in organizing materials	5.881
39	Ability to understand and adapt to different selling methods	5.866
40	Ability to handle claims in a professional manner	5.851
41	Skill in writing business-type letters	5.848
42	Ability to understand a sense of obligation--or conscience--toward other persons	5.836
	Ability to be aggressive and goal-oriented	5.836
43	Skill in executing each buying step in the program	5.833
44	Skills in understanding and showing respect for the salesperson's position and time	5.821
45	Skill in assessing and forecasting appropriate economic quantities based on specified needs	5.818
46	Skill in assessing ordering costs and carrying charges	5.788

47	Ability to understand and apply specialized purchasing procedures, i.e., blanket orders	5.761
48	Skill in simplifying complex matters	5.731
	Ability to conduct cost-to-benefit analysis	5.731
49	Ability to write legibly	5.712
50	Skill in measuring and evaluating the success of each buying step	5.682
	Ability to understand standards, grades, and product codes	5.682
51	Ability to comprehend complex systems	5.672
	Ability to understand the techniques of value analysis	5.672
52	Ability to apply mathematical skills with precision	5.667
53	Ability to accept buying failures	5.657
54	Skill in tempering optimism with reality	5.652
55	Ability to understand and relate complex attributes of industrial machinery, equipment, materials, and supplies	5.621
56	Ability to understand lease agreements	5.561
57	Ability to achieve a proper balance among work, play, love, and spiritual values	5.552
58	Ability to read, understand, and apply business reports: financial, statistical, sales analysis, market analysis, etc.	5.537
59	Ability to understand and apply budgets	5.500
60	Ability to organize personal travel in a way that minimizes costs--plant visits, trade shows, etc.	5.485
61	Ability to understand industry literature	5.470
62	Ability to accept and understand that a professional appearance is necessary for buying success	5.455
	Skill in assessing the economy	5.455
63	Ability to interpret, understand, evaluate, and recommend efficient and economical transportation modes and carriers	5.394
64	Ability to learn how to apply intuition with discretion	5.379
65	Ability to understand the different types of industrial products--MRO versus capital equipment, etc.	5.358
66	Ability to assess feasibility of buying or making the product	5.299
67	Ability to interact socially and professionally with professional organizations, civic groups, and government agencies	5.197
	Ability to organize and administer effective inventory control systems	5.197
68	Skill in checking invoices	5.149
69	Ability to understand processes for disposing of scrap	5.104
70	Ability to compute return on investment	5.090

71	Ability to organize and administer effective receiving and inspection programs	5.000
72	Ability to interpret and evaluate results of different inspection methods, i.e., sequential sampling	4.791
73	Ability to use electronic data processing equipment	4.758
74	Ability to understand and apply the Standard Industrial Classification System (SIC)	4.606
75	Ability to understand and use transportation tariffs	4.552

Appendix B

Consolidated Competency List

1. Strengthen vendor relations
2. Negotiate with salespeople
3. Network with key non-sales personnel in the vendor's organization
4. Train and develop new buyers
5. Maintain good relations with facilitating agencies, i.e., transportation, warehousing, receiving
6. Respect the salesperson's position and time
7. Develop a team concept with personnel in other departments and locations within your company
8. Develop professional rapport with salespeople
9. Communicate firmly, politely, and professionally
10. Acquire needed information: specs, prices, competitors, etc.
11. Develop and improve listening skills
12. Use the telephone to communicate effectively and efficiently
13. Locate and evaluate alternate sources of supply which are competitive
14. Apply Materials Requirements Planning (MRP)
15. Think more objectively
16. Perform and use vendor analyses
17. Apply pricing concepts: discount schedules, 2/10,net 30, etc.
18. Improve problem solving skills
19. Insure accuracy in defining and describing needs
20. Analyze buying mistakes and failures
21. Assess opportunities and risks

22. Anticipate and plan for contingencies, i.e., strikes and shortages

23. Establish goals and efficient means for achievement

24. Perform supplier price/cost analyses

25. Perform ABC inventory analyses

26. Perform post-purchase product evaluations

27. Apply standardization procedures

28. Identify and maximize computer applications

29. Forecast appropriate economic quantities

30. Analyze ordering costs and carrying charges

31. Conduct cost-to-benefit analyses

32. Perform value analysis

33. Perform make vs buy analyses

34. Analyze strengths and weaknesses of products and services

35. Evaluate and select efficient and economical transportation modes and carriers

36. Understand and apply high ethical standards

37. Apply judicious judgment and common sense

38. Establish efficient time management habits

39. Respect the confidentiality of certain communications

40. Understand legal considerations

41. Apply competitive bidding procedures

42. Interpret and implement company buying policies

43. Understand and formulate sales contracts

44. Follow up and insure delivery as promised

45. Determine and insure quality of incoming products

46. Use special procedures (blanket orders/consignment inventories)

47. Use lease arrangements

48. Obtain trial/test equipment for evaluation at no/minimal cost

Appendix C

The Six Q-Sort Panelists

The six Q-sort panelists were:

1. Tom Aud-Chief Administrative Officer of Babcock and Wilcox Nuclear Technologies. Prior to this position, he was Manager of Purchasing and Administrative Services for Babcock and Wilcox. He is a past president of PMAC-V and a recipient of the National Association of Purchasing Managers' Professional Development Person of the Year Award for 1990-1991.

2. Dan Dale-Purchasing Manager for the Core Products Division of the Square D Company. In this position he is responsible for the purchasing activities of eleven plants. He has held numerous purchasing positions since 1966.

3. Tom Robertson-is Vice-President of Procurement, Services, and Materials for Duke Power Company. He is a past president of PMAC-V and a recipient of the Thomas Award for outstanding service.

4. Dr. Monroe Bird-is the PMAC-V Professor of Purchasing at Virginia Tech University. He has conducted over 500 purchasing seminars and workshops for more than 10,000 participants. He has published a book and over eighty articles on purchasing.

5. Dr. Mark Hartley-is Director of the Purchasing Management program at the College of Charleston. He is Chairman for Professional Development for PMAC-V and

is an Academic Member of the National Association of Purchasing Management.

6. Dr. Donald Eckrich-is Professor of Marketing at Ithaca College. He was the co-author (with Moore) of the noteworthy journal article describing the development of the Purchasing Hierarchy. He has written a book on Industrial Marketing and many articles in the area of materials management.

Appendix D

Q-Sort Material

Appendix D consists of: (1) an example of the cover letter sent the Q-sort participants, (2) the Q-sort instructions, and (3) the score sheet for each participant's responses.

1568 Fort Hill Drive
Seneca, SC 29678
April 15, 1992

Mr. Dan Dale
Square D
Suite 300-3201 Nicholasville Rd
Lexington, KY 40503

Dear Dan:

It was good to talk to you about the work I'm doing with PMAC-V. David Carver at Seneca has provided several helpful suggestions for the questionnaire I will use. Thank you very much for participating in the Q sort for my research. I have enclosed the following materials:

* Q sort information sheet
* Score sheet
* A set of competency cards
* A list of the 48 competencies
* A return envelope for the score sheet.

If you have any questions while working on the sort, please call me at (803) 653-5221. I would appreciate receiving your score sheet by May 5. I will need to document the backgrounds of the Q sort participants, so I would appreciate a copy of your recent vita. Thank you again for your help.

Sincerely,

Gary Newkirk

Q Sort Instructions

Objective:

The Q sort technique is a procedure for establishing rank order through the creation of groups of statements. The object of this Q sort is to rank 48 purchasing competencies into nine categories from most to least important. Use your knowledge and experience of the Purchasing function to approach the sort according to the question:

"From January 1, 1990 to the present, if you were responsible for training and developing purchasing personnel in the United States, what are the priorities you would assign to the 48 purchasing competencies to increase the effectiveness of these individuals?"

Each of the nine categories requires an exact number of competencies according to the following distribution:

	Most Important								Least Important
Category:	1	2	3	4	5	6	7	8	9
Number of Competencies:	2	4	5	8	10	8	5	4	2

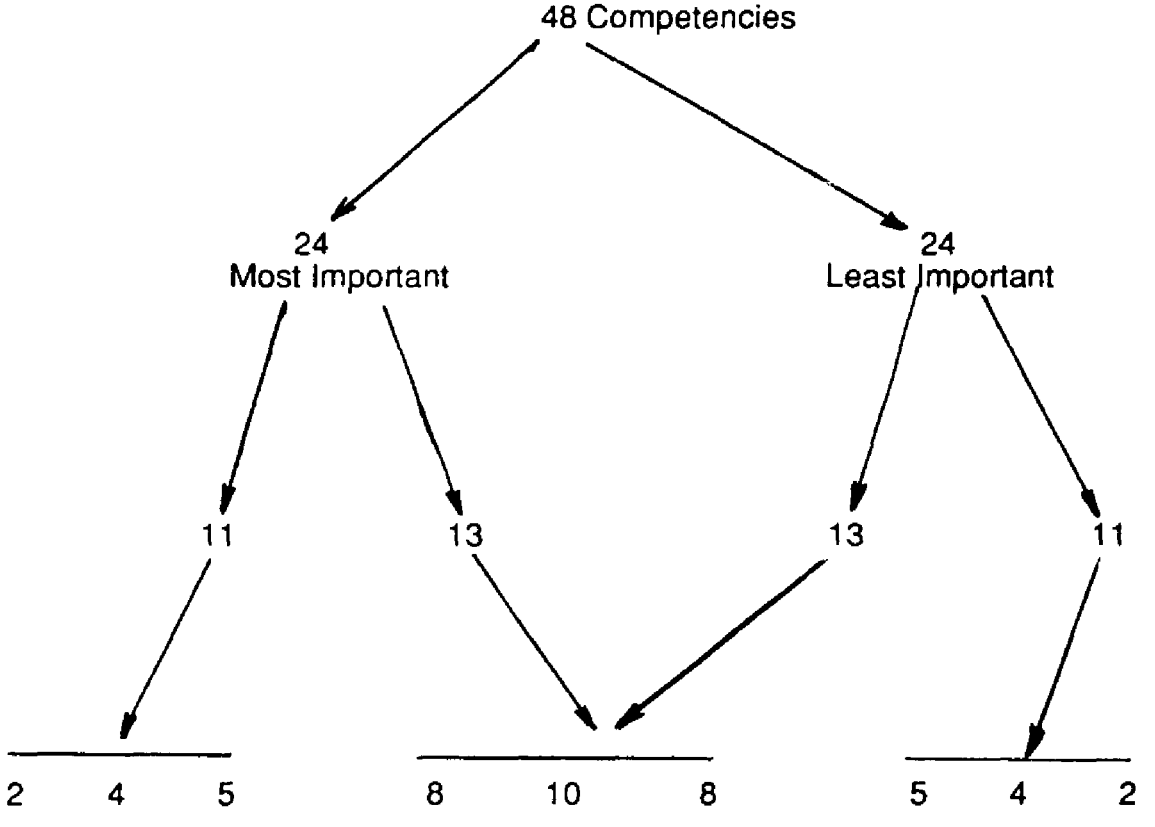
**Please indicate on the attached scoresheet any purchasing competency that you feel is not valid, is ambiguous/not clear, or should be removed from the list.

Process:

A set of cards containing each competency is included, as some participants find it useful to spread the cards on a table and move them around until they are satisfied with the sorting. The number on each card will be used to

record (on the attached score sheet) the location of the competency in your Q sort. When considering the competencies, think of each as being preceded by the statement "Training that helped you to....." (for instance) 1. Strengthen vendor relations.

There are many methods that make the sorting process more manageable, such as dividing the original 48 competencies into two halves (24 most important and 24 least important), then sub-dividing the two halves into four groups and proceeding according to this diagram:



There are many ways to approach the sorting, and you may have a different (and better) technique that works for you. When you have completed your sort, record the location of each competency (by competency number) on the score sheet.

Score Sheet

Category	Number of Competencies	Record Your Competency Numbers
1 Most Important	2	____, ____
2	4	____, ____, ____, ____
3	5	____, ____, ____, ____, ____
4	8	____, ____, ____, ____
		____, ____, ____, ____
5	10	____, ____, ____, ____, ____
		____, ____, ____, ____, ____
6	8	____, ____, ____, ____
		____, ____, ____, ____
7	5	____, ____, ____, ____, ____
8	4	____, ____, ____, ____
9 Least Important	2	____, ____.

_____
(your name)

Please return the score sheet (only) to Gary Newkirk in the enclosed envelope.

Thank you very much for your help.

Appendix E

The Mean Scores for the 48 Competencies Based on the Q-Sort Results

		Mean Score
1.	Strengthen vendor relations	5.50
2.	Negotiate with salespeople	5.17
3.	Network with key non-sales personnel in the vendor's organization	2.67
4.	Train and develop new buyers	4.17
5.	Maintain good relations with facilitating agencies, i.e., transportation, warehousing, receiving	3.33
6.	Respect the salesperson's position and time	3.33
7.	Develop a team concept with personnel in other departments and locations within your company	5.67
8.	Develop professional rapport with salespeople	4.17
9.	Communicate firmly, politely, and professionally	4.50
10.	Acquire needed information: specs, prices, competitors, etc.	6.67
11.	Develop and improve listening skills	2.83
12.	Use the telephone to communicate effectively and efficiently	2.67
13.	Locate and evaluate alternate sources of supply which are competitive	5.50
14.	Apply Materials Requirements Planning (MRP)	1.67
15.	Think more objectively	3.33
16.	Perform and use vendor analyses	5.00
17.	Apply pricing concepts: discount schedules, 2/10,net 30, etc.	3.00
18.	Improve problem solving skills	4.67
19.	Insure accuracy in defining and describing needs	5.50

20.	Analyze buying mistakes and failures	3.67
21.	Assess opportunities and risks	5.00
22.	Anticipate and plan for contingencies, i.e. strikes and shortages	4.50
23.	Establish goals and efficient means for achievement	6.33
24.	Perform supplier price/cost analyses	5.00
25.	Perform ABC inventory analyses	1.67
26.	Perform post-purchase product evaluations	2.17
27.	Apply standardization procedures	3.83
28.	Identify and maximize computer applications	2.83
29.	Forecast appropriate economic quantities	3.17
30.	Analyze ordering costs and carrying charges	2.50
31.	Conduct cost-to-benefit analyses	3.33
32.	Perform value analysis	3.50
33.	Perform make vs buy analyses	2.83
34.	Analyze strengths and weaknesses of products and services	4.33
35.	Evaluate and select efficient and economical transportation modes and carriers	3.50
36.	Understand and apply high ethical standards	7.00
37.	Apply judicious judgment and common sense	4.33
38.	Establish efficient time management habits	3.83
39.	Respect the confidentiality of certain communications	4.33
40.	Understand legal considerations	4.83
41.	Apply competitive bidding procedures	5.00
42.	Interpret and implement company buying policies	6.50
43.	Understand and formulate sales contracts	5.17

44.	Follow up and insure delivery as promised	3.67
45.	Determine and insure quality of incoming products	3.50
46.	Use special procedures (blanket orders/ consignment inventories)	3.00
47.	Use lease arrangements	2.50
48.	Obtain trial/test equipment for evaluation at no/minimal cost	0.83

Appendix F

Purchasing Questionnaire

Appendix F contains a copy of the purchasing questionnaire mailed to those professionals selected to participate in this research.

TRAINING FOR PURCHASING PERSONNEL:

A STUDY OF KEY PURCHASING COMPETENCIES

This survey is designed to provide information about the training you have received in Purchasing in order to help direct and focus future Purchasing Training. If you wish to comment on any questions, please feel free to use the space in the margins or the back page. Your comments will be read and taken into account.

Thank you for your help.

PMAC-V

Gary L. Newkirk, C.P.M.
1568 Fort Hill Drive
Seneca, SC 29678
803-653-5221

PMAC-V Training Questionnaire

For this survey, "training" is defined as:

1. any structured or formal learning experience conducted by another person, such as an instructor or facilitator, **or**,
2. training conducted by your supervisor if the supervisor had training materials such as a lesson outline, learning objectives, and/or a lesson plan, **or**,
3. organized instruction such as the NAPM Phase program or other materials designed for the CPM examination, even if you worked alone.

For each of the purchasing competencies listed below, please circle the number of hours **closest** to the amount of training you have received since January 1, 1990. If you have received more than 6 hours of training in a competency, write in the appropriate number in the blank provided.

I. HUMAN RELATIONS SKILLS

Circle the number of hours of training you have received since January 1, 1990, in each of these subjects (or fill in the blank if greater than 6 hours).

Training that helped you to:		**Number of hours**
1.	Strengthen vendor relations	0 1 2 3 4 5 6 ____
2.	Negotiate with salespeople	0 1 2 3 4 5 6 ____
3.	Network with key non-sales personnel in the vendor's organization	0 1 2 3 4 5 6 ____
4.	Train and develop new buyers	0 1 2 3 4 5 6 ____
5.	Maintain good relations with facilitating agencies, i.e., transportation, warehousing, receiving	0 1 2 3 4 5 6 ____
6.	Respect the salesperson's position and time	0 1 2 3 4 5 6 ____
7.	Develop a team concept with personnel in other departments and locations within your company	0 1 2 3 4 5 6 ____
8.	Develop professional rapport with salespeople	0 1 2 3 4 5 6 ____

II. COMMUNICATION SKILLS

Circle the number of hours of training you have received since January 1, 1990, in each of these subjects (or fill in the blank if greater than 6 hours).

Training that helped you to:		**Number of hours**							
9.	Communicate firmly, politely, and professionally	0	1	2	3	4	5	6	____
10.	Acquire needed information: specs, prices, competitors, etc.	0	1	2	3	4	5	6	____
11.	Develop and improve listening skills	0	1	2	3	4	5	6	____
12.	Use the telephone to communicate effectively and efficiently	0	1	2	3	4	5	6	____

III. ANALYTICAL SKILLS

Circle the number of hours of training you have received since January 1, 1990, in each of these subjects (or fill in the blank if greater than 6 hours).

Training that helped you to:		**Number of hours**							
13.	Locate and evaluate alternate sources of supply which are competitive	0	1	2	3	4	5	6	____
14.	Apply Materials Requirements Planning (MRP)	0	1	2	3	4	5	6	____
15.	Think more objectively	0	1	2	3	4	5	6	____
16.	Perform and use vendor analyses	0	1	2	3	4	5	6	____
17.	Apply pricing concepts: discount schedules, 2/10, net 30, etc.	0	1	2	3	4	5	6	____
18.	Improve problem solving skills	0	1	2	3	4	5	6	____
19.	Insure accuracy in defining and describing needs	0	1	2	3	4	5	6	____
20.	Analyze buying mistakes and failures	0	1	2	3	4	5	6	____
21.	Assess opportunities and risks	0	1	2	3	4	5	6	____
22.	Anticipate and plan for contingencies, i.e. strikes and shortages	0	1	2	3	4	5	6	____
23.	Establish goals and efficient means for achievement	0	1	2	3	4	5	6	____
24.	Perform supplier price/cost analyses	0	1	2	3	4	5	6	____
25.	Perform ABC inventory analyses	0	1	2	3	4	5	6	____
26.	Perform post-purchase product evaluations	0	1	2	3	4	5	6	____
27.	Apply standardization procedures	0	1	2	3	4	5	6	____
28.	Identify and maximize computer applications	0	1	2	3	4	5	6	____

		Number of hours							
29.	Forecast appropriate economic quantities	0	1	2	3	4	5	6	____
30.	Analyze ordering costs and carrying charges	0	1	2	3	4	5	6	____
31.	Conduct cost-to-benefit analyses	0	1	2	3	4	5	6	____
32.	Perform value analysis	0	1	2	3	4	5	6	____
33.	Perform make vs buy analyses	0	1	2	3	4	5	6	____
34.	Analyze strengths and weaknesses of products and services	0	1	2	3	4	5	6	____
35.	Evaluate and select efficient and economical transportation modes and carriers	0	1	2	3	4	5	6	____

IV. PERSONAL

Circle the number of hours of training you have received since January 1, 1990, in each of these subjects (or fill in the blank if greater than 6 hours).

Training that helped you to:		**Number of hours**							
36.	Understand and apply high ethical standards	0	1	2	3	4	5	6	____
37.	Apply judicious judgment and common sense	0	1	2	3	4	5	6	____
38.	Establish efficient time management habits	0	1	2	3	4	5	6	____
39.	Respect the confidentiality of certain communications	0	1	2	3	4	5	6	____

V. OTHER PROFESSIONAL

Circle the number of hours of training you have received since January 1, 1990, in each of these subjects (or fill in the blank if greater than 6 hours).

Training that helped you to:		**Number of hours**							
40.	Understand legal considerations	0	1	2	3	4	5	6	____
41.	Apply competitive bidding procedures	0	1	2	3	4	5	6	____
42.	Interpret and implement company buying policies	0	1	2	3	4	5	6	____
43.	Understand and formulate sales contracts	0	1	2	3	4	5	6	____
44.	Follow up and insure delivery as promised	0	1	2	3	4	5	6	____
45.	Determine and insure quality of incoming products	0	1	2	3	4	5	6	____
46.	Use special procedures (blanket orders/consignment inventories)	0	1	2	3	4	5	6	____
47.	Use lease arrangements	0	1	2	3	4	5	6	____
48.	Obtain trial/test equipment for evaluation at no/minimal cost	0	1	2	3	4	5	6	____

VI. DEMOGRAPHIC INFORMATION

This section includes questions that will be used for classifying survey data. Your response to each item is very important and will in no way be identified with you or your company.

1. What is your gender? (Circle number of your answer)

   1 FEMALE

   2 MALE

2. What is your age?

   ____YEARS

3. How long have you been in the purchasing profession?

   ____YEARS

4. What is the highest level of education you have completed?

   1 HIGH SCHOOL

   2 COMMUNITY COLLEGE DEGREE

   3 BACHELOR'S DEGREE

   4 MASTER'S DEGREE

   5 OTHER...(specify)_____

5. Which of these job titles is most similar to yours? (Circle number)

   1 JUNIOR BUYER

   2 BUYER

   3 SENIOR BUYER

   4 SECTION MANAGER

   5 PURCHASING MANAGER

6. How would you describe the amount of purchasing training you have received since January 1, 1990?

   1 EXCESSIVE

   2 ABOUT RIGHT

   3 MINIMAL

   4 NONE

7. How would you describe the overall quality of the purchasing training you have received since January 1,1990? (Circle one)

   1 EXCELLENT

   2 ABOVE AVERAGE

   3 AVERAGE

   4 POOR

   5 VERY POOR

8. How would you rate the overall content of the purchasing training you have received since January 1, 1990?

   1 HIGH VALUE TO ME IN MY JOB

   2 MODERATE VALUE TO ME IN MY JOB

   3 AVERAGE VALUE

   4 MINIMAL VALUE

   5 NO VALUE

9. How is the type and amount of training you receive generally determined?

   1 BASED ON APPRAISALS

   2 BASED ON NEEDS ASSESSMENTS

   3 YOUR REQUESTS

   4 YOUR SUPERVISOR'S DECISION

   5 JOINT DECISION BETWEEN YOU AND YOUR SUPERVISOR

   6 OTHER...(specify) _____

10. Who pays for your membership in the Purchasing Association? (Circle one)

   1 YOU PAY 100%

   2 YOUR EMPLOYER PAYS 100%

   3 COST OF MEMBERSHIP SHARED WITH YOUR EMPLOYER

11. Who pays for your attendance at PMAC-V quarterly meetings?

   1 YOU PAY 100%

   2 YOUR EMPLOYER PAYS 100%

   3 COST SHARED WITH YOUR EMPLOYER

12. Who pays for you to attend the monthly chapter meeting?

    1 YOU PAY 100%

    2 YOUR EMPLOYER PAYS 100%

    3 COST IS SHARED WITH YOUR EMPLOYER

13. Which of the following best describes your company? (Circle number)

    1 A GOVERNMENT AGENCY

    2 A BUSINESS THAT IS PRIMARILY INVOLVED IN MANUFACTURING

    3 A BUSINESS THAT IS PRIMARILY INVOLVED IN THE SERVICE SECTOR

14. In what industry sector is your company (such as Textiles, Banking, Government, Insurance, Transportation, Hospital/Medical) ?

    _____

15. Approximately how many people are employed by your company?

    1 LESS THAN 100

    2 101 TO 500

    3 501 TO 1000

    4 1001 TO 5000

    5 5001 TO 10000

    6 10001 TO 25000

    7 MORE THAN 25000

16. How many people are in the Purchasing Department at your work location?

    _____ PURCHASING PERSONNEL

17. What are the approximate annual sales for your company?

    _____ DOLLARS

18. What are the best two days of the week for you to attend the quarterly PMAC-V meeting?

1	SUNDAY & MONDAY	4	WEDNESDAY & THURSDAY
2	MONDAY & TUESDAY	5	THURSDAY & FRIDAY
3	TUESDAY & WEDNESDAY	6	FRIDAY & SATURDAY

Is there anything else you would like to tell us about the training you have received in Purchasing? If so, please use this space for that purpose.

Your contribution to this effort is greatly appreciated. *Thank you.*

Appendix G

Endorsement Materials From PMAC-V

This Appendix consists of: (1) the letter from PMAC-V confirming support for this study, (2) a copy of the pre-survey journal article that appeared in the May-June Southern Purchasor [sic], and (3) a copy of the President's Letter supporting the research and requesting "special attention" from the member-participants.

Santee Cooper

One Riverwood Drive, P.O. Box 2946101, Moncks Corner, South Carolina 29461-2901 • (803) 761-8000

April 7, 1992

Clemson University
College of Education
Attn: Mr. Gary Newkirk, C.P.M.
G-01 Tillman Hall
Clemson, SC 29634-0711

Re: Request for Research Assistance

Dear Gary:

I am pleased to inform you that the Board of Directors of the Purchasing Management Association of Carolinas-Virginia, has approved your request for research assistance in the amount of $2,075.00. The check will be mailed shortly to Dr. Henry Pate at Clemson University.

PMAC-V is anxious to see the results of your research in purchasing training and will look forward to sharing some of those results with our membership in the Southern Purchaser. I also appreciate your willingness to add the additional questions to your survey which will further increase the benefits of your research to the professional development efforts of our organization.

We look forward to a continued relationship with yourself and with Clemson University. Please feel free to call me at any time.

Sincerely,

W. C. Ferguson, C.P.M.

Wade C. Ferguson, C.P.M.
Supervisor, Purchasing
(Chairman, PMAC-V Professional
Development Committee)

PMAC-V TO CONDUCT TRAINING STUDY

BACKGROUND

During the first half of the 1980's, several excellent articles appeared in the *Journal of Purchasing and Materials Management* describing major research efforts focused on defining purchasing competencies, the knowledge and skills needed for successfuul purchasing performance. The data generated in each study were analyzed and used to establish a priority listing, or hierarchy, of purchasing competencies. Given that time and funding were limited, the researchers sought to assist organizations and their purchasing personnel by defining competencies that had the greatest perceived importance to practitioners. An organization's training effort, while subject to significant restraints, could be focused on those competencies most important to increasing the effectiveness of training provided to purchasing professionals.

While competency identification was thoroughly studied and the results well documented, follow-up research was not performed to verify that organizations were using the results to focus their training on the most significant competencies. PMAC-V will now participate in a study to determine the extent to which training within the association has followed a purchasing hierarchy.

PMAC-C STUDY

The proposed study has two major research components. First, a panel of six experts from within PMAC-V will evaluate a list of 48 purchasing competencies and prioritize them based on the premise: From January 1, 1990 to May 1, 1992, if you were responsible for training and developing purchasing personnel, what are the priorities you would assign to the 48 competencies to increase the effectiveness of these individuals?

The second part of the study is the collection of data from PMAC-V members which will determine how much training (in hours) members have received in each competency. Approximately 500 randomly selected members of PMAC-V will be selected to participate in this study and will be asked to complete a short questionnaire mailed to them at their business address. Participants are asked to improve the accuracy of their responses by referring to their training records, seminar outlines, and other instructional material. The sample group is also asked to provide demographic information that will be consolidated and analyzed for PMAC-V.

CONFIDENTIALITY

It is important to emphasize to each participant that complete anonymity is guaranteed. All responses will be held in strict confidence.

CONCLUSION

The questionnaires will be mailed during the middle of May, and after follow-up mailings, data analyses, and interpretation, the research report will be submitted to PMAC-V in September. The results should be helpful to PMAC-V members and their organizations as a benchmark for assessing Purchasing Training. It is also anticipated that the PMAC-V will receive national recognition for this reearch through an article submitted to the *Journal of Purchasing and Materials Management*. Since the questionnaire is being mailed to a small number of PMAC-V members, it is important that each questionnaire be returned in order that the results be truly representative.

I would like to thank Henry Moore for his support, recommendations, and direction in planning our survey; Gil Snyder for his assistance, and the panel of experts who aided this research effort. And I would especially like to thank in advance all of the respondents who complete and return their questionnaires. This is a major research effort that is made possible through the cooperation of PMAC-V.

March 18, 1992

Mr. N. Henry Moore, Jr.
Director of Purchasing
National Spinning Company
Post Office Box 191
Washington, NC 27889

Dear Henry:

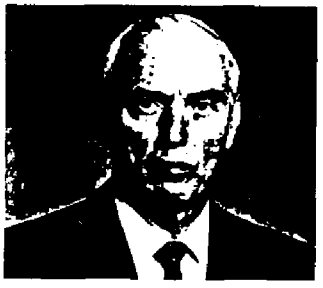
Attached is the project proposal that presents in detail the research plan to study the training and development of purchasing personnel in the PMAC-V. I feel we are fortunate to have Dr. Marion assist me on this project, since he has so much experience with survey research. The fact that a project of this magnitude has never been undertaken to define the amount of training delivered, by competency, increases the value of the research to professional journals. The sample size of 500 was chosen for economy, but is more than sufficient to statistically represent the 1500 members in our association.

Thank you for giving me the opportunity to present this proposal. Please give me a call if there are any questions. I look forward to hearing from you soon.

Sincerely,

Gary Newkirk

PRESIDENT'S MESSAGE



N. Henry Moore, Jr., C.P.M.

I am getting close to the end of my term as your President. The new administration begins at the end of the Trade Show, June 20th.

I am delighted that you have elected such a capable group of officers and directors to lead our association for the next year -- I know that Pat Wylie is already planning for the new year. As in the past, participation by our membership will be the key to the continued success of our association and in turn, the value of the association to its members.

I have enjoyed my visits to all eleven chapters and especially the opportunity to interact with our members and share how we may work together for our mutual benefit. I have shared your ideas and concerns with a committee of immediate past presidents that will make recommendations to the board at our Myrtle Beach Meeting. The use of past presidents for guidance and strategic planning will give the board valuable input for the continue success of our association.

At our Williamsburg Meeting, the board authorized the formation of a Business Survey Committee to conduct and publish a business survey for our region. I have asked Norbert Ore to serve as chairperson and Ken Carle to serve as assistant chairperson on this committee. The College of Charleston will also help us with this project.

Two of our members, Wade Ferguson and Gary Newkirk will soon be sending you a research survey as part of their study for doctoral degrees. I trust you will give these surveys special attention because the results will be published for us to use to help better manage the purchasing function.

If you have not already, please make your plans today to be with us at Myrtle Beach for what will be our biggest and best Trade Show ever.

N. Henry Moore, Jr., C.P.M., *President*, PMAC-V

1991-1992 PMAC-V COMMITTEE CHAIRMEN

ATTENDANCE
Richard Carter, Jr., Comfy Home Furnishings Div.
P.O. Box 479, Kenansville,NC 28349 (919/296-1041)

CONSITITUTION & BY-LAWS
Richard L. Hammond, Lenox China, P.O. Box 987
Oxfordm NC 27565 (919/693-9111)

CENTRAL OFFICE
W. T. Robertson, C.P.M., Duke Power Co., P.O. Box 1007, Charlotte, NC 28201-1007 (703/373-4751)

ELIGIBILITY
George W. Anderson, Philip Morris USA, P.O. Box 1098 Concord, NC 28025 (704/788-5507)

FACILITIES & ENTERTAINMENT
Joe B. McGill, C.P.M., Springs Industries, Inc.
P.O. Box 70, Fort Mill, SC 29715 (803/547-3867)

FORUM PANEL
D. Barry Self, C.P.M.,R. J. Reynolds Tobacco Co., 401 N. Main St., Winston-Salem, NC 27102 (919/741-5083)

INTERNATIONAL TRADE
Michael P. Bratkowski, Morflex Chemical Co., 2110 High Point Rd., Greensboro, NC 27403 (919/292-1781)

MEMBERSHIP
Sharon B. McGuire, C.P.M., Philip Morris USA,
P.O. Box 1098, Concord, NC 28025 (704/788-5516)

PHOTOGRAPHY
Leonard L. Friday, C.P.M., Carolina Power & Light Co.,
P.O. Box 1551, Raleigh, NC 28602 (919/546-7004)

PROFESSIONAL DEVELOPMENT
Wade C. Ferguson, C.P.M., Santee Cooper, P.O. Box 398
Moncks Corner, SC 29461 (803/761-4077)

PROGRAM
Pat P. Wylie, C.P.M., Sequa Chmicals, Inc., P.O. Box 70
Chester, SC 29706 (803/385-5181)

PUBLIC RELATIONS
James D. Smith, Organon Teknika Corp., 100 Akzo Ave.
Durham, NC 27704 (919/620-2369)

REGISTRATION
Peggy W. Eaves, Northern Telecom, 5920 Suncreek Court, Raleigh, NC 27606 (919/992-3721)

SCHOLARSHIP
Frank A. Cox, Central Piedmont Community College, P. O. Box 39005, Charlotte, NC 28235 (704/342-6646)

THOMAS AWARD
Dan W. Dale, C.P.M., Square D Company, 3203
Nicholasville Rd., Lexington, KY 40503 (606/245-7938)

TRADE SHOW DIRECTOR
Leonard L. Friday, C.P.M., Carolina Power & Light Company,
P.O. Box 1551, Raleigh, NC 27602 (919/546-7004)
Assistant Trade Show Director - Danny L. Wright, C.P.M.

Appendix H

Survey Mail-Out Materials

Included in this Appendix are: (1) a copy of the first cover letter mailed to the participants, (2) a copy of the follow-up post card mailed to the participants, (3) a copy of the second letter mailed to non-respondents, and (4) a copy of the letter sent by certified mail to non-respondents.

May 12, 1992

Mr. John Purchaser
Co Name
Address
City state zip

Dear Mr. Purchaser:

While the Purchasing profession spends millions of dollars each year for training, there is little evidence to confirm that purchasing personnel actually receive training in the competencies most essential to job performance. This study will provide information on purchasing training in the PMAC-V through measurement of the content of training and an assessment of the amount and quality of training. In addition, this study seeks your input to guide the directors of PMAC-V in the planning of future quarterly meetings.

Your name was selected in a random sample of PMAC-V members to participate in this training study. In order that the results of the sample will truly represent our association, it is important that each questionnaire be completed and returned. To determine training times, it may help to review recent training and seminar outlines for specific skills, competencies, and times. Also, your Training Department and supervisor may have additional training records to assist you.

You are assured of complete confidentiality. The questionnaire has an identification number for mailing purposes and follow-up only. Your name will never be placed on the questionnaire or revealed in any way.

This study is endorsed by Henry Moore, President of PMAC-V, in the May edition of Southern Purchasor, and it is also supported by Gil Snyder Jr., Executive Vice-President. The results, which will be made available to the PMAC-V Association and to all interested Purchasing and Training personnel, will provide a benchmark of training and will be very useful in the evaluation and planning of Purchasing training efforts.

I would be most happy to answer any questions you might have. Please write or call. The telephone number is (803) 653-5221. Thank you for your assistance.

Sincerely,

Gary Newkirk, C.P.M.
Clemson University

PMAC-V

May 19, 1992

Last week a questionnaire seeking input about your purchasing training was mailed to you. Your name was drawn in a random sample of all PMAC-V members.

If you have completed and returned your questionnaire we send our sincere thanks. If you have not returned the questionnaire, please do so today. Because of financial constraints, the questionnaires have been sent to only a small, but representative sample. It is extremely important that we receive your comments if the results are to accurately represent the experiences of PMAC-V members.

If by some chance you did not receive the questionnaire, or it has been misplaced, please call (803) 653-5221 and another questionnaire will be mailed to you.

Thank you for your assistance.

Sincerely,

Gary L. Newkirk, CPM

June 1, 1992

Approximately three weeks ago I sent you a questionnaire regarding the training you have received in specific purchasing competencies. As of today I have not yet received your completed questionnaire.

This research is important to PMAC-V because it will provide information to determine if training is being provided in the most relevant purchasing competencies. In addition, this study seeks to determine your level of satisfaction with the amount, quality, and content of the purchasing training you have received. A summary of the training study appears on page 28 of the May-June edition of the Southern Purchasor.

I am writing to you again because of the significance each questionnaire has to the usefulness of this study. Your name was drawn through a random sampling process in which every member of PMAC-V had an equal chance of being selected. In order for the results of this study to be truly representative of all PMAC-V members it is very important that each person in the sample return their questionnaire. The results of the study will be made available to Purchasing and Training professionals as a benchmark for future training efforts.

You are assured of complete confidentiality. The questionnaire has an identification number for mailing purposes and follow-up only. I am the only person with access to the identification numbers; your name will never be revealed in any way.

In the event that your questionnaire has been misplaced, a replacement and return envelope are enclosed. I urge you to complete and return it as quickly as possible as we are nearing the end of the survey.

Thank you in advance for your time and cooperation. Please call me at (803) 653-5221 if you have any questions or concerns.

Sincerely,

Gary Newkirk, C.P.M.

Name
Title
Address
City state zip

June 29, 1992

Dear Mr./Ms._____:

I am writing to you about the PMAC-V study concerning the training provided to purchasing professionals. We have not yet received your completed questionnaire.

The large number of questionnaires that have been returned is very encouraging. But, whether we will be able to determine accurately how much training our members have received, and how they feel about several critical issues, depends upon you and the others who have not yet responded. We would like to have your responses because past surveys suggest that those persons who have not returned their questionnaires may hold quite different training experiences and opinions than those who have replied.

This is the first study of the amount of training purchasing professionals have received in specific competencies. Therefore, the results are of particular importance to PMAC-V and to many businesses in our area. The usefulness of our results depends on how accurately we are able to describe what training our members have received.

Because of the significance of this study, I am sending this letter by certified mail to insure its delivery to you. In case my other correspondence did not reach you, a replacement questionnaire and return envelope are enclosed. May I urge you to complete and return it as quickly as possible. The results of this research will be published in the (November-December edition of the) Southern Purchasor.

Your contribution to the success of this study will be greatly appreciated.
Thank you.

Sincerely,

Gary L. Newkirk, C.P.M.

Appendix I

t-Test Results Comparing Wave 1 and Wave 3

	Competency	n=212 Y(bar) Wave 1	n=47 Y(bar) Wave 3	p-value
1.	Strengthen vendor relations	2.79	2.59	.789
2.	Negotiate with salespeople	3.94	3.04	.366
3.	Network with key non-sales personnel in the vendor's organization	0.83	0.38	.267
4.	Train and develop new buyers	1.82	1.19	.420
5.	Maintain good relations with facilitating agencies, i.e., transportation, warehousing, receiving	2.10	1.10	.226
6.	Respect the salesperson's position and time	0.83	0.55	.243
7.	Develop a team concept with personnel in other departments and locations within your company	7.71	4.59	.161
8.	Develop professional rapport with salespeople	1.20	1.08	.763
9.	Communicate firmly, politely, and professionally	3.27	2.10	.191
10.	Acquire needed information: specs, prices, competitors, etc.	1.37	1.38	.990
11.	Develop and improve listening skills	2.18	1.91	.666
12.	Use the telephone to communicate effectively and efficiently	0.86	0.66	.508
13.	Locate and evaluate alternate sources of supply which are competitive	1.73	1.44	.626
14.	Apply Materials Requirements Planning	2.70	1.61	.198
15.	Think more objectively	2.22	3.44	.252
16.	Perform and use vendor analyses	2.07	1.72	.622
17.	Apply pricing concepts: discount schedules, 2/10, net 30, etc.	0.84	0.74	.714
18.	Improve problem solving skills	4.33	2.12	.104
19.	Insure accuracy in defining and describing needs	0.93	0.83	.750
20.	Analyze buying mistakes and failures	0.90	0.93	.951
21.	Assess opportunities and risks	1.20	0.78	.469
22.	Anticipate and plan for contingencies, strikes and shortages	0.60	0.78	.480
23.	Establish goals and efficient means for achievement	2.84	1.91	.245
24.	Perform supplier price/cost analyses	1.92	1.42	.390
25.	Perform ABC inventory analyses	1.04	1.27	.582
26.	Perform post-purchase product evaluations	0.61	0.55	.809
27.	Apply standardization procedures	1.0[illegible]	1.08	.818
28.	Identify and maximize computer applications	2.5[illegible]	2.74	.818
29.	Forecast appropriate economic quantities	1.46	0.57	.393
30.	Analyze ordering costs and carrying charges	0.94	0.95	.977
31.	Conduct cost-to-benefit analyses	0.82	0.61	.483
32.	Perform value analysis	1.52	0.91	.244
33.	Perform make vs buy analyses	0.84	0.89	.879
34.	Analyze strengths and weaknesses of products and services	0.87	1.04	.692
35.	Evaluate and select efficient and economical transportation modes and carriers	0.97	0.93	.945
36.	Understand and apply high ethical standards	2.27	2.12	.847
37.	Apply judicious judgment and common sense	1.92	1.72	.802

	Competency	y(bar) Wave 1	y(bar) Wave 2	p-value
38.	Establish efficient time management habits	2.43	1.93	.397
39.	Respect the confidentiality of certain communications	0.93	0.80	.652
40.	Understand legal considerations	3.97	2.19	.038**
41.	Apply competitive bidding procedures	1.74	1.02	.210
42.	Interpret and implement company buying policies	1.52	1.12	.649
43.	Understand and formulate sales contracts	0.83	1.00	.644
44.	Follow up and insure delivery as promised	0.92	1.29	.233
45.	Determine and insure quality of incoming products	1.86	2.21	.691
46.	Use special procedures (blanket orders/ consignment inventories)	1.49	1.12	.491
47.	Use lease arrangements	0.68	0.59	.777
48.	Obtain trial/test equipment for evaluation at no/minimal cost	0.42	0.44	.926

** Significant at the 5% level

Appendix J

Variances of Manufacturing and Non-Manufacturing Data

Competency	Variance Manf	Variance Non-Manf.
1	19.9998245	24.6354938
2	34.2846363	17.2750000
3	5.9671405	9.6595679
4	15.9763681	29.8595679
5	24.9167471	9.6447531
6	3.7081834	8.9891975
7	112.1133799	106.3030864
8	5.6035945	3.4058642
9	25.3981603	26.7484568
10	6.2186687	9.6000000
11	14.0124594	12.2277778
12	2.7845486	8.5077160
13	9.5682051	6.2141975
14	57.5799479	5.1944444
15	41.4578105	13.9197531
16	16.8232576	4.5679012
17	2.2986897	3.8864198
18	67.8611477	32.7277778
19	3.6451113	2.8750000
20	8.9984645	3.5444444
21	12.3830833	3.6750000
22	2.3726273	3.7549383
23	23.6607879	24.0475309
24	12.0397181	13.4188272
25	5.8000058	8.4660494
26	2.1268901	3.7277778
27	3.3181247	21.4799383
28	60.6397151	85.9345679
29	41.1756456	6.0540123
30	3.1642391	5.1000000
31	2.8317540	3.8882716
32	9.6013717	7.7679012
33	4.8144980	1.9132716
34	6.8711649	8.8444444
35	10.7208915	3.3873457
36	22.7494955	8.5694444
37	23.1504197	8.5410494
38	12.2876342	21.8429012
39	2.9342371	2.3373457
40	25.3658565	45.5003086
41	8.5035389	39.6540123
42	30.1735691	9.3250000
43	4.5868211	4.5623457
44	2.7579919	5.3206790
45	23.9361235	25.7058642
46	10.3048756	3.9058642
47	2.0853002	5.6438272
48	0.9988740	3.1854938

Appendix K

Demographic Data

1. Gender:

	No.	%
FEMALE:	120	33.7
MALE:	236	66.3

2. Age:

Mean:	43.13 years
Standard Deviation:	8.82 years

3. Time in the purchasing profession:

Mean:	12.33 years
Standard Deviation:	8.22 years

4. Highest level of education completed:

	No.	%
HIGH SCHOOL:	83	23.3
COMMUNITY COLLEGE DEGREE:	48	13.5
BACHELOR'S DEGREE:	182	51.1
MASTER'S DEGREE:	42	11.8
OTHER:	1	.3

5. Job titles:

	No.	%
JUNIOR BUYER:	14	3.9
BUYER:	71	19.9
SENIOR BUYER:	75	21.1
SECTION MANAGER:	24	6.7
PURCHASING MANAGER:	169	47.5

6. Description of the amount of purchasing training received since January 1, 1990:

	No.	%
EXCESSIVE:	4	1.1
ABOUT RIGHT:	116	32.6
MINIMAL:	186	52.2
NONE:	46	12.9

7. Description of the quality of the purchasing received since January 1,1990:

	No.	%
EXCELLENT:	26	7.3
ABOVE AVERAGE:	91	25.6
AVERAGE:	146	41.0
POOR:	26	7.3
VERY POOR:	21	5.9

8. Rate the content of the purchasing training received since January 1, 1990:

	No.	%
HIGH VALUE TO ME IN MY JOB:	68	19.1
MODERATE VALUE IN MY JOB:	101	28.4
AVERAGE VALUE:	92	25.8
MINIMAL VALUE:	29	8.1
NO VALUE:	16	4.5

9. Type and amount of training is determined by:

	No.	%
BASED ON APPRAISALS:	4	1.1
BASED ON NEEDS ASSESSMENTS:	49	13.8
YOUR REQUESTS:	104	29.2
YOUR SUPERVISOR'S DECISION:	44	12.4
JOINT DECISION BETWEEN YOU AND YOUR SUPERVISOR:	109	30.6
OTHER:	13	3.7

10. Who pays for your membership in the Purchasing Association?

	No.	%
YOU PAY 100%:	22	6.2
YOUR EMPLOYER PAYS 100%:	313	87.9
SHARED WITH EMPLOYER:	6	1.7

11. Who pays for your attendance at PMAC-V quarterly meetings?

	No.	%
YOU PAY 100%:	55	15.4
YOUR EMPLOYER PAYS 100%:	233	65.4
SHARED WITH EMPLOYER:	10	2.8

12. Who pays for you to attend the monthly chapter meeting?

	No.	%
YOU PAY 100%:	68	19.1
YOUR EMPLOYER PAYS 100%:	239	67.1
SHARED WITH EMPLOYER:	7	2.0

13. Business segments:

	No.	%
A GOVERNMENT AGENCY:	14	3.9
A MANUFACTURING BUSINESS:	262	73.6
SERVICE BUSINESS:	67	18.8

14. The major industry sectors for this survey:

	Number of Respondents
Textiles:	44
Chemicals:	23
Paper:	16
Medical:	15
Transportation and Distribution:	17
Machinery and Equipment	15
Consumer and Industrial Products	15
Electronics	18

15. Company employment:

	No.	%
LESS THAN 100:	26	7.3
101 TO 500:	104	29.2
501 TO 1000:	36	10.1
1001 TO 5000:	72	20.2
5001 TO 10000:	24	6.7
10001 TO 25000:	26	7.3
MORE THAN 25000:	47	13.2

16. Number of purchasing personnel at your location:

Mean: 11

17. Company annual sales:

Mean: $2.924 Billion

18. Preference for the quarterly PMAC-V meeting:

	No.	%
SUNDAY & MONDAY	8	2.2
MONDAY & TUESDAY:	29	8.1
TUESDAY & WEDNESDAY:	38	10.7
WEDNESDAY & THURSDAY:	46	12.9
THURSDAY & FRIDAY:	92	25.8
FRIDAY & SATURDAY:	94	26.4
NO PREFERENCE:	49	13.8

REFERENCE LIST

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