

THE COMPETENCIES REQUIRED FOR EMPLOYMENT  
IN THE FERTILIZER INDUSTRY IN CHEROKEE AND  
CRAWFORD COUNTIES, KANSAS

by 4589

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A MASTER'S REPORT

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requirements for the degree

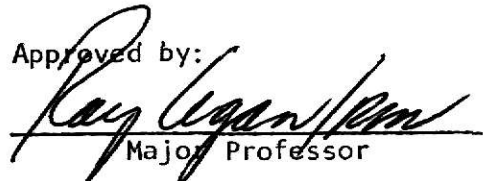
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## CHAPTER I

### INTRODUCTION

#### Background

Since the passage of the Vocational Education Act of 1963, vocational educators in agriculture have been called upon to provide training for high school agriculture students for employment in non-farm agriculture occupations.

This has created a need for identification of competencies required for employment in various agricultural occupations in order that proper and valuable training can be provided.

A 1964 Iowa survey estimated that there would be job opportunities in firms retailing fertilizer for 3,937 new full time employees during the period 1964-1968. This anticipated need included 654 fertilizer salesmen, 177 heads of fertilizer departments, 115 managers, and 229 assistant managers.<sup>1</sup>

It seemed logical to the writer that if the competencies required for employment in the fertilizer industry could be determined, the teaching of them could be incorporated into the vocational agriculture curriculum. This would better prepare the students for such fertilizer jobs.

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<sup>1</sup>Thomas R. Powell, "Factors Related to Employment Opportunities in Retail Fertilizer Distribution in Iowa" (Abstract of Master's thesis, Iowa State University, Ames, 1965).



This would seem to be an area in which some training could be well used as Langdon reported that an increase of employees in the agriculture service occupations would be by 57.8 per cent in the next five years.<sup>2</sup>

#### Statement of the Problem

The problem was to determine in Cherokee and Crawford Counties, Kansas: (1) the number of retail fertilizer workers and the per cent of time spent in fertilizer work, (2) the anticipated need for new fertilizer employees in the next five years, (3) whether or not hiring of competent personnel was a problem, (4) employer interest in a cooperative training program, and (5) competencies and degree of competency required for employment in the fertilizer industry.

#### Limitations of the Study

Limitations beyond the control of the investigator were that not all of the correspondents in the study cooperated fully in filling out the questionnaire. Some of them answered only certain parts of the instrument or answered parts incompletely. Some parts of a few returned questionnaires were unusable.

#### Importance of the Study

It was anticipated that a local study such as this could be used in setting up courses of study for local vocational agriculture

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<sup>2</sup>Charles L. Langdon, "A Survey of Agricultural Occupations in Michigan" (Staff Study, Division of Vocational Education, Michigan Department of Education, Lansing, 1965), Publication No. 550.

departments. Previous similar studies on this topic have been reported. However, the results of a local study would give the teacher more confidence that the competencies being taught are applicable to his situation. From past experience, the writer has observed a majority of past graduates return to their local community and find work. This fact makes the results of a local survey even more valuable.

#### Definition of Terms

Competencies. The term "competencies" is used to indicate those abilities and understandings necessary to complete a given task.

Fertilizer. Fertilizer is a term used to indicate a material added to the soil to supply one or more plant nutrients.<sup>3</sup>

Agribusiness. Agribusiness refers to those non-farm agricultural industries and businesses which provide fertilizer supplies and services to farmers and other agricultural personnel.

Soil Texture. "Soil texture" is a term referring to the proportion of the various sizes of soil particles present in a given soil.<sup>4</sup>

Soil Test. The term "soil test" indicates a series of laboratory procedures to determine the content in a soil sample of certain elements and compounds.<sup>5</sup>

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<sup>3</sup>Farmland Industries, Fertilizer Handbook (a reference for employees), p. 141.

<sup>4</sup>Ibid., p. 151.

<sup>5</sup>Ibid.

Fertilizer Formula. "Fertilizer formula" is a term referring to the grades and amounts of material used to make a specific fertilizer.<sup>6</sup>

Soil pH. "Soil pH" is a term used with a number to designate the acidity or alkalinity of a soil.<sup>7</sup>

E.C.C. "E.C.C." means effective calcium carbonate which is a measurement of the neutralizing ability or value of agricultural lime.<sup>8</sup>

Fertilizer Grade. "Fertilizer grade" is a term which indicates the amount of nitrogen, phosphate, and potash on a percentage basis guaranteed in a fertilizer.<sup>9</sup>

Fertilizer Ratio. The term "fertilizer ratio" is used to tell the ratio of the primary nutrients in a fertilizer, expressed by numbers.<sup>10</sup>

Related Competencies. "Related competencies" refers to those business competencies which do not require a direct knowledge or ability in agriculture, but which are common to all businesses, agricultural and non-agricultural.

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<sup>6</sup> Ibid., p. 145.

<sup>7</sup> Ibid., p. 149.

<sup>8</sup> Donald H. Sander, Soils and Soil Fertility, (Kansas State University Extension Service).

<sup>9</sup> Farmland Industries, op. cit., p. 145.

<sup>10</sup> Ibid., p. 150.

## CHAPTER II

### REVIEW OF SELECTED LITERATURE

A survey was made of literature, which included Master's reports, Ph.D. dissertations, textbooks, bulletins, pamphlets, and other published and unpublished material. From the survey, certain literature was selected for review in this report.

A limited number of studies have been conducted on the competencies required for employment in the fertilizer industry. The reason for this is the recency of the recognized importance of such topics, and the passage of the Vocational Education Act of 1963 which called for training for employment in agriculturally related occupations by vocational agriculture departments.

A major work in this area tested twenty-nine competencies in the managerial, sales, and service areas of fertilizer employment.<sup>1</sup>

Managers indicated that twenty-six of the twenty-nine competencies were "much needed" in their job. Sales personnel needed "much" competence in seventeen of the twenty-nine areas and fourteen of the twenty-nine were "much" needed by the service men.

Combining the three groups, the ten most needed competencies, in order of importance, were:

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<sup>1</sup>C. E. Bundy and F. A. VanLoh, "Competencies Needed by Fertilizer Retailers," Agricultural Education. XXXVII (January, 1965), 180-181.

1. Ability to determine the amount of fertilizer required for various levels of crop production.
2. Knowledge of seed quality and plant population relative to fertilizer response.
3. Knowledge of weed and insect problems and their control.
4. Ability to interpret soil test reports.
5. Ability to identify fertilizer materials and evaluate fertilizer formulas.
6. Ability to make proper recommendations regarding fertilizer use.
7. Ability to recognize good new fertilizer practices and recommend their use.
8. Ability to recognize plant food deficiency in growing crops.
9. Ability to make recommendations in absence of a soil test report.
10. Ability to determine an individual's financial situation and management level.<sup>2</sup>

Subject matter knowledge considered most important for agribusiness employment as selected from forty-six technical subjects as determined in a Kansas study in order of importance were:<sup>3</sup>

1. Current general agricultural knowledge.
2. Salesmanship.
3. Tractors, power units, and mechanics.
4. Soils and crops.
5. Agricultural chemicals, insects, and pest control.

Subjects considered unimportant were forestry, physics, advanced mathematics, foreign language, and sound and light.

Stevenson of Oklahoma reported that managerial employees in an agricultural supply business, such as a fertilizer retailer, should be

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<sup>2</sup>Ibid.

<sup>3</sup>R. J. Agan, "Kansas Studies Agricultural Non-Farm Occupations," Agricultural Education, XXXVII (July, 1964), 15-16.

highly trained in plant and animal science, have some training in soil science and agribusiness management, but needed very little training in agricultural mechanics.<sup>4</sup>

Sales and service employees were considered to need less plant science, agricultural mechanics, and agribusiness management training than managers. Servicemen also needed more competency in agricultural mechanics than either salesmen or managers.

Interviews with sixty-five agricultural supply businesses in Kentucky checked on seventy competencies in the fertilizer industry and found eleven which were rated as "very helpful" for employees by employers.<sup>5</sup> These competencies were very similar to those earlier listed as determined by Bundy and Van Loh.<sup>6</sup>

Non-technical competencies as well as technical competencies are required for employment in the fertilizer industry and in all agribusiness positions.

A sample drawn from 2,979 employers with 6,787 employees under 126 job titles in Kansas dealt with non-technical competencies which

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<sup>4</sup> William Stevenson, "Characteristics and Competencies Desired by Employees in Agricultural Related Businesses," Agricultural Education, XXXVIII (April, 1966), 236-37.

<sup>5</sup> H. Binkley, "Competencies Needed in Agricultural Supply Business," Agricultural Education, XXXIX (August, 1966), 34-35.

<sup>6</sup> Cf. ante., pp. 3-4.

employees of all agribusinesses should possess.<sup>7</sup> It was found that the average agribusiness employee works with people outside the firm 28 per cent of the time. He must be able to meet farm people, meet non-farm people, diagnose, consult, advertise, sell, estimate costs, and buy wisely.

The employee also works 28 per cent of the time with equipment, tools, and supplies. He should be able to operate, maintain, adjust, inspect, and trouble shoot the available equipment. He works with business problems 21 per cent of the time and should be able to keep records and accounts, make decisions wisely, and handle money properly.

The average employee works with production and services 15 per cent of the time. He should be able to make use of technical and service manuals, inspect for weaknesses, and assemble and mix products. He works with personnel in the firm 8 per cent of the time and should be able to handle men and train others.<sup>8</sup>

An Oklahoma report researched non-technical agribusiness competencies as ranked by employers. These competencies, in order of importance, were found to be customer relations, writing, salesmanship, safety, public speech, employee-employer relations, management decisions, inventory and warehousing, receiving, marking, and shipping, and employee-supervisor relations.<sup>9</sup>

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<sup>7</sup>Agan, loc. cit.

<sup>8</sup>Ibid.

<sup>9</sup>Stevenson, loc. cit.

It was also reported that a farm or rural background was a preferred characteristic in employees by most agribusiness employers. The employers indicated that a more positive attitude toward work, ability to talk the farmer's language, and being more sympathetic toward farm problems were advantages held by farm reared employees.



## CHAPTER III

### PROCEDURE OF INVESTIGATION

#### Method

The investigation was made by mailing a questionnaire to managers or owners of retail fertilizer firms and having them mark their responses. Two weeks after the initial mailing, a follow-up letter was sent to all firms which had not already replied.

#### Source of Data

The research was limited to those retail fertilizer businesses which were located in Cherokee and Crawford Counties, Kansas, the teaching area of the researcher. The businesses interviewed offered bulk fertilizer service with spreading equipment available for the farmers' use or offered some type of custom fertilizer applications.

Names of fertilizer firms meeting these criteria were obtained through personal visits by the researcher with the county agricultural agents of the respective counties, by consulting the yellow pages of the local telephone directories, and through correspondence with the Kansas State Chamber of Commerce of Topeka and the Chamber of Commerce of Columbus and Pittsburg, Kansas.

#### Description of the Instrument

A questionnaire was developed by the researcher to obtain the desired information. The questionnaire was based on research of previous

similar studies<sup>1</sup>, on competencies being taught in the researcher's local teaching situation, and from information in courses of study in vocational agriculture developed at Kansas State University.<sup>2</sup>

This questionnaire was reviewed by Dr. R. J. Agan of Kansas State University and suggested changes were incorporated.

The completed instrument contained a general information section, a soil and plant competency section, a mechanical competency section, and a section on related job competencies. These areas were further divided into abilities and understandings of the various competencies.

A rating scale of one for no importance, two for little importance, three for somewhat important, and a four for very important was incorporated into the questionnaire.

### Results

Sixteen agribusinesses in the two county area met the criteria listed above and received a copy of the questionnaire. Twelve replies were received for a 75 per cent return.

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<sup>1</sup>Bundy and Van Loh, loc. cit.

<sup>2</sup>Howard R. Bradley et al., A Suggested Program of Instruction in Crops and Soils Including some Selected Lesson Plans in Crops and Soils for Eastern Kansas Vocational Agriculture No. 11 Students (Kansas State University, 1962).

## CHAPTER IV

### PRESENTATION OF THE DATA

The twelve responding firms were divided into two groups based upon the number of employees working in the fertilizer business. The six firms with the most fertilizer employees composed one group and were referred to as the "large" group. The remaining six firms were referred to as the "small" group.

The large group had more than one full time employee working with fertilizer while the small group had one or less full time fertilizer employee. It was hoped the results would indicate whether or not there was any major differences in opinions of the large firms and the small ones.

The data in Table I show the response of the firms concerning the number of employees working with fertilizer and the per cent of time spent in the fertilizer area. The six large firms reported 13 employees spending 75-100 per cent of their time in fertilizer work. They also reported nine employees working 25-75 per cent of the time with fertilizer while 16 employees worked in the fertilizer part of the business from 0-25 per cent of the time.

The six small firms reported 1.5 employees working with fertilizer 75-100 per cent of the time. They also had 6.5 employees working 25-75 per cent of the time in fertilizers with 7.5 employees working 0-25 per cent of the time. Altogether, the twelve firms had 14.5 persons employed

in fertilizer work 75-100 per cent of the time, 15.5 persons employed 25-75 per cent of the time, and 23.5 persons employed 0-25 per cent of the time working with fertilizer.

Total employees spending some time in fertilizer work for the six large firms was 38.0. There were 15.5 employees spending some time in fertilizer work for the six smaller firms. The total fertilizer employees for the twelve firms was 53.5.

One fertilizer firm manager commented that the size of their operation did not warrant full time fertilizer personnel but the season dictated the number of persons involved.

TABLE I  
TOTAL WORKERS EMPLOYED BY FIRMS

Time spent in fertilizer work	Firm's responses		
	N=6 Large	N=6 Small number	N=12 Total
75-100 per cent	13.0	1.5	14.5
25-75 per cent	9.0	6.5	15.5
0-25	<u>16.0</u>	<u>7.5</u>	<u>23.5</u>
Total employees spending some time in fertilizer work	38.0	15.5	53.5

Data in Table II show the average number of fertilizer workers employed by the firms. The large firms showed an average of 2.2 workers spending 75-100 per cent of the time working with fertilizer. They also reported an average of 1.5 persons employed 25-75 per cent of the time and 2.7 persons employed 0-25 per cent of the time. The small firms had only 0.3 employees spending 75-100 per cent of their time in fertilizer work with 1.1 persons spending 25-75 per cent of the time and 1.3 persons spending 0-25 per cent in this area.

The six large firms had an average of 6.3 employees spending some time in fertilizer work while the six smaller firms had average fertilizer employees of 2.6. The average number of employees spending some time in fertilizer work for all 12 firms was 4.5.

TABLE II  
AVERAGE WORKERS EMPLOYED BY FIRMS

Time spent in fertilizer work	Firm's responses		
	N = 6	N = 6 Number	N = 12
75-100 per cent	2.2	0.3	1.2
25-75 per cent	1.5	1.1	1.3
0-25 per cent	<u>2.7</u>	<u>1.3</u>	<u>2.0</u>
Total employees spending some time in fertilizer work	6.3	2.6	4.5

From this data one can see the large differences in size of the two groups. The large firms have well over twice as many employees working in fertilizers as do the small firms. This might indicate two major groups of retail fertilizer dealers in the two-county area, the large and the small.

In Table III, the data indicated that of the 12 respondents, 50 per cent indicated plans to increase fertilizer employees by one or two persons. Forty-two per cent did not plan to increase the number of employees. Only eight per cent planned to increase personnel by three or more persons.

TABLE III  
PLANS TO INCREASE THE NUMBER OF  
FERTILIZER EMPLOYEES

Amount of increase	Firm's responses		
	N = 6 Large	N = 6 Small Per cent	N = 12 Average
One to two persons	67	33	50
Three or more persons	17	0	8
None	17	67	42

A much larger share (67 per cent) of the small firms did not plan to hire any new employees as compared to the large firms (only 17 per cent). Sixty-seven per cent of the large firms indicated they

would increase employees by one to two persons while only 33 per cent of the small firms indicated these plans.

The responses suggest that the larger firms are going to be the ones who effect any expansion in the retail fertilizer industry in the two counties while the small firms are going to remain somewhat stable in size.

These results are similar to that reported in a Kentucky study in which employers reported an expected 40 per cent increase in the number of employees needing technical competencies in agriculture for the next five years.<sup>1</sup>

A question on the problem of filling job vacancies with qualified personnel was included in the general information section of the questionnaire for response by the southeastern Kansas retail fertilizer dealers.

Data in Table IV show that 75 per cent of the respondents indicated that hiring of competent personnel was a problem. Twenty-five per cent indicated that it was not a problem. The large firms, which are doing most of the hiring,<sup>2</sup> were unanimous in their opinion that hiring of competent personnel was a problem while the small firms were

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<sup>1</sup>Roy D. Dillon and Paul S. Cain, "Employment Opportunities and Usable Agricultural Skills in Non-Farm Agricultural Occupations in Appalachia" (Abstract of a Staff Study, Morehead State University, Morehead, Kentucky, 1966).

<sup>2</sup>Cf. ante Table III.

equally divided on whether or not it was a problem.

A Washington State University study reported an average of 93 per cent of the employer responses indicated a major problem in filling job vacancies with qualified personnel.<sup>3</sup>

TABLE IV  
PROBLEMS IN HIRING COMPETENT PERSONNEL

Is hiring a problem?	Firm's responses		
	N = 6 Large	N = 6 Small Per cent	N = 12 Average
Yes	100	50	75
No	0	50	25

Interest in having a vocational agriculture student with fertilizer training as a part-time worker in a learning capacity as indicated by the respondents is shown in Table V.

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<sup>3</sup>Chester Kirk Hansen, "A Study to Determine Employment Opportunities and Agricultural Knowledges Needed by Employees in the Nursery, Greenhouse, Landscaping, and Chemical Applicator Businesses in King County, Washington" (Abstract of Master's Thesis, Washington State University, Pullman, 1967).



TABLE V  
INTEREST IN HAVING A VOCATIONAL AGRICULTURE STUDENT  
AS A PART-TIME WORKER IN A LEARNING CAPACITY

Interested	Firm's responses		
	N = 6 Large	N = 6 Small Per cent	N = 12 Average
Yes	33	33	33
No	17	33	25
Undecided	50	33	42

Thirty-three per cent were interested in having a part-time student with vocational agriculture training while 25 per cent were not interested and 42 per cent of the firms were undecided about this facet of the program.

There was not much difference in interest on this topic between the large and small firms. Although the large firms indicated they planned to hire most of the new employees<sup>4</sup> and were the ones who indicated unanimously that there was a problem in hiring competent personnel,<sup>5</sup> they were not much more interested in helping to train such students than were the small firms.

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<sup>4</sup>Cf. ante Table III.

<sup>5</sup>Cf. ante Table IV.

These results were not as favorable as those reported by Madden in which 13 of 15 firms contacted were willing to participate in a cooperative school business training program of non-farm agricultural occupations.<sup>6</sup> One employer stated that insurance limitations would place a burden on hiring anyone under 18 years of age.

#### Abilities in Soils and Plants

An area of study was included to give the firms an opportunity to rate various abilities in crops and soils which an employee in their firm should be able to demonstrate. Table VI shows the data concerning the employer responses in this area.

In Table VI, the data indicated that the ability to make fertilizer recommendations from soil tests was the most important with a combined rating of 3.7 using a rating scale of four points for very important, three points for somewhat important, two points for little importance, and one point for no importance. Both the large and small firms were in fairly close agreement in this rating.

The abilities to evaluate fertilizer formulas and to recognize good new fertilizer practices and recommend their use had an average rating of 3.5. There was considerable difference in the ratings of the two groups on these two abilities.

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<sup>6</sup>Robert L. Madden, "Opportunities and Training Needs in Non-Farm Agricultural Occupations in a South-Western Iowa School District" (Abstract of Master's Thesis, South Dakota State University, Brookings, 1965).

The ability to recognize good new fertilizer practices and recommend their use was rated at a maximum 4.0 by the large firms but was dropped to a 3.0 rating by the small firms. The ability to evaluate fertilizer formulas was rated at 3.8 by the large firms and at 3.2 by the small firms. Ranking fourth in this category of abilities was the ability to determine soil texture with an overall rating of 3.3

TABLE VI  
ABILITIES IN SOILS AND PLANTS

Abilities	Firm's responses		
	N = 6 Large	N = 6 Small	N = 12 Average
	Average rating*		
Make fertilizer recommendations from soil tests	3.8	3.6	3.7
Evaluate fertilizer formulas	3.8	3.2	3.5
Recognize good new fertilizer practices and recommend their use	4.0	3.0	3.5
Determine soil texture	3.4	3.2	3.3
Make fertilizer recommendations in absence of soil test report	2.8	3.5	3.2
Recognize plant food deficiency symptoms in growing crops	3.4	3.0	3.2
Take a soil test	3.0	3.2	3.1
Interpret experiment station results	2.8	3.2	3.0

\* The following rating scale was used: very important, four points; somewhat important, three points; little importance, two points; no importance, one point.

Ranking fifth and sixth in the soil and plant abilities was the ability to recognize plant food deficiency symptoms in growing crops and to make fertilizer recommendations in absence of soil test reports, with identical ratings of 3.2. The ability to make fertilizer recommendations in the absence of a soil test report was considered much more important by the small firms (3.5 rating) than by the large firms (2.8 rating). Completing the rankings of soil and plant abilities were the ability to take a soil test (3.1 rating) and the ability to interpret experiment station results (3.0 rating).

These findings were in general agreement with those reported by Bundy.<sup>7</sup> There was much more range in the ratings of the large firms ( $4.0-2.8 = 1.2$ ) than the small firms ( $3.6-3.0 = .6$ ). All of the abilities were rated as being somewhat to very important.

#### Understandings in Soils

One section of the questionnaire dealt with understandings in the area of soils. Data collected is shown in Table VII. From the data in Table VII, it appears that there is general agreement between the groups and within the groups on the importance of the various understandings. The understandings of effect of soil pH on crop production, the nutrient removal of crops, and the fertility needs for various levels of production received similar ratings of 3.5.

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<sup>7</sup>Bundy, loc. cit.

There was not much disagreement between the large and small firms on these understandings.

TABLE VII  
UNDERSTANDINGS IN SOILS

Understandings	Firm's responses		
	N = 6 Large	N = 6 Small	N = 12 Average
	Average rating		
Effect of soil pH on crop production	3.4	3.6	3.5
Nutrient removal of crops	3.4	3.6	3.5
Fertility needs for various levels of production	3.4	3.6	3.5
Importance of soil texture	3.4	3.2	3.3
E.C.C. of liming materials	3.4	2.8	3.1
Micronutrients and their effects on crops of the area	2.6	2.5	2.6

Ranking fourth in this area of competencies was the understanding of the importance of soil texture with a rating of 3.3. It was followed by the competency of understanding the E.C.C. of liming materials with a rating of 3.1. From the data in Table VII, one might conclude that micronutrients are not an important factor in the retail fertilizer businesses of Cherokee and Crawford Counties. Micronutrients and their effects on the crops of the area received an overall rating of only 2.6.

The responses of the large firms were consistent throughout the ratings of understandings in this area.

#### Understandings of Fertilizer Competencies

The employers were asked to rate the importance of various fertilizer competency understandings. Their responses are shown by the data in Table VIII.

TABLE VIII  
UNDERSTANDINGS OF FERTILIZER COMPETENCIES

Understandings	Firm's responses		
	N = 6 Large	N = 6 Small	N = 12 Average
	Average rating		
Fertilizer grade	3.6	3.6	3.6
Characteristics of fertilizer materials	3.6	3.6	3.6
Fertilizer ratio	3.8	3.2	3.5
Desirable fertilizer application methods	3.2	3.8	3.5
Fertilizer placement	3.4	3.5	3.5
Fertilizer effect on lodging	3.4	3.3	3.4
Timeliness of fertilizer application	3.4	3.3	3.4
Economy of various fertilizer materials	3.2	3.2	3.2
Effect of weather on fertilizer utilization	3.4	2.8	3.1

The competencies in this area rated highest by the respondents were an understanding of fertilizer grade and an understanding of characteristics of fertilizer materials. The data indicated that apparently there was agreement between the two employer groups because the rating of both the large and small firms were 3.6 for both these competencies.

The three competencies ranked next in importance from this area were an understanding of fertilizer ratio, an understanding of desirable fertilizer application methods, and an understanding of fertilizer placement. The large firms rated the importance of an understanding of fertilizer ratio somewhat higher (3.8) than did the small firms (3.2). The small firms rated the importance of an understanding of desirable fertilizer application methods higher (3.8) than did the large firms (3.2). There was not much difference in opinion on the importance of an understanding of fertilizer placement between the firm groups.

An understanding of fertilizer effect on lodging and of the timeliness of fertilizer applications were ranked next in importance by the employers questioned. A ranking of 3.4 was recorded on both of these competencies. Both groups were mainly in agreement on these two competencies.

The responses as shown in Table VIII indicate the employers rated an understanding of the economy of various fertilizer materials as the next to last in importance in this area with a 3.2 rating.

Rating least in importance was the understanding of effect of weather on fertilizer utilization with a 3.1 rating. However, there was some disagreement on the importance of this competency between the two groups. The large firms gave it a rating of 3.4 while the small firms accorded it a 2.8 rating.

### Mechanical Abilities

An area of the questionnaire was devoted to mechanical abilities which might be necessary for employment in the retail fertilizer industry. Employees were given an opportunity to rate the various competencies and the results of their ratings are summarized by the data in Table IX.

The ability to operate equipment in a safe manner was rated as the most important by the respondents with a 3.9 rating. The large firms rated it at a perfect 4.0. Following closely in importance was the ability to perform routine maintenance on equipment with a rating of 3.8 by both employer groups.

The abilities to apply fertilizer to the soil properly and accurately and to repair fertilizer equipment was given a rating of 3.7. The ability rated least important by the firms was that of accurately estimating field acreage with a 3.0 rating by both firm groups. The high rating of these mechanical competencies suggests to the writer that some of these abilities might be incorporated into the vocational agriculture course of study.



TABLE IX  
MECHANICAL ABILITIES FOR EMPLOYEES

Abilities	Firm's responses		
	N = 6 Large	N = 6 Small	N = 12 Average
	Average rating		
Operate equipment in a safe manner	4.0	3.8	3.9
Perform routine maintenance on equipment	3.8	3.8	3.8
Apply fertilizer to soil properly and accurately	3.8	3.5	3.7
Repair fertilizer equipment	3.5	3.8	3.7
Accurately estimate field acreage	3.0	3.0	3.0

#### Related Job Abilities

Hoover reported that salesmanship, human relations, and business management are competencies that are needed by all agricultural employees, but in varying degrees.<sup>8</sup>

An area of the questionnaire was concerned with related job abilities necessary or desirable for retail fertilizer employment. Data collected are presented in Table X.

<sup>8</sup>N. K. Hoover, Dr. R. McClay, and G. Z. Stevens, "Off-Farm Agricultural Occupations in Pennsylvania--Employment Opportunities and Technical Education Needs" (Abstract of Staff Study Department of Agricultural Education, Pennsylvania State University, University Park, 1966).

TABLE X  
RELATED ABILITIES

Abilities	Firm's responses		
	N = 6 Large	N = 6 Small	N = 12 Average
	Average rating		
Meet the public well	4.0	3.3	3.7
Make mathematical calculations accurately	3.8	3.3	3.6
Follow instructions	4.0	3.2	3.6
Have enthusiasm	4.0	3.2	3.6
Accept and carry out responsibility	3.8	3.3	3.6
Willingness to work	4.0	3.2	3.6
Anticipate needed jobs and do them	3.6	3.0	3.3
Take orders on the telephone	3.6	3.0	3.3
Write legibly	3.0	3.3	3.2
Use cash register and other office equipment	2.8	3.0	2.9

The highest ranking competency in the related ability area was the ability to meet the public well with a rating of 3.7. This had a unanimous rating of 4.0 by the large firms and a 3.3 by the small firms. There were five abilities rated at 3.6 from the list of related abilities. These included the willingness to work, the ability to accept and carry out responsibility, the ability to have enthusiasm, the

ability to follow instructions, and the ability to make mathematical calculations accurately.

These abilities were all rated somewhat higher by the large firms than by the small ones. The willingness to work, the ability to have enthusiasm, and the ability to follow instructions all received 4.0 ratings by the large firms. Ranking next in importance was the ability to anticipate needed jobs and do them and the ability to take orders on the telephone with ratings of 3.3. Again, these abilities were rated somewhat higher (3.6) by the large firm group than by the small firm group (3.0).

The ability to write legibly was rated at 3.2. It was rated higher by the small firms (3.3) than by the larger ones (3.0). The only ability in this area to receive less than a 3.0 rating was the ability to use the cash register and other office equipment. Apparently this is not an area of work in which most fertilizer employees are involved. It was given a rating of 2.9 with a slightly higher rating by the small firm group than the large firm group.

#### Related Understandings

Data in Table XI show the response of the employers to the importance of various related understandings.

An understanding of good employee-employer relationships and good employee-customer relationships both received ratings of 3.7. The large firms considered good employee-customer relationships to be

important to the extent of a 4.0 rating. Apparently the employers were not quite as concerned about the relationships between the employees as they rated employee-employee relationships at 3.5.

Loreen reported in a 1967 study that competencies in employee relations with his supervisor, employee relations with fellow workers, and customer relations were all considered important for entry into most jobs.<sup>9</sup>

TABLE XI  
RELATED UNDERSTANDINGS

Understandings	Firm's responses		
	N = 6 Large	N = 6 Small Average rating	N = 12 Average
Good employee-employer relationships	3.8	3.5	3.7
Good employee-customer relationships	4.0	3.3	3.7
Good employee-employee relationships	3.8	3.2	3.5

<sup>9</sup>C. O. Loreen, "Occupational Opportunities and Training Needs of Youth for Non-Farm Agricultural Jobs in Washington State" (Thesis of State Staff Study, Agricultural Education Office, Washington State University, Pullman, 1967).

## CHAPTER V

### SUMMARY

There appears to be two types of fertilizer retailers in Cherokee and Crawford Counties, the large and the small. The large retailers have well over twice as many employees working in fertilizer as do the small ones.

Most of the employment expansion in the fertilizer area is being planned by the large retailers. Hiring of competent personnel is a problem with both the large and small dealers, but more of a problem with the large firms.

Neither group of retailers is overly enthusiastic about a cooperative program where a vocational agriculture student would receive work experience in their firm. It should be stated that the employers were not asked to respond to a cooperative program as such, but to reply as to their interest in having a vocational agriculture student as a part-time worker on a learning basis.

Vocational agriculture educators are constantly asking themselves where the emphasis in their program should be placed. In training students for employment in the retail fertilizer trade, data in Table XII might provide some general direction to these problems.

In Table XII a comparison of the various major competency areas of the questionnaire is detailed. These are composite ratings for all the competencies in a given area as rated by the fertilizer firm's manager or owner.

Understandings in related areas and mechanical abilities were the highest ranking competency areas with 3.6 ratings. They were followed by abilities in related areas with a rating of 3.5. Understandings in fertilizer received a 3.4 rating. The least important areas were those of abilities in plants and soils with a 3.3 rating and understanding in soils with a 3.25 rating.

TABLE XII  
AVERAGE RATING OF THE VARIOUS MAJOR COMPETENCY  
AREAS IN RETAIL FERTILIZER DISTRIBUTION

Major competency areas	Firm's responses		
	N = 6 Large	N = 6 Small	N = 12 Average
	Average rating		
Ability in mechanics (5)	3.6	3.6	3.6
Understandings in related areas (3)	3.9	3.3	3.6
Abilities in related areas (10)	3.7	3.2	3.5
Understandings in fertilizers (9)	3.4	3.4	3.4
Abilities in plants and soils (8)	3.4	3.2	3.3
Understandings in soils (6)	3.3	3.2	3.25

This data suggest to the writer that time spent teaching related and mechanical competencies may be more valuable than that used in teaching agriculture technology. In addition, these

competencies in the related and mechanical areas are also common to many other non-farming agricultural occupations.

It was found that there was a difference in the attitude of the large and small firms. The larger firms rated the competencies in related areas considerably higher than did the smaller firms. They also desired more competence in plant and soil abilities and understandings. In no competency area did the small firms rate the degree of competency higher than did the large firms.

The results of the data convinced the writer that local studies can do much to inform vocational agricultural departments of the attitudes and expectations of prospective student employers. If all departments could have access to a local study concerned with all phases of agricultural industry, adaptations in the courses of study could be made to much better meet the needs of the community.

## CHAPTER VI

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to give guidance to the agricultural occupations part of the vocational agriculture curriculum at Southeast High School. This was to be accomplished by determining in Cherokee and Crawford Counties, Kansas: (1) the number of retail fertilizer workers employed, (2) the anticipated need for new fertilizer employees in the next five years, (3) whether or not hiring of competent personnel was a problem, (4) employer interest in a cooperative training program, and (5) competencies and degree of competency required for employment in the fertilizer industry.

A review of the literature revealed that a limited number of studies have been conducted on the competencies required for employment in the fertilizer industry. The only major study dealing directly with this topic discovered by the writer was a 1965 report by Bundy and Van Loh of Iowa. A number of studies on related agricultural occupations and related competencies have been completed. Besides technical, related, and mechanical competencies, an Oklahoma study by Stevenson reported that a farm or rural background was a preferred characteristic in employees by most agribusiness employers.

A questionnaire was developed by the researcher and mailed to sixteen fertilizer firms in the two-county area. The questionnaire was set up in six different areas and each of the areas were



broken down into a number of abilities or understandings. The respondents were asked to rate the importance of the various competencies using a rating scale of four for very important, three for somewhat important, two for little importance, and one for no importance. Twelve replies were received for a seventy-five per cent return.

The firms were divided into two groups, the large and the small, based on the number of employees involved in fertilizer work. The large group consisted of those firms which had more than one person employed full time in fertilizer work. The small group had one or less full time fertilizer employee.

The findings were that most of the employment expansion in the fertilizer area is being planned by the large group. Hiring of competent personnel is a problem with both the large and small dealers, but more of a problem with the large firms. There was not a majority of either group of retailers interested in hiring vocational agriculture students as part-time workers in a learning capacity.

The writer concluded that the study was successful in determining the number of retail fertilizer workers in the two counties, in determining anticipated need for more fertilizer employees, and in finding out whether or not hiring of competent personnel was a problem. It was also successful in determining the competencies and degree of competency desired in employees by prospective employers.

It was also concluded that the study did not accurately determine employer interest in a cooperative school-business training program. The employers were asked to indicate their interest in having a vocational agriculture student as a part-time worker in a learning capacity. The questionnaire method of obtaining information and the manner in which the cooperative training question was stated on the questionnaire were felt to be the main reasons for not obtaining an accurate picture of the desired information.

Understandings in related areas and abilities in mechanical areas were the highest ranking competency areas with composite 3.6 ratings. They were followed by abilities in related areas with a rating of 3.5. Understandings in fertilizer received a 3.4 rating. The least important areas were those of abilities in plants and soils with a 3.3 rating and understandings in soils with a 3.25 rating.

Of the forty-one competencies surveyed, those rated most important were the abilities to operate equipment in a safe manner, to perform routine equipment maintenance, to repair fertilizer equipment, to apply fertilizer to the soil properly and accurately, to meet the public well, to make mathematical calculations accurately, to follow instructions, to have enthusiasm, to accept and carry out responsibility, to make fertilizer recommendations from soil tests, and to have the willingness to work. Those understandings rated highest were those of good employee-employer relationships, good employee-customer relationships, fertilizer grade, and characteristics of fertilizer materials.

Of the forty-one competencies, only two received overall ratings of less than 3.0 (somewhat important). They were the understanding of micronutrients and their effect on the crops of the area (2.6 rating) and the ability to use the cash register and other office equipment (2.9 rating).

The writer concluded that this survey would be a valuable local aid in determining course content and in conducting agricultural career experience classes. The competencies determined in a local survey can be taught with the confidence that they are truly needed and desired by the local employers.

It would be recommended that a similar survey, only pertaining to all agricultural industry, be available for each Kansas vocational agricultural department. A survey of agribusiness in each of the seven Kansas Vocational Agriculture Teachers Association Districts would keep the number of studies small enough to be practical but would make the results local enough to be taught with confidence in each individual teaching situation.

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## APPENDIX

May 10, 1970

Dear Sir:

Your opinion as a manager or owner of a firm involved in fertilizer sales and service is important to a study being undertaken to determine competencies required for employment in this business in Cherokee and Crawford Counties.

It is hoped that this study can help vocational agriculture teachers make their teaching more helpful in preparing students for these and other agricultural occupations.

Because of the limited scope (two counties) of this study, I need 100 per cent cooperation from the fertilizer dealers in the area. Won't you please send your response to me right away?

Sincerely yours,

Larry Coltrane,  
Vocational Agriculture Instructor,  
Southeast High School  
Cherokee, Kansas 66724



COMPETENCIES REQUIRED FOR EMPLOYMENT IN THE FERTILIZER INDUSTRY  
IN CHEROKEE AND CRAWFORD COUNTIES, KANSAS

General Information:

1. How many workers are employed by your firm in the area of fertilizer sales and service including yourself?

Number

\_\_\_\_\_ 75-100% of time spent in fertilizer work

\_\_\_\_\_ 25-75% of time spent in fertilizer work

\_\_\_\_\_ 0-25% of time spent in fertilizer work

Comments:

2. Do you anticipate increasing the number of fertilizer sales and service employees in the next 5 years? (Circle one)

a. Yes, by 1-2 persons

b. Yes, by 3 or more persons

c. No

d. Comments:

3. Is hiring of competent personnel for work in fertilizer sales and service a problem in your firm?

a. Yes

b. No

c. Comments:

4. Would your firm be interested in having a vocational agriculture student with fertilizer training as a part-time worker in a learning capacity?

a. Yes

b. No

c. Undecided

d. Comments:

Please rate the following competencies as to their degree of importance for an employee in your firm using the following scale:

- 1--No importance.
- 2--Little importance.
- 3--Somewhat important.
- 4--Very important.

#### SOILS AND PLANTS

Ability to:	Rating: (Circle one)			
1. Determine soil texture	1	2	3	4
2. Take a soil test	1	2	3	4
3. Make fertilizer recommendations from soil tests	1	2	3	4
4. Make fertilizer recommendations in absence of a soil test report	1	2	3	4
5. Interpret experiment station results	1	2	3	4
6. Evaluate fertilizer formulas	1	2	3	4
7. Recognize good new fertilizer practices and recommend their use	1	2	3	4
8. Recognize plant food deficiency symptoms in growing crops	1	2	3	4
Understanding of:				
1. Importance of soil texture	1	2	3	4
2. Effect of soil pH on crop production	1	2	3	4
3. E.C.C. of liming materials	1	2	3	4
4. Fertilizer grade	1	2	3	4
5. Fertilizer ratio	1	2	3	4
6. Characteristics of fertilizer materials	1	2	3	4

1--No importance.  
 2--Little importance.  
 3--Somewhat important.  
 4--Very important.

Rating: (Circle one)

- |  |   |   |   |   |
|--|---|---|---|---|
| 9. Desirable fertilizer application methods              | 1 | 2 | 3 | 4 |
| 10. Fertilizer placement                                 | 1 | 2 | 3 | 4 |
| 11. Fertilizer effect on lodging                         | 1 | 2 | 3 | 4 |
| 12. Timeliness of fertilizer application                 | 1 | 2 | 3 | 4 |
| 13. Effect of weather on fertilizer utilization          | 1 | 2 | 3 | 4 |
| 14. Fertility needs for various levels of production     | 1 | 2 | 3 | 4 |
| 15. Micronutrients and their effect on crops of the area | 1 | 2 | 3 | 4 |

#### MECHANICAL

Ability to:

- |   |   |   |   |   |
|---|---|---|---|---|
| 1. Perform routine maintenance on equipment         | 1 | 2 | 3 | 4 |
| 2. Operate equipment in a safe manner               | 1 | 2 | 3 | 4 |
| 3. Apply fertilizer to soil properly and accurately | 1 | 2 | 3 | 4 |
| 4. Accurately estimate field acreage                | 1 | 2 | 3 | 4 |
| 5. Repair fertilizer equipment                      | 1 | 2 | 3 | 4 |

- 1--No importance.  
 2--Little importance.  
 3--Somewhat important.  
 4--Very important.

RELATED

Ability to: Rating: (Circle one)

- |   |   |   |   |   |
|---|---|---|---|---|
| 1. Anticipate needed jobs and do them           | 1 | 2 | 3 | 4 |
| 2. Willingness to work                          | 1 | 2 | 3 | 4 |
| 3. Accept and carry out responsibility          | 1 | 2 | 3 | 4 |
| 4. Have enthusiasm                              | 1 | 2 | 3 | 4 |
| 5. Write legibly                                | 1 | 2 | 3 | 4 |
| 6. Take orders on telephone                     | 1 | 2 | 3 | 4 |
| 7. Use cash register and other office equipment | 1 | 2 | 3 | 4 |
| 8. Follow instructions                          | 1 | 2 | 3 | 4 |
| 9. Make mathematical calculations accurately    | 1 | 2 | 3 | 4 |
| 10. Meet the public well                        | 1 | 2 | 3 | 4 |

Understanding of:

- |   |   |   |   |   |
|---|---|---|---|---|
| 1. Good employee-employer relationships | 1 | 2 | 3 | 4 |
| 2. Good employee-employee relationships | 1 | 2 | 3 | 4 |
| 3. Good employee-customer relationships | 1 | 2 | 3 | 4 |

Please use this space to make any comments or suggestions that you might have.

May 25, 1970

Dear Sir:

Several days have passed since I mailed you a questionnaire concerning competencies for employment in the fertilizer industry.

If you have returned the form, let me take this opportunity to thank you very much for your cooperation.

If you have not yet returned the form, please do so at your earliest convenience. Your opinion is important.

Sincerely yours,

Larry Coltrane,  
Vocational Agriculture Instructor,  
Southeast High School,  
Cherokee, Kansas

P. S. I am enclosing an extra form in case you have mislaid the first.

THE COMPETENCIES REQUIRED FOR EMPLOYMENT  
IN THE FERTILIZER INDUSTRY IN CHEROKEE AND  
CRAWFORD COUNTIES, KANSAS

by

LARRY HAROLD COLTRANE

B. S., Kansas State University, 1966

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AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Adult and Occupational Education

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1970

The purpose of this study was to give guidance to the agricultural occupations part of the vocational agriculture curriculum at Southeast High School. The writer endeavored to secure the opinions of retail fertilizer dealers as to the competencies necessary for employment in the retail fertilizer industry.

Twelve firms returned questionnaires in the collection of data. The research population consisted of managers or owners of fertilizer firms in Cherokee and Crawford Counties, Kansas. The questionnaire was set up in six different areas and each of the areas were broken down into a number of abilities or understandings.

The respondents were asked to rate the importance of the various competencies using a rating scale of four for very important, three for somewhat important, two for little importance, and one for no importance.

The firms were divided into two groups, the large and the small, based on the number of employees involved in fertilizer work. The large group consisted of those firms which had more than one person employed full time in fertilizer work. The small group had one or less full-time fertilizer employees.

The findings were that most of the employment expansion in the fertilizer area is being planned by the large group. Hiring of competent personnel is a problem with both the large and small dealers, but more of a problem with the large firms. There was not a majority of either group of retailers interested in hiring

vocational agriculture students as part-time workers in a learning capacity.

Understandings in related areas and abilities in mechanical areas were the highest ranking competency areas with composite 3.6 ratings. They were followed by abilities in related areas with a rating of 3.5. Understandings in fertilizer received a 3.4 rating. The least important areas were those of abilities in plants and soils with a 3.3 rating and understandings in soils with a 3.25 rating.

Of the 41 competencies surveyed, those rated most important were the abilities to operate equipment in a safe manner, to perform routine equipment maintenance, to repair fertilizer equipment, to apply fertilizer to the soil properly and accurately, to meet the public well, to make mathematical calculations accurately, to follow instructions, to have enthusiasm, to accept and carry out responsibility, to make fertilizer recommendations from soil tests, and to have the willingness to work.

Those understandings rated highest were those of good employee-employer relationships, good employee-customer relationships, fertilizer grade, and characteristics of fertilizer materials.

It was found that there was a difference in the attitude of the large and small firms. The larger firms rated the competencies in related areas considerably higher than did the smaller firms. They also desired more competence in plant and soil abilities and understandings. In no competency area did the small firms rate the degree of competency needed higher than did the large firms.



The results of the data convinced the writer that local studies can do much to inform vocational agricultural departments of the attitudes and expectations of prospective student employers. If all departments could have access to a local study concerned with all phases of agricultural industry, adaptations in the courses of study could be made to much better meet the needs of the community.