Identifying important educational competencies in Montana's value-added industry
by Carole Lynne Skeeters

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Agricultural Education
Montana State University

Abstract:
This survey was a descriptive study to identify the importance and need of select competencies in Montana's value-added industry. The population of the survey consisted of those individuals receiving the Value-Added Montana Newsletter, those individuals who attended the Montana Value-Added Forum, excluding Montana State University students who were required to attend the forum for class credit and the president/directors of Montana's major agricultural associations.

A mailed survey based on the cross-sectional survey design by Borg and Gall (1983) was used to collect data. Eighty-seven competencies in six competency areas; production and processing, marketing, entrepreneurship, promotion, basic economic principles and business principles were identified.

Based on a needs assessment model by Borich (1980) respondents were asked to identify the educational importance and their level of knowledge of each competency. In addition respondents were asked to choose one of four value-added definitions derived from the researcher's review of literature that best fit their understanding of the concept as it relates to Montana agriculture. In order to assure that the survey was clear and free of grammatical, typing and formatting errors a pilot study was used. Following the initial mailing of 271 surveys, a follow-up post card and second mailing of the survey were provided to non-respondents to insure the researcher obtained the needed sample size.

The survey data was entered into a Microsoft Excel spreadsheet. Using a statistical package, Cronbach alphas were computed on each of the competency area's level of knowledge and educational importance scores to assure reliability of the survey. The computed alpha showed that the survey had sufficient reliability for the study.

Frequency scores were calculated for value-added definitions. Means, standard deviations and weighed discrepancy scores for each calculated for each competency. The WD scores were tested with an alpha .05 using Analysis of variance and t-test to determine if there were any differences due to demographic data. WD scores were used to determine the educational need of each competency. A positive WD score indicated an educational need.

The data from the survey showed that all but one competency should be included in a community based value-added curriculum. Based on t-test and ANOVA scores, demographic data showed to have no significant effect on the educational needs of the respondents.

Value-added training seminars need to be created using the highest positive WD scored competencies. Marketing competencies showed the highest level of educational need, while respondents had the lowest educational need for business principle competencies. Due to the fact that there was not an overwhelming consensus on a definition of value-added, a Delphi panel should be created to establish a working definition of value-added as it relates to Montana agriculture.

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A thesis submitted in partial fulfillment
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of

Master of Science

in

Agricultural Education

Montana State University – Bozeman
Bozeman, Montana

August 1998

APPROVAL

of a thesis submitted by

Carole Lynne Skeeters

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

Committee Chair — Date: 7/20/98

Approved for the College of Agriculture

Department Head — Date: 20 July 1998

Approved for the College of Graduate Studies

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Date

ACKNOWLEDGEMENTS

The researcher would like to make the following acknowledgements to those individuals who helped make this project possible. A special thanks to the researcher's graduate advisor and committee chair Dr. Van Shelhamer for his guidance and support, and the members of her graduate committee, Drs. Martin Frick and Clayton Marlow for their valuable input. The researcher wishes to express a sincere thanks to Barb Planalp for her personal and professional assistance in completing this project.

Finally the researcher wishes to thank her family for their constant support through the good and bad times of her graduate endeavors. The educational values and work ethic that her family promoted encouraged the researcher to pursue her educational and professional desires. Without their influence and understanding, this project would not have been possible.

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ABSTRACT

This survey was a descriptive study to identify the importance and need of select competencies in Montana's value-added industry. The population of the survey consisted of those individuals receiving the *Value-Added Montana Newsletter,* those individuals who attended the Montana Value-Added Forum, excluding Montana State University students who were required to attend the forum for class credit and the president/directors of Montana's major agricultural associations.

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CHAPTER 1

THE PROBLEM

Introduction

Montana's farmers and ranchers have little control over their products once they leave the farm gate. A significant amount of the value being added to these products is happening after the farmers and ranchers are no longer able to benefit. Through marketing, processing, and other various forms of alteration, Montana's traditional crops are now becoming Montana's "value-added" products. Organic production, high-tech marketing programs, and new products formed from traditional crops are changing the face of Montana agriculture. In response to the changing needs of the consumers a new trend has emerged: Value-added Agriculture.

According to Montana Agricultural Statistics (1996), Montana has 59.7 million acres of land in farms and ranches, ranking second in the nation behind Texas in farmland acreage. As stated in the Montana Department of Agriculture's 1997 release "Montana Ag Information and Statistics," farmer's share in the food dollar is less than 50 percent of Montana's major crop producing areas. If the consumer pays $.75/lb of bread the farmer receives $.05/lb, if $2.83/lb is paid for choice beef the farmer receives $.70/lb. The agricultural cash income for selected Montana industries shows a seven percent decrease

in the agricultural income, according to the Montana Agricultural Statistics (1996). Cash incomes, including government payments, decreased eight percent in 1995 from 1994, and 5 percent from 1993. This shows a decrease of nearly 170 million dollars.

The decreasing process of adding value to products significantly influences farm income. Montana farmers and ranchers are unable to take advantage of value-added agriculture because they are lacking the knowledge and resources to do so. The Department of Agriculture and the Montana State County Extension offices do not have the value-added education resources to offer Montanans. Value-added as it relates to Montana and the value-added educational needs of Montanans have not been clarified. The concept of value-added is broad; it can span from processing and alteration of raw materials, to marketing and promotion of products. However value-added is defined, it is indisputable that "value-added" agriculture is the answer to decreasing cash incomes for the Montana's farmers.

The actual "value-added" contribution from farmers for each dollar spent on food has declined from 16.2 cents in 1950 to only 3.5 cents in 1990 (University of Arizona Cooperative Extension Service, 1997). In *Oregon State University Hot Topics,* (1996), Jim Cornelius, an Oregon State University agricultural economist, noted that nationwide, that processing, a form of value-added, can add up to 70 percent of the farm-gate value to crops (Duncan, p.1). With a 70 percent increase to Montana's agricultural income, Montana's agricultural community has the opportunity to greatly increase the economic

impact they have on the state. In order to do so Montana's farmers and ranchers, educators, and extension agents need to be educated about value-added as it related to Montana's agriculture.

Statement of Purpose

The purpose of this study will be to identify the importance and educational need for selected competencies by individuals involved in the Montana value-added industry. Competencies will relate to production and processing, entrepreneurship, marketing, promotion, and basic economic and business principles.

Need for Study

It is difficult to meet the educational needs of the consumer without first knowing how to do so. It is, therefore, necessary to develop educational resources and materials for those individuals interested in entering or expanding their knowledge of the value-added industry. According to Montana Agricultural Statistics (1996), U.S. agricultural exports for the first six months of the fiscal year 1996 totaled nearly $32 billion. "This strong export performance is due to the increased value of U.S. bulk commodities and the continued demand for U.S. high-value products" (Montana Agricultural Statistics, 1996, p 96).

Without adequate resources Montana's farmers and ranchers will remain uneducated about value-added agricultural strategies that can significantly increase their cash incomes. Montana Governor Marc Racicot stated "Montana's agricultural market is no longer regional or even national, it is global. Farmers, rancher, and agri-business people must have concise, reliable information to compete" (Montana Agricultural Statistics, 1996, p. 3). Constructing competencies needed in the industry is the first step in informing the public about value-added agriculture. Montana agricultural educators need value-added competencies; without these competencies Montana's value-added industry cannot prosper and Montanans will lack the information need to be competitive regionally, nationally, and internationally. Continuing to inform Montanans about the value-added industry without these competencies will require Montana's educators to rely on information from other state's value-added programs. These programs, tailored to fit the needs of individuals residing within the given state, will not provide information specific to Montana agriculture. Competencies directly evaluated by individuals involved in Montana's value-added industry will provide accurate information that can be directly applied to Montana agriculture.

Educating Montanans about competencies needed in Montana's value-added industry will result in a greater competitiveness of Montana's agricultural products. Enhancing Montana's value-added industry would allow Montana to gain greater economic values from its products through the conversion of traditional products into higher valued products for the use in domestic and international exports.

Research in the area of value-added will benefit all areas of the state by providing new jobs that allow youth the opportunity to remain in the state, increase farmer's and rancher's incomes and help with rural development. According to the USDA (1997) research in the area of value-added is needed to enhance the competitive value of agricultural products. There is an opportunity to obtain a greater economic value from agricultural materials through: the conversion to high-value products; the development of new products from conventional and new plant and animal sources; making existing products more valuable; increasing process efficiency; making greater use of co-products and waste materials; and through the integration of forest and agricultural products.

By determining the competencies presently used in Montana's value-added industry, it is possible to provide a resource base for those individuals currently involved and those interested in becoming involved in the value-added industry. Montana is presently lacking the information needed to become a competitor in the value-added industry. States such as North Dakota, Idaho, Wyoming, and Oregon have recently implemented value-added programs for their states' agriculture industry, providing essential resources to their farmers and ranchers.

Value-added will diversify the agricultural market in Montana as it has done for its neighboring states. Roger Johnson in North Dakota's Biennium 1997-99 Agricultural Marketing Plan (1997) believed that producers and processors need to have value-added resource available to them on an individual basis. "Several states' agricultural concerns have the product but lack marketing skills and information" stated Johnson (p. 4).

Information is the foundation in forming an effective value-added industry. It is necessary to first identify what information is important in Montana's value-added industry. Today, as Montana's agricultural cash incomes decrease, the demand for U.S. high-value products continue to increase. Value-added is becoming an increasingly important agricultural sector. With ample resources, Montana's agriculturists can build upon the value-added foundation that has already been established within the state; however educational attention needs to be paid to the importance skills, knowledge and attitudes needed to be competitive. In the December 17, 1997 Issue of *Montana Grain News*, Gary Broyles, Montana Grain Growers Association President said, "I am convinced that Montana farmers can make the change, but we need to focus our energy on those areas where we can make a real difference" (p. 1). Broyles believed that one of these areas is value-added agriculture. This study will provide Montana's farmers and ranchers with the information they need to become competitive in the national and international value-added market. This study will both identify and determine the most important areas that need to be included in a value-added curriculum.

By relying on the input from individuals that are presently involved in the industry, it is possible to provide information that is specific to Montana's agricultural industry. By incorporating individuals' current level of knowledge, information that is important to the value-added industry presently available to Montanans can be eliminated. Therefore, information that will be included in a value-added curriculum will not duplicate programs and resources that are already available, but will provide new innovative information to those individuals who are involved, or wish to be involved in

Montana's value-added industry. With access to value-added educational resources, the agricultural community can respond to the needs and desires of consumers in the state and around the world.

Objectives

To meet the purpose of this study the following objectives were purposed:

(1) To identify perceptions of what value-added means in Montana agriculture by those individuals involved in the value-added industry.

(2) To determine the level of knowledge of selected value-added competencies of those individuals involved in Montana's value-added industry.

(3) To determine the educational importance of selected value-added competencies.

(4) To determine the sources of information in which value-added knowledge was obtained by those individuals involved in the value-added industry.

(5) To determine the competencies needed in a community-based value-added curriculum.

Assumptions

The researcher realized the following assumptions in this study:

(1) It was assumed that there is a set of competencies that are needed by individuals in the value-added industry.

(2) It was assumed that those individuals involved in the value-added industry are aware that their business is considered value-added.

(3) It was assumed that those individuals involved in Montana's value-added industry are knowledgeable about the educational competencies needed to be successful within the industry.

Limitations

The research recognized the following limitations to the study:

(1) The population of this study was limited to those individuals receiving the *Value-Added Montana Newsletter*, those individuals who attended the November 15, 1996 Montana Value-Added Forum, excluding Montana State University students, who were required to attend the Forum for a class and the presidents/directors of Montana's major agricultural associations.

(2) The population consisted of only those individuals residing in Montana.

(3) The time frame of this study was from January 1998 to July 1998.

(4) Competencies of the study related to production and processing, entrepreneurship, marketing, promotion and basic economic and business principles.

Definition of Terms

Competencies-- Behavioral characteristics of knowledge, skills and attitude which enable a person to perform efficiently and effectively given a function or task.

Value-added industry-- Those businesses and individuals involved in increasing the value of their initial commodity through marketing, processing, production, development of new uses and products from traditional crops or animal byproducts, and manufacturing in Montana.

CHAPTER 2

REVIEW OF LITERATURE

The review of literature covered five areas; (1) Value-added definitions, (2) Value-added programs in other states and Canadian provinces, (3) Identifying educational competencies, (4) Curriculum Development, and (5) Value-added in Montana.

Value-Added Definitions

There is currently no known definition of value-added as it relates to Montana agriculture. Therefore, educators are unable to provide Montana's agricultural community with adequate educational resources on the topic. In order to identify those competencies that are important in the value-added industry, we must first look at how value-added has been defined.

Value-added is a term that can mean different things to different people. Dr. Roger A. McCain (1997), Professor of Economics at Drexel University stated, "Value-added is defined as the revenue of the firm minus the amounts paid to other firms (for raw and semi-finished materials and services). Equivalently, the value-added is the sum of all payments from the firm to households "including wages, rent, interest, and profit" (p. 1). While this definition described economically what value is being added to a firm, it does

little to form a definition about what is a value-added product. According to this definition, a value-added product is anything that brings revenue to a firm.

The concept of value-added agriculture spans far beyond the fences that traditional definitions impose. Iowa Senator Tom Harkin (1997) believed that the concept of value-added included the variety of crops that are fed to livestock, the processing of crops and livestock into products that are more marketable to a consumer, as well as developing new uses and products from existing traditional crops and animal byproducts. According to Harkin, value-added means more jobs, higher incomes, and greater opportunities for families and communities. Value-added allows farmers and ranchers in rural communities to gain control over what happens to their products once they leave the farm gate. Harkin (1997) added, "Farmers who share in the ownership and profits of value-added enterprises will be less vulnerable because they will not just be price takers selling basic commodities" (p. 2). Harkin stated however, that in order for value-added agriculture to have an impact research needs to be developed. Public sources of research need to be available to farmers and ranchers who are interested in promoting value-added products. It is not the large established manufacturers who need this information, but rather the small family farmers who want to gain more control over their livelihood.

J.C. Purcell, B.R. Eddleman and J.J. Kunz (1982) reported, that "Value-added is a concept generally applied to manufacturing. It is simply the value of the final product adjusted for the value of raw materials consumed or modified in the manufacturing

process" (p. 4). The authors pointed out that through the modification of products, value is being acquired. The difference in the value of the initial product and the value of the product after it has gone through the modification process constitutes value-added.

Value-Added Programs in Other States and Canadian Provinces

Value-added agriculture not only has the potential to increase individual economies, but will also add benefits to state and regional economies as well. Saskatchewan, Canada created a multi-million dollar program to support value-added agriculture within the province. The *Canada-Saskatchewan Agri-Food Innovation Agreement* (1997) is "an industry-driven strategic initiative to support new and emerging commodities and value-added activities in Saskatchewan" (p. 7). Shifting attitudes within the province from government dependence to an environment of industry and market-driven initiatives have encouraged change within the agricultural sectors of Saskatchewan.

Agricultural diversification and value-added activities have combined and resulted in new policies and programs for Saskatchewan agriculture. According to the *Canada-Saskatchewan Agri-Food Innovation Agreement*, "Value-added refers to the practice of processing a primary commodity in some way so that value is added to the initial commodity" (1997, p. 1). The new programs and policies that have been developed encourage the value-added processing to take place within Saskatchewan, rather than

exporting raw materials out of the province or the country to processing plants who gain the value being added to the product. The programs and policies also ensure the viability of rural communities by creating an environment where the producers of the raw materials can become involved in the outcome of their product, allowing the value to be returned to the grower, rather than to the processor. By focusing on eight distinct areas of agriculture; biotechnology, food processing, horticulture, information technology, non-food processing, special crops, specialized livestock, and sustainable agriculture, Saskatchewan has identified areas of value-added agriculture that will receive assistance for research, development, and infrastructure needs.

In addition to providing an outlined plan for value-added agriculture to its residents, Saskatchewan has also focused on the educational needs of the agricultural community. The government realized that without a solid outline, farmers and ranchers will not know how to engage in value-added activities. Therefore, for each of the value-added sectors that Saskatchewan has identified, they have also outlined "Priority Areas." These priority areas defined the important plans and strategies that needed to be implemented in order for the various sectors to be successful. All areas of sustainable agriculture and value-added activities were assigned a strategic area committee to oversee the priority areas and assure each area's needs are addressed. Each was given individual attention in order for the individuals involved in the sectors to be adequately educated on the topic.

Identifying the areas of agriculture in which value-added applies is vital to having

a productive statewide value-added program. North Dakota has been successful in implementing a value-added program by identifying those areas that value-added applies to. Much of the attention focused around value-added in North Dakota has been food processing. While processing has been the main focus, North Dakota State University (1995) also pointed out that value-added has also centered around byproducts from processing, industrial use of farm products, new crops and products, as well as the individuals who are involved in the process (p.1). Like Montana, most of North Dakota's economy is derived from agriculture; however, the majority of the economic activity has taken place after the product leaves the farm gate.

North Dakota has focused on three main areas to increase their value-added campaign. First, the state has focused on the local changes that are taking place. Since the 1970's, the state has relied on agriculture to carry the brunt of economic development within the state. With the increased numbers of processing cooperatives and a recent trend in new alternative crops and livestock, North Dakota is reassessing the traditional mold agriculture has been accustom to. According to NDSU (1995), one of the main motivators behind North Dakota's shift towards value-added is an opportunity to replace jobs lost in consolidating farm operations of the 1970's and 1980's. The increase in jobs associated with value-added agriculture is a primary reason North Dakotans have seen an increase in value-added products.

The second reason North Dakota has focused on value-added is that it is impossible for them to ignore the changes that have taken place in the agricultural

industry. North Dakota State University pointed out in *Building North Dakota's Foundation* (1995) that "farmers are getting a decreased share of the food dollar 21 cents overall in 1994, compared to 32 cents in 1970" (p.2). In order for farmers to improve their income, they must move toward processing, concentrating on what the consumer wants in order to make a profit. Environmental trends, the popularity of industrial products made from farm commodities, and a demand for increased efficiency along with other strong national trends, have been a basis upon which North Dakota has expanded its value-added market.

The final reason North Dakota has moved toward value-added is that they have the capability to do so. Technology has now allowed farmers to produce specialty crops in addition to the traditional crops they produce. Improved communications, packaging and shipping techniques, and farming efficiency has opened a new door for many of North Dakota's farmers. In addition to the concern about adding dollars to the farm, North Dakota has also pointed out the additional benefits of value-added. Some of these benefits are: restoring areas that are in danger of being lost with the declining need for farm labor; developing jobs that will keep the youth in the state; and retaining the culture of the state by developing an economic base upon which the state can build.

The success of North Dakota's value-added program is dependent upon their international and national promotion plans. Included in the *Marketing Plan 1997-99 Biennium*, from the North Dakota Department of Agriculture (1997), promotional plans were: market development; development of logos and program to educate the consumer

on value-added; exhibiting trade shows; and primarily educational programs for the farmers and ranchers of North Dakota.

North Dakota's educational efforts concentrated on marketing, an important area of value-added. The educational division of the ND Department of Agriculture has been aimed at helping the state's agriculturists enhance their marketing conditions. According to the Marketing Plan (1997) the division's educational efforts included:

> focusing on knowledge enhancement activities including sponsorship of marketing meetings; inviting agricultural marketing experts into the state to consult with North Dakota companies and serving as a referral point to both research and finance programs (p. 5).

In order to meet the educational needs of its members, the "Pride of Dakota," North Dakota's leading value-added program, and the Marketing Division of the Department of Agriculture, which is in charge of the value-added program, surveyed its members to find out what services the members wanted to gain from the value-added program. In response, the members overwhelmingly requested more seminars. As a result a four-part series of seminars covered topics from "the principles of marketing to designing working marketing plans" (p. 5) was created. As a result of these marketing seminars and the availability of resources, North Dakota's value-added agriculturists have established themselves in the agricultural marketing sector of the state's economy. By providing its

members with vital information on marketing and promotion, the "Pride of Dakota" has built a rapport with its members and created a role for itself as a source for facts, trends, and both basic and applied research.

In the fall of 1985 University of Wyoming's College of Agriculture conducted the "Value-Added Study." According to Torok, Hambley and Ahleschwede (1988), the Joint Agricultural Committee of the Wyoming legislature requested that UW College of Agriculture provide the state with a "futuristic perspective related to Wyoming's agricultural industry" (p.1). The results of this study were enacted into law in February of 1988. The study focused primarily on the processing of nine major Wyoming agricultural commodities; alfalfa, barley, beef, corn, dry beans, oats, sugar beets, sheep and wheat.

The Idaho State Department of Agriculture (1997) hoped to stimulate economic diversification in Idaho agriculture through several marketing programs. According to an Idaho State Department of Agriculture publication "Idaho, Marketing Food and Agriculture," "agricultural diversification included value-added processing, alternative markets, new uses for agricultural products or resources, alternative production methods and specialty crops or livestock." Because of this goal, the Department has developed expertise for several value-added programs including; specialty food processing, farmers' markets, organic production, farm and ranch recreation, and specialty crops and livestock. According to the Idaho State Department of Agriculture's International Marketing Program, through consumer education, agricultural loans, produce market

news, exporter education, trade shows and missions, promotions, and trade office, Idaho hoped to promote their food and agriculture around the world.

Montana needs to align itself with the research that is being done in other states. As a growing industry, it is important to identify the important educational competencies needed in Montana's value-added industry to a) create new jobs in Montana thereby keeping more Montanans from leaving the state to find employment, b) create a new and innovative agricultural market opportunites, c) increase economic impact to the state, and d) gain legislative and private support for value-added products in Montana.

Identifying Educational Competencies

When developing a value-added educational program that will benefit the farmers and ranchers within Montana's economy, it is first essential that the criteria for the program be established. This can be done by identifying and confirming the essential competencies needed for successful involvement in Montana's value-added industry. From 1976-1978, Instructional Consulting and Research Associates Inc. under the direction of David McClay conducted the *National Ag Occupations Competency Study*. McClay (1978) stated,

> The purpose of the study was to identify the essential agricultural competencies needed for entry employment and advancement in the major agriculture and agribusiness occupations and to validate the importance of the competencies identified for each occupation by workers employed in the occupation (p. iii).

The report looked at 57 major production agriculture and 139 agribusiness occupations. Teacher educators in agricultural education from 40 colleges and universities identified these occupations across the nation.

The study compiled a list of occupations and classified the occupations as skilled, technical and/or managerial, or professional. Following the identification of the occupations, the study prepared job descriptions for each of the occupations eliminating duplicate occupations and identifying those occupations which employed the most workers regionally and nationally. Using a job and task analysis, the important competencies for each occupation were identified. The competencies were then reviewed by an Employer/Employee Review Group (E.E.R.G.) and the survey instrument was also pilot tested on this group. The survey instrument was then revised eliminating those competencies identified as unimportant. A national E.E.R.G. obtained a minimum of 30 completed questionnaires and classified the competencies according to importance. The responses of the E.E.R.G. were then summarized and a report of the findings was prepared.

Following the summarization of the competencies several areas of the agricultural industry were able to identify those competencies that needed to be focused on. According to McClay (1978), competency was defined as a "behavioral characteristic of knowledge, skills, attitudes, and judgment generally required for the successful performance of a task(s) or the sum total of attitudes, knowledge, and skills which enable a person to perform efficiently and effectively a given function" (p.7). The results of this

study were used to increase and improve vocational-agriculture educational programs. McClay (1978) believed that the information allowed agricultural educators to identify the important competencies needed as described by individuals presently involved in the agricultural workforce. As a result, secondary school vocational-technical programs had the opportunity to: update and evaluate courses of studies offered within agriculture and agri-business programs; offer updated co-op training programs for occupational preparation; determine additional equipment and supplies needed for optimal instruction; establish additional areas of instruction for areas of importance that were identified by the surveys; and, re-train instructors in competency areas in which instructors were deemed deficient. In addition to the secondary educators uses of the survey, state administrators, teacher education departments, colleges and universities, agriculture and agribusiness industries, and student's career development also were intended as beneficiaries of the study.

Using a competency based approach for the survey will allow curriculum development to focus on the needs and desires of those individuals involved in Montana's value-added industry. A University of Wisconsin Cooperative Extension Bulletin (1998) stated that "competency-based approaches have a potential to offer a clear and integrated set of dimensions against which present and future performance can be measured" (p. 3). While this survey identified important competencies needed in the agricultural industry, it also identified the fact that several new agricultural occupations

were arising. By targeting the new agricultural occupations and identifying the competencies needed in Montana's value-added industry, programs and educational institutions in Montana can benefit from the information.

Curriculum Development

In their book Curriculum Development in Vocational and Technical Education: Planning, Content and Implementation (1984), Curtis R. Finch and John R. Crunkilton offered detailed guidelines to creating a vocational education curriculum. Following the goals of the Vocational Education Act of 1963, which "set forth the philosophy that instructional programs should be developed and evaluated on the basis of manpower needs" Finch and Crunkilton based their curriculum development on a data collection philosophy (McClay, 1978, p. 1). Finch and Crunkilton (1984) stated that "the contemporary vocational and technical curriculum cannot function properly unless it is data based" (p. 17). This data, they believed, needs to be based on a cooperative data collection effort between schools and communities. Finch and Crunkilton's curriculum development focused on eight areas of perceived outcome. Finch and Crunkilton (1984) believed:

> . . .Curriculum developers must give consideration to the basic character of the curriculum and build in those factors that contribute to its quality . . . a vocational and technical curriculum that is data based, dynamic, explicit in its outcomes, fully articulated, realistic, student oriented, evaluation conscious, and future oriented (p. 16-17).

Value-added is an emerging area of agriculture that needs to be looked at in a futuristic manner. By collecting current data about Montana's value-added industry, a curriculum based on the current and future needs of farmers can be created. Finch and Crunkilton stated that "any curriculum that hopes to be relevant tomorrow must be responsive to tomorrow's as well as today's needs" (p. 20).

Value-Added In Montana

Value-added resources that are available to members of Montana's value-added industry are scarce. The Montana Department of Agriculture published "Value-Added Montana Newsletter." As stated in the Spring 1996 edition of "Value-Added Montana Newsletter," the publication strives to "fill the gap between producers and exporters, providing information on the production and promotion of value-added products in the national and international markets" (p 1). The newsletter has been distributed biannually to food producers throughout Montana.

The Made in Montana program is another example of Montana value-added. "The Made in Montana program has worked to evaluate the status of Montana made products in the market place and then educate Montanans about the diversity of products manufactured in their state" (Value-Added MT, Spring 1996, p1). According to the

Montana Department of Agriculture, in order for a farmer or rancher's product to be considered Made in Montana, 50% of the value-added to the product must take place within the state.

Because Montana is located close to the Pacific Northwest region, it has the capability to dramatically increase value-added trade with Pacific Rim Countries. According to an article in the Winter 1997 issue of *Oregon's Agricultural Progress*, entitled Pulp Fixings, T. Gentle stated "the countries located around the Pacific Rim are considered to have the most immediate potential for value-added products" (p.3). Markets for Northwest agricultural products are developing in Japan, Korea, China, Taiwan, Singapore and Russia.

Montana's Vision 2005 task force set goals for Montana value-added products. As stated in the *Montana Farmer Stockman* (1998), the task force hoped to provide recommendations, ideas and strategies that can double agriculture's economic value by the end of 2005. The task force will work throughout 1998 on a variety of agricultural issues including value-added agriculture. The task force was formed as a result of the 1998 Governors' Conference on Agriculture in which the subject of value-added agriculture was raised.

Montana lacks the educational resources to make its value-added industry successful. Many states have developed a working definition of value-added as well as a program to promote their value-added products. Montana cannot rely on other state's value-added resources. In order to compete with these states Montana must establish

value-added standards and provide the information that individuals in Montana's value-added industry need. This information includes a community based value-added curriculum. In order to do this competencies need to be identified for educational importance and need. Value-added agriculture will provide jobs for Montana's, increase the agricultural impact to the state, and allow the benefits of small business to remain in Montana.

CHAPTER 3

METHODOLOGY

This study was designed to identify the importance and educational need for selected competencies by individuals involved in the Montana value-added industry. Value-added competencies that were included in the study related to entrepreneurship, marketing, processing, production and promotion. This chapter will explain the methods and procedures used to conduct the research and is organized as follows; (1) population description, (2) survey instrument design, (3) data collection and rate of response, (4) data analysis, and (5) summary.

The study was classified as a descriptive study. The survey design was based on the descriptive study design described by Isaac and Michael (1971). As described by Isaac and Michael (1971), the design performed a needs assessment for a community-based vocational education program in addition to answering the objectives of the study.

Population Description

The population of this study consisted of those individuals receiving the *Value-Added Montana Newsletter*, those individuals who attended the Montana Value-Added Forum, (Montana State University students who were required to attend the Forum for class credit were excluded) and the presidents/directors of Montana's major agricultural associations. The Montana Department of Agriculture's Marketing Division supplied the

names and addresses of the newsletter recipients and the forum attendants to the researcher. The names of the presidents/directors of Montana's major agricultural associations were supplied by Dr. Van Shelhamer, for use in an Agricultural Education course, AGED 251 Leadership Development in Agriculture and Industry. Permission was granted to researcher by Dr. Shelhamer to use the information.

The population initially consisted of 287 individuals involved in Montana's value-added industry. However, after reviewing the list of individuals, it was found that several of the names on the list were vacation homes, wrongly identified as being involved in Montana's value-added industry, or no longer associated with the company, association, or department asked to respond to the survey. After eliminating these names from the population, 271 individuals were surveyed.

Response Rate

A total of 271 individuals involved in Montana's value-added industry received *The Montana Value-Added Educational Competencies Survey* (Appendix A). The first mailing of 271 surveys generated a return rate of 19.9(54). After the follow-up postcard was mailed, 38 (17.5%) more surveys were returned. The second mailing generated the highest rate of return. Of the 179-second mailings, 47(26.3%) were returned. All mailings generated a return rate of 51.3%, 139 of the 271 individuals surveyed. The data in Table 1 show the response rate of individuals involved in Montana's value-added industry by date. The percentages shown represent the rate of return percentage for the

individual mailings, therefore, the returned percentages exceed the 51.3% return rate due to the varying number of surveys sent per mailing.

Table 1. Return Rate by Date of Return. (N=271)

Date Returned	Number Sent	Number Returned	Percent Returned
First Mailing	271	54	19.9%
Reminder Postcard	217	38	17.5%
Second Mailing	179	47	26.3%
Total		139	51.3%

Instrument Design

The design of the survey paralleled the cross-sectional survey described by Borg and Gall (1983). The survey was divided into three sections. Section I asked the respondents to circle the number that corresponds to the definition of value-added that best represents their understanding of the concept as related to Montana agriculture. The respondent was given four definitions of value-added. These definitions were derived from the researcher's review of literature. Definition one focused on value-added as manufacturing, definition two related to the practice of processing a primary commodity, definition three focused on moving up the food chain, and definition four related to processing, marketing, and distribution an agricultural product.

Section II consisted of 87 competencies divided into six sub-categories; production and processing, marketing, entrepreneurship, promotion, basic economic principles and business principles. The areas and competencies were chosen on the basis

of information gained during the review of literature as well as personal knowledge of the researcher and the graduate advisor. The competencies were further developed and clarified following the pilot test. Of the 87 competencies, 15 were related to production and processing, 14 to marketing, 15 to entrepreneurship, 11 to promotion, 15 to basic economic principles, and 17 to business principles.

The respondents were asked to rank their level of knowledge and educational importance of the competencies using a Likert-type scale. The five point Likert-type scales were weighed so that the numbers represented the following; for educational importance, 1= not important, 2= less important, 3= somewhat important, 4= more important, and 5=very important. Level of knowledge ranking were; 1= no knowledge, 2= less knowledgeable, 3= somewhat knowledgeable, 4= more knowledgeable, and 5= very knowledgeable.

The survey was designed to meet the criteria of Borich (1980) needs assessment model. Borich's model allows the researcher to obtain a weighted discrepancy (WD) score. The WD score is obtained by taking the respondent's educational importance ratings minus their level of knowledge for each of the 87 competencies. This score is then multiplied by the mean level of importance of each competency, resulting in a WD score for each competency. Borich's model and the WD scores allow the researcher to identify those competencies that need more educational attention when developing a curriculum. As reported in Kowasaki's (1994) study, WD score that is above zero indicates that the competency should be included in a curriculum. The higher the score in the positive direction, the more educational attention the competency should receive. Using the WD score allows the researcher to accurately identify the competencies that

need to be included in a community based value-added educational curriculum. In addition to the information provided by the mean education importance of each competency, a WD score allows a competency with a low level of education importance and a high WD score to rank higher than a competency with a high level of educational importance and a low WD. Therefore, the respondent's level of knowledge was also taken into account.

Section III of the survey was comprised of the demographic information. The question related to the areas of agriculture in which the respondent was involved, home location and size of town closest to home, size of farm or ranch, years involved in Montana agriculture, educational experience, and the area in which value-added educational experience was received. These questions allowed the researcher to obtain a profile of the respondents.

Data Collection

The instrument was pilot tested on 45 students enrolled in two Montana State University courses; Marketing 345, Professional Selling and Animal, Range and Natural Resources 432, Sheep Management. Based on the course descriptions in the Montana State University 1996-1998 Graduate and Undergraduate Bulletin, the researcher felt that the students involved in these courses would provide an advanced level of knowledge in the areas which the survey was intending to evaluate. The Animal, Range and Natural Resources course focused on many of the production and processing, marketing and entrepreneurship competencies included in the survey. The Marketing course focused not

only on the marketing aspects of the survey but the promotion, basic economic and business principles included in the survey as well.

The researcher attended the Animal, Range and Natural Resource 432 course on March 2, 1998 and the Marketing 345 course on March 4, 1998 and administered the survey to the pilot respondents. Pilot respondents were asked to complete the survey and return it to the researcher when finished. Respondents were asked to evaluate the survey for clarity, grammatical and typing errors, and format changes. No major changes were suggested. The pilot respondents were given 15-20 minutes to complete the survey. Each respondent completed this survey in its entirety during the given time.

On March 13, 1998, a cover letter (Appendix B) and the survey were sent to respondents on Department of Education, Agricultural and Technology Education letterhead. The cover letter bore the signatures of Dr. Van Shelhamer, Graduate advisor, and the researcher. The respondents were asked to return the survey directly to the researcher, postage paid, by March 27, 1998.

Three weeks following the initial mailing of the survey, April 3, 1998, a postcard reminder (Appendix C) was sent to all non-respondents. The follow-up postcards allowed the researcher to eliminate unnecessary second mailings to respondents, as well as generate prompt responses from the respondents.

April 17, 1998, two weeks after the mailing of the follow-up postcards, a second cover letter (Appendix D) and survey were sent to all non-respondents. The second cover letter encouraged the value-added individual to respond and emphasized the importance of their input to the success of the survey. The non-respondents were asked to return the survey no later than May 15, 1998 in order for their input to be included in the study.

Analysis of Data

Responses from the surveys were entered into a Microsoft Office 95 Excel spreadsheet. Scores for educational importance and level of knowledge were entered individually. Demographic Data was also coded and entered. Means and standard deviations were run for each competency.

Using SPSS, (Statistical Package for Social Sciences) reliability coefficients were run using the educational importance and level of knowledge data sets for each of six competency areas. Cronbach's alpha coefficient was used to indicate the reliability of the survey. For the educational importance of production and processing, marketing, entrepreneurship, promotion, basic economic principles and business principles, alphas of .8794, .9440, .9402, .9441, .9492, and .9712 were computed. For level of knowledge of production and processing, marketing, entrepreneurship, promotion, basic economic and business principles alphas of .9236, .9663, .9557, .9487, .9574, and .9595 were respectively computed. All alphas showed a high level of correlation, and were therefore sufficiently reliable for the study.

Data analysis was conducted on each of the 87 competencies. Means, and standard deviations were calculated for educational importance and level of knowledge. A formula in the Excel spreadsheet was created to calculate the weighed discrepancy scores (WD). WD scores were calculated by subtracting the level of knowledge score from the educational importance score and then multiplying the difference by the educational importance score.

Analysis of variance (ANOVA) or t-tests were run for each WD score against different demographics, a significant level of .05 was used. Demographics used were level of education and years involved in Montana agriculture. These showed no statistical significance.

Summary

This survey was a descriptive study to identify the importance and need of select competencies in Montana's value-added industry. The population of the survey consisted of those individuals receiving the *Value-Added Montana Newsletter,* those individuals who attended the Montana Value-Added Forum, excluding Montana State University students who were required to attend the forum for class credit and the president/directors of Montana's major agricultural associations.

A mailed survey based on the cross-sectional survey design by Borg and Gall (1983), was used to collect data. Eighty-seven competencies in six competency areas; production and processing, marketing, entrepreneurship, promotion, basic economic principles and business principles were identified. Based on a needs assessment model by Borich (1980), respondents were asked to identify the educational importance and their level of knowledge of each competency. In order to assure that the survey was clear and free of grammatical, typing and formatting errors, a pilot study was used. Following the initial mailing of 271 surveys, a follow-up post card and second mailing of the survey were provided to non-respondents to insure the researcher obtained the needed sample size.

The survey data was entered into a Microsoft Excel spreadsheet. Using a statistical package (SPSS 7.5), Cronbach alphas were computed on each of the competency area's level of knowledge and educational importance scores to assure instrument reliability. The computed alpha showed that the survey had sufficient reliability for the study. The researcher calculated means, standard deviations and weighed discrepancy scores for each competency. The WD scores were tested with an alpha .05 using Analysis of Variance (ANOVA) and t-test to determine if there were any differences due to demographic data. The WD scores were also used to determine the educational need of each competency.

CHAPTER 4

RESULTS OF THE STUDY

The purpose of this study was to identify the importance and educational need for selected competencies by individuals involved in the Montana value-added industry. Competencies related to entrepreneurship, marketing, processing, production, promotion, and basic economic and business principles were included. For the researcher to answer the objectives of this study, data were collected using a survey mailed to those individuals involved in Montana's value-added industry. Data are presented in five sections; (1) Demographic data, (2) Value-Added definition, (3) Perceived level of educational importance, (4) Perceived level of knowledge, and (5) Weighted Discrepancy.

Demographic Data

The data in Table 2 represents the return rates by type of degree held by the respondents. Most respondents, 73 (52.5%) held Bachelors of Science degrees. The respondents with High School degrees was the second highest group, 32 (22.3%). Twenty-four respondents (17.3%) had Masters of Science degrees. It is interesting to note that 73.4% (112 of 139) of the respondents continued their education past the high school level.

Table 2. Distribution of Degree Held by Respondents. (N=139)

Degree Held	n	%
High School	31	22.3
Bachelors	73	52.5
Masters	24	17.3
Doctorate	05	3.6
Other	02	1.4
Missing	04	2.9

The data in Table 3 indicated that of the 139 respondents surveyed, 78 (57.8%) were involved in the production area of agriculture. The second largest area of agriculture that respondents were involved in is marketing, 74 (54.8. Sixty-six (48.9%) respondents were involved in sales, while 52 (38.5%) were involved in distribution and 43 (31.9%) in processing. It is interesting to note that many of the respondents were involved in several areas of agriculture, hence the percentage is greater than 100.

Table 3. Distribution of the Areas of Agriculture in Which Respondents are Involved In. (N=135)

Areas of Agriculture	n	%*
Production	78	57.8
Marketing	74	54.8
Sales	66	48.9
Distribution	52	38.5
Processing	43	31.9

*Percentages will exceed 100 because respondents could select more than one category.

The data in Table 4 represents the distribution of the areas in which the respondents received their value-added educational information. The majority of respondents, 81 (60%) received their information by attending seminars. Sixty-nine

(51.1%) of the respondents had previous educational experience that provided them with their value-added information. The Montana Department on Agriculture provided 59 (43.7%) of the respondents with their information. Twenty-six (19.2%) of the respondents received their information from County Extension Agents. On the job experiences accounted for 23 (17%) of the respondents value-added information. Sixteen respondents (11.9%) received their information from trade magazines, 14 (10.4%) from being a member of an agricultural organization, while 12 (8.99%) received their information from a local library. Thirty-three (24.4%) respondents received their information from other sources including trade shows, friends, and personal research..

Table 4. Distribution of Areas in Which Value-Added Educational Information Was Received By Respondents. (N=135).

Value-Added Informational Resource	n	%
Seminars	81	60.0
Previous Educational Experience	69	51.1
Montana Department of Agriculture	59	43.7
Other	33	24.4
County Agent	26	19.2
On the Job Experience	23	17.0
Trade Magazines	16	11.9
Member of an Organization	14	10.4
Local Library	12	8.9

*Percentages will exceed 100 because respondents could select more than one category.

Definition of Value-Added

In Section I of the survey, respondents were asked to identify the definition of value-added that best represented their understanding of the concept as it related to Montana agriculture. Table 5 data reveals the distribution of respondents' understanding of value-added. Of the 89 respondents, 4 (4.5%) selected –"Value-added is a concept generally applied to manufacturing. It is simply the value of the finished product adjusted for the value of the raw materials consumed or modified in the manufacturing process." The definition most frequently related, 42 (47.2%) was —"Value-added refers to the practice of processing a primary commodity in some way so that value is added to the initial commodity." Four respondents (4.5%) selected the definition of "value-added is 'moving up the food chain'—byproducts from processing, industrial use of farm products, new crops and livestock, and the people involved in it all." Thirty-nine (43.8%) respondents felt that—"The concept of value-added, as applied to the agricultural industry, typically refers to the increased value assumed by the raw agricultural commodities as they move through the nation's food and fiber, processing, marketing and distribution system.

Table 5. Distribution of Value-Added Definitions Indicated By Respondents. (N=89)

Definitions	n	%
(1) Value-added is a concept generally applied to manufacturing. It is simply the value of the finished product adjusted for the value of the raw materials consumed or modified in the manufacturing process.	4	4.5
(2) Value-added refers to the practice of processing a primary commodity in some way so that value is added to the initial commodity.	42	47.2

Table 5. (Continued) Distribution of Value-Added Definitions Indicated By Respondents. (N=89)

Definitions	n	%
(3) Value-added is 'moving up the food chain'—byproducts from processing, industrial use of farm products, new crops and livestock, and the people involved in it all.	4	4.5
(4) The concept of value-added, as applied to the agricultural industry, typically refers to the increased value assumed by raw agricultural commodities as they move through the nation's food and fiber processing, marketing, and distribution system.	39	43.8
Total	89	100.0

Perceived Level of Educational Importance

The following represents data generated from the respondents' rating of educational importance. The ratings ranged from 1—Not Important to 5—Very Important. The higher the mean scores the more important that competency. Mean scores have been broken into the following convections in order to estimate the educational importance of each competency; 1.00 to1.50 not important, 1.51 to 2.49 less important, 2.50 to 3.49 somewhat important, 3.50 to 4.49 more important, 4.50 to 5.00 very important. The data were summarized for the mean and standard deviation (SD) for each competency. Means and standard deviations were rounded at two decimal points. The competencies were sorted in descending order by mean level of importance. The competencies were separated into the individual competency areas of production and processing, marketing, entrepreneurship, promotion, basic economic principles, and business principles. The total number of responses for each competency varied due to the fact that some of the respondent's surveys were not properly completed.

The data in Table 6 represents the rank order of competency areas by overall educational importance means and SD. Respondents indicated that the most important competency area was entrepreneurship with an overall mean educational importance score of 4.10. The lowest overall ranked competency area was business principles, with a mean educational importance of 3.56. Three competency areas scored within .06 of the highest ranked competency area. These areas were basic economic principles, production and processing, and marketing. The promotion competency area had a mean score of 3.96. SD scores ranged from 0.90 to 1.04.

Table 6. Rank Order of Competency Areas By Mean Educational Importance.

Competency Area	Mean*	SD
Entrepreneurship	4.10	0.90
Basic Economic Principles	4.09	0.90
Production and Processing	4.07	0.91
Marketing	4.04	0.92
Promotion	3.96	0.95
Business Principles	3.56	1.04

*Based on a Scale of 1 to 5. 1= Not Important, 2= Less Important, 3= Somewhat Important, 4= More Important, 5= Very Important.

The data in Table 7 indicates that production and processing competencies range from 4.44 to 3.67. The competencies in the production and processing area fall in the more important educational needs convection. The highest-ranking competency was *understand food safety regulations*, the lowest ranking competency was *understand how to use chemical preservatives.* Standard deviations ranged from .77 to 1.16. It is interesting to note that the competencies dealing with regulation range from 4.44 to 3.78.