ANALYZING THE COLLEGE EDUCATED WORKFORCE NEEDS OF GEORIGA'S AGRIBUSINESS INDUSTRY

by

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(Under the Direction of John McKissick)

ABSTRACT

The demand for college educated employees continues to grow throughout many sectors of the economy including the agribusiness sector. It is important to the state of Georgia that the University System of Georgia is producing enough qualified graduates that have the correct skill set to prosper in the competitive agribusiness environment. This thesis utilizes a comprehensive survey to observe both the current and future needs of the agribusiness industry. Ordinary Least Squares and Ordered Logistical Regression models are used to determine which attributes impact demand for college educated employees. It is observed that very large and very small firms, the industry sector of government, finance & trade, and proximity to a metropolitan area all contribute positively to the demand for college educated employees in agribusiness.

INDEX WORDS: Georgia, Workforce Needs, Growth Projections, OLS, OLR, Georgia's Agribusiness Industry, College Educated Graduates

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B.S.A., University of Georgia, 2006

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial

Fulfillment of the Requirements for the Degree

MASTERS OF SCIENCE

ATHENS, GEORGIA

2009

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May 2009

ACKNOWLEDGEMENTS

First and foremost I would like to thank my family and friends whom supported me during the last two years of my life. It has been a unique time of personal growth and the decision to return to graduate school has been a positive maturation process that will help in preparation for entering the next phase of my life. I have enjoyed the past two years of school more than most. The freedom and challenges that graduate school offers are part of what make is so attractive. Lastly, I will give one final thanks to the city of Athens for being my humble home the past seven years.

The leadership and availability of my committee has been a tremendous aspect to the success of my thesis' development. I am thankful to Dr. McKissick for providing me with an assistantship to work with the Center for Agribusiness and Economic Development while completing my Masters' Degree from the University of Georgia. I appreciate all the leadership and direction that he has provided throughout the entire process. The coordination efforts and help with the survey were instrumental throughout the developmental process.

Next, I would like to thank Dr. Jones for her continued support and the many hours she spent with me throughout the entire project. Her accommodating availability and continued support on this, and previous projects, has been instrumental in the production of this paper. Without her generous time and commitment, this project would have been very difficult to complete. Thanks again for the help and also the guidance and teaching about the academic process.

I would like to thank Dr. Escalante for his help with the data and modeling. His leadership and knowledge set helped tremendously when setting up the econometrics of this paper. Also, his communication and positive attitude helped me get through the final stages of my thesis. His compassion and concern for students is unlike any other individual that I have worked with.

Finally, I would like to thank my best friend and fiancé, Kali. The continued support and confidence she has shown has been a blessing over the past two years. I truly appreciate the way she is always there for me and up for activity when I needed a friend. I also appreciate the hard work she has done to allow me to concentrate on paper during very busy times.

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CHAPTER 1

INTRODUCTION

The Georgia agribusiness industry contributed more than $76 billion in economic activity to the State's economy in 2006. Over 400,000 workers are employed and contribute $15 billion in labor income to the economy (Flanders 2006). The demand for college educated employees continues to grow throughout many sectors of the economy including the agribusiness sector. It is important to the state of Georgia that the University System of Georgia is producing enough qualified graduates that have the correct skill set to prosper in the competitive agribusiness environment. Another important aspect of agribusiness needs assessment is to identify the attributes of firms that show demand for college educated graduates and pay special attention to their needs. Identifying areas that are specifically likely to expand is important to ensure that the future needs of the industry will be met.

Importance of Georgia's Agribusiness Sector

According to recent data, the national agribusiness sector generates an estimated $1.98 trillion in output for the U.S. economy and employs more than 12 million people. Overall, Georgia ranks 12th among all states that are agricultural producers. The agribusiness industry accounted for 11% of the total value of output and 8% of the total workforce in Georgia (Brooks 2008). The direct impact of agribusiness production and employment also generates many other indirect economic impacts. Taking into account

linkages between sectors, including the multiplier effect, the contributions of Georgia's agribusiness sector become even more apparent. When these indirect impacts are also considered, the combined effects of the direct and indirect economic activity contribute almost $120 billion to the State's economy and generate close to 700,000 jobs (Flanders et al 2006).

There are many agricultural sub-sectors where Georgia ranks as a significant national and international producer. Georgia ranks first nationally in the production of poultry (broilers), cucumbers, peanuts & squash. Georgia also contributes significantly to the production of rye, snap beans, bell peppers, peaches and onions. Broilers alone contribute cash receipts of over $6.1 billion dollars to the State's economy (Abbe 2008).

The composition of Georgia's agribusiness industry, inclusive of agricultural and forestry production, food and fiber manufacturing and processing, production inputs, food retail and whole trade, and food services, has a tremendous role in the state's economy. The industry linkage between the production sector and the input and output sectors creates a delicate yet symbiotic balance that continues to drive the industry.

History, Perspective & Recent Trends

Agriculture has played a dominant role in Georgia's economy for more than one hundred and fifty years. Beginning with settlement and colonization during the early 1730s, one of colonial Georgia's main goals was to be an established producer of commodities that could be exported to England. Through council and communication with local Native American tribes, the colonist learned agricultural practices that allowed them to successfully produce corn, silk, rice, indigo and wine (Flatt 2004).

After the American Revolution, cotton took over as the most dominant commodity grown. With the advent of the cotton gin, crop production rose to approximately 700,000 bales of cotton by 1860. Upon completion of the civil war, cotton had established its dominance as a major cash crop. However, erosion, depletion of soil and the boll weevil began to adversely effect production (Bonner 1964). Beginning midway through the twentieth century, developments in agricultural practices including: diversification of crops, increased emphasis on livestock, poultry, orchards, forestry and vineyards helped mold and shape the current state of Georgia's agriculture (Brown 2002). As Georgia's agribusiness industry continues to evolve, the economic impact of the agricultural sector continues to be a major aspect of the state's economy.

Defining the Agribusiness Industry

The agribusiness sector in Georgia is quite a diverse industry that can be difficult to coherently classify. For purposes of this paper, a consistent definition of the agribusiness sector has been developed partially based on the definition identified by the Economic Research Services (ERS) of the United States Department of Agriculture (USDA) (See Appendix B). The North American Industrial Classification System (NAICS) codes are used to divide the agribusiness industry into two primary categories: Farm (NAICS codes 111-112) and Farm Related (See Appendix C). The USDA, ERS defines farm and farm-related employment defined as "industries having 50% or more of their work force employed in providing goods and services necessary to satisfy the final demand for agricultural products. Indirect agribusinesses have between 32% and 50% of

employment providing goods and services related to agricultural products (Flanders 2006).

Role of Higher Education in the Economy

Postsecondary education in the United States plays an important role in the viability and productivity of the workforce. As noted in the Spellings Commission, postsecondary education is seen increasingly as the means to accomplish both quality of life and economic development goals for the nation and its citizens (Spellings 2006). The role of an educated public provides many positive economic and societal benefits. Postsecondary graduates contribute to higher economic development through increased private and tax revenues, greater productivity, greater workforce flexibility, diminished reliance on government support and increased consumption. Higher education also fills the social demands across industrial sectors and fuels development to the growing fund of knowledge through research.

Higher education also plays an important role in the efficiency and productivity of the agribusiness labor force. The research of this paper will be used to determine what attributes of higher education contribute to greater demand for college educated employees. Information gathered from employers will reveal what skill sets are necessary to succeed in the work place.

College Educated Workforce Needs Survey

Through the Center for Agribusiness and Economic Development, a survey will be developed to gain a clearer understanding of the college educated workforce needs of

agribusiness employers. The survey of Georgia's agribusiness workforce needs will provide the basis for information necessary to group respondents by their attributes including: industry, size, type, location, and growth rate. By separating firms into conglomerate categories, the hope is to identify specific traits that lead to demand for college educated workers. The information should also highlight any areas of particular concern about the workforce preparedness of college-educated workers and provide a basis for addressing those concerns and other issues raised by those firms with specialized and specific workforce needs. Correlations will also be developed from the interdependent effects of the variables. Each category of separation is drawn from questions answered in the survey.

Econometric Modeling

The overall goal of the defining attributes is to determine which variables have a significant impact on demand for college educated workers within the agribusiness industry. An economic model will be developed to help identify the specific attributes that have the most significant impact. An Ordinary Least Square regression analysis will be used to help identify how strongly the need for college educated employees correlates with the defining attributes of the firm (i.e. size, location) Next, an Ordered Logistical Regression model will be used to look at the impacts of specific variables related to college-educated workforce growth within specific categorical qualifiers. The information gathered should help present a clearer picture of the agribusiness industry by observing which attributes related to an increased demand for college educated graduates.

Problem Statement

The overall objective of this research is to identify the college educated employment needs of Georgia's agribusiness industry. Additionally, the research will attempt to determine which attributes effect the demand for college educated employees.

Research Objective

Primary data will be gathered through the *Workforce Needs of the Georgia Agribusiness Industry* survey to determine if attributes such as size, growth rate, location and type, relate to college educated workforce needs demand.

Format

This thesis will be assembled in a chapter format. Chapter One introduces the paper and provides a basic outline of the topics that will be covered. Chapter Two identifies relevant literature related to workforce needs studies and also literature explaining Ordinary Least Squares and Ordinal Logistic Regression models. Next, Chapter Three will discuss the methodology of survey techniques and regression models. Chapter Four will summarizes the data obtained from the survey of agribusiness employers. Results from the econometric analyses will be discussed in Chapter Five. Finally, Chapter Six will review the information and identify conclusions and suggestions for future research.

CHAPTER TWO

LITERATURE REVIEW

The goal of this chapter is to review previous empirical research that provides insight into the specific methods chosen for this project. The chapter will begin by discussing the basics of workforce needs assessment and describes several different articles that provide the basis for information gathered regarding this type of evaluation. Next, the literature will present insight into the concepts of econometric modeling and cover the steps that make up regression analysis. Finally, this chapter will specifically address models that relate directly to the assessment of the workforce needs of Georgia's agribusiness sector.

Workforce Needs Studies

Workforce Training Needs for Agribusiness Industry

A study of the Workforce Training Needs for the Agribusiness Industry in Georgia prepared for the Office of Economic Development of the Board of Regents (BOR), University System of Georgia (USG) written by The Center for Agribusiness and Economic Development at the University of Georgia provides an useful resource related to the specific needs of Georgia's Agribusiness Industry (Brooks 2008). The focus of the publication was to identify the needs of Georgia's agribusiness workforce then evaluate their characteristics to ensure that degree programs within the University System are relevant to the current and future needs of the agribusiness industry. The report

summarizes the findings of the study completed by the CAED regarding the workforce needs of the agribusiness industry and includes the results from the survey administered to agribusiness employers.

There are many important findings and implications of the study. Using data compiled by the Georgia Department of Labor, the researchers found that growth in Georgia's total job openings is set to outpace that of new college educated graduates. This growth will encompass the need to fill more than 1,400 new openings for college educated workers. Agribusiness and allied programs will contribute over 3,000 graduates in the next four years but will remain only a minor percentage of the total graduates (1.8%).

The survey developed was also used as a primary data source for the basis of this thesis. *A Study of the Workforce Training Needs for the Agribusiness Industry in Georgia* survey was analyzed and will be further expanded in chapter 3 & 4 of this thesis. The report begins by examining the collected response from Georgia's agribusiness firms. Using the data gathered, the industry needs are extracted and combined with supply side data to help understand the current state of the Georgia's agribusiness.

Finally, recommendations were made based on the analysis to further improve the current educational system with a focus on what industry is demanding. Of the important factors: A stronger public/private partnership, promoting the business side of agribusiness, expanding hands-on learning experiences (including internships) and developing a flexible curricula and program design are all recommendations that arose from the study.

This study will be an extremely useful tool that will aid in information collection. The survey included in this report will be the primary data set used for the modeling and analysis in this thesis. The depth and information wealth contained in this paper will serve as a basis for initial analysis and act as a foundation for the thesis' conclusions.

Study of Undergraduate Curriculum in Agribusiness Management

Jay.Akridge and Michael Boland's working paper entitled "A Summary of Undergraduate Curriculum in Agribusiness Management Degrees" provides great insight into the core curriculum of approximately 140 agribusiness and agricultural economics programs throughout the United States. Their 2004 study compares the current curricula of agribusiness and agricultural economics programs to a similar study preformed in 1985 by the National Agribusiness Education Commission. The relevance of the article tends to reflect the dramatic changes of the agribusiness educational sector and signal the changes that will continue to evolve in the coming years (Akridge 2004).

The study separates the findings into five key areas. It begins with stating that agribusiness management is now tied with agricultural policy as the third most commonly taught undergraduate course in agricultural economics departments (following marketing and finance). It then states that a required course in farm management has dropped to only a third of current programs. Secondly, most agribusiness degrees are three times as likely to require business finance relative to agricultural economics degrees. Thirdly, no "strategy courses" were identified as being taught in 1985 but is now one of the fastest developing courses in agribusiness curricula. The idea of a strategy course is to incorporate many of the broad concepts of management into a cohesive class that teaches

the interaction between different fields. This will be important to note when looking at what the needs of Georgia's agribusiness employees will be. It is also noted that this emerging course was only identified in agribusiness and no such class is offered in agricultural economics. And one final relevant discussion mentioned was the lack of international awareness in relation to finance, management, marketing, policy, trade and similar topics.

The final conclusion made is the growing importance of agribusiness and the decreased emphasis on agricultural economics. The past twenty years have seen a dynamic shift in students moving from economics to the business type curricula. This study brings to light many potential concepts that define the way the agricultural educational field is evolving. Throughout this thesis, the research will focus on industry needs to continue the process of identifying the relevant skill sets needed by college educated graduates to thrive in the agribusiness industry.

Aldridge and Boland's article contains particular relevance to the questions that will be answered in this thesis. When defining the skills that are most needed by agribusiness employers, one must use this information to create applicable coursework that meets those demands. The paper provides a reference to understand the evolution that is changing the demand of skill sets in agribusiness. This article highlights the historical evolution of agribusiness coursework and demonstrates a shifted focus that translates into skill sets that are in demand relative to the current agribusiness marketplace.

Relevance of Soft Skills in the Workforce

Debora Bosley's article "The Impact of 'Soft Skills' in the Information – Knowledge Management Economy and the UNC System" shows the importance of the entire educational process that is broader than simply the "hard skills" taught in most textbooks and classrooms. Bosley begins by stating that society lives in an information and knowledge management economy where critical information requires new technical, intellectual, global and interpersonal skills. The author then suggested that the primary focus of many educational universities has shifted to increased emphases on STEM (Science, Technology, Engineering and Math) areas. It is also noted that many federal resources and grants also continue to favor these specific areas. The focus on development of these hard skills has led to a, "perhaps more serious, crisis: the lack of "soft skills" (Bosely 2007).

Soft skills are primarily defined as interpersonal, intellectual and communication skills. More specifically: diplomacy, leadership, ethics, teamwork, collaboration, diversity, problem solving, decision making, critical thinking, analytical reasoning, writing, speaking, listing, and communication.

The study uses three primary applications to gather information regarding the soft skills needed in the modern industrial economy. A public forum institution was used to create a series of forums to gather feedback from citizens on the challenges and initiatives surrounding workforce development in the information age. The second study referenced in the article uses reports from the 2003 study conducted by the National Assessment on Adult Literacy (NAAL) measuring prose, document and quantitative literacy in adults. Finally, three studies from the National Commission on Writing in America's Families,

Schools and Colleges focused on the national crises of writing and skill building among the educational system.

The concepts conferred here will be used to ask questions to agribusiness employers to determine which skills are most important to their employees. The survey will pose the question of what skills are important to having productive employees that are able to perform their jobs efficiently.

Empirical Applications of Ordinary Least Squares and Ordered Logistic Regression Models

Ordinary Least Squares (OLS) is a concept that is used as a method of fitting data to explain the relationship between two or more variables. In this model, the best fit is that instance for which the sum of the squared residuals has its least possible value. The residual is defined as the difference between an observed value and the value given by the model. The French mathematician, Adrien-Marie Legendre, published the first known uses of the minimization of the sum of squares; however, some credit the German mathematician Carl Friedrich Gauss with first describing the method before the turn of the 18th century (Britannica 2009). The least squares principle asserts that to fit a line to data values it should be fitted based that the sum of the squares of the vertical distance from each point to the line is as small as possible. The distances are squared to prevent large positive distances from being canceled by large negative distances (Hill 2001).

Kmenta describes Least Squares Estimation in his 1971 book, *Elements of Econometrics*. He describes this technique as the method suitable for estimating

moments about zero in a population distribution. The book properly explains the theoretical basis for many complex econometric concepts (Kmenta 1971).

Escalante and Barry's article "Business Growth Strategies of Illinois Grain Farmers" takes an economic approach to analyzing the importance of revenue enhancement, cost reduction and capital management strategies. It also analyzes non-farming related strategies aimed at minimizing equity withdrawals through family expenditures, and the effects of low farming incomes with receipts from nonfarm employment and investments that significantly affect cost value equity growth rates.

The conceptual discussion explains the relationship between a farm's rate of growth and a series of independent variables. The paper examines Family Living Expenses, Net Off-Farm Income, Asset Turnover Ration and Interest Expense Ratio as significant factors to growth. The article concludes with the statement that the relationship between a farm's changes in equity capital over time is an important determining factor that can be used to analyze and identify specific revenue enhancement, cost reduction, asset control and financial management strategies. By using estimates of the cost value of the equity and assets, an opportunity is presented to discern equity growth strategies that contribute to a farm's net worth position. The OLS regression results show that there are many significant variables that affect growth strategies. The article presents a solid basis for identifying variables, and provides conceptual discussion of the relationship derived from the model. The strategies utilized in this article will be very similar to the data analysis that will be performed in this thesis. The methodology closely mirrors the variables and model that identify the attributes and traits that affect college educated demand for agribusiness employers. Similar to the

“Business Growth Strategies", the model this thesis uses will look at growth firms will to identify which variables will have a significant impact on growth.

The other analytical method, Ordered Logistical Regression (OLR), can be best understood by considering Newsome’s illustration. . The goal of logistic regression is a bit different than predicating the likelihood that $Y = 1$ (compared to $Y = 0$) relative to a certain value of X by looking at the probability of $Y = 1$ and defining the dependent variable as non continuous. If X and Y have a positive linear relationship, the probability that a person will have a score of $Y = 1$ will increase in relation to an increased value of X. Conceptually, the observation is referring to the prediction of possibilities rather than the scores of the dependant variable (Newsome 2008).

The example used is the possibility of predicting the success of a small business owner succeeding in opening his own business relative to the number of years experience he has working within the field. The predicted outcome would be the greater the number of years in the field, the better chance of succeeding in business. Therefore, as the number of years (X) increases, the chance the business will succeed $Y = 1$ also increases (failure is $Y = 0$).

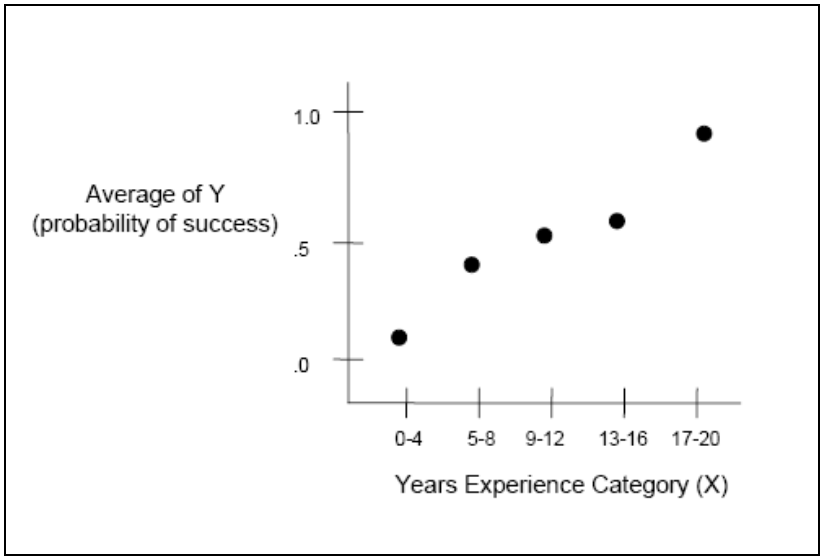
Table 2.1 Success Rate vs. Years of Experience

Years Experience	Average	Probability that Y=1
0-4	0.17	0.17
5-8	0.40	0.40
9-12	0.50	0.50
13-16	0.56	0.56
17-20	0.96	0.96

(Newsome 2008)

When graphed the data is represented as follows:

Graph 2.1 Probability of Success vs. Years of Experience



(Newsome 2008)

When graphed the results follow a non-liner S-shaped curve. As compared to a standard least square estimation that forms a straight line, the S-shaped curve will be formed for a logistical model (Newsome 2008). This example allows one to understand

the benefits of the logistical model for working with data that are based on non-continuous variables. Further explanation of the methodology will be discussed in the following chapter.

Barry, Ellinger and Moss present a useful account of how to properly evaluate variables that are on a point scale. A distinct parallel to the workforce needs study is that the distribution of the survey results included responses on a point based scale similar to a Likert scale (with 1 = most desired and 5 = least desired).

The empirical model utilizes an ordered probit technique to regress each respondent's answers to the survey. The primary information that was being gathered revolves around the banking industry but easily translates to the workforce needs survey. The model develops the following conceptual form, with a linear, additive relationship among the respective independent variables in each group:

(1) $y = f(G_1, G_2, G_3)$,

where y is the ordered discrete variable having a value on a sliding ordinal scale. This thesis uses many variables that are collected using a similar sliding ordinal scale.

The review of current literature provides the basis for understanding how to approach the problem statement of this thesis. The research that has been preformed will help guide the methods that are used throughout this paper. The next chapter will introduce the conceptual framework and methodology used to develop the survey and model.

CHAPTER THREE

METHODOLOGY

This chapter will focus on the various methods used to develop and collect the survey and includes the basic statistical analysis and modeling. The chapter will also describe the methodology used to construct the various statistical estimation models. The specific methods used to collect the data will be described in detail and a relationship between the collected data and the modeling will be identified. The following sections outline the methods used to analyze the information used in this thesis.

Survey Development Methodology

Labor statistics are available through various government research agencies at the national and state levels. However, the specific needs of Georgia's agribusiness firms in relation to college educated employees represent an area that is not well explored or documented. Therefore, a survey was developed with the following objectives:

- Determine the current workforce needs of Georgia's agribusiness firms
- Determine how growth will affect the future needs for employment within the agribusiness industry
- Identify the most important skill sets that the agribusiness industry desires
- Identify attributes, such as location, growth rate, size and industry type, that impact the demand for college graduates.

Once the objective of the survey were identified of gaining a better understanding of Georgia's agribusiness workforce needs, a survey was developed and twenty questions eventually formulated to solicit the desired information. The research team from the Center for Agribusiness & Economic Development conferred to produce and evaluate the survey and then each question was pre-screened to ensure its relevance and efficiency to the study's overall goals. The panel drew from many years of experience and multiple comparable surveys to produce the final *Agribusiness Workforce Needs Assessment Survey*. Focusing the scope of the survey ensured that each question was relevant to the specific objectives of the survey. The development strategy was crucially important to obtaining accurate results but also to obtaining completed surveys. It was important to develop a comprehensive survey to collect the desired information that was not so long as to appear intimidating and time consuming to the respondents. After evaluating many similar surveys, the completed survey created an effective investigation instrument.

The questions used several different formats including the grid-like format with grouped percentiles to increase the overall that the sampled respondents would complete the survey. Other question formats includes multiple choice, single line text response, and numerical value questions that were useful to collecting a variety of quantitative and statistical data. While many different question types were used, the percentile based grid question was most efficient for some questions where there was a need to collect a large amount of information regarding one specific subject. An example of such a question format is illustrated below using the twelfth question on the survey.

Table 3.1 – Example of a Percentile Based Grid Question

12. What has been the impact of the following on your company's ability to recruit and retain college-educated employees? For "other", please specify.

	Significant (>75%)	Moderate (51-75%)	Average (31-50%)	Slight (10-30%)	Not at All
Employee expectations not consistent with actual job requirements					
Employees' promotion and/or salary expectations					
Inadequate subject matter knowledge					
Lack of interest in relocating					
Lack of prior work experience					
Other _____					

This type of question is useful to the modeling section as the numbers can be communicated in a relational fashion to produce accurate modeling estimates. The results obtained relay the information on a Likert scale. Note that or the purpose of our survey, the scale was selected such that the lower the Likert value, the more desirable the trait. Other questions included in the survey were simple "yes" or "no" open-ended questions with space allowed for the survey participants to provide comments or to express any additional concerns or issues that their businesses face. The summary and conclusion sections of this paper will address some of the issues raised in the respondents' comments.

To determine the current needs of Georgia's agribusiness firms, respondents were asked to identify which college degrees, skill sets, and work fields they feel were the most valuable traits that entry-level hires should possess. Next, they were given the chance to identify problem areas, such as employee retention and recruitment, that limit

their ability to successfully grow and develop their businesses. Finally, respondents were given the opportunity to recommend any changes to the University System of Georgia curricula that would be beneficial to the agribusiness industry. Identifying important skill sets and determining how growth will affect the future needs for employment was also addressed. To establish the significance of various skills, employers were asked questions about a variety of attributes and given the opportunity to categorize their relative importance. Respondents were also asked to share their growth expectations for the next five years and evaluate the importance of college degrees for future new employees.

Descriptive statistical techniques were used to separate the agribusiness employers into various categories. Based on current employment numbers, firms were divided into groups based on the size of their companies. For modeling purposes, firms were grouped by size, with size defined into four broader categories as follows: Small (1-10 workers), Medium (11-50), Large (51-200), and Very Large (200+). Special note will be made of national and international companies with employment outside of Georgia. Industries were also grouped into types of firms based on four broad categories within the agribusiness sector. The composition of Georgia's agribusiness sector will be divided into: Agricultural Production, Manufacturing, Government, Finance and Trade; and Service and Support. The following set aggregates twelve broader categories making the analysis easier to view and understand. By defining different types of agribusiness firms, it will help identify the specific needs of each subsector.

The location of a firm allowed for further division by measuring the size of the city where the firm is located. Using data from the U.S. Census' Metropolitan Statistical Areas (MSA) allowed for each city to be given a value relative to its population (Census

2007). This defined the location variable on a sliding scale ranging from closest to a metropolitan area (value of 1) to closest to a rural area (value of 4). The growth rate variable divided the firms into groups based on expectations of future growth. Growth rates were defined as current/short term (1-5 years) and long term growth rates (6+ years). A distinction was also made between firms that have no or negative expectations of growth. By separating and identify employers by their attributes, the goal was to determine how demand for college educated graduates will relate to these identifying characteristics.

Survey Administration

The *Study of the Workforce Training Needs for the Agribusiness Industry in Georgia* (hereafter, *Workforce Needs Survey*) survey can be found in Appendix A. The survey consisted of twenty questions soliciting information related the college educated workforce needs, skill sets needed by new college hires, workforce vacancy and retention issues, and college educated worker quality/quantity issues.

The distribution of the Survey was accompanied by a cover page explaining the study objective, how the information in the survey would be used, and a link to an online survey that allowed for electronic completion and submission through *Survey Monkey*. A consent form that outlined the design of the study and also personal liability issues were also included in the survey packet. The packet also contained a prepaid reply envelop, addressed to the CAED, for return of paper surveys. In total, the survey was disseminated to approximately 2000 employers through first class mail. Additionally, an invitational link was provided at the CAED's and the Georgia Agribusiness Council's (GAC) web

pages to the *Survey Monkey* electronic form. Reminder cards were also sent to employers who did not submit the survey by the original desired submission date. In total, the number of useable completed returned surveys numbered slightly greater than 200. Though the number is relatively low compared with the number of surveys sent, it mirrors the results of similar surveys of the agricultural and agribusiness sectors and the data collected contained representative data for each major industrial grouping.

Survey Participants

The first major process was identifying key agribusiness companies in terms of employment within the industry. Based on their relative size within the industry or membership in selected agribusiness organizations, significant agribusiness employers were identified. Agribusiness companies were selected using *Selectory*, a subscription-based electronic database, and the GAC directory for those NAICS codes included in the definition of "agribusiness". From the information in the database, companies with greater than ten employees were chosen. Additionally, members of the Georgia Agribusiness Council were also selected to participate in the survey regardless of firm size as the overall goal of the survey was to access a valid cross-section of Georgia's agribusiness industry and to include small farm producers not covered by *the Selectory* database. .

Intuitional Review Board (IRB)

During the creation and collection stages of the research, standards based on the University of Georgia's Graduates Schools and Human Subjects Offices were closely

followed to ensure that the procedures were compliant with published guidelines. The survey was submitted to the Human Subjects Office in April and approval was obtained in May 2008 from the University of Georgia's Institutional Review Board. Completing this process ensured that all guidelines were met and the research was both non-harming and correctly formatted for dissemination.

Survey Data Collection

Approximately half the survey data were collected from completed paper surveys received through the mail and half were gathered by online surveys entered through *Survey Monkey's* online data collection system. When paper surveys were received, the responses were manually entered into the online data collection system. Once the initial collection had been completed, all data were exported from the online database into Microsoft Excel. The results were then reviewed and edited to make sure all the information was appropriate and to remove any unusable or incomplete surveys. Once the completed dataset was available, the information was used to draw conclusions based on descriptive statistical analysis. Next, using Stat Transfer the data was converted into an appropriate format for use with STATA statistical analysis software. STATA was chosen because it combined the desired flexibility with an intuitive interface for OLR modeling that creates results that are clearly analyzable.

Personal interviews and focus groups were also conducted to delve deeper into the specific needs of a few selected agribusinesses leaders. The intention was to gain an even greater understanding beyond the scope of the twenty minute survey. The information

collected throughout these interviews will be used in drawing the conclusions and implications made in the final chapter of this thesis.

Ordinary Least Squares Regression Analysis Theory

Donald L McLagen's 1973 article in Business Economics presents a basic description of regression analysis that is often used in basic econometric modeling. McLagen describes the concept of Least Squares as a "method of developing an equation which relates one variable (such as company's sales) to one or more variables which should explain the first (such as price, economic demands, competition, etc.). This method is mathematically contrived so that the resulting combination of explanatory variables produces the smallest error between the historical actual values and those estimated in the regression." Basically, one is looking at a specific variable (the dependent variable)and using other factors (the independent variables) to see how they affect that variable.

The output of least squares analysis provides an equation for the dependent variable that is being explained. In the equation, the dependant variable equals the sum of the explanatory variables where each is multiplied by a regression estimated coefficient. The idea of OLS is simply to determine, based on a set of rules, the most logical estimators that are represented by coefficients to explain the behavior or observed value of the dependent variable.

There are many important measurement tools that are used to validate how useful the regression model is as an estimator of the dependant variable. The coefficient of determination (R^2) is the best known indicator of the success of the least squares fit.

Basically, the R^2 measures the percentage change in the dependant variable that is explained by the series of independent variables. The standard error gives a measure of how close the fitted values are to the actual values of the past. The smaller the standard error, the more representative the equation becomes. Finally, the t-Statistic shows the significance each explanatory variable has in predicting the dependent variable. The examples used will also consider the probability that the explanatory variables are greater than the absolute value of the t-statistic. (McLagen 1973) These concepts will help determine the validity of the regression used in chapter five.

The classic formulation of the least squares model is expressed in terms of a random variable X in its rth moment about zero:

(1) $$E(X^r) = u_r',$$

Where $r = 0, 1, 2,\ldots n$ The sample to be used is given by $X_1, X_2,\ldots.., X_n$. To derive the least squares estimator of u_r' the following sum is computed:

(2) $$\sum_{i=1}^{n} [X_i^r - u_r^{'}]^2 .$$

As the least squares estimator, that value of μ is selected which makes the above sum as small as possible.

As an example, to find the least squares estimator of the population mean $\mu(=\mu_1^{'})$, we find the value of μ which minimizes the sum:

(3) $$\sum_{i=1}^{n} [X_i - u\ ]^2 .$$

Since X_i^r is the *i*th observation on X^r and $E(X_i^r) = u_r'$ is the mean of X_i^r, the expression to be minimized is equal to the sum of squared deviations of the observed values from their mean, therefore making the least squares estimator of this mean the value which makes the sum the smallest. An important aspect of the least squares estimation formula is solving the problem of minimizing a function with respect to a given variable u_r'. Therefore, based on simplistic calculus equations, the first derivative is taken and set it equal to zero. Finally, solving the resulting equation for u_r' ensures that the resulting point will be a maximum or minimum, and in this particular case a minimum.

(4) $$\sum_{i=1}^{n} (X_i - u)^2 .$$

Next the equation is differentiated with respect to μ. The formula is then equated to zero and puts a "hat" on μ to indicate that it is only the estimator of μ which satisfies the equation obtaining the following.

(5) $$-2\sum_i (X_i - \hat{\mu}) = 0,$$

$$(\sum_i X)_i - n\hat{\mu}) = 0,$$

$$\hat{\mu} = \frac{1}{n}\sum_i X_i = \overline{X}.$$

This finds that the least squares estimator of the population mean is given by the sample mean (i.e. is equal to the moments estimator). Ordinary Least Squares regression analysis will be useful to determine the independent variables (business traits or characteristics) that affect the dependant variable (demand for college-educated workers). Combining the

model with the collected data will allow the research to analyze the affects of industry attributes that contribute to an increased demand for college educated employees.

Ordered/Ordinal Logistic Regression Analysis Theory

Portland State's Jason Newsome explains the basic differences between Logistic and OLS Regressions (Newsome 2008). His comparisons show that logistic regression is an approach to prediction not unlike ordinary least squares regression. However, with logistic regression, the observer is predicting a dichotomous outcome. Due to the OLS assumption that the error variances (residuals) are normally distributed, this situation creates a problem when using data similar to that collected from the Survey. Instead, the error variances are more likely to follow a logistic distribution. When logistic distributions are being used, an algebraic conversion is used to arrive at the typical liner regression equation (i.e. $Y = B_0 + B_1 X + e$).

Logistic regression does not produce a standardized solution. Therefore, the un-standardized solution does not have the same straight-forward interpretation as does the least squares regression. One primary difference between OLS and logistic regression is that there is no R^2 to gauge the variance accounted for in the overall model. This thesis will use a chi-square test to indicate how well the logistic regression fits the model's data (Newsome 2008).

Newsome's publication on logistical data analysis explains that a basic formula is required to convert from an OLS-type equation to a logistic equation. The logistic formulas are stated in terms of the probability that $Y = 1$, which is referred to as $\hat{\rho}$ and the probability that $Y = 0$ is $(1-\hat{\rho})$

(6) $$\ln(\frac{\hat{\rho}}{1-\hat{\rho}}) = B_0 + B_1 X$$

In this example the *ln* represents the natural logarithm and the $B_0 + B_1 X$ represents the equation for the regression line.

(7) $$\hat{\rho} = \frac{e^{B_0 + B_1 x}}{1 + e^{B_0 + B_1 x}}$$

P can also be computed from the regression. If the regression equation is known, theoretically, we could calculate the expected probability that *Y*=1 for a given value of *X*. (Newsome 2008)

It is important to simply point out the basic relationship between *e* and *ln*. The exponential function represents the value ~2.2183. The natural logarithm is the opposite of the *e* function. For example: $e^4 = 54.598 \rightarrow \ln(54.598) = 4$. This illustration displays the converse relationship between the two functions.

The coefficient interpretation in an OLR is different than an OLS model. The idea that *b* represents the change in *Y* with a one unit change in *X* does not hold. It becomes necessary to translate using exponential functions that result in the production of a coefficient termed *odds ratio.* The odds ratio is represented by e^B. Take the example where the regression slope is 0.50. The odds ratio is approximately 1.65 because $e^{0.50} = 1.65$. The relationship is defined that the probability that $Y = 1$ is 1.65 as likely as the value of *X* is increased by one unit. If the unit ratio is negative it simply

represents a negative correlation. Finally, an odds ratio of 1.0 indicates there is no relationship between *X* and *Y* (Newsome 2008).

An Ordered Logistic Regression (OLR) is a statistical technique that is applied to an ordered (from low to high) dependent variable. The probability that y takes on a value of 1, 2, … n is given by the following equations:

(8) $$LOGIT(p_1) = \log\frac{p_1}{1-p_1} = \alpha_1 + \beta' x$$

(9) $$LOGIT(p_1 + p_2) = \log\frac{p_1 + p_2}{1-p_1-p_2} = \alpha_2 + \beta' x$$

(10) $$LOGIT(p_1 + p_2 + ... + p_k) = \log\frac{p_1 + p_2 + ... + p_k}{1-p_1-p_2 + ... + p_k} = \alpha_k + \beta' x$$

Where $p_1 + p_2 + ... + p_{k+1} = 1$

This model is known as the proportional-odds model because the odds ratio of the event is independent of the category *j*. The odds ratio is assumed to be constant for all categories (Glynn, Snedker, Wang 2002).

OLR model's cumulative probability is used to simultaneously estimate multiple equations. The number of equations it estimates will be the number of categories in the dependant variable minus one. The example provides four specific variables so three equations will be estimated. The equations are shown as follows:

	Pooled Categories (1)	Comparison	Pooled Categories (2)
Equation 1:	1		2, 3, 4
Equation 2:	1, 2		3, 4
Equation 3:	1, 2, 3		4

In this notation, each equation models the odds of being in the set categories of the first set of pooled categories relative to the second set of pooled categories. Glynn, Snedker & Wang describe this processes as, "OLR provides only one set of coefficients for each independent variable. Therefore, there is an assumption of parallel regression. That is, the coefficients of the variables in the equations would not vary significantly if they were estimated separately. The intercepts would be different, but the slopes would be essentially the same."

The odds ratio terminology is important when looking at equations where both the *X* and *Y* variables are dichotomous. This type of relationship compares the probability that $Y = 1$ when $X = 1$ with the probability of $Y = 1$ when $X = 0$. The odds ratio is often referred to using the symbol Ψ. To obtain the *b* from the odds ratio one simply takes the log of the odds ratio, $ln(\Psi)$.

A table similar to that of a chi-square reflects that the odds ratio can be computed using the following formula:

$$\hat{\psi} = \frac{success\ vs.\ failure\ when\ X=1}{success\ vs.\ failure\ when\ X=0} = \frac{X=1\ when\ Y=1\ /\ X=1\ when\ Y=0}{X=0\ when\ Y=1\ /\ X=0\ when\ Y=0} = \frac{\pi(1)/1-\pi(1)}{\pi(0)/1-\pi(0)}$$

In the equation, the π refers to the probability that $Y = 1$. Therefore, $\pi(1)$ is the point where $Y = 1$ and $X = 1$, and $\pi(0)$ is where $Y = 1$ and $X = 0$. This format can also be used when the predictor variable is continuous.

Summary

The survey development and administration was a key component that made the analysis relevant and possible. The methods used allowed for an efficient survey that gathered the appropriate information in an analyzable format. The data collected represent the perspectives of many of the top agribusinesses throughout the state of Georgia. The primary goal was to define the methodology used to answer the questions: Are the current and future college educated employment needs of Georgia's Agribusiness workforce being met and what are the key characteristics that contributed to an increased demand for college educated agribusiness graduates? The following chapters will explain the results obtained from using the methods described here and also the implications of the conclusions that are drawn from the analysis.

CHAPTER FOUR

SURVEY RESULTS AND FINDINGS

The purpose of this chapter is to present and discuss the results obtained through the *Workforce Needs Survey.* First, information will be presented discussing the respondents to the survey. Next, the data will be summarized and analytical statistics will be calculated. Finally, implications and conclusions will be briefly discussed to allow further understanding of the survey's response results. More detailed implications and conclusions will be presented in Chapter 6.

Agribusiness Industry Responses

This section will provide descriptive information about Georgia's Agribusiness Industry based on the *Workforce Need's Survey*. As identified in the methodology, the primary objective of the disseminated survey was to determine the needs of Georgia's agribusiness industry with a specific emphasis on the college educated workforce. Secondly, determining future needs, identifying important skill sets, and establishing attributes that increase demand for college educated workers were also important components of the survey's objectives. While large volumes of state and federal data are available on segments of the agribusiness industry, specific data relating to the exact needs of individual firms is much less available. The *Workforce Needs Survey* attempts to capture the actual needs of agribusiness employers especially as they relate to the need for a specialized, college educated workforce.

Using the *Selectory* electronic database and the leading industry trade association, key Georgia agribusinesses were identified. The survey was disturbed to 1,994 agricultural businesses throughout the State. The number of completed surveys totaled 200 with a total of 142 returned as undeliverable. The total survey response rate was 11%. The survey respondents had approximately 22,000 employees in Georgia and 250,000 throughout the United States. As shown in the following table, the distribution of survey participants reflects the fact that agribusiness employers represent a diverse group of businesses that have a wide variety of primary agribusiness areas.

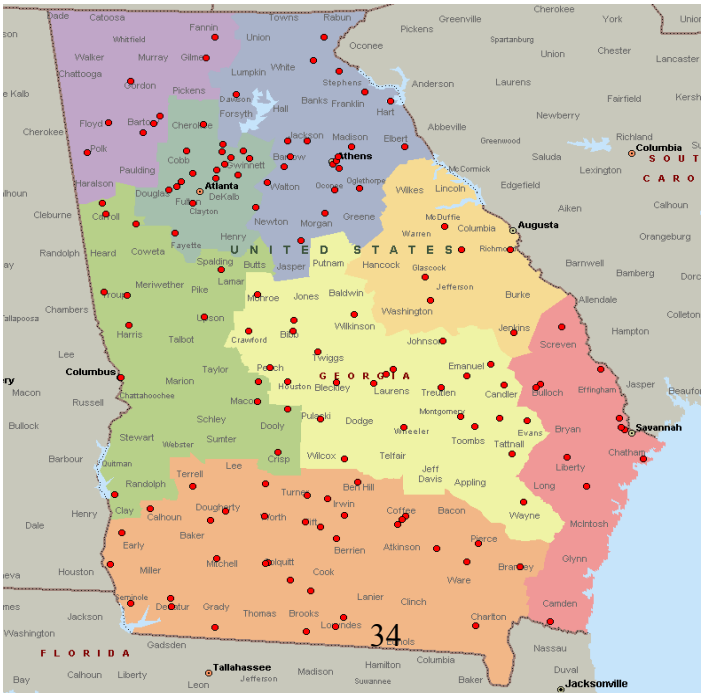
Table 4.1 - Respondents by Industry Sector

Respondents by Industry Sector		
Agribusiness Areas	**Number of Businesses**	**Number of Employees**
Agricultural Production		
Green Industry	27	1369
Crop Production	14	661
Animal Production/Processing	12	5549
Forestry and Logging Operations	8	179
Manufacturing		
Wood Product Manufacturing	22	1670
Agricultural Product Manufacturing	18	1841
Pulp and Paper Manufacturing	11	1883
Government, Finance & Trade		
Professional, Scientific, and Technical Services	18	223
Administration and Education Related to Agricultural Production	11	2935
Agricultural Finance and Risk Minimization	7	714
Service & Support		
Farm Suppliers and Food Wholesale and Retail Distributors	15	1032
Support Activities for Agricultural Production	7	2132
Farm Product Warehousing and Storage	6	67
Nature-based/Agro Tourism	5	94

In relation to the specific areas of the primary agribusiness subsector, the top three respondents were the green industry, wood and paper manufacturing, agricultural product manufacturing, and professional, scientific, and technical services. Agricultural finance and risk management, support activities, farm product warehousing and storage, and nature-based/agrotourism were the categories with the fewest number of respondents although they represented a large segment of their respective subsectors. It is important to note that all major agribusiness subsectors were represented among the participants included in the survey. The primary agribusiness sectors were then combined into four major industry categories: Agricultural Production; Government, Finance & Trade; Manufacturing; and Service and Support. The industry groups are combined to make broad comparisons and to obtain greater observation numbers that make the implications from the statistics more relevant.

Obtaining a data cross section that represents agribusiness industries throughout the State was also a primary concern. Chart 4.1 shows the location of the survey respondents in throughout Georgia.

Chart 4.1 - Survey Respondents' Georgia Locations



The locations of the employers' businesses were compared with the Metropolitan Area Statistics defined by the U.S. Census Bureau. Each city is given a value in relation to its size. Cities with populations great that 1 million are given a "1" value and the smallest rural value (Pop < 50,000) is "4". This ordinal scale allows one to arrange the locations of Georgia's agribusinesses relative to their proximity to a metropolitan area.

Table 4.2 – Number of Full Time Positions Requiring a College Degree

Number of Full-Time Employees in Georgia	Percent (%) of Full Time Positions Requiring a College Degree: Georgia	Number of Full-Time Employees in U.S.	Percent (%) of Full Time Positions Requiring a College Degree: U.S.
21,968	24.71%	253,824	22.68%

Respondents from the survey indicated that approximately 23% of their full time positions in all U.S. locations and 25% of those positions in Georgia require a college degree. That number relates closely to the overall population statistics for the U.S. The United States Census Bureau reports that 27% of the population has attained a bachelor's degree or higher (Census 2007). Surprisingly, when asked if a college degree in a specific subject matter was required, 57.8% of the 185 responses indicated that a degree in a specific subject matter was not required for entry level work. In fact, only 2.2% responded that all positions required a specific college degree. Fields such as agricultural consulting, finance, and risk management need more specific degrees while crop and greenhouse production, food warehousing, wholesaling and retailing had the lowest percentage of needs for specific subject matter.

To obtain information identifying which skills are the most important for college educated employees, respondents were asked to rate a set of attributes/skills as reported in Table 4.3.

Table 4.3 Importance of Attributes/Skills in College Educated Applicants

	Required	Preferred	Required & Preferred	Not Important	Response Count
Initiative	119	45	164	8	172
Oral communication skills	111	57	168	5	173
Critical thinking/problem solving	107	59	166	8	174
Business ethics	106	61	167	6	173
Customer relations skills	102	62	164	9	173
Office software/computer competency	91	68	159	14	173
Written communication skills	81	72	153	16	169
Leadership/team building skills	76	87	163	10	173
Project management skills	40	101	141	28	169
Statistics and mathematics	36	97	133	38	171
Interpersonal/cultural diversity skills	32	102	134	37	171
Prior work experience	30	119	149	22	171
Internship experience	10	92	102	68	170
Foreign language capabilities	7	91	98	71	169
Study abroad experience	2	25	27	146	173

Initiative and oral communication skills were the top two desired traits while foreign language capabilities and study abroad experiences were least required attributes. Almost 2/3 of employees responded that business ethics (61.3%), critical thinking/problem solving (61.5%), oral communication skills (64.2%) and initiative (69.2%) were required (see Appendix D for further detailed statistics from the survey). The results of the survey clearly show that many “soft skills” are required and preferred by agribusiness employers. As Michael Boland stated in his paper on agricultural education curricula, many universities are currently developing capstones course to

combine and develop these skills (i.e., problem solving, leadership, teamwork) that are sought by employers.

Looking ahead to the future, 75% of firms responded that it will be somewhat or very important for new employees to have a college degree within the next 2-10 years. A small increase is observed comparing 2-5 year expectations (74.1%) to 6-10 year expectations (81.7%). This implies that there is a perceived increase in demand for college educated employee in the future.

Table 4.4 Five Year Growth Expectations of Workforce Needs

Answer Options	Increase > 10%	Increase 6-10%	Increase 3-5%	Increase 1-2%	No Change	Decrease	Don't Know / Not Sure
General Workforce	20.1%	9.5%	15.1%	12.8%	29.6%	3.4%	9.5%
College-Educated Workforce	17.6%	15.3%	11.8%	15.9%	25.3%	0.0%	14.1%

The table above summarizes the industries growth expectations in relation to general and college educated workforce needs. The five year projections show there is a slightly higher expected increase in the overall need for college educated employees. Interestingly, less than 4% of employers foresaw any decrease in their workforce within the next five years. The data gathered from this question will be used to further analyze the firms' specifically related to their size, location and industry.

When asked about recruitment and retainment, survey respondents indicated that several factors impacted their college educated workforce needs. "Employees' salary and promotion expectations" was the most common response, followed by inconsistencies between employees' expectations and actual job requirement. Lack of interest in

relocating and lack of prior work experience were also factors that impacted companies' ability to recruit and retain college educated employees.

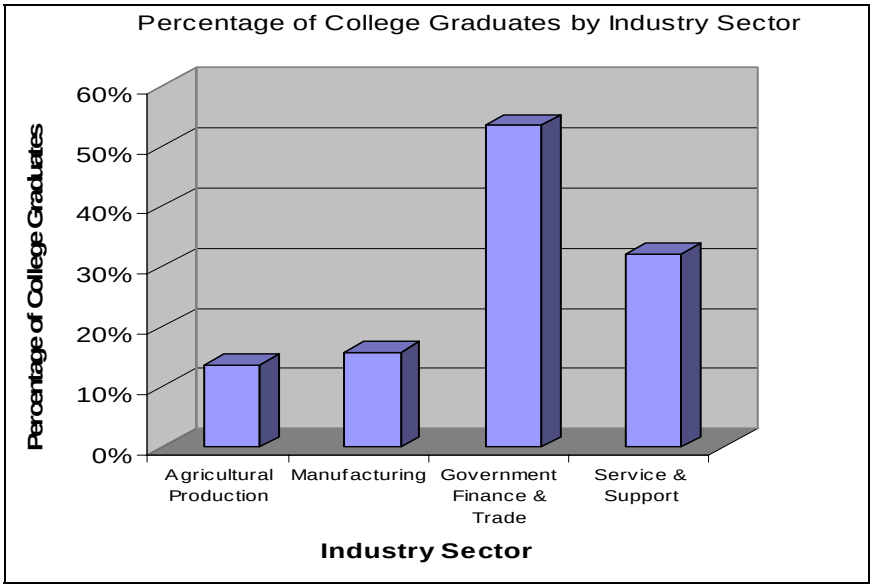
Finally, agribusiness employers were asked if their company's expansion efforts or plans had been hindered in any way by the quality or quantity of the college educated workforce in Georgia. Less than 3% felt that their expansion efforts had been hindered "A lot" while 32% had "some/a little" hindrance in their expansion needs. Respondents were also allowed to provide comments of other issues facing expansion plans. Details about these comments are reported in Appendix D.

Analysis by Attributes

The final objective of the survey was to identity attributes such as location, size, and industry type that impact the demand for college educated graduates. The remaining analysis separates the attributes of agribusiness employers by these variables and the results measured.

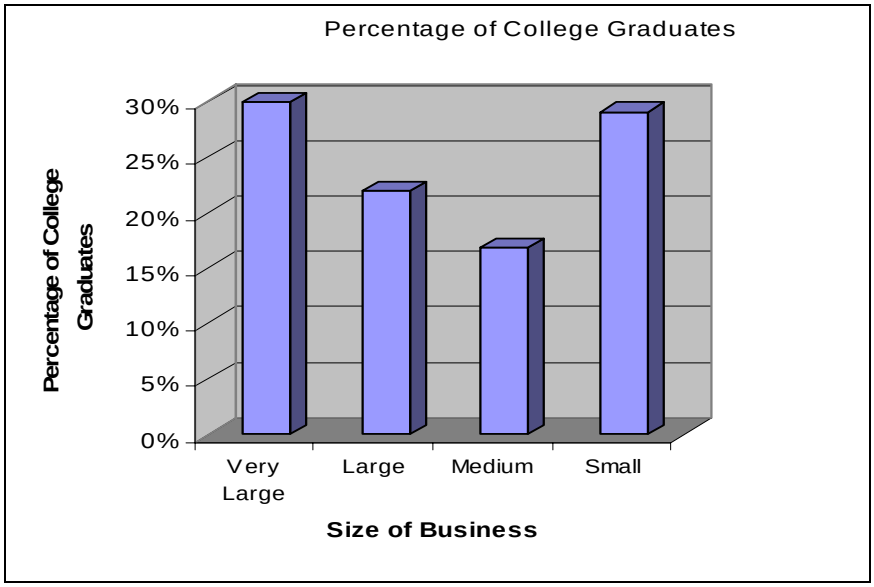
First, survey respondents were divided by industry sector. As described in the methodology, primary lines of business were divided into four distinct categories. Next, a comparison showing the results of individual categories in relationship to the other attributes was developed. Graph 4.1 shows the relationship between industry and percentage of college graduates.

Graph 4.1 Percent of Graduates by Industry Sector



The graph clearly shows that Government, Finance & Trade demand far higher percentages of college graduates than do the other categories. Service and support (including consulting) also shows a higher demand for college graduates.

Graph 4.2 Percent of Graduates by Size of Business

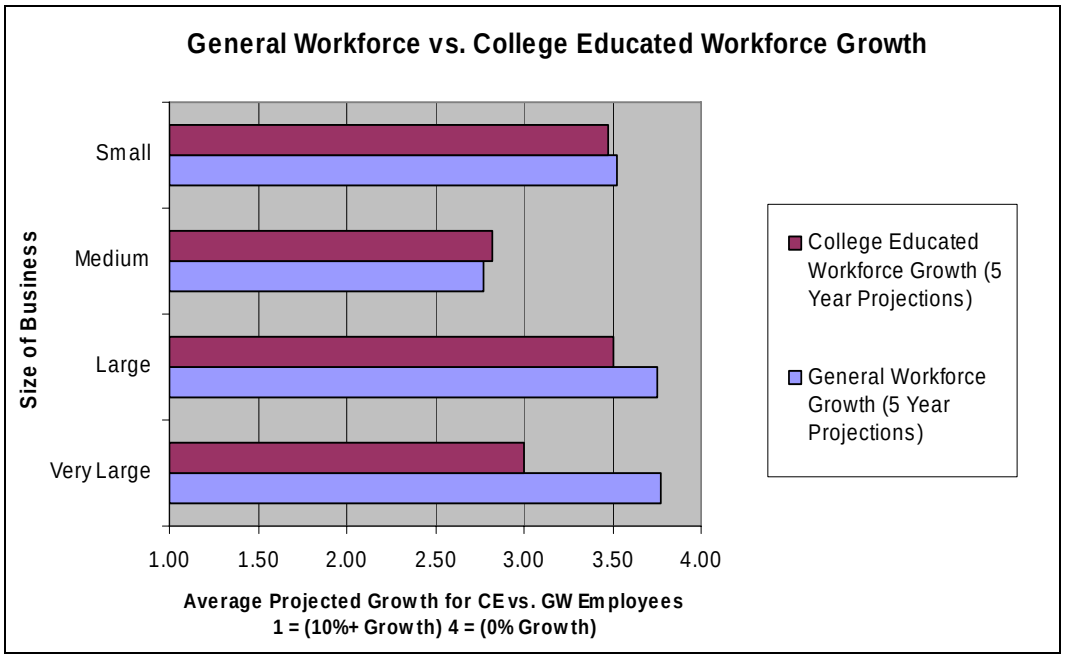


Dividing business by their size shows an interesting positive correlation between size and percentage of college graduates demanded. Of interest is the fact that small

businesses actually have a larger percentage of college graduates than initial expectations would suggest. One explanation would be that smaller firms encompass many finance, risk minimization and consulting businesses that all demand college educated workers.

Next, college education workforce demand is compared with general workforce demand in relation to industry type and size. Average projected five year workforce growth is measured by groupings based on percentage growth. For purposes of the thesis, the scale used ranged from 1 to 4, with the largest projected growth (>10%+) represented by the number "1" and the lowest projected growth represented by the number "4". Graph 4.3 shows the average projected growth for college educated employees vs. general workforce employees in relation to the size of the agribusiness.

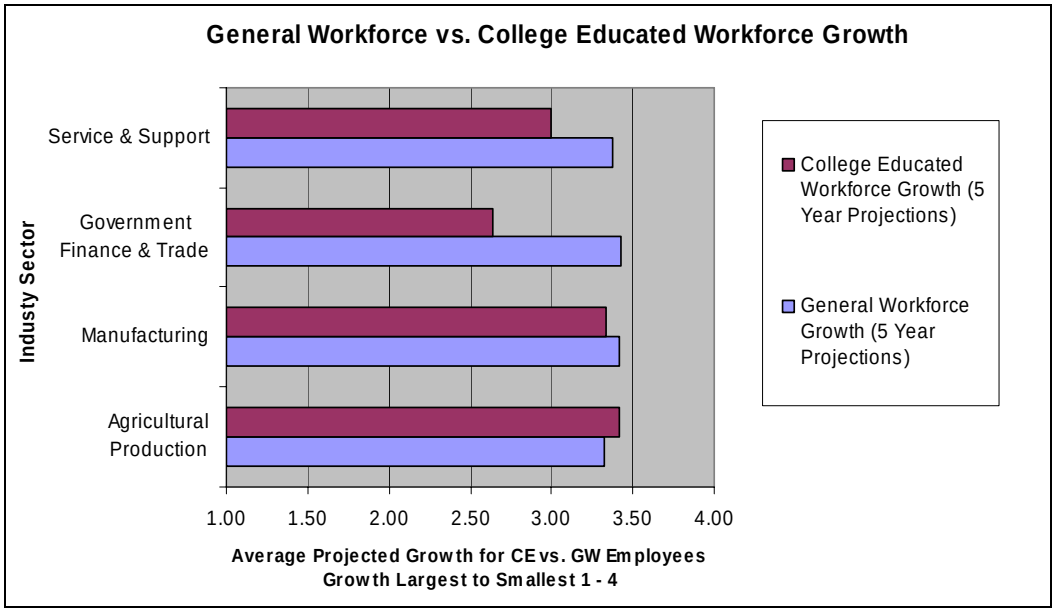
Graph 4.3 General Workforce vs. College Educated Workforce Growth (Size)



The graph shows that medium size companies predicted the largest increase in college educated employees within the next five years. Very large companies have the largest difference between demand for college educated vs. general workforce growth

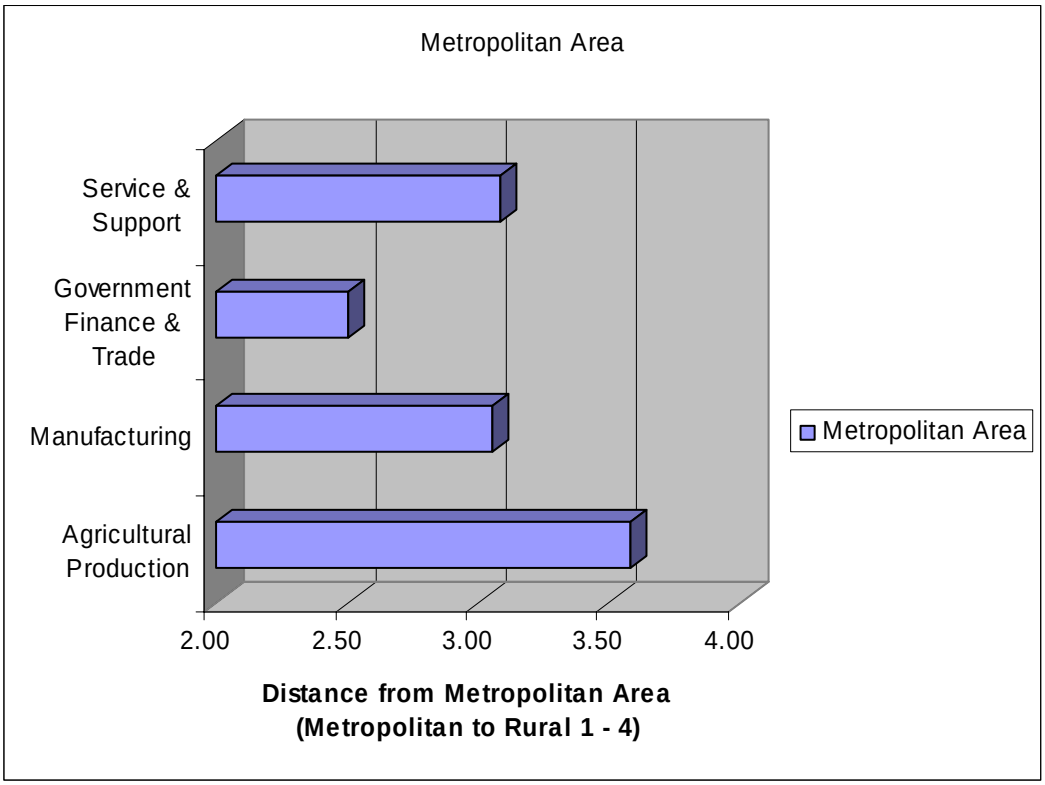
needs. While mid sized companies exhibited the smallest current percentage of college educated employees, it is clear that they have the highest expectation for short term future growth. Next, the data was analyzed by dividing employers by their primary line of business.

Graph 4.4 General Workforce vs. College Educated Workforce Growth (Industry)



The division by industrial sector again shows the overall demand for college educated workers is highest in the government, finance & trade sector. Agricultural production shows the smallest overall demand for college educated workers. The discrepancies between government, finance & trade's general workforce and college educated needs highlight the increased demand for college graduates in those fields. Finally, the location of a firm is observed to determine the effect it has on demand for each industry classification.

Graph 4.5 Industrial Sectors vs. Distance from a Metropolitan Area



The ordinal scale was used to classify metropolitan areas using the number "1" and rural areas using the number "4". An increase in the value from 1 to 4 indicates an increased proximity of the business to a rural area. Confirming the original expectations, government, finance and trade congregate in metropolitan areas while agricultural production is primarily limited to rural areas.

In summary, primary data collected from the *Workforce Needs Survey* examined the needs of individual agribusinesses throughout the State in support of the research objectives. The results of the survey indicate that the majority of industries agribusiness needs are being met. Fewer than half of employers indicated their expansion efforts have been inhibited by the quality or quantity of Georgia's college educated workforce. Particular skills such as initiative, oral communication and critical thinking prove to be

required by most employers. Finally, the analysis by industry sector showed strong correlations between employers' attributes and demand for college educated employees.

To further examine the effects employers' attributes exhibit on agribusiness workforce needs, the next chapter will discuss two different models and explain the results of regression analyses conducted using the collected survey data. OLS and OLR models will be used to determine which variables have the largest impact on demand for college educated employees.

CHAPTER FIVE

OLS and OLR MODELS

The Ordinary Least Square and Ordered Logistical Regression models will be used to determine how the *Workforce Needs* Survey variables are related. This chapter will examine each model then describe the results obtained through regression analysis. The theoretical framework for the methodology has been covered but the analysis will be used to illustrate the relevance and impact each of the dependant variables have on the college educated agribusiness workforce.

Ordinary Least Squares Regression

As discussed in the previous chapters, an equation has been developed to determine how each of the variables from the survey interacts. Ordinary least squares regression techniques will be employed to identify the significant determinants of the respondent firms' proportion of college-educated to the total workforce. Based on the information contained in the survey, the data has been carefully extrapolated into a functional form that can be imported into the Stata 10 statistical analysis software package.

This study's estimating equation for ordinary least squares regression is given by:

$$pct\_clgdeg_i = \beta_0 + \beta_1 gwh\_5\_gw + \beta_2 size\_ga + \beta_3 metro + \beta_4 service\_sup port + \beta_5 government\_finance\_trade + \beta_6 manufacturing + \varepsilon_i$$

This equations dependent variable is the Percent of Full Time Positions Requiring a College Degree (pct_clgdeg). This variable considers the proportion of full time workers within a company that require a college degree. This will present a basis for determining the needs of Georgia's employers who utilize the skill sets gained from a formal college education. This variable will be regressed against the following explanatory variables:

a. Five-Year Growth Expectations of the General Workforce (gwh_5_gw): The survey specifically addresses the growth expectations for companies in both the general workforce and also the college educated workforce. Growth expectations are ranked based on their percentile growth projections. Companies are separated based on growth expectations such as High (10%+), Medium (5-10%), and Low (0-5%). A separate variable exists to differentiate the general workforce and the college educated workforce.
b. Size of Company based on Number of Employees (size_ga): The size variable is measured by total employment of the company. This specific variable limits the companies to only employees located in Georgia. The companies are grouped based on categories defined in the introduction such as: Small (0-10), Medium (11-50), Large (51-200) and Very Large (200+).
c. Location in relation to size of city (metro): The metropolitan statistic will be used to observe the relationship between a company's location and its bearing on

the demand for college educated employees. For this variable, location will be defined on a scale of Rural to Metropolitan. MSA values assign each Georgia city with a value (1 = Metro to 4 = Rural) based on the population of the city. The correlation will be based on proximity to a rural area.

d. Primary Industry Classifications: The final classification divides the companies based on industry groupings. They are divided as follows: Agricultural Production, Service & Support, Government, Finance & Trade, and Manufacturing. The categories are conglomerates of specific industry sectors the respondents filled out on the survey. The primary industry classifications are used to help gain information to target if there is a correlation to the college educated employees and a specific industry grouping. These industry groupings are represented in this analysis by dummy variables. Only 3 of these industry dummies are considered (government_finance_trade, manufacturing, and service_support), with the 4th industry grouping (agricultural production) as the excluded category in the regression.

Ordered Logistical Regression

The second model will build off the variables and data contained in the previous model. Conceptually, the OLR model makes additional adjustments for variables that are in an ordered form. The theoretical framework for this selection has been previously explained in the beginning chapters of this thesis. Because the dependent variable will be an ordered scale, the OLR will be the selected method for determining the relevance of

each to the independent variables. By accounting for ordinal variables, the model should give more accurate estimates of projected five year demand for college graduates.

In this analysis, the ordered logistical regression approach is employed to identify the determinants of the respondent firms' expectations of the growth of their college educated workforce in the next five years. The model assumes the following form:

$$gwh\_5\_ce = f(pct\_clgdeg_1, size\_ga_2, metro_3, service\_sup_4, gov\_fin\_trd_5, manufact_6, gwh\_5\_gw_6)$$

where *gwh_5_ce* is an ordered qualitative variable representing the respondent firms' growth expectations for their college educated workforce. These growth expectations are ranked based on their percentile growth projections. Hence the ordered dependent variable *gwh_5_ce* takes a value of 1 when a firm's growth expectation is high (i.e. the respondent expects the college workforce to grow by 10% or more); a value of 2 if the growth expectation is medium (growing by 5% to 10%); and a value of 3 for low growth expectation (i.e. from no growth expected to about 5% growth).

The basic version of this study's OLR model considers the same set of regressors in the previous OLS model, including that model's dependent variable (pct_clgdeg). In order to test the validity of other potential determinants of college educated workforce growth expectations, an expanded version of the above OLR model is also defined to include the following additional groups of regressors:

a. Quantity & Quality of College Educated Factors: This variable looks to see if a company's expansion plans have been hampered by the lack of quality or quantity in Georgia's college educated workforce. The question has three possible answers: Yes, Sometimes and No.

b. Employee Expectations Factors: The final variable relates to employee expectation and retention issues. It looks at specific variables such as work experience, relocating, expectations and salary.

Additional variables

pct_clg = Percent of full time positions requiring a college degree: Georgia

pct_cldg = Percent of full time positions requiring a college degree: US

qlty_gwh = Quality of graduates impact on growth

quat_gwt = Quantity of graduates impact on growth

emp_wkexp = Impact of work experience on retention and recruitment

emp_relo = Impact of relocation expectation on retention and recruitment

emp_exp = Impact of employee expectations on retention and recruitment

emp_sal = Impact of salary expectation on retention and recruitment

Table 5.1 Stata OLS Regression Results

Table 5.1. Ordinary Least Squares Regression Results			
Variable	Coefficient Estimate	Standard Deviation	t-statistic
Manufacturing	-2.14314	6.91363	-0.31
Government-Finance-Trade	22.57358[c]	11.60884	1.94
Service	9.19258	8.91750	1.03
Size (Georgia)	2.00190	2.95598	0.68
Metro	-8.59843[a]	3.10958	-2.86
General Workforce Growth	-5.03073[a]	1.90595	-2.79
Intercept	51.23080[a]	16.15295	3.75
Model's F-statistic	4.51[a]		
R^2	0.2237		

Note: Superscripts *a, b, and c* denote significance at the 99%, 95%, and 90% confidence levels, respectively.

OLS Results

To begin, the model is observed to determine if the R-squared output is within an acceptable range. The output of 0.2237 with the adjusted R-squared value of 0.1741 means our model does present relevant data. The next step is to look at the T-Statistics and also the P > | t | values. These values show the significance of the effect the independent variables have on the dependant. As a value approaches zero, the greater the significance the variable presents to the equation. Finally, the coefficient helps to measure the degrees of the significant variables.

In this particular regression three main variables stand out as the most significant. Because we are regressing against the variable Percentage of Employees with College Degrees, the results explain how significant the independent variables are in relation to this. The low P > | t | value for the Government, Finance and Trade Industry shows that this industry group has a significant impact on the need for a college educated employees, relative to the excluded industry category (Agricultural Production). The large coefficient also helps explain the exact degree of the impact the variable represents. This result conforms to logical expectations that majority of the jobs in the Government, Finance and Trade industry are traditionally designed for college graduates whereas the Agricultural Production sector normally offers more employment opportunities to blue-collar workers, with only a few administrative positions usually coveted by college educated workers.

The Metropolitan variable illustrates how demand for percentage of college graduates relates to areas that are considered rural. Due to the high negative coefficient, it

becomes evident that the closer a business is to a rural environment, the less likely they will be to demand college educated employees. Conversely, the closer a business is to a large metropolitan area, the greater the demand for college educated employees. This result is consistent with the expectation that college graduates are usually drawn to seek employment in large urban areas that offer more opportunities for advancement and social mobility. In contrast, employment opportunities for college educated workers in rural areas are not only scarcer, but perhaps less desirable for such potential employees that seek out the amenities and opportunities of more modern, metropolitan working environments.

The final significant variable is that of the general workforce growth projections by the company. In a similar fashion to the *metro* statistic, the value correlates to zero growth. The negative coefficient inversely correlates to a positive growth rate. Therefore, the projection follows that if a company plans to grow their general workforce, there will be a significant impact on the increased demand for college graduates also.

OLR Results

To begin, the model is observed to determine if the Chi-squared output is within an acceptable range. The output of 41.92 and the pseudo R-squared value of 0.1547 means our model does present relevant data. The next step is to look at the z-statistics and also the P > | z | values. These values show the significance of the effect the independent variables have on the dependant. As a value approaches zero, the greater the significance the variable presents to the equation. Finally, the coefficient helps to measure the degrees of the significant variables. It is important to note that, unlike OLS models, the

coefficient variables do not directly correlate into marginal effects. A secondary analysis is needed to determine the exact marginal effects of each variable.

The results of the model report that general workforce growth and current percentage of college-educated workers are affected by 5 year growth expectations of college educated employees. The strongest correlation (General Workforce) suggests that overall growth expectations greatly affect the growth projections for college educated and general workforce employees.

Table 5.2. Ordered Logistic Regression Results (Original Model)

Variable	Coefficient Estimate	Standard Deviation	z-statistic
Percent of College-Educated Workers	-0.01508[c]	0.00855	-1.76
Size (Georgia)	0.28897	0.21857	1.32
Metro	0.28399	0.23650	1.20
Service	-0.17759	0.71568	-0.25
Government-Finance-Trade	-0.16366	0.85628	-0.19
Manufacturing	0.82336[c]	0.50404	1.63
General Workforce 5-year Growth	0.70291[a]	0.15494	4.54
Model's LR chi-square	41.92[a]		
Pseudo R^2	0.1547		

Note: Superscripts *a, b, and c* denote significance at the 99%, 95%, and 90% confidence levels, respectively.

Once the initial observations have been completed, an expanded second model is also analyzed to determine if additional factors may effect the 5 year growth expectations for demand.

Table 5.3 OLR Regression Results Continued

Table 5.3 Ordered Logistic Regression Results (Expanded Model)			
Variable	Coefficient Estimate	Standard Deviation	z-statistic
Percent of College-Educated Workers	0.0442	0.0363	1.22
Size (Georgia)	-0.1619	0.2934	-0.55
Metro	-0.6393	0.3261	-0.20
Service	-0.0285	0.1975	-0.04
Government-Finance-Trade	-0.7938	1.1670	-0.68
Manufacturing	0.5971	0.7204	0.83
General Workforce 5-year Growth	0.6061	0.2007	3.02
Quality of graduates impact on growth	0.1096	0.3875	0.28
Quantity of graduates impact on growth	0.1079	0.3891	0.28
Impact of work experience on retention and recruitment	0.5892	0.3297	1.79
Impact of relocation expectation on retention and recruitment	-0.2328	0.2356	-0.99
Impact of employee expectations on retention and recruitment	0.2491	0.3945	0.63
Impact of salary expectation on retention and recruitment	-0.4041	0.4025	-1.00
Model's LR chi-square	44.67		
Pseudo R^2	0.2172		

Based on the results in Table 5.3, general workforce growth is again the most significant factor; however, employee work expectations and the percentage of college degrees also impact the results.

Summary and Conclusions

Both the Ordinary Least Square and Ordered Logistical Regression models are used to help establish relationships between industry attributes, growth and college educated workforce demand. The OLS model establishes that the location of an

agribusiness is a significant factor in the demand for college educated employees. It also demonstrates that industry sectors differ significantly in their specific needs for college educated employees. The OLR model demonstrates that growth expectations for college educated employees are heavily dependent on overall growth projections and that the number of college educated employees also impact the future growth expectations.

The regression models presented in the chapter help bring about a clearer picture of what effects the variables have in relation to each other but also the degree and significance of these measurable effects.

CHAPTER SIX

SUMMARY AND CONCLUSIONS

The purpose of this chapter is to provide an overview of the research presented in this study. By reviewing the research objective, it is determined that a detailed look into individual agribusiness firms is desired to understand the college educated workforce needs of the agribusiness industry. Conclusions drawn from the completed survey will be drawn along with the results from the OLS and OLR models. Limitations on the research will be reviewed in combination with suggestions for future research to be completed. The chapter will conclude with a discussion of some of the implications emanating from the research

Overview of Thesis

The agribusiness industry plays a significant role in Georgia's economy, contributing more than $76 billion in economic activity to the State's economy in 2006. $15 B in labor income is also generated for the 400,000 workers that are directly employed in the agricultural sector. As a result of economic expansion, the demand for college educated employees continues to grow throughout many sectors of the economy including the agribusiness sector. Thus, it is important to the state of Georgia that the University System of Georgia produces enough qualified graduates that have the appropriate skill set to support the expansion of an increasingly competitive agribusiness environment. Another important aspect of agribusiness needs is to identify the attributes

of firms that show demand for college educated graduates and pay special attention to their needs.

The primary issue this thesis addresses is identifying the college educated employment needs of Georgia's agribusiness industry and determining which attributes affect the demand for college educated employees. Using primary data collected from the "Workforce Needs of the Georgia Agribusiness Industry" survey it was determined that attributes such as size, growth rate, location and type, have a significant effect on college educated workforce demand.

Limitations of the Research

One important consideration of note is that projects like these are inherently based on assumptions. Often, to make a completely accurate estimation, the shear amount of variables is difficult to consider. While each model has its own limitations, Kmenta uses multiple examples to establish that least squared models can be the most consistent estimator. He noted that "Indeed, a large part of modern econometrics owes its existence to the discovery that in many economic models, least squares estimators are, in fact, inconsistent (Kmenta 1971)." While the model does represent relatively accurate and consistent projections, it is important to note that econometric modeling is based on a series of assumptions to minimize any inconsistencies.

Another important limitation of the research is that the current economic recession may be affecting the growth projections of data gathered from the previous year. In our analysis, and consistent with the assumptions made by the Georgia Department of Labor, the assumptions include that no major changes will occur in

technology, economic trends and structure of the State's economy. The research also assumes that population growth rates and age distributions will remain constant. It is quite evident now that the economy has shown signs of change. Many companies have trimmed back current production and are not hiring at the rate of pervious years. According to BLS data, "the fourth quarter of 2008, the unemployment rate rose to 6.9 percent and the unemployment level reached 10.6 million, an increase of 2.1 percentage points and 3.3 million persons, respectively, over the fourth quarter of 2007 (Borbely 2009). While agriculture may be slightly shielded from minor recessions, impacts are still being felt in that industry as they are throughout all industries in the U.S. economy.

The research that has been presented in this thesis is based on projections and goals (1-10+ years) that may fluctuate from year to year. Similar to the financial markets, most experts see the current recession in the short term and still look for long term projections to identify valuable trends. Nationwide, the past six months have had a significant impact on the employment projections that were available one year ago. The highest unemployment numbers in the last twenty five years were recorded early this year in 2009. Most projections that are discussed in this thesis bridge the scope of the current economic time. However, the agricultural sector is at least partially shielded from economic woes. Even in the hardest of economic times, sustenance exhibits an intrinsic demand.

Future Research Possibilities

The agribusiness industry is a state of constant change as it continues to evolve. The rate of technological innovation in the last hundred years has completely revolutionized the industry and even the progress made in the last twenty years is amazing. The most important aspect of future research is to simply keep current with the modern efficiencies that allow education and industry to combine for the betterment of all. The agribusiness sector has seen enormous change in the past few months. As with the entire United States economy, unemployment is up and markets are down. The agricultural sector has recessed but it can be noted that this field has shown less slowdown than many other industries. It can be surmised that Americans are currently cutting back lifestyles in most areas. However, food is still one of the necessities that is typically the last to be cut. In that respect, domestic agriculture is somewhat shielded from the recession that diminishes demand for frivolous and luxury items.

Gathering current information from the surveyed agribusiness firms would be an area of future research that would provide additional insight into the current economic needs. Comparing the outlook, especially in the area of growth expectations, would allow any significant changes that effect individual agribusiness firms to be observed.

Statistically, the wealth of information contained in the collected survey could be used to gain a better understanding of Georgia's agribusiness industry. Identifying specific agribusiness companies and analyzing their individual needs would provide a better understanding of firm-specific issues and desires. Defining the attributes at that level would allow for focused resourced related to these firm-specific needs.

Benefits and Implications of the Study

The primary benefit of this project was to gain a better understanding of agribusiness workforce needs and to identify the factors that impact those needs. An analysis of the survey response data shed insights into the attributes that lead to increased demand for college educated graduates. The factors size, type, location, and growth rate, it were used to determine which attributes more closely relate to differences in the level of demand for college educated workers. Using two types of economic modeling, the results indicated that type and location of the agribusiness both have a significant impact on the demand for college graduates. It has been also determined that the fields of Government, Finance and Consulting and Service and Support have a significantly higher demand for college educated employees. Secondly, it was determined there is also a significant positive correlation between metropolitan areas and demand for college educated employees. While small and very large companies exhibited the greatest demand for college educated workers, medium sized firms expressed the highest future growth expectations. Overall, business growth represented the largest explanatory factor when determining the future needs for both college educated and general workforce needs.

Many conclusions and implications can be extracted from the analysis of the information contained in the study. It has been shown that the largest and smallest companies have the greatest percentage of college educated employees. It has also been shown that medium sized companies predict the largest increase in demand for college

educated employees. Identifying and targeting the specific needs of these firms many further stimulate demand for college educated employees.

The location of firms and their proximity to a metropolitan are has shown an increased demand for college educated graduates. The infrastructure and technological resources often contribute to the development of metropolitan areas. An increase in transportation and technological access to develop rural location could further increase the ability for college educated employees to work in rural locations.

The agribusiness industry is, and continues to be, a major contributor to the state and national economies. The industry continues to grow and evolve and the technological developments of the past few decades have revolutionized modern production agriculture. As agribusiness evolves and develops, it will be increasingly important for the educational system to stay current and relevant and allow for an efficient allocation of time and resources to ensure the industry's workforce needs are being met.

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APPENDIX A:

WORKFORCE NEEDS OF GEORGIA'S AGRIBUSINESS INDUSTRY SURVEY

A Study of the Workforce Training Needs for the Agribusiness Industry in Georgia

Conducted by the Center for Agribusiness and Economic Development (CAED) at UGA
For the Board of Regents (BOR) of the University System of Georgia (USG)

Background

Please provide the following information (the information provided in Questions 1 – 3 WILL NOT be included in the report):

1. Contact information for person completing the survey: _____ _____
   Name Title

   (____)_____ _____
   Telephone Email

2. What is the name of your company and primary product or service produced?

   Name_____

   Product/service: _____

3. What is the contact information for the principal company location in Georgia? (____) _____
   (Phone #, if different from that in Question 1)

   _____
   City zip Web Address

4. Which of the following is your primary line of business?

Agricultural Chemical and Machinery Manufacturing	□			
Agricultural Consulting				□
Agricultural Finance and Risk Minimization		□		
Animal and Animal Aquaculture Production		□		
Crop and Greenhouse Production			□	
Food Warehousing, Wholesaling, and Retailing Operations				□
Food, Beverage, and Tobacco Manufacturing	□			
Forestry and Logging Operations			□	
Government and Education Related to Agricultural Production				□
Other Farm Production and Farm Support Activities	□			
Trade Organizations/Associations			□	
Wood and Paper Product Manufacturing			□	
Other _____ (Please specify)	□			

5. What is the current approximate size of your workforce and what percentage of full-time positions in your company require a college degree in Georgia and all U.S. locations?

   Georgia: Approximate number of employees _____

   % of full time positions requiring a college degree _____%
   (Use whole numbers only – no decimals)

   U.S. Approximate number of employees _____

   % of full time positions requiring a college degree _____%
   (Use whole numbers only – no decimals)

Workforce Needs (WN)

6. Is a college degree in a **specific subject matter** currently required for entry-level positions in your company?

Yes, All □ Yes, Most □

Yes, Some □ No □

7. In the future, how important will each of the following attributes/skills be in college-educated applicants considered for hire in your company?

	Required (definite must have)	Preferred (nice to have)	Not Important
Business ethics			
Critical thinking/problem solving skills			
Customer relations skills			
Foreign language capabilities			
Initiative			
Internship experience			
Interpersonal/ cultural diversity skills			
Leadership/team building skills			
Office software/ computer competency			
Oral communication skills			
Prior work experience			
Project management skills			
Statistics and mathematics			
Study abroad experience			
Written communication skills			
Other (specify) _____			

8. As you look forward to the future, how important will it be for new employees to have a college degree?

	Very Important	Some What Important	Not Important	Don't Know/Not Sure
In the next 2 - 5 years				
In the next 6 - 10 years				

9. Over the next five years, what are your expectations about your general and college-educated workforce needs?

	Increase more than 10%	Increase 6 -10%	Increase 3 - 5 %	Increase 1 - 2%	No Change	Decrease	Don't know /Not Sure
General workforce							
College-educated workforce							

Workforce Needs (WN) Continued

10. For positions requiring a college degree, for what portion of your openings would you require **specific subject matter** in the following fields?

    Check only those subject matter fields for which you would hire. If none, leave blank. For "other", please specify.

	All/Almost All (more than 90%)	Most (61– 90%)	Some (25 – 60%)	A few (Less than 25%)
Agribusiness/Agricultural Economics/General Business				
Agricultural Education				
Agricultural Mechanization				
Animal Sciences (including dairy & poultry)				
Engineering				
Environmental Science				
Food Science				
Food Technology				
Forestry				
Geology/Earth Sciences				
Horticulture & Landscaping				
IT/Computer Science				
Plant Protection and Pest Management/Entomology				
Plant/Crop Sciences				
Public Relations & Communications				
Turfgrass Management				
Other _____				

11. When you have vacant positions, for what proportion of the vacancies in the following fields has it been difficult to find applicants with college degrees?

    If your record is zero vacancies in a particular field, select Not Applicable.

    If you have had vacancies in a particular field but never experience problems filling the vacancies, select Never

	Always (>90%)	Often (51-90%)	Sometimes (26-50%)	Seldom (1 – 25%)	Never	Not Applicable
Mid-level Management						
Entry level Management						
Engineering and Technical						
IT/Computer Science						
Marketing and Sales						
Business Operations						
Communications & P.R.						
Waste Management						
Research/Education						
Production & Processing						
Food/Agricultural Security						
Other (please specify) _____						

Workforce Needs (WN) Continued

12. What has been the impact of the following on your company's ability to recruit and retain college-educated employees? For "other", please specify.

	Significant (>75%)	Moderate (51-75%)	Average (31-50%)	Slight (10-30%)	Not at All
Employee expectations not consistent with actual job requirements					
Employees' promotion and/or salary expectations					
Inadequate subject matter knowledge					
Lack of interest in relocating					
Lack of prior work experience					
Other _____					

13. Which of the following methods do you use to recruit college-educated applicants? For "other", please specify.

	Always (>90%)	Often (51-90%)	Sometimes (26 -50%)	Seldom (1-25%)	Never
Promote from within					
Hire current interns					
Recruit competitors' employees					
Recruit at college career fairs					
Use recruiting/search firms					
Referrals from employees					
University placement offices					
Personal contacts at universities					
Industry contacts/networks					
GeorgiaHIRE.com					
Other _____					

14. From which of the following universities have you had most success in hiring college-educated applicants?

	Always (>90%)	Often (51-90%)	Sometimes (26 -50%)	Seldom (1-25%)	Never
Abraham Baldwin Agricultural College					
Fort Valley State University					
Georgia Institute of Technology					
University of Georgia					
Other universities/colleges in Georgia (Please specify) _____					
Auburn University					
Clemson University					
University of Florida					
University of Tennessee					

Other U.S. university (Please specify) _____					

Workforce Needs (WN) Continued

15. How interested would you be in considering the following educational/ training programs for your current workforce?

	Very Interested	Moderately interested	Slightly Interested	Not Interested
Basic skills (including written & oral communication, mathematics, statistics)				
Foreign language training				
Job-specific education and training				
Professional development (incl. customer service, team building, cultural competence, leadership)				
Specific subject matter college course work or certificates (specify)_____				
Technology training (including agricultural mechanization, computer hardware and software)				
Other (specify) _____				

16. How helpful would it be to the growth of your company if potential applicants had college-level training in the following subject matter/emphases? For "other", please specify.

	Very Helpful	Some What Helpful	Not Helpful	Don't Know/Not Sure
Ag business technology /computers in agriculture				
Agricultural mechanization /engineering technology				
Alternative fuel technology				
Bio-diversity				
Biotechnology				
Food/agrosecurity				
Government and Policy				
Integrated nutrient management				
Integrated pest management				
Organic/sustainable agriculture				
Precision agriculture				
Production management				
Resource conservation				
Waste management				
Other _____				

17. In your sector of the industry, are there any innovations or new technology likely in the foreseeable future that would require new skills or training?

Yes, a significant number □ Yes, a moderate amount □ Yes, a few □ No □

If appropriate, please provide more information in this space.

Workforce Needs (WN) Continued

18. Has your company's expansion efforts or plans been hindered in any way by the quality or quantity of a college-educated workforce in Georgia?

    Quality: Yes, a lot □ Yes, some □
    Yes, a little □ No □

    Quantity: Yes, a lot □ Yes, some □
    Yes, a little □ No □

    If appropriate, please provide more information in this space.

19. In considering your future need for college-educated workers, which of the following programs would be important to the growth of your company? For "other", please specify.

	Very Important	Some What Important	Not Important	Don't Know/Not Sure
Access to a university-managed resume bank				
Established internship programs				
University sponsored on-site instruction				
University career centers specifically for students majoring in ag-related degree programs				
Other _____				

Recommendations

20. What changes in degrees and curricula would you recommend to the University System of Georgia so that it could more readily respond to anticipated changes in the U.S. agribusiness industry?

Please use this space to discuss any additional workforce issues to be considered by the University System of Georgia in ensuring its responsiveness to the agribusiness workforce needs.

We appreciate your participation in the survey. Your input is very valuable to us as we gather the information about the industry's needs and the University System's efforts to respond to those workforce needs.

If you would like to receive a copy of the final survey results, please check below and be sure to complete questions 1 -3.

I would like to receive a copy of the final report □

If necessary, may we contact you for further follow up about the study? **Yes** □ **No** □

APPENDIX B:

SUMMARY OF NAICS CODES INCLUDED IN THE STUDY

Summary of NAICS Codes Included in the Study

SUMMARY TABLE	Aggregated NAICS Grouping	Description
Oilseed Farming thru All Other Crop Farming	**111** (1111, 1112, 1113, 1114, 1119)	Crop Production
Cattle Ranching & Farming thru Animal Production, Except Poultry & Egg	**112** (1121, 1122, 1123, 1124, 1125,1129)	Animal Production
Logging thru Forest Nurseries, Forest Products, & Timber	**113** (1131, 1132, 1133)	Forestry and Logging Operations
Fishing thru Agricultural & Forestry Support Services	**114 and 115** (1141, 1142, 1151,1152, 1153)	Other Farming and Farm Support Activities
Dog & Cat Food Manufacturing thru Narrow Fabric Mills & Schiffli Embroidery; Leather & Hide Tanning; Other Leather Product Manufacturing	**311, 312, 3131,** 31321, 31322, 3161, 3169 (3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3121, 3122, 3131, 31321, 31322, 3161, 3169)	Food, Beverage, Tobacco, Textile, and Leather Manufacturing
Sawmills thru Wood Container & Pallet Manufacturing; Miscellaneous Wood Product Manufacturing thru Paperboard Container Manufacturing; Surface-Coated Paperboard Manufacturing thru Coated & Uncoated Paper Bag Manufacturing	**3211, 3212,** 32191, 32192, 321999, **3221**, 32221,32222 **EXCI.**322225 (32111, 32121, 32191, 32192, 321999, 32211, 32212, 32213, 32221, 322221, 322222, 322223, 322224, 322226)	Wood and Paper Product Manufacturing
Nitrogenous Fertilizer Manufacturing thru Pesticide & Other Ag. Chemical Manufacturing; Farm Machinery & Equipment Manufacturing; Lawn & Garden Equipment Manufacturing; Food Product Machinery Manufacturing	**3253, 33311,** 333294 (325311, 325312, 325314, 32532, 333111, 333112, 333294)	Agricultural Chemical and Machinery Manufacturing
Wholesale Trade; Warehousing and Storage;; Food and Beverage Stores; Gasoline Stations; General Merchandise Stores	**4244, 4245, 4248**, 42491, 42493, 42494, 4442, **445, 447, 452, 484,** 49313 (42441 - 42449, 42451, 42452, 42459, 42481, 42482, 42491, 42493, 42494, 4451, 4452, 4453, 4471, 4521, 4529, 49313) – (IMPUTED VALUES from IMPLAN)	Food Warehousing, Wholesaling, and Retailing Operations
Landscaping Services PLUS: Agricultural Finance, Risk Minimization; Agricultural Consulting and Trade Organizations/Associations Government and Education Related to Agricultural Production	56173, 522000, 52412, 541613, 541614, 54162, 54169, 54171, 54194, 71219, 81391, 81392, 92411, 92412, 92512, 92611, 92614,	Agricultural Support Services and Related Activities
	Bold = select all NAICS codes in that category	

APPENDIX C:

COMPARISON OF NAICS CODES TO DEFINE AGRIBUSINESS INDUSTRY WITH CNGA REPORT

Comparison of NAICS Codes to Define the Agribusiness Industry for this Study and Those Included in the Commission for a new Georgia's (CNGA) Report[89]

Commission for a New Georgia Definition - 4 digit NAICS	Industry Sector	Notes on Commission for New Georgia (CNGA) Definitions	Notes on Model	Rationale for the Differences
1111	Oilseed and Grain Farming		Consistent with CNGA	
1112	Vegetable and Melon Farming		Consistent with CNGA	
1113	Fruit and Tree Nut Farming		Consistent with CNGA	
1114	Greenhouse, Nursery, and Floriculture Production		Consistent with CNGA	
1119	Other Crop Farming		Consistent with CNGA	
1121	Cattle Ranching and Farming		Consistent with CNGA	
1122	Hog and Pig Farming		Consistent with CNGA	
1123	Poultry and Egg Production		Consistent with CNGA	
1124	Sheep and Goat Farming		Consistent with CNGA	
1125	Animal Aquaculture		Consistent with CNGA	
1129	Other Animal Production		Consistent with CNGA	
1131	Timber Tract Operations		Consistent with CNGA	
1132	Forest Nurseries and Gathering of Forest Products		Consistent with CNGA	
1133	Logging		Consistent with CNGA	
1141	Fishing		Consistent with CNGA	
1142	Hunting and Trapping		Consistent with CNGA	
1151	Support Activities for Crop Production		Consistent with CNGA	
1152	Support Activities for Animal Production		Consistent with CNGA	
1153	Support Activities for Forestry		Consistent with CNGA	
3111	Animal Food Manufacturing		Consistent with CNGA	
3112	Grain and Oilseed Milling		Consistent with CNGA	
3113	Sugar and Confectionery Product Manufacturing		Consistent with CNGA	
3114	Fruit and Vegetable Preserving and Specialty Food Manufacture		Consistent with CNGA	
3115	Dairy Product Manufacturing		Consistent with CNGA	
3116	Animal Slaughtering and Processing		Consistent with CNGA	
3117	Seafood Production Preparation and Packaging		Consistent with CNGA	

Commission for a New Georgia Definition - 4 digit NAICS	Industry Sector	Notes on Commission for New Georgia (CNGA) Definitions	Notes on Model	Rationale for the Differences
3118	Bakeries and Tortilla Manufacturing		Consistent with CNGA	
3119	Other Food Manufacturing		Consistent with CNGA	
3121	Beverage Manufacturing		Consistent with CNGA	
3122	Tobacco Manufacturing		Consistent with CNGA	
313 Not Included	Textile Mills	Does not include any elements of the textile sector	**Adds** 3 categories within Textile Mills **3131, 31321, 31322**	Economic significance of the sector to agribusiness – See Chapter 2
316 Not Included	Leather and Allied Product Manufacturing	Does not include any elements of the Leather and Allied Product Manufacturing sector	**Adds** 2 categories within leather goods manufacturing **3161, 3169**	Economic significance of the sector to agribusiness – See Chapter 2
3211	Sawmills and Wood Preservation		Consistent with CNGA	
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing		Consistent with CNGA	
3219	Other Wood Product Manufacturing	Includes all 3219 sub categories (32191, 32192, 32199)	Includes all subcategories within 32191 and 32192 but includes only 321999 i.e. **does not include 321991 and 321992**	Manufactured homes and wood product manufacturing are too far removed in the line of processing to be considered agribusiness
3221	Pulp, Paper, and Paperboard Mills		Consistent with CNGA	
3222	Converted Paper Product Manufacturing	Includes all subsectors within 3222	Includes all 32221. Includes only some of 32222 (**excludes 322225**), all of 32223 and 32229	Production of laminated aluminum foil not agribusiness-related
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing		Consistent with CNGA	
3331	Agriculture, Construction, and Mining Machinery Manufacturing		Consistent with CNGA	

Commission for a New Georgia Definition - 4 digit NAICS	Industry Sector	Notes on Commission for New Georgia (CNGA) Definitions	Notes on Model	Rationale for the Differences
3332 Not Included	Industrial Machinery Manufacturing	Does not include any elements of the industrial machinery manufacturing sector	Includes **333294** - Food Product Machinery Manufacturing	Significant to agribusiness production
424 Not Included	Wholesale trade - non-durable goods	Does not include any elements of the wholesale trade	Includes **4244, 4245, 4248, 42491, 42493, 42494** included using a formula to compute approximate values from IMPLAN	Economic significance of the sector to agribusiness – See Chapter 2
445, 447, 452, Not Included	Retail trade - Food and beverage stores	Does not include any elements of the retail trade	included using a formula to compute approximate values from IMPLAN (based on current economic modeling assumptions)	Economic significance of the sector to agribusiness – See Chapter 2
484 and 493 Not Included	Transportation and Warehousing	Does not include any elements of the transportation and warehousing sectors	included using a formula to compute approximate values from IMPLAN based on current economic modeling assumptions)	

APPENDIX D:

DETAILED RESPONDSE FROM *WORKFORCE NEEDS OF GEORGIA'S AGRIBUSINESS INDUSTRY* SURVEY

Georgia Agribusiness Needs Assessment Survey		
Q. #4: Which of the following in the primary agribusiness area for your company?		
Answer Options	**Response Percent**	**Response Count**
Agricultural Consulting	1.6%	3
Agricultural Finance and Risk Minimization	2.2%	7
Government/Education Related to Agricultural Production	2.7%	10
Other Farm Production & Farm Support Activities	3.2%	20
Trade Organization	3.2%	11
Animal and Animal Aquaculture Production	3.8%	11
Food Warehousing, Wholesaling, & Retailing Operations	3.8%	15
Forestry and Logging Operations	5.4%	10
Agricultural Chemical & Machinery Manufacturing	5.4%	12
Food, Beverage, & Tobacco Manufacturing	7.5%	16
Wood and Paper Product Manufacturing	10.2%	19
Crop and Greenhouse Production	17.4%	33
Other (Please specify below.)	37.6%	23
	answered question	**190**

Q. #5: What is the current approximate size of your workforce and what percentage of full-time positions in your company require a college degree in Georgia and all U.S. locations?			
Answer Options	**Response Average**	**Response Total**	**Response Count**
Approximate number of employees in Georgia?	115.95	21,103	182
Percent (%) of full time positions requiring a college degree: Georgia?	25.87%		180
Approximate number of employees in the U.S.?	1,822.03	251,440	138
Percent (%) of full time positions requiring a college degree: U.S.?	23.05%		136
	answered question		**184**

Q. #6: Is a college degree in a specific subject matter currently required for entry-level positions in your company?		
Answer Options	**Response Percent**	**Response Count**
Yes - All	2.2%	4
Yes - Most	10.8%	20
Yes - Some	29.2%	54
No	57.8%	107
	answered question	***185***

Q. # 7: In the future, how important will each of the following attributes/skills be in college-educated applicants considered for hire in your company?

Answer Options	Required	Preferred	Not Important	Response Count
Project management skills	40	101	28	169
Statistics and mathematics	36	97	38	171
Written communication	81	72	16	169
Oral communication	111	57	5	173
Foreign language capabilities	7	91	71	169
Office software/computer competency	91	68	14	173
Study abroad experience	2	25	146	173
Internship experience	10	92	68	170
Prior work experience	30	119	22	171
Initiative	119	45	8	172
Leadership/team building	76	87	10	173
Interpersonal/cultural diversity skills	32	102	37	171
Critical thinking/problem solving	107	59	8	174
Customer relations skills	102	62	9	173
Business ethics	106	61	6	173
Other (Please specify below.)				8
answered question				178

Other responses:

- Chemical, Electrical or Mechanical Engineering degree Agriculture
- Realistic expectations for work requirements and pay
- Industry related experience
    - Marketing skills/experience
- Subject matter specific skills - required
    - Trade Skills
- General
- Speak English

Q. # 8: As you look forward to the future, how important will it be for new employees to have a college degree?

Answer Options	Very Important	Somewhat Important	Not Important	Don't Know/ Not Sure	Response Count
In the next 2-5 years	58	74	31	15	178
In the next 6-10 years	76	63	14	17	170
answered question					181

Q. # 9: Over the next five years, what are your expectations about your workforce needs?

Workforce Type	Increase > 10%	Increase 6-10%	Increase 3-5%	Increase 1-2%	No Change	Decrease	Don't Know/ Not Sure	Count
General Workforce	36	17	27	23	53	6	17	179
	20.1%	9.5%	15.1%	12.8%	29.6%	3.4%	9.5%	
College-educated Workforce	30	26	20	27	43	0	24	170
	17.6%	15.3%	11.8%	15.9%	25.3%	0.0%	14.1%	

answered question	182

Q. # 10: For positions requiring a college degree, for what portion of your openings would you REQUIRE specific subject matter in the following fields?

Answer Options	All or Almost All (>90%)	Most (51-90%)	Some (25-50%)	A Few (<25%)	Response Count
Agribusiness/Agricultural Economics/General Business	28	29	23	26	106
Animal Sciences (Incl. Dairy & Poultry)	9	5	9	37	60
Plant/Crop Sciences	11	13	19	29	72
Public Relations & Communications	18	25	21	30	94
Environmental Sciences	13	13	17	30	73
Agricultural Engineering	9	11	15	41	76
Food Science	5	4	11	41	61
Forestry	8	10	19	38	75
Geology/Earth Sciences	3	1	17	35	56
Horticulture & Landscaping	16	6	17	29	68
IT/Computer Science	12	18	29	28	87
Turfgrass Management	3	10	11	37	61
Agricultural Mechanization	5	13	19	32	69
Soil Science	4	11	14	23	52
Plant Protection & Pest Mgmt	12	16	20	28	76
Agricultural Education	9	12	19	33	73
Food Technology	7	3	10	46	66
				Other (please specify below)	24
				answered question	150

Other responses (number of occurrences in parentheses):

• Association management; meeting planning • Accounting/Finance - A few • Business – A few
• Economic Development • Engineering - a few (3)
• Food Science (3)
• Engineering - all/almost all (2) – Some (2) • Government Relations • Forestry -timber - a few
• Entomology and Plant Pathology essential • Manufacturing • Other - a few
• Math and Statistics 15 hours' min. • Quality, R&D
• Retail Farm Supply Store
• Chemical, electrical or mechanical engineering • Sales
• Type of Degree not important
• Rural Development Skill - building up rural areas with jobs/housing/water/sewer

Q. # 11: When you have vacant positions, for what proportion of the vacancies in the following fields has it been difficult to find applicants with college degrees?

Answer Options	Always (>90%)	Often (51-90%)	Some-times (26-50%)	Seldom (up to 25%)	Never (0%)	N/A	Count
Mid-level management	5.4%	14.3%	15.0%	11.6%	18.4%	35.4%	147
Entry level management	8.1%	9.5%	16.9%	18.2%	12.8%	34.5%	148
Engineering and technical	4.9%	7.7%	12.7%	7.7%	9.9%	57.0%	142
IT/Computer Science	5.0%	6.4%	13.5%	16.3%	9.9%	48.9%	141
Marketing and sales	5.7%	8.6%	12.9%	16.4%	10.0%	46.4%	140
Business operations	4.2%	11.8%	15.3%	16.0%	12.5%	40.3%	144

Communications & P.R.	2.8%	4.3%	12.8%	11.3%	14.9%	53.9%	141
Waste management	2.2%	1.5%	2.9%	5.8%	10.2%	77.4%	137
Research/education	1.4%	4.3%	4.3%	6.5%	10.8%	72.7%	139
Production & Processing	3.5%	7.8%	14.9%	15.6%	9.9%	48.2%	141
Food/agricultural security	2.2%	3.6%	3.6%	4.3%	7.2%	79.1%	139
						Other (please specify)	5
						answered question	157

Other responses:

- Accounting – Sometimes, HR sometimes
- Always (>90%) Agriculture and Statistics
- Ag mechanization - always
- Field testing and statistical knowledge
- In our nonprofit, these 3 positions are grouped into one which was filled by an applicant with a degree

Q. # 12: What has been the impact of the following on your company's ability to recruit and retain college-educated employees?

Answer Options	Significant (> 75%)	Moderate (51-75%)	Average (31-50%)	Slight (10-30%)	Very Small (1-9%)	Not at All	Response Count
Inadequate subject matter knowledge	16	20	30	35	8	41	150
Lack of prior work experience	10	17	47	26	8	42	150
Lack of interest in relocating	15	20	22	27	7	59	150
Employee expectations not consistent with actual job requirements	19	28	37	23	8	39	154
Employees' promotion and/or salary expectations	20	37	37	21	9	30	154
						Other (please specify below)	3
						answered question	160

Other responses:

- Drug Problems
- Mobility across U.S. (>75%)
- Lack of competent verbal and written communication

Q. # 13: Which of the following methods do you use to recruit college-educated applicants?

Answer Options	Always (> 90%)	Often (51-90%)	Sometimes (26-50%)	Seldom (1- 25%)	Never (0%)	Response Count
Promote from within	9	53	49	15	23	149
Hire current interns	3	10	36	31	64	144
Recruit competitors' employees	0	21	39	29	53	142
Recruit at college career fairs	6	7	24	34	72	143
Use recruiting/search firms	2	14	17	31	78	142
Referrals from employees	5	32	62	25	24	148
University placement offices	3	6	30	46	58	143
Personal contacts at universities	11	17	34	28	54	144
Industry contacts/networks	1	3	9	1	1	15
GeorgiaHIRE.com	0	2	5	13	114	134
					Other Responses	9
					answered question	155

Other responses (number of occurrences in parentheses):

• Craig's list
• Web sites such as www.gsae.org
• Monster.com (2) •
Trade Association Job Sites
• Newspaper ads (2) • Referrals
from members
• We don't currently have any college educated employees

Q. # 14: From which of the following universities have you had most success in hiring college-educated applicants?						
Answer Options	**Always (>90%)**	**Often (51-90%)**	**Sometimes (26-50%)**	**Seldom (1-25%)**	**Never (0%)**	**Response Count**
ABRAHAM BALDWIN AGRICULTURAL COLLEGE	7	18	16	11	75	127
Fort Valley State University	1	3	2	8	103	117
Georgia Institute of Technology	1	3	10	12	91	117
UGA	15	41	33	21	31	141
Other Univ./college in Georgia (Specify)	6	9	17	14	62	108
Auburn University	8	14	13	14	72	121
Clemson University	2	6	6	19	80	113
University of Florida	3	4	9	15	85	116
University of Tennessee	4	1	11	11	90	117
Other U.S. University (Specify)	3	3	10	12	61	89
					Answered question	*150*

Other responses (number of occurrences in parentheses):

• Agnes Scott College • Alabama A & M
• Area Technological Colleges,
• Athens Tech – seldom • Anderson College – seldom •
Austin Peavy State University
• Augusta State • Berry College
• College of Charleston, Macon State
• Colorado State University • Columbus State
• FSU - Seldom
• Georgia College and State • Georgia Southern (13)
• Georgia State
• Georgia State and Western GA • Iowa State
• Kennesaw State
• Mercer (2) • Middle Tennessee State
• Michigan State and Perdue
• Mississippi State (2) • North Carolina State (2)
• NC State – Sometimes
• North Metro Tech. College (2) • Ogeechee Technical College • Ohio State
• Penn State • Purdue
• Samford University
• South Florida – Seldom • Southern Tech, Kennesaw State •
Southeastern Tech Inst
• Southwestern • Stanford, Ohio State
• Texas A & M
• University of Alabama • University of Arkansas
• University of Kentucky
• University of Nebraska • University of North Carolina
•University of Puerto Rico

- University of South Carolina
- University of West Georgia
- Valdosta State University (4)
- West Florida, Okaloosa Walton
- West Virginia – Sometimes
- University of Texas
- Virginia Tech
- Western Kentucky

Q. # 15: How interested would you be in considering the following educational/ training programs for your current workforce?

Answer Options	Very Interested	Moderately Interested	Slightly Interested	Not Interested	Response Count
Job-specific education and training	31	49	31	41	152
Professional development (incl. customer service, team building, cultural competence, leadership)	38	46	37	39	160
Technology training (including agricultural mechanization, computer hardware and software)	25	41	42	45	153
Specific subject matter college course work or certificates	17	27	32	57	133
Basic skills (including written & oral communication, mathematics, statistics)	30	40	33	58	161
Foreign language training	19	26	38	74	157
Other (please specify)					15
answered question					166

Other responses:

- Accounting/finance
- Advanced communications/public relations
- Membership recruitment and retention
- Agronomy and entomology
- Basic fertilizer material knowledge.
- Dendrology
- Farm Appraisals and management
- Food Technology, Food Engineering
- Foreign Language (Spanish)
- GIS/GPS Mapping
- Communication
- Horticulture (2)
- Organic production methods and marketing
- Timber Cruising & Inventory
- Pulp & Paper Technology
- Taxes
- Sales forecasting and budgeting for fertilizer materials
- Manufacturing skills, computer skills, problem solving skills, root cause analysis, Design of experiments

Q. # 16: How helpful would it be to the growth of your company if potential applicants had college-level training in the following subject matter/emphases?

Answer Options	Very Helpful	Somewhat Helpful	Not Helpful	Don't Know/ Not Sure	Response Count
Resource conservation	21	55	45	27	148
Integrated pest management	31	46	52	24	153
Integrated nutrient management	14	41	62	31	148
Bio-diversity	5	39	60	44	148
Waste management	15	43	57	31	146
Biotechnology	14	39	61	36	150
Government and Policy	28	54	43	24	149
Alternative fuel technology	12	54	52	30	148
Production management	40	70	19	21	150
Food/agrosecurity	17	38	62	32	149
Organic/sustainable agriculture	18	36	67	29	150
Precision agriculture	18	37	59	37	151
Agricultural mechanization /engineering technology	18	58	49	25	150
Ag business technology /computers in agriculture	39	54	40	19	152
				Other (please specify)	2

Other responses:

- Statistics 6 Hour Minimum
- Timber - don't know/not sure

Q. # 17: In your sector of the industry, are there any innovations or new technology likely in the foreseeable future that would require new skills or training?

Answer Options	Response Percent	Response Count
Yes - A significant number	10.7%	18
Yes - A moderate amount	34.5%	58
Yes - A few	31.5%	53
No	23.2%	39
If appropriate, please provide more information		34
answered question		168

Additional information provided:

● Ag mechanization/engineering with new equipment and automation
● Alternative energy sources
● ASQ auditing
● Creative solutions to water shortages
● ArcGIS and other mapping skills
● Automated packaging/processing equipment
● Bioenergy
● Bio-fuels (2)
● Biofuel from forest operations
● Biotech (2)
● Computer programs, food safety, GPS
● Computerization of farmers' grain tickets and records

● Constantly changing pesticides
● Energy generation (methane etc)
● Entomology and plant pathology
● Food distribution safety● Fuel alternatives in machinery
● Forest waste bio energy utilization
● GIS/GPS innovations
● Genetics
● High speed equipment
● Internet technology, taxes requirements
● Knowledge of waste-energy solutions and marketing of value-added or organic products
● Marketing skills
● Nanotechnology
● New food applications such as cheese or other volatile food products that are hard to make/keep shelf stable
● New machinery skills
● New pulping technology as part of bio-diversification
● New wastewater treatment systems and engineering software
● Office management/time management
● Organics
● Precision ag, air quality, and energy conservation

● Precision farming technology
● Propagation
● Rain harvest technology
● Safety and quality foods (SQF)
● Statistical process control
● Since we are in the education business it is imperative that our employees stay on the cutting edge of new agricultural technology across the board
● Sustainability
● Total quality and performance skills
● Transportation technology
● The rapid advancement of fertigation in the blueberry industry may demand a more trained worker to operate those systems
● Web based decision models and databases

Q. # 18:	Has your company's expansion efforts or plans been hindered in any way by the quality or quantity of a college-educated workforce in Georgia?				
Answer Options	Yes - A lot	Yes - Some	Yes - A little	No	Response Count
Quality	4	28	26	112	170
Quantity	5	20	23	101	149
If appropriate, please share how plans have been impacted.					21
answered question					173

Reponses to how plans have been impacted:

- College grads don't want to go into our field because it sometimes requires long hours, electrical knowledge, and getting their hands dirty
- Expectations are unrealistic - many college (tech school) graduates expect to run a company when they accept a job. Several that we have hired have ideals that are not consistent with real-world applications. Most are unprepared to work in a multi-cultural environment, and are unwilling to adapt. They easily become disenchanted with the difficulty of the work, the cultural challenges, and the inability to immediately apply textbook concepts to actual work. Planning a future on this volatility is next to impossible.
- Fully Field Trained Forestry workers are hard to find.
- Hard to find applicants that are work force ready
- I find a way to get it done but it usually means more hours from my "brain trust" top employees.
- In recent years many of our management personnel have been hired within from our technical non college educated staff. This has hindered us to a degree in having the leadership and interpersonal skills to deal most effectively with customer and partners. Some of these skills are gained through the "college experience."
- It's mostly the general workforce wanting more pay for less work.
- More hindrance in the area of skilled trades- electricians, mechanics, equipment operators and maintenance people
- Most of our employment is minimum wage manual labor.
- Need folks that know how to get things done, and have a desire to accomplish something work related in their life
- Not college
- Not yet at a stage of hiring for employment in Georgia
- Number of student diversity in turfgrass programs is inadequate. Diversity speaks to students interested in turfgrass other than golf industry. Student numbers too low for industry demands
- Quality people with broad perspective and knowledge of the food industry
- Reduced FTE's, few replacement hires when people retire.
- Very difficult to find qualified candidates for County Extension Agent positions
- We are a seasonal business requiring a varied workforce- college degree not required or needed. On the job training necessary for all employees. Need employees with good common sense and ability to learn quickly. Must have good personality and people skills.
- We are working our skilled professionals longer simply because you aren't making it attractiveness for young people to seek an agriculture future. We prefer home grown with hands-on experience and will pay for it. Not too interested in background developed in other parts of the world lacking similar practices.
- We have been unable to find anyone with a college education interested in working as a farmer
- We have had difficulty hiring qualified candidates in some of our more rural and remote counties.
- Work ethic that limits expansion. Wants position that's ACC, work ethic that earning to company funds expansion and growth

Q. # 19:	In considering your future need for college-educated workers, which of the following programs would be important to the growth of your company?				
Answer Options	Very Important	Somewhat Important	Not Important	Don't Know/ Not Sure	Response Count

Access to a university-managed resume bank	34	65	32	26	157
Established internship programs	36	68	33	21	158
University sponsored on-site instruction	19	61	45	30	155
University career centers specifically for students majoring in ag-related degree programs	4	8	3	2	17
				Other (please specify)	1
				answered question	160

Q. # 22: I would like to receive a copy of the final report:

Answer Options	Response Percent	Response Count
Yes	77.7%	94
No	22.3%	27
	answered question	121
	skipped question	79

Q. # 23: If necessary, may we contact you for further follow up about the study?

Answer Options	Response Percent	Response Count
Yes	82.9%	126
No	17.1%	26
	answered question	152

Q. # 20:	What changes in degrees and curricula would you recommend to the University System of Georgia so that it could more readily respond to anticipated changes in the U.S. agribusiness industry?	
Answer Options		Response Count
		78
	answered question	78
	skipped question	122

Responses:

Responses Provided by Survey Participants to Question About Changes in Degrees and Curricula to Improve Responsiveness
A. Programs - Curriculum Content
Fluency in Spanish (Mexican version);
Degrees in food processing and manufacturing, management, or engineering with an emphasis in a commodity, meat, poultry, vegetables, fruits
grain merchandising
More emphasis on agricultural government and policy
Ecosystem Management; Endangered Species Habitat Management; GIS/GPS Field Use and CPU; Software Expertise; Wetland Recognition, Analysis and Protection; SE Forest Pest ID and Suppression; Prescribed Fire management
Food technology, Government food law and regulations.
More real business world curricula, in form of sales training, marketing, and budget writing.
communication
Curricula should be developed to prepare students for workforce entry. Students need additional training in practical arenas. Check turf programs at Miss State and Auburn.
Do you have anyone studying/specializing in Georgia Produce like Vidalia Onions? Because these 'niche' crops are big numbers to the state's economy.
Banking/Finance -> Accounting, Business Law
Ability to understand the Farm Bill
more business applications; real world; leadership, coaching and building a successful business and team
Emphasize written and oral communication.
Impact of Biofuels
Studies in Ag Policy/Government affairs; Studies in new technologies and studies in marketing of those new technologies and/or value added products
According to an FRA Survey, the average age of people that owned logging areas in the US is 57 years. I think we need to train people in this field, including accounting and business management
Develop hands on experience with all types of agricultural marketing. Offer more in the area of agricultural policy and the understanding of the historical perspective.
More policy courses and financial management courses
Prepare students for international agribusiness, Alternative Fuels, Water management
Hunting and Shooting Preserve Management
Require 6 hrs. in statistics for agricultural econ undergrad degree
Introduction to government, especially relating to immigrant workers. Introductions to psychology - this helps in dealing with teammates, customers, and more!
Requirement of interpersonal communication, focus on completing assignments through teams.

Responses Provided by Survey Participants to Question About Changes in Degrees and Curricula to Improve Responsiveness
Basics of fuel alternatives and implementation
For managers only, important training -1) business management; 2) Accounting: 3) human relations labor laws/rules
1. Emphasis on production agriculture, more agronomists, entomologists, and horticulturist and mechanical engineering 2. the biggest need for businesses is work ethic
More business and management classes for Poultry Science Majors
Some current degree programs are too specific. Need more candidates with broader range of expertise.
Continue Basic Egg Laying Training
required - forest pathology and entomology; forest conservation; forest policy - governmental
Stress Economics!
food safety; legal issues regarding FSA and natural resources, especially water rights; advancing technologies in ag; ag marketing for sale of produce and advertising of produce
food packing technology
More written and oral communication classes.
More on Government Programs and Impact of FSA program including price support and conservation
Offer a Natural Resource Conservation Degree in the College of Ag Digital mapping Customer service and communications Management/Leadership training
Put back into force short courses on production methods, especially organic and sustainable.
B. Programs - Hands-on Learning
Additional Internship opportunities
Hands On Training, Pass EIT/FE before graduation, mandatory internships.
We need more internship opportunities for students. I find that most college grads have a basic understanding of bird health but very little knowledge of poultry processing.
More Internships so that students can get an idea of what it is really like to work for a living. UGA students seem unable to get their hands dirty.
More on job training/internships perhaps at 2 different locations during 4 years college Business courses - how to make a profit- common sense business classes - the need for ETHICS in business
Make the internship program REAL. More hands-on technical training. More basic mgr/leadership training.
Instill the desire to sweat and earn a honest living
To encourage students to get the most diversity and training not in classroom but real world experience.
On-site Training; Co-op Program Requirement
More hands on experience. Most people have never had a job when they graduate from college and we find this generation lazy.
More hands on experience rather than so much technical book learning.
More on farm training at the top facilities in Georgia. Taking Ag and Vet students out to actual good working farms.
Credit for on the job training (internships) and less emphasis for core curriculum.
more industrial type maintenance and PLC training
C. Programs - Skill Development
More people skills and problem solving skills. More business skills in the technical curriculum
More emphasis in skills training programs at local technical colleges
D. Higher Education Structure

Responses Provided by Survey Participants to Question About Changes in Degrees and Curricula to Improve Responsiveness
Most agricultural degrees in Georgia are obtained at UGA. Many students who desire to study agriculture don't meet the entrance requirements at UGA. Loosening entrance requirements for transfer students is helping. 4 year program at ABRAHAM BALDWIN AGRICULTURAL COLLEGE should help.
The 4 year degree being offered in Tifton is a very good example of the kind of support staff we need.
Accept that agriculture really doesn't happen in Athens and get faculty out in the field. By the way agriculture is not within the city limits of Atlanta nor does it require knowledge of social programs.
More support to land grant college of agriculture and establish each school as a center for expertise or a collective of expertise in a given area instead of a hodgepodge of academics without a common focus .e.g., Food Science
More Communication with farmers, agribusiness and advertising
Make more ag related courses available at community college, i.e. Darton College.
E. Other, No recommendations, Not Applicable
Our company is small; employees (current and future) are required to perform several manual labor-type duties. Our company philosophy requires hands-on labor to lend itself to improvement in management practices.
Food security will become a major issue as more production goes off-shore. We should maintain our ability to grow our own food crops and not let the technology escape us.
The majority of our workforce does not require a college education, but the ability to be a laborer.
Don't need a college degree.
Produce better and more school teachers.
We are just on the fringes of Agribusiness. We manufacture blow molded plastic drums, fiber drums and Intermediate Bulk Containers that are used for a variety of industries. As it relates to Agribusiness, they are used for Agriculture Chemicals, liquid food ingredients, etc. Our needs are in Mechanical & Electrical Engineering, Production Management, etc.
Ours is a manufacturing plant and all the employees are sowers, so really they don't need to have a college degree as long as they have the skill to sow, but I am sure in a different field that would be very important. Thank you
We are a farm. I (managing partner) have a college degree in accounting. I do use this knowledge in my business. But: all employees are seasonal or part time. I don't see this changing in the future. A college degree is not important in hiring employees.
Our Industry requires semi skilled blue collar workers. Welding, basic mechanical work, painting. You can't get college grads to do this kind of work for this level of pay.
We are an in-ground tree farm. What we need is an easier way to keep and maintain our Hispanic work force.
The turnover at the Georgia National Fairgrounds and Agricenter for college graduate level jobs is extremely low- The GNFA is a facility rental state facility- we host events from agricultural to wedding receptions- our mission is to provide a first-class venue for competitions, entertainment, exhibitions, expositions meetings, and trade shows and to show case Georgia and Agriculture/Agribusiness- one of our top priorities is to promote the agricultural achievements of Georgia's young people- (4-H/FFA GNFA also hold the Georgia national fair each year in October.
This is captured in the answering of question 7
None-Not Applicable with my company
I don't know that I would change anything
Current Degrees ok
None (2)
Not familiar enough with degrees and curricula to make reasoned recommendation.
Not Sure (3)
unknown - we mostly hire engineers