

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

FINAL REPORT

Prepared for

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Executive Summary

Sponsorship and Purpose of Study

In an effort to better link the University System's intellectual capital to the needs of Georgia's agribusiness enterprises, the University System of Georgia's Office of Economic Development (OED) commissioned the Center for Agribusiness and Economic Development (CAED) at the University of Georgia to conduct an Agribusiness Workforce Needs Assessment. As part of the project, a survey was conducted to gather information about the industry's current and future workforce needs and the types of skills required to support economic growth in the State. Specifically, the research was designed to ascertain the college-educated workforce needs of the agribusiness industry and the System's ability to meet those needs.

The Broad Focus: What are the agribusiness workforce needs?

Rationale: To ensure that degree programs within the University System are relevant to the current and future needs of the agribusiness industry.

As part of those efforts, this 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 stakeholders. The survey allowed participants the opportunity to identify their current and future workforce needs and served as the basis for the evaluation of current programs and future needs.

Outline of Report

This report provides the findings of the research study and an analysis of the data reflecting the current and future demand for and supply of college-educated workers in Georgia's agribusiness sector. The study includes the following

- A discussion of Georgia's economy and the significance of agribusiness to the economic health of the State.
- An inventory of degree programs and a gap analysis of the supply of college-educated workers relative to industry demand. This includes an assessment of how well current degree programs match current and future workforce needs.
- An analysis of the graduation data by CIP and degree award level within the University System of Georgia.
- The results of a survey of agribusiness employers' needs for college-educated workers and the desired knowledge, skills and attributes necessary to meet those workforce needs.
- The development of recommendations for future programs and the identification of some 'best practices' from other institutions of higher education.

The report is organized into six chapters as follows:

- ▶ Chapter 1 – Introduction to the Study
- ▶ Chapter 2 – The Economic Significance of the Agribusiness Sector
- ▶ Chapter 3 – The Demand for a College–Educated Workforce in Georgia’s Agribusiness Industry
- ▶ Chapter 4 – The Supply of College Educated Workers for Georgia’s Agribusiness Sector
- ▶ Chapter 5 – Projected Employment Opportunities and Potential Gaps
- ▶ Chapter 6 – Implications and Recommendations

Summary of Findings

■ Labor Market Analysis and Recommendations

The demand side of the market for college-educated workers in the agribusiness sector will be influenced by two factors:

1. The estimated numbers of workers needed to produce the projected demand for agribusiness products and services (quantity of labor demanded); and
2. The ability of the higher education system to graduate a college-educated workforce that reflects the kinds of skills sought by agribusiness employers (quality of labor demanded).

The quantity of labor demanded is calculated by the Georgia Department of Labor (DOL) as the total annual openings from two sources:

1. Employment growth – from the creation of new jobs/positions due to business expansion.
2. Replacements- due to such factors as retirement, relocation, or labor shifts to other occupations and industries.

Both sources of jobs play an important role in the growth of the workforce in Georgia’s agribusiness sector. Analyses conducted by the DOL provide projections as to the number of jobs required each year over a ten-year period to meet the state’s economic demand. These projections are made on the basis of the “typical” or average education and training requirements necessary to fill those job openings. For Georgia’s economy, growth in total job openings in the agribusiness industry is projected to increase about 1.4% per year into 2014. Workforce growth projections for demand for college-educated workers in the agribusiness industry are slightly higher, at an annual growth rate of 1.5%. The conclusion to be drawn from the DOL projections is that occupations that require postsecondary education (awards of certificates and degrees) will grow faster than the state average for all occupations. This growth will be led by job openings (from growth and replacements) of more than 1,400 for persons with bachelor’s degrees or higher.

On the supply side of the market, the USG currently offers 151 degree programs and majors in agribusiness and allied disciplines ranging from certificates of less than one year to doctoral degrees. The majority of these (79) are offered at the University of Georgia. Although agribusiness degree programs are also offered at Fort Valley State University and Abraham Baldwin Agricultural College, agribusiness employers had greater success in hiring University of Georgia graduates than those from the other two institutions. It should be noted that this difference in success rates reflects

only the number of graduates hired and is not indicative of the quality of the graduates or of their performance in the workplace. The source of the difference appears to be based on the total number and types of programs offered, the numbers of students matriculating through the programs, and the relatively shorter period over which some programs have been available at Fort Valley State University and Abraham Baldwin Agricultural College. Considering all award levels, the System graduated an average of 754 students in core and allied agribusiness programs over the 2002 - 2006 academic years, a small portion of the System's average annual graduates of more than 42,000 over the same period.

Recognizing that studies of labor market trends are imprecise and largely influenced by the validity of the economic assumptions made and the quality of the available data, the study elected to analyze the data in terms of the implications emanating from the trends rather than estimating precise quantitative labor market gaps. Using three different economic assumptions about the labor market, the analysis consistently predicted an agribusiness labor market mismatch in the form of a shortage of job seekers who hold at least a college degree. Some of this labor imbalance (where the number of potential job applicants is projected to fall short of the projected number of job openings) may be corrected by in migration of college educated workers from other parts of the U.S. Indeed, agribusiness employers surveyed indicated that, following the University of Georgia and Abraham Baldwin Agricultural College, Auburn University was a major source of recruits for available agribusiness positions that required a college education. Addressing such labor shortages will require the establishment and expansion of effective public/private partnerships with agribusiness industry employers to respond to and anticipate forthcoming changes in the labor market. While the agribusiness sector is expected to grow at a rate of only 0.2% annually until 2014, the size of that industry means that an additional 9,000 jobs will be created annually due to growth and replacement to the year 2014. Of that amount, 15% will require an associate's degree or higher, creating positions that could be filled within the State by ensuring an adequate supply of college graduates with the requisite technical knowledge and professional skills.

Results from the survey of agribusiness employers provided much insight into the qualitative analysis by identifying those 'soft' skills that are critical to the composition and size of the agribusiness workforce and that influence the quality of labor demanded. From the results, it is evident that one of the challenges that must be faced in the agribusiness labor market is the gap between the skills needed by agribusiness employers and the curriculum content of major agribusiness-related degree programs. Although satisfied with the level of technical knowledge provided in the college education received by employees, employers were less pleased with the professional skills demonstrated by their college-educated workers, noting particular shortcomings in the levels of team building, initiative, leadership, and communication skills demonstrated by their college-educated workforce. Employers appeared to be more concerned about the quality of college-educated applicants in terms of the match between their skill sets and the job requirements than of the quantity of graduates in the labor pool. Although no severe labor shortages were projected in the System's ability to meet the demand for college-educated labor in the agribusiness sector, what may be the bigger challenge is meeting the industry's needs for critical thinking skills, leadership/initiative, and communication skills in new hires. Most respondents indicated that the growth of their companies was not limited by either the quality or quantity of graduates produced in Georgia. However that level of satisfaction does not transfer to their perceptions about graduates' skills or with the depth of preparation provided by an otherwise knowledge-based curriculum.

Overview of Recommendations Made

Without question, Georgia's agribusiness industry has played, and will likely continue to play, a critical and strategic role in sustained economic growth in the State. However, changes in the structure of the State's economy, due largely to national and global economic shifts, will result in substantial changes in the structure of production. This has already been observed in textile and apparel manufacturing where job losses had led to changes in the relative share of those

enterprises in the State's economy. Considerations of workforce demand and supply conditions cannot ignore these shifts over time and their impacts on projections made over a ten year span. As Georgia's competitive advantages change with national and global competition, the link between higher education and industry needs will be all the more important in ensuring that graduates possess the skills and knowledge needed to support changing industries. To support these changes, the following recommendations are offered:

A. Build Stronger Public/Private Partnerships

This would necessitate an enhancement of the connection between the agribusiness industry and the higher education community through more transparent communication channels that allow for clear and frequent discussion of the issues so as to identify and implement effective solutions.

Best Practices Recommended for Adoption

- ▶ Establish faculty and student relationships with professional organizations such as the University Food Industry Coalition to provide additional opportunities for faculty and student research.
- ▶ Create an interdisciplinary research program that connects faculty to industry leaders to identify and explore agribusiness-related issues and concerns.
- ▶ Establish and/or enhance relationships (through a designated liaison) with the USDA's Student Career Experience Program to provide internship and job opportunities for students and graduates.
- ▶ Establish and/or expand opportunities for academia and industry representatives to interact on relevant industry developments and needs. These discussions can be facilitated through seminars and workshops.
- ▶ Develop a catalog of industry leaders, by enterprise/commodity, who might be available, across the State, to serve as guest lecturers, hosts for interns, volunteers on advisory boards, etc.

B. Promote the Business of Agribusiness

Employers' requests for more generalized knowledge of the business side of agribusiness could be accommodated by incorporating management and entrepreneurship training across the curriculum, in a manner similar to the internationalization initiative implemented several years ago. The message from employers of the need to refocus attention away from a heavy reliance on learning the text book material toward the development of such skills such as initiative, problem-solving, and collaboration should not go unheeded.

Best Practices Recommended for Adoption

- ▶ Develop an introductory class on the economics of agribusiness at the freshman level that lays the foundations of agribusiness principles. Can be team taught as an elective in Area B and taught in agribusiness or business colleges.
- ▶ Require a capstone course designed with the objective of integrating the agribusiness curriculum through hands-on applications, research, oral and written presentations, and case analyses.
- ▶ Incorporate business and management concepts into existing production/technical courses so that students understand the application of the technical knowledge to the management of the enterprise.

- ▶ Develop interdisciplinary courses that can be cross listed across campus that integrate agriculture and agribusiness concepts through case studies, applied research, and group/team approaches.
- ▶ Introduce an interdisciplinary, introductory seminar course on *Georgia's Strategic Industries* at the freshman level that discusses Georgia's economy, the challenges and opportunities available in those industries, and the degree programs within those industries.

C. Expand Opportunities for Hands-on Learning

The development of professional skills could be enhanced in program curricula through more hands-on learning opportunities such as internships, job shadowing, and cooperative employment experiences that allow students the opportunity to interact with industry professionals.

Best Practices Recommended for Adoption

- ▶ Introduce a required introductory agribusiness orientation course for students admitted into the major/minor. It could also serve as an elective and recruitment tool for undeclared students.
- ▶ Given the significance attached to this experience by employers, explore the addition of hands-on student learning experiences through a practicum course or a required internship in the major.
- ▶ Introduce a 'Professional Practices Course' that allows students to identify the soft skills with the technical knowledge needed to succeed within their career fields.
- ▶ Incorporate more interactive instructional methods into major classes that allow for discussion and team projects, analysis of case studies, computer simulations, etc. in applying business concepts to agricultural-related problems.
- ▶ Revamp programs offered through career services offices that prepare students for careers by expanding program offerings to include enhancement of soft skills in addition to resume writing and interviewing techniques.

D. Introduce More Flexibility in Curricula and Program Design

This recommendation sprung from the perception among some survey respondents that current degree programs are too subject-matter specific and that employees needed a broader range of expertise to succeed in the current agribusiness climate.

Best Practices Recommended for Adoption

- ▶ Explore the development of additional course work/electives in programs not currently available across the University System. The development of new business or agribusiness courses should focus on those fields where interest is highest among employers and for which institutions nationwide have experienced steady or increasing enrollments in the most recent years.
- ▶ As an alternative to the previous recommendation, efforts should be made to redesign existing courses to incorporate emerging topics in agribusiness such as the legal, ethic, and political environment of agribusiness, sustainable agriculture, and technology and production systems management.
- ▶ Introduce into degree programs the option for self-designed, interdisciplinary studies majors/minors that allow students the ability to incorporate experimental learning options in

courses taught by faculty across the university and external to the university (through distance learning technology options).

E. Establish a USG Workforce Development Strategy

The recommendations from agribusiness employers pointed to the need for the University System to develop a comprehensive workforce policy. The goals of such a program should be linked to the goals of the Commission for a New Georgia on workforce development focusing on developing the student from matriculation through job placement and career growth. Given that increases in the supply of graduates is a long-term process of at least three years, on average, beyond the completion of core requirements, the expansion or addition of programs must be forward thinking, looking toward changes at the national level in consumer demand for alternative energy and bioenergy, 'green' technology, sustainable production methods, and agrotourism.

Best Practices Recommended for Adoption

- ▶ Modify the University of Georgia's Bachelor of Science in Agriculture with an honors interdisciplinary studies major and extend its availability as an external degree.
- ▶ Develop a system to track USG graduates as they enter the workforce.
- ▶ Develop a state-wide internship program.
- ▶ Create career services centers with enhanced employer-focused missions.
- ▶ Negotiate cross institutional agreements for collaboration that allow faculty members to enhance their levels of agricultural literacy and develop cross discipline solutions to agricultural problems. Arrangements can also involve faculty exchanges/externships with the business community.

Future Implications

History has clearly demonstrated that labor shortages can and have been mitigated by increases in labor productivity through investments in capital and technology. However, there is no such cure for addressing skills shortages beyond taking the issue head on with proactive solutions that create opportunities to acquire those skills. Participants in the Agribusiness Needs Assessment Survey were very clear in expressing their opinions that these skill shortages are urgent and must be addressed through the expansion of hands-on industry experience provided through internships and similar hands-on learning opportunities. Further, many participants stressed the need for the creation of curricula that are flexible and responsive to changes in the structure of Georgia's agribusiness industry. Responding effectively to these perceptions and expressed needs will be a critical determinant of the degree to which the University System can effectively meet the needs of agribusiness employers. The results of the study suggest that significant returns on investment can be earned from building agribusiness curricula that marry adaptability to industry changes. However, such flexibility should not ignore the need to maintain the current level of technical and scientific knowledge imparted in the curricula that will be critical to the growth of Georgia's agribusiness industry. That so few of the respondents depended on resources within the System to meet their recruitment needs or have had any formal contact with the institutions about program design or course content speak to the need for enhanced public/private partnerships between the University System and the agribusiness industry employers. Survey participants frequently echoed the lack of opportunity to provide input into curricula and their interest in reaching qualified applicants in a cost-effective manner. Respondents expressed their gratitude at being afforded the opportunity to express their needs and for the establishment of this initial link between the higher education and business communities. More than half of the 200 survey participants requested a

copy of the report (77% of the 121 who provided a response to the question) and $\frac{3}{4}$ of the 200 survey participants (83% of the 152 who provided a response to the question) welcomed the opportunity to be contacted further about the study.

Considerations of workforce demand and supply conditions cannot ignore the comparative shifts in production and efficiency over time and the impact of those shifts on labor market projections for the next decade. As Georgia's competitive advantages change with national and global competition, the link between higher education and industry needs will be all the more important in ensuring that graduates possess the skills and knowledge needed to support changing industries. As labor demand shifts, higher education must stand ready to expand and contract programs and redesign curricula. This point is made clear by Chaffee who stressed the importance of viewing employers as "customers of institutions of higher education." As he stated "like it or not, and whatever else may be in the mission statement, preparing future employees is absolutely fundamental to the purpose of all postsecondary education."¹ That the University System recognizes that role it must play in building the State's strategic industries has not gone unnoticed. Attempts to enhance those links will be to the benefit of the System's graduates and the State's economy. The success of the System's workforce development efforts will depend, in large part, on its ability to respond to employers' needs.

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¹ Chaffee, E. E. (1990). "Strategies for the 1990s". In L. W. Jones & F. A. Nowotony (Eds.) *New directions for higher education: An agenda for the new decade*. San Francisco. Josey-Bass, Nov. 1990, pp. 59-66, cited in Carmelita A. Acciola.

Chapter 1: Introduction to the Study

Project Overview

The Office of Economic Development (OED) of the University System of Georgia (USG) commissioned the Center for Agribusiness and Economic Development (CAED) at the University of Georgia to conduct an Agribusiness Workforce Needs Assessment to determine the college-educated workforce needs of the agribusiness industry and the System's ability to meet those needs.

The project grew out of the recommendations from the Commission for a New Georgia, a non-profit corporation appointed by Governor Sonny Perdue and led by CEOs and senior executives from all parts of the State. With a mission to enhance the State's ability to manage and use its resources, the Workforce Development (WFD) Taskforce, a part of the Commission, found that there was a need for the State to strengthen the connection between the business and education communities by graduating and training potential workers with the skills employers need. It was anticipated that this strengthened connection would improve the responsiveness of the State's education system to the present and future skill requirements of Georgia's business and industries. A key finding of the WFD Taskforce was the prediction that the current workforce training system will fail to produce the skilled talent pool that will be critical to Georgia's future economic growth, a prediction that, if not remedied, could spell trouble for the State's economic stability and its ability to meet the rising costs of social services. The Commission established a goal of having the agribusiness sector ranked as one of the Nation's top competitors by 2020. To accomplish this goal, the Commission recognized the need to effectively leverage the State's human capital and other resources to support the sector's growth.²

So as to remedy that prediction, efforts ensued to make the educational system more responsive to and supportive of the needs of the 'strategic' industries, including agribusiness, on which the State's economic growth depends. A key component of this enhancement process involved obtaining input from agribusiness leaders and tapping into their experience and expertise in creating a relevant framework on which to build the preparedness of the University System's college graduates for future employment. The intent is to make Georgia's higher education system a national model of productive connections between higher education and business and industry.³

As part of those efforts, the CAED has now completed the initial study of the workforce needs of the agribusiness industry that provided stakeholders with an opportunity to express their workforce needs and to guide the System in evaluating current programs and future needs.

This report, based in part on that study, explores whether the USG's degree programs are relevant and can respond to the anticipated changes in workforce demand based on projected changes in the State's economic structure, particularly in the agribusiness industry. Specifically, this report attempts to answer four key questions and provide recommendations based on the responses to those questions as follows:

- What is the likely source and size of future employment demand from the agribusiness industry for college-educated workers?
- How does the demand for college-educated workers compare to the supply of graduates produced by the System in key agribusiness degree programs?

² Commission for a New Georgia Work Force Development Task Force Final Report, October, 2004. Ann Cramer, Chair. p. 8

³ Ibid.

- ❑ Does the USG have the capacity to support Georgia's long-term college-educated workforce needs by producing graduates who possess the knowledge and skills desired by agribusiness employers?
- ❑ What current programs and innovative strategies will be necessary within the USG institutions to respond to the needs of the agribusiness sector so that the knowledge and skills acquired in college by those seeking employment match future employment opportunities?

Project Objective

The main objective of the project is to improve the USG's responsiveness to the workforce needs of the agribusiness industry by identifying:

1. The types of skills required to support agribusiness economic growth in the State
2. The degree programs offered through USG institutions that reflect the workforce needs of the agribusiness industry
3. The degree programs and skill set development necessary to reflect the current and future workforce needs of the agribusiness industry
4. The bottlenecks in the pipeline of post-secondary participants in Georgia with college-degrees and/or field experience (through internships, cooperatives, apprenticeship programs)
5. Potential degree programs and training solutions to address the potential skills gap likely to result from the impending retirement of large segments of the agribusiness workforce

Specific goals, as outlined in the service agreement between CAED and ICAPP, include the completion of an inventory of the State's supply and demand of the agribusiness workforce to determine the college-educated workforce development needs of the agribusiness industry and the USG's current and future ability to meet those needs.

A full inventory of USG institutions' offerings in agribusiness-related disciplines and programs was completed to provide a framework for conducting an assessment of the academic programs currently offered. To support those assessment efforts, the following research activities were undertaken:

1. An estimate of the current and future agribusiness industry college-educated workforce
2. A projection of the future needs (hiring, training, and retraining) for college-educated workers by Georgia and US agribusiness industries
3. The creation of a listing of current higher education program offerings within the USG to develop (train and retrain) the relevant workforce
4. The identification of specific, measureable, and attainable recommendations for workforce education and training in Georgia's higher education system

The bottom line was to provide decision-makers with the information needed to make decisions about the future development of academic programs that would support Georgia's agribusiness industry by developing a proficient, well-educated workforce.

Research Methodology

Background:

In preparing this report, the authors undertook research and analysis of secondary labor market and economic data, conducted focus group and individual interviews with Georgia agribusiness leaders, and administered a comprehensive survey to Georgia agribusiness producers among all relevant North American Industry Classification System (NAICS) codes to address the following questions:

1. What is the supply of and the demand for agribusiness-trained college graduates?
2. What are the training needs – where do gaps exist in terms of demand from agribusiness employers and the current and projected availability of graduates?
3. How would new developments/future trends in the agribusiness industry impact the future labor demand?
4. What are some national best practices that could be adopted and/or modified to suit the needs of Georgia's agribusiness sector?

In addition to the quantitative analyses of the secondary data, the study included consultation with employers through one-on-one interviews. The interviews were used to supplement and validate the secondary data.

The report examines the agribusiness labor market demand and supply. The labor market demand is computed from industry and occupation growth projections in those sectors within the relevant NAICS codes and for those occupations for which post-secondary education is typically required. The labor market supply is calculated from data on graduation by degree programs within the relevant NAICS codes. Following the analyses of potential gaps in supply and demand within the University System of Georgia, key findings are used to develop appropriate recommendations to address the identified gaps.

The intended goal was to examine long-term projected trends in the demand for college-educated workers for sectors and occupations relevant to the agribusiness industry using data for the period 2000 to 2016. Industry sectors were identified using the 2000 NAICS at the five-digit level for the State's 12 service delivery regions (as defined below).

Survey Participants:

The researchers sought to identify the major agribusiness companies in Georgia in terms of employment. Since it was not possible to identify the major employers of college-educated workers, major agribusiness employers were selected based on the size of their workforces and/or their memberships in selected agribusiness organizations. The survey sample was drawn from among the top employers from the agribusiness-related NAICS codes using a database purchased from *Selectory* (a Dun & Bradstreet electronic business database at www.Selectory.com). Surveys were distributed to agribusiness employers with ten or more employees in all relevant NAICS codes (see below for list of relevant codes). In addition, all members of the Georgia Agribusiness Council who were not included in the *Selectory* database were included among the survey recipients. As a result, surveys were distributed to a total of 1,994 employers, including multiple locations of the same company providing that there was no duplication of product or service among the locations. Following the initial distribution of surveys, reminder postcards were mailed to all recipients who had not yet responded by the follow-up date. All participants were provided the option of completing the survey electronically or using the hard copy questionnaire received by mail. The estimated time to complete the survey was approximately 30 minutes. Unfortunately, the purchased database information was not wholly accurate, resulting in mail returned by the postal services for various "non-deliverable" reasons, including incorrect addresses. As a result, the total 'undelivered' surveys were 142. By the end of the survey response date, 200 completed surveys were returned. The response rate is, in part, a reflection of the typically lower rates for blanket mail surveys and the time of year administered. As Pennings et al. reported, "June is one of the worst months for [persons involved in agriculture] receiving a mail survey, with January and February being the preferred months for receiving questionnaires. This timing preference is overwhelming, with 63% of the farmers indicating that January or February are the best months to complete a survey."⁴ Unfortunately, given the project timeframe, the timing was unavoidable. That matter could be addressed in future follow-up research. We are hopeful that

⁴ See Pennings et al.

a continuation of this research will afford us the opportunity to solicit information from agribusiness sub-sectors that we were unable to contact in this phase of the study.

In addition to the surveys, one-on-one interviews were conducted with approximately 10 companies. These interviews sought to obtain more focused information from key employers who might have been hesitant to provide such information in their survey responses. The original intent was to conduct more one-on-one interviews but an unfortunate set of circumstances forestalled those activities. Again, it is our hope that a continuation of this research will afford us the opportunity to contact those companies with whom interviews have not yet been completed.

Secondary Data:

Projections of future demand are based on secondary data provided by various state and federal agencies and the University System of Georgia. Specifically, projections of industry growth combine data from the Georgia Department of Labor, for the period 2004 – 2014, and the US Department of Labor, for the period 2006 – 2016 (the latest available data). As such, some assumptions and adjustments were necessary in comparing the two sets of data.

The U.S. Department of Education's National Center for Education Statistics, the U.S. Department of Agriculture's Food and Agricultural Education Information System (FAEIS), and the Occupational Supply and Demand System⁵ were used as the primary sources of enrollment and graduation data as they provided downloadable files from which data analyses could be conducted. Since these sources rely on institutions to self report the information, the data are accurate only to the extent that such reporting is accurate and timely. In some instances, such as missing data for Abraham Baldwin Agricultural College (ABAC), University System of Georgia data were used. However, use of the USG files was limited to supplementing missing data since they were not downloadable.

Additional sources of data included the Bureau of Economic Analysis (BEA), the US Census Bureau's County Business Patterns, the U.S. Bureau of Labor Statistics (BLS), and the U.S. Department of Agriculture (USDA).

Data Analysis:

The methodology used to project demand for labor combined the traditional "industry" and "occupational" approaches to labor demand forecasting⁶ to better suit the particular nature of the research. In essence, the projections are based on occupational trends within the agribusiness industry only, identifying growth and declines by occupations and education requirements where college-level agricultural-related training is most typical. Since the study's focus is tied to college-educated labor in only one industry, this approach allowed the researchers to focus only on those occupations most relevant to the agribusiness industry. Thus, occupations for which agribusiness training may be applicable but not necessary (such as market and survey researchers, real estate agents, insurance agents, or public relations specialists) are not included in the demand estimates. In addition, training acquired in degree programs outside the relevant agribusiness-related CIP codes but adaptable to agribusiness (such as the traditional business degrees in marketing, management, or accounting) are excluded from the estimates. Much of the analysis will focus on occupations with largest growth rates due to the creation of new positions and net replacements due to labor market attrition.

⁵ Data on the OSDS site are collected, analyzed, and maintained by the Georgia Career Information Center, Georgia State University for the U. S. Department of Labor. The site is located at <http://www.occsupplydemand.org/>.

⁶ The industry approach is based on predicting the labor needed to fill potential positions in those industries for which growth rates are predicted to be highest. The occupational approach calculates labor demand estimates for those occupations projected to reflect the highest rates of growth across industries. Further discussion of these approaches can be found in Lowry et al,

Data Issues and Words of Caution:⁷

This study of the State's agribusiness labor market for college-educated workers is based on projections of future industry and occupational changes. Forecasts of future demand and supply are, at best, only educated estimates based on time series data and informed assumptions about factors that affect labor markets. Such factors may include changes in technology and levels of productivity, consumer demand, and global competition. While the forecasts can be useful tools for policy formulation, the fact should not be ignored that they are based on static assumptions about dynamic future labor market events subject to differing opinions and interpretations among economists. That the labor market is, of itself, dynamic, responding to the volatile consumer goods market is certainly attested to by the current economic conditions. Thus, although it is feasible, and acceptable, to use time series trends to project future labor market variables, it must be noted that the gap analysis is not entirely 'gospel'. Hence, to determine exact values for shortages (or surpluses) would be more risky than necessary.

It should also be noted that estimates of the available supply do not include the numbers of graduates from institutions within Georgia that are not members of the University System or from institutions outside the State whose graduates may migrate to fill positions in Georgia. In addition, out-migration of USG graduates to other states is not accounted for in the gap analysis. Nor does the analysis reflect the fact that positions requiring a college education as a minimum qualification may be filled, for any number of reasons, by persons lacking such qualifications. Further, while the report includes data on degree completion, no estimate is made of relevant skills acquired in college as reflected in the needs expressed by the survey respondents. In addition, given the wide applicability of business training to agribusiness, the notion of predicting quantities of shortages (or surpluses) with absolute certainty is made more difficult. Therefore, the "gap" may be over or underestimated and should be viewed only as an estimate of the likely trends.

The limitations of economic forecasting are further compounded by data suppression issues existing in the data obtained from the Bureau of Labor Statistics and the Georgia Department of Labor. State and federal agencies are legally precluded from releasing data at a detailed level if such disclosure would violate the agencies' commitment to preserving the confidentiality of specific companies or individuals. As such, publicly available information for certain sectors of the agribusiness industry and the labor market was suppressed, thereby limiting the researchers' ability to make wholly accurate projections. This is particularly true for estimates of employment openings for master's trained graduates reported in the Georgia Department of Labor (DOL) data.

Thus, it is advisable that the findings of the gap analysis between future supply and demand in the agribusiness labor market be interpreted in light of the data shortcomings and the limitations of economic forecasting. Assuming no major changes in the conditions under which the forecasts were developed, the analysis serves the purpose for which it was intended; simply as a guide in discussing potential scenarios. Any differences in the supply of and demand for college-educated workers must bear in mind that the labor market is subject to volatility due to the impact of factors outside the purview of this research. Nonetheless, with these constraints in mind, the researchers sought to provide the best estimates of future gaps using the most accurate available data, sound economic modeling theories, and reasonable assumptions about future economic trends. The approach taken in this report was to predict the existence of labor market gaps only in terms of likely scenarios so as to provide a range within which the estimates would fall. In addition, the results of the agribusiness employer survey served as a useful tool to validate the findings based on the economic modeling. The survey data can be interpreted to be a projection of employers' perceptions of future needs based on current economic conditions in 2008. As such, the perceptions, trends, and needs expressed by the survey respondents were used as the primary basis on which the recommendations for change were developed.

⁷ The discussion about data limitations draws heavily from a similar study conducted in January 2007 by the North Carolina Commission on Workforce Development.

Definition of Terms

Defining “college-educated”:

The report used the 11-category definitions of educational attainment defined by The Office of Occupational Statistics and Employment Projections of the U.S. Bureau of Labor Statistics (BLS).⁸ These categories⁹ are as follows:

1. First professional degree
2. Doctoral degree
3. Master's degree
4. Bachelor's or higher degree, plus work experience
5. Bachelor's degree
6. Associate's degree
7. Postsecondary vocational award
8. Work experience in a related occupation
9. Long-term on-the-job training
10. Moderate-term on-the-job training
11. Short-term on-the-job training

For the purpose of this report, per instructions from Georgia's Intellectual Capital Partnership Program (ICAPP) Office, “college-educated” was defined to include only categories 1 – 7. However, data on certificate awards and programs (level 7) will be reported separately from degree awards and programs (levels 1-6) in the gap analysis.

Defining the Agribusiness Sector:

Defining the agribusiness sector was no easy task given the myriad of existing definitions. However, for consistency in data analysis, the definition of the agribusiness sector used in this report was partly based on the definition developed by the Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA). That definition divides NAICS industry groups and components into two categories: i) farm (to include all farming activities in NAICS codes 111-112) and ii) farm-related. The second category is further subdivided into a) closely-related industries; b) “peripherally-related”; and c) indirect agribusiness industries. While the ERS definition is fairly consistent with that used in the report, there were some major differences based on Georgia's economic circumstances and the Commission for a new Georgia's definition of the agribusiness industry.¹⁰ Specific mention should be made of the fact that NAICS codes 3221 (Pulp, Paper, and Paperboard Mills), 3222 (Converted Paper Product Manufacturing), and 3253 (Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing), considered “peripheral” or “indirect” industries by ERS, are included among the closely-related Georgia agribusiness industries for the purposes of this study. These changes are consistent with the Commission for a new Georgia's definition of “agribusiness”. In addition, several other closely-related agribusiness industry codes, including agricultural wholesale and retail trade, farm product warehousing, and agricultural finance, were added to the Commission's definition, consistent with that used by ERS. As with previous studies done by CAED, farm and farm-related employment is 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.”¹¹

⁸ Downloaded from <http://www.bls.gov/emp/optd/optd001.pdf>, July 9, 2008

⁹ According to BLS, a category is defined as “the most significant source of education or training needed to become qualified in an occupation.”

¹⁰ The exclusions and changes made to the ERS and Commission for a New Georgia's definitions are contained in Appendix A of this report.

¹¹ Economic Sectors of the Georgia Food and Fiber System in Flanders et al, May 2008, p. 1

Defining the Aggregated Regions:

Acknowledging regional differences in levels of economic activity in various agribusiness sectors across the State, the researchers felt it was best to subsume regional differences within aggregated regions. County level data, although more detailed, ignore the migration of labor across counties that may, in part, affect labor market conditions. On the other hand, limiting the analysis only to state level data would assume that labor movements occur freely across regional boundaries. Census data do not support such free flow of labor within the State.¹² Thus, the researchers opted to review the data on the basis of the officially-defined 12 service delivery regions, permitting broader application to other studies, including the eight regions used by the Commission for a New Georgia. While some economic data were available only for Workforce Investment Areas (WIAs), a crosswalk was developed to match those WIAs to the service delivery regions.¹³

Relevant NAICS Codes

There is no single NAICS code that can be used for the agribusiness sector. Based on the definition of the agribusiness sector as above, the relevant NAICS codes were used to identify industries and occupations into groupings for ease of data analysis and presentation.¹⁴

1. Crop Production
2. Animal Production
3. Forestry and Logging Operations
4. Other Farming and Farm Support Activities
5. Food, Beverage, Tobacco, Textile, and Leather Manufacturing
6. Wood and Paper Product Manufacturing
7. Agricultural Chemical and Machinery Manufacturing
8. Food Warehousing, Wholesaling, and Retailing Operations
9. Agricultural Support Services and Related Activities (including agricultural finance, risk minimization, government and education related to agricultural production¹⁵, and agricultural consulting¹⁶ and trade organizations/associations)

In large part, the groupings included NAICS codes that were consistent with those identified by the Commission for a New Georgia's Strategic Industries Task Force,¹⁷ with a few exceptions as noted in Appendix A. Of particular note is the decision by the researchers to include agricultural wholesale and retail trade and farm product warehousing as part of the agribusiness sector. That decision is based on economic data that reflect employment in those subsectors of nearly 15% of Georgia's agribusiness workforce.¹⁸ This revised definition of the agribusiness industry is consistent with that used by other researchers and agencies, including USDA.¹⁹

¹² The data are available from the Census Bureau report, County-to-County Worker Flow Files, at <http://www.census.gov/population/www/cen2000/commuting/index.html#GA>

¹³ See Appendix C for a copy of the crosswalk table.

¹⁴ A full list of the NAICS codes associated with each category is reported in Appendix B of this report.

¹⁵ Respondents included in this category ranged from employees of state and federal agencies associated with agricultural production, marketing, regulation, and compliance to agricultural extension agents.

¹⁶ According to the Bureau of Labor Statistics, agricultural consultants, "offer technical expertise, information, contacts, and tools that clients cannot provide themselves" including marketing finance, human resources, and regulatory compliance. <http://www.bls.gov/oco/cg/cgs037.htm>.

¹⁷ Strategic Industries Task Force Final Report. Downloaded from <http://newgeorgia.org/newsletters/Strategic%20Industries%20Final%20Report.pdf>, July 9, 2008. The full list of NAICS codes are contained in Appendix B of this report.

¹⁸ Data based on estimates developed by economists in the Center for Agribusiness and Economic Development, University of Georgia.

¹⁹ Further discussion is available from Flanders et al, May 2008.

Relevant CIP Codes

The report used the 2000 Classification of Instructional Programs (CIP) codes to identify those degree programs most directly related to the agribusiness sector as defined by the included NAICS. Following the development of the initial list of codes, data from the National Center for Education Statistics (NCES) were used to identify only those programs with graduates since 2000 for the State of Georgia and competitor schools in Alabama, Florida, South Carolina, North Carolina, and Tennessee. As a result of that process, 36 CIP codes were used in the report to reflect supply of graduates since 2002.²⁰

²⁰ A complete list of the relevant CIP codes is available in Appendix D.

Chapter 2: The Economic Significance of the Agribusiness Industry

Introduction

In its report to the Governor, the Strategic Industries Taskforce of the Commission for a New Georgia recommended that the State focus on the agribusiness sector as one of its “strategic industries” as part of the State’s “strategic approach to economic development.”²¹ That recognition is based on the sector’s contribution to the State’s economy, both in terms of the value of production and the level of employment within the sector. Agriculture and the businesses that process the raw materials used or produced by farmers have long been a key part of both the national and State economies. While the number of persons employed in direct farm production has declined, the total employment of persons in agribusiness continues to support the economies of both the U.S. and Georgia. It is no wonder then that the Taskforce recognized the economic significance of the agribusiness sector to the future economic growth of the State. Agricultural production and related agribusiness have and will continue to rank as one of the State’s top industries.

As previously discussed, the agribusiness sector ²²is defined to include the primary agricultural sector of crop and livestock production and greenhouse, nursery, and forestry operations. In addition, the definition also includes those sectors of the economy that depend on agricultural output to support their economic activities or provide inputs used in agricultural production or distribution. Input sectors include those sectors and industries such as agricultural chemical and farm machinery manufacturers, agricultural support service providers including extension, veterinary services and farm financing. Forward links exist between farm production and those processing industries that use agricultural raw materials as inputs. Such industries include meat slaughtering, food, beverage, leather, textile, and tobacco manufacturing, food warehousing, wholesaling, and retailing, and pulp and paper manufacturing.

In addition to the direct economic impact generated by the agribusiness sector through production and employment that reflect the direct impact of agribusiness activities on the level of activity in the overall economy, one cannot ignore the indirect impact of agribusiness, through the ripple or multiplier effects that increases in agribusiness activity have on other sectors of the economy; as agribusiness activity increases so does the level of activity in other industries with whom these businesses do business. In addition, as income increases in the agribusiness sector, expenditures on goods and services produced by other sectors also increase, stimulating the overall level of economic activity. Thus, the agribusiness sector cannot be viewed in a vacuum in considering the economic significance of that sector to the national and state economies. The inclusion of the multiplier effects gives a more complete picture of the overall contribution of the agribusiness sector to the national and state economies.²³

²¹ Strategic Industries Taskforce Report, pp.7 - 8

²² As the agribusiness sector is sometimes referred to as “as the Food and Fiber industry”, some data will be reported in that manner.

²³ The following summary on multipliers is extracted from “Economic Multipliers: How Communities: Can Use Them for Planning.” Wayne P. Miller, Extension Economist, University of Arkansas: “Multipliers are simple ratios of total to initial change, numerous economic multipliers are easy to calculate (see Appendix A). Four multipliers are commonly used to assess impacts of an initial increase in production resulting from an increase in sales, usually called final demand in multiplier analysis. The four are: (1) Output, (2) Employment, (3) Income and (4) Value Added Multipliers. Multipliers usually range between 1.0 and 3.0 and vary by the amount of economic activity within an area and by the interaction of industries within the area. The more inputs purchased locally and the more consumer expenditures at local shops, the higher the multiplier. The larger the area, the more economic activity will likely occur within the area.” See http://www.uaex.edu/Other_Areas/publications/PDF/FSCDD-6.pdf

The U.S. National Picture

The agribusiness sector is estimated to generate almost \$1,975 billion in output for the U.S. economy and employ more than 12 million people. As seen in Table 2.1, those numbers represented approximately 8% and 7% respectively of the total value of output for 2006.²⁴ These numbers represent the direct economic impacts of the agribusiness sector, excluding the multiplier effects on other sectors of the economy.

Table 2.1 - U.S. Agribusiness Employment and Output, by Category, 2006

Sector	Employment	Output
		<i>-In \$ M-</i>
Crop Production	1,516,904	130,759
Animal Production	1,329,165	124,889
Forestry and Logging Operations	140,814	39,507
Other Farming and Farm Support Activities ¹	1,926,333	87,546
Food, Beverage, Tobacco, Textile, and Leather Manufacturing	1,832,758	827,843
Wood and Paper Product Manufacturing	932,965	271,617
Agricultural Chemical and Machinery Manufacturing	136,455	86,643
Food Warehousing, Wholesaling, and Retailing Operations ²	4,229,095	406,145
Total Agribusiness²⁵	12,044,490	1,974,950
Agribusiness Percent of Economy	7	8

¹ Includes landscape services.

² Food, drink, tobacco, and alcohol only.

Source: IMPLAN model estimates, CAED²⁶

The performance of the farm producing subsector is of tremendous significance to the overall performance of the agribusiness sector because farm production is intricately intertwined with the rest of the economy. In addition, consumption of agricultural products, either in direct or processed forms, further adds to the economic impact of agribusiness activity.

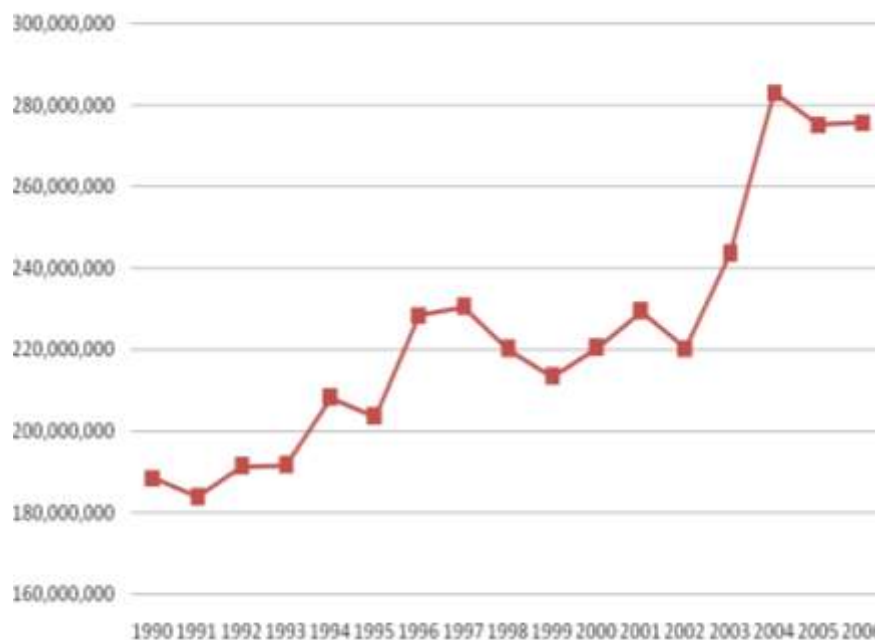
²⁴ Estimates were derived by economists with the CAED using input-output (I/O) modeling developed from the Minnesota IMPLAN Group, Inc. (MIG 2004) 2006 software and its associated data bases.

²⁵ These numbers do not include values for the economic output and employment generated in services such as banking, government, or education, for which data on the percentage directly or indirectly related to the agricultural sector are not available.

²⁶ IMPLAN Professional® 2.0 is an economic impact assessment software system which is generally used with IMPLAN® Data Files to create local area Social Accounting Matrices and develop Multiplier Models that can be used to estimate such variables as detailed economic impacts of economic activity. Further information is available at www.implan.com. Note that, because IMPLAN only looks at backward linkages, the impact of forward linkages is not included.

Chart 2.1 - Value of Production in U.S. Agricultural Sector (final output), 1990-2006

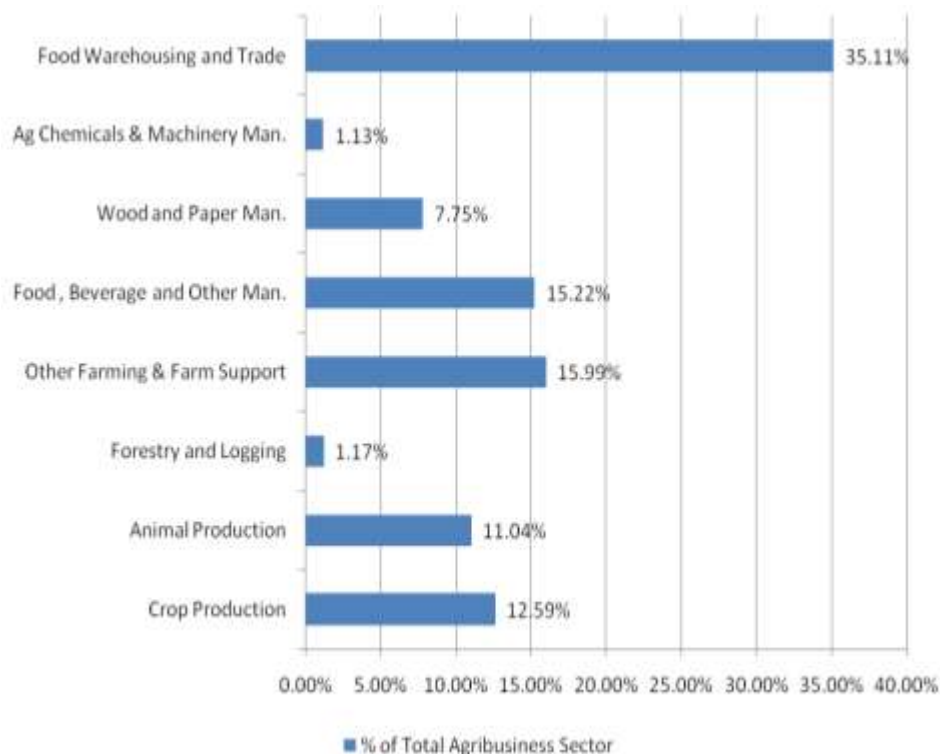
The data for the value of production for the US agricultural sector indicate that there have been frequent fluctuations in the level of output over the period 1990 – 2006. However, over that period, the value of production has increased some 46.3%, suggesting that the agricultural sector, and the businesses that it supports, will continue to have a significant impact on the overall economy in the future.



Source: Economic Research Service/USDA, July 2007

Chart 2.2 - Distribution of Total Employment by Major Category, U.S., 2006

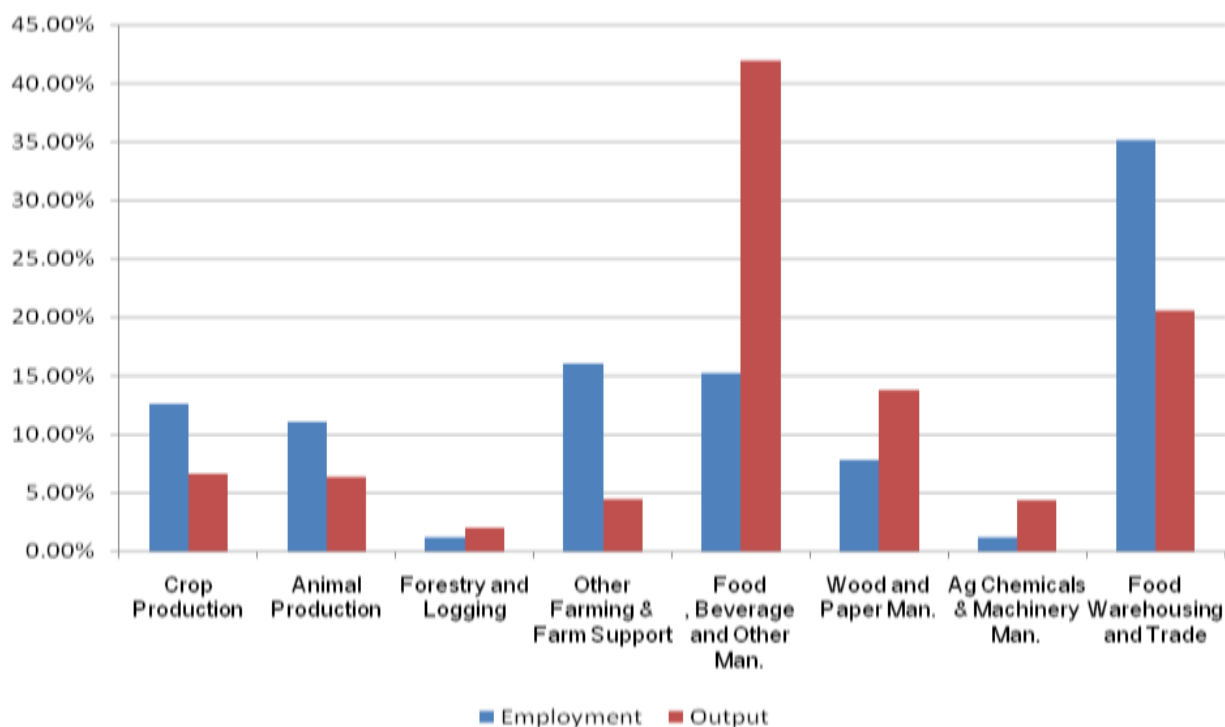
Within the agricultural sector, food warehousing, wholesale, and retail trade represent the largest share of total value of output, employing more than 1/3 of the total agribusiness workforce. Conversely, the smallest employers of ag-related labor are within the agricultural chemical and machinery manufacturing and forestry and logging operations production subsectors.



Source: IMPLAN Model Estimates, CAED

In considering the contributions of each category to employment and output in the agribusiness sector, it is clear that the relative strengths of categories differ by type of output produced. Food warehousing and trade, crop and animal production, and other farming and farm support activities tend to be more labor intensive and make a bigger contribution to employment than to the value of output. On the other hand, the manufacturing subsectors employ relatively fewer workers but contribute a larger share of total value of production. This will have significant implications to the demand for labor in the agribusiness sector.

Chart 2.3 - Comparison of Output and Employment Distribution, by Major Category, U.S., 2006



Source: IMPLAN Model Estimates, CAED

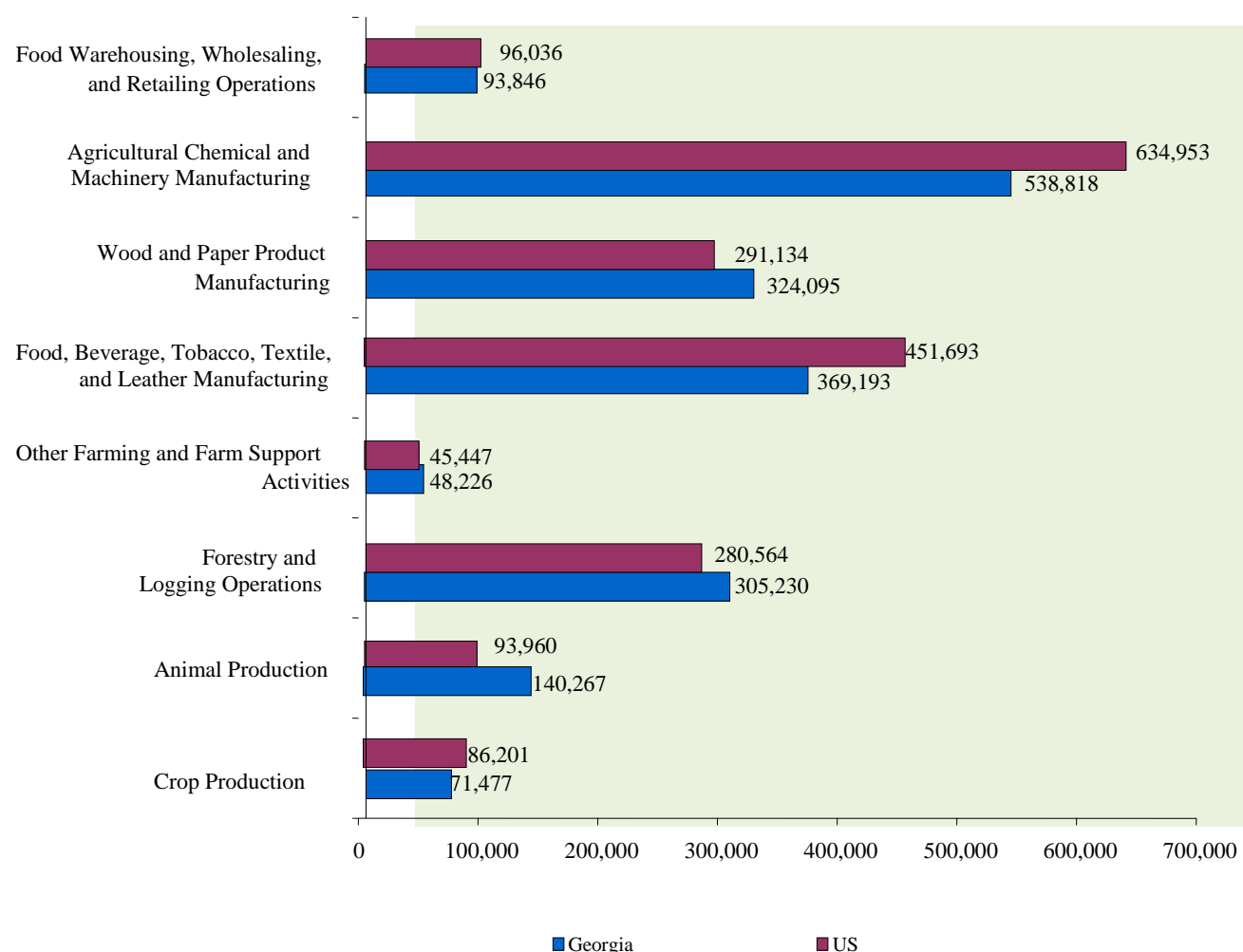
One means of measuring the efficiency of a production sector is to compute labor productivity using the following formula:

$$\text{Labor Productivity (output per hour)} = \frac{\text{Output}}{\text{Labor Inputs}}$$

While this can be measured in terms of physical output per unit of labor, for this report output is measured in monetary terms for the U.S. and Georgia. Thus the labor productivity calculation gives an estimate of the value of output produced per worker. As the level of productivity rises, it means that each worker is producing more output. In other words, it takes fewer workers to produce a given level of output, as, for instance, in agricultural production throughout the United States, often reported as “it now takes fewer farmers to feed the country.”

On the basis of the data generated by the IMPLAN model, the level of labor productivity in Georgia's agribusiness sector exceeds that for the U.S. as a whole. Georgia outperforms the Nation in terms of animal productivity, in part due to efficiencies in the poultry subsector. Efficiency levels are higher in Georgia for wood and paper product manufacturing, and forestry and logging operations. On the other hand, labor productivity levels are lower in Georgia than in the U.S. in crop production and agricultural chemical and machinery manufacturing.

Chart 2.4 - Comparison of Levels of Productivity in U.S. and Georgia Agribusiness



A comparison of the relative levels of productivity for Georgia and the U.S. shows that Georgia's labor productivity is higher in forestry and logging operations, animal production (including poultry), wood and paper product manufacturing, and other farming and farm support activities (including peanut and tobacco production). On the other hand, for the U.S. economy as a whole, labor productivity in crop production, food, beverage, tobacco, textiles and leather manufacturing, and other manufacturing is higher than for similar processes in Georgia. While these differences must be understood in light of other economic factors, including technology and factor costs of other inputs, they are an important first step in analysis the potential growth of the Georgia agribusiness industry.

The Economic Impact of Georgia Agribusiness

Production and Employment Trends

Georgia's agribusiness industry contributed more than \$76 billion in economic activity to the State in 2006, employing almost 400,000 workers and contributing \$15 billion in labor income to the economy. Based on these figures, the agribusiness industry accounted for 11% of the total value of output and 8% of the total workforce. (Table 2.2) Taking into account the linkages among the sectors - including the indirect or multiplier effects - the contributions of the agribusiness sector to the level of economic activity in the State are even more impressive. This combined economic activity, reported in Tables 2.2 – 2.4, shows that a total contribution of nearly \$20 billion in output, over 700,000 jobs, and \$30 billion in labor income to the Georgia economy. These additional effects incorporate not only the effects of input purchases by the agribusiness sector, but also the increased household income of the workers employed in both the agribusiness sector and the businesses that supply inputs to that sector. The level of those economic impacts are provided in Table 2.3 (by sectors) and in Table 2.4 (by economic activity).²⁷

Table 2.2 - Georgia Agribusiness Employment and Output, by Categories, Georgia, 2006

Sector	Employment	Output - in \$M-
Crop Production	33,065	2,363
Animal Production	28,498	3,997
Forestry and Logging Operations	9,106	2,779
Other Farming and Farm Support Activities ¹	56,300	2,715
Food, Beverage, Tobacco, Textile, and Leather Manufacturing	98,313	36,296
Wood and Paper Product Manufacturing	42,022	13,619
Agricultural Chemical and Machinery Manufacturing	5,923	3,191
Food Warehousing, Wholesaling, and Retailing Operations ²	120,818	11,338
Total Agribusiness	394,043	76,300
Agribusiness Percent of Economy	8	11

¹ Includes landscape services.

² Food, drink, tobacco, and alcohol only.

Table 2.3 - Economic Impacts of Georgia Agribusiness by Major Economic Sectors, 2006

Sector	Employment	Labor Income (\$)	Value of Output (\$)
Agriculture	89,685	2,543,709,895	9,825,991,554
Mining and Construction	3,139	137,942,391	358,309,502
Utilities	2,638	373,722,791	1,768,698,783
Manufacturing	157,121	8,515,789,512	56,969,086,751
Transportation, Warehousing	33,615	1,564,594,203	3,738,151,534
Trade	185,452	7,452,530,611	18,949,754,597
Finance, Insurance, & Real Estate	33,520	1,715,058,602	6,709,743,527
Services	207,391	7,817,899,072	18,336,220,866
Government & Non NAICS	3,154	122,776,923	3,121,182,386
Total	715,716	30,244,023,999	119,777,139,500

²⁷ Data for tables 2.2 - 2.4 were developed by CAED staff using IMPLAN modeling and data.

Table 2.4 – Total Economic Impacts of Georgia Agribusiness, 2006

	Direct Impact	Indirect Impact	Total Impact
Employment	394,043	321,672	715,716
Labor Income (\$)	15,753,762,966	14,490,261,033	30,244,023,999
Output (\$)	76,300,137,176	43,477,002,324	119,777,139,500

In considering the contributions of each category to output and employment in the agribusiness sector, it is clear that the relative strengths of categories differ by type of output produced. Crop and animal production, food warehousing and trade, and other farming and farm support activities like that for the U.S., tend to be labor-intensive and contribute more to employment than to the value of output. On the other hand, relatively fewer workers are employed in the manufacturing subsectors but those subsectors contribute a larger share to the total value of production. The impact of this fact on the demand for labor in the agribusiness sector will be discussed in a subsequent chapter.

Chart 2.5 – Distribution of Output and Employment by Category, Georgia, 2006

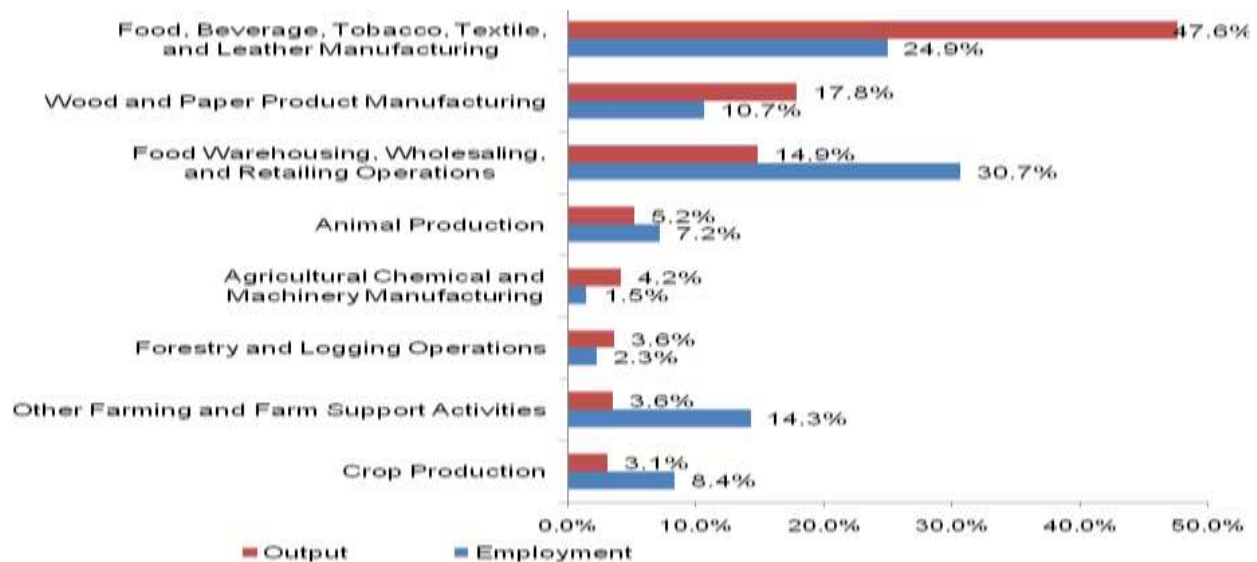


Table 2.5 - Annual Comparison of Farm Gate Value, 1999 - 2007

Production Year	Total Value of Production
1999	\$7,926,020,249
2000	\$8,295,451,715
2001	\$8,714,970,992
2002	\$8,825,753,908
2003	\$9,859,173,985
2004	\$10,283,536,190
2005	\$10,579,891,717
2006	\$10,366,342,023
2007	\$11,566,159,994

Given these production and employment numbers for the agribusiness sector, the value of total output at the farm gate enhances the picture of the value of farm production to the economy in terms of measuring the value of the commodities produced. As shown in Table 2.5, farm gate values have increased by nearly 46% (45.9%) from 1999 to 2007, a rate of increase of almost 5% annually.

Source: 2007 Georgia Farm Gate Value Report, CAED, AR-08-01

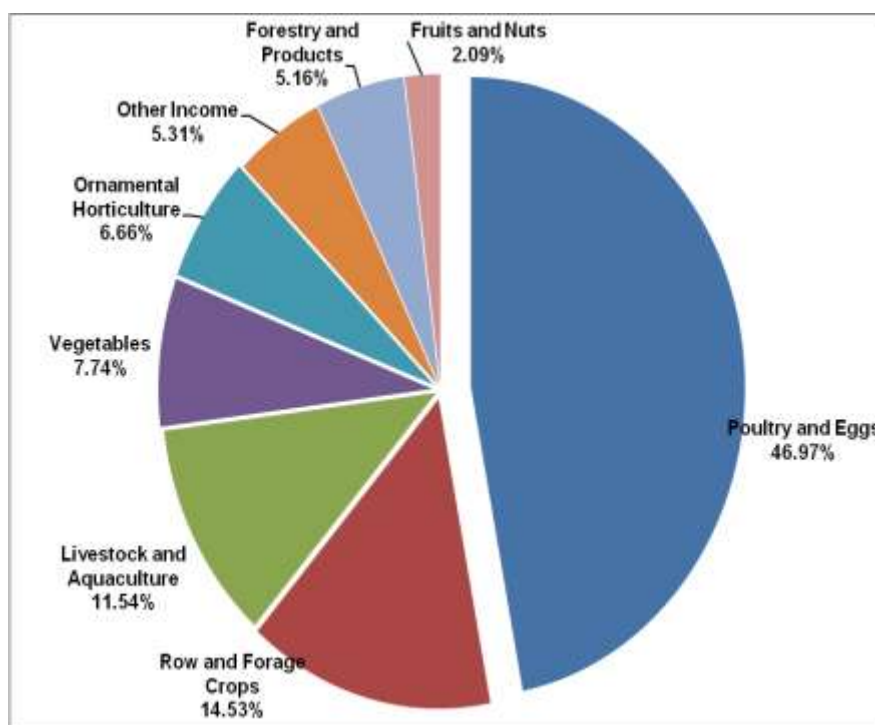
Much of that increase is due to increases in poultry and egg production which increased some 66% from 1999 to 2007. For 2007, the top ten commodities represented almost 75% of the total farm gate value of production.

Table 2.6 - Farm Gate Value of Top Ten Commodities, by Commodity, Georgia, 2007

Rank	Commodity	Farm Gate Value By Commodity	% of Total Farm Gate Value
1	Broilers	\$4,715,194,764	40.77%
2	Cotton	\$628,800,267	5.44%
3	Eggs	\$549,714,874	4.75%
4	Timber	\$500,864,049	4.33%
5	Horses	\$429,569,500	3.71%
6	Beef	\$423,272,771	3.66%
7	Peanuts	\$381,951,526	3.30%
8	Dairy	\$310,023,659	2.68%
9	Greenhouse	\$268,766,728	2.32%
10	Container Nursery	\$215,132,375	1.86%
Contribution Made by Top 10 Commodities		\$8,423,290,513	72.83%
Total farm gate value		\$11,566,159,994	

Chart 2.6 Distribution of Farm Gate Production by Commodity Group, Georgia, 2007

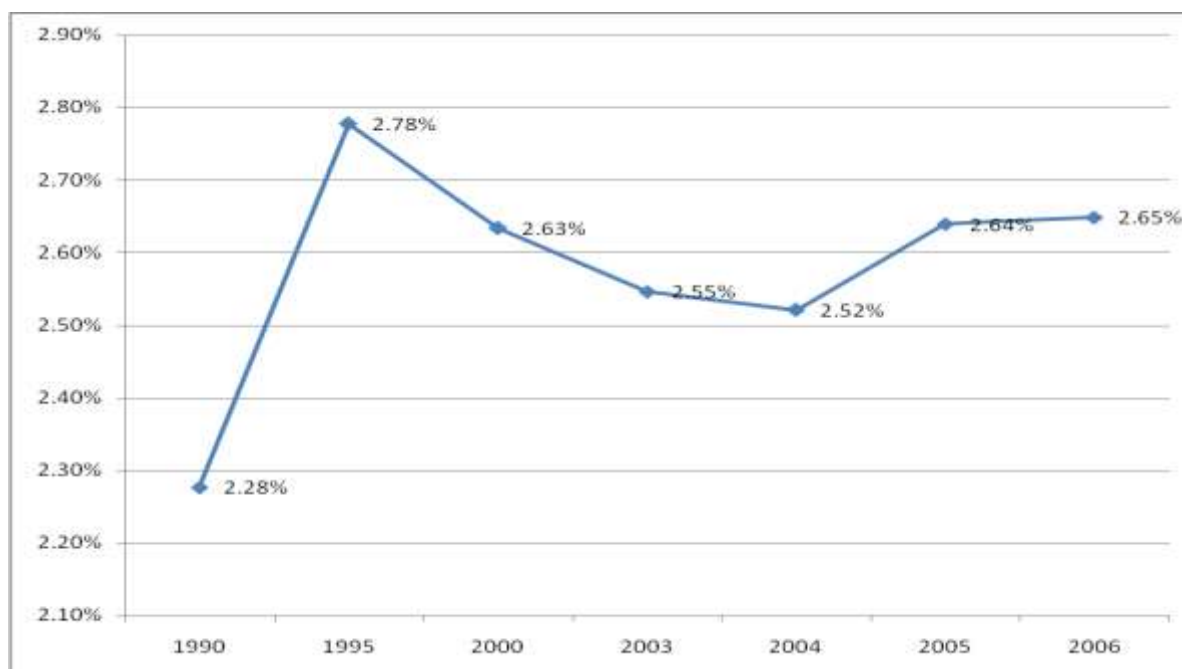
The statistics reported by the CAED estimated that much of the farm gate value of total agricultural production of over \$11m for 2007 was contributed by poultry and egg production (47%), livestock and aquaculture (12%), row and forage crops (14.53%), and vegetables (8%). Broilers alone accounted for almost 41% of the total farm gate value of commodities produced in 2007.



Source: 2007 Georgia Farm Gate Value Report, CAED, AR-08-01

Based on these increases in farm output, despite fluctuations in the value of production, Georgia's share of total US farm production has increased from 2.3% in 1990 to 2.7% in 2006.

Chart 2.7– Georgia's Share of U.S. Value of Production in Agriculture, 1990 – 2006



Source: Economic Research Service/USDA, July 2007

As a state, Georgia ranked 12th among the states in terms of its value of farm production in 2006. While that rank has fluctuated over the years, to a high of 11th in 1999, 2001, and 2005, overall, the trend has been upward from 17th in 1990.

Table 2.7 – Georgia's Rank Among Agricultural Producers in U.S., 1990 - 2006

Year	Value of US Production In \$'000	GA's Production as Share of US	Georgia's Rank Among All States
1990	188,496,680	2.28%	17 th
1995	203,553,284	2.78%	12th
1999	213,421,168	2.83%	11th
2000	220,466,802	2.63%	12th
2001	229,429,600	2.76%	11 th
2002	220,358,440	2.41%	13th
2003	243,482,016	2.55%	12th
2004	283,009,336	2.52%	14th
2005	275,201,649	2.64%	11th
2006	275,700,012	2.65%	12th

Source; Economic Research Service/USDA, July 25, 2007

Employment Concentration and Competitive Advantage

Despite the significant contribution made by agricultural commodities to the State's economy, the impact on employment is smaller relative to other subsectors within the agribusiness sector. In fact, few of the commodity groups have employment concentrations that rank them among major producers in the U.S. when viewed from the perspective of location quotients. The State's level of economic activity related to the agribusiness industry is not uniformly distributed across the state or by commodity groups. Location quotients were calculated to determine the degree of industry specialization within the State using data and techniques provided by the U.S. Department of Labor's Bureau of Labor Statistics (BLS).²⁸

A location quotient greater than 1 in a specific industry can be interpreted as an indicator of the area's competitive advantage in that industry due to the existing supply of labor and other resources, including input suppliers and infrastructure. Conversely, a location quotient significantly below 1 is often a signal that the area lacks a concentration of labor in that sector or industry relative to other areas.

Since location quotients are often used to compare concentrations of industries in a particular area, using the BLS Location Quotient Calculator tool, statistics were computed for the top 10 commodity groups, using the U.S. as the comparator group. The results of that analysis confirmed that:

1. Agricultural commodity groups are not major employers of labor in Georgia, with that subsector employing just under one percent (0.97%) of the State's workforce. That number was not much lower than the similar statistics for the U. S. for which the value was 1.13%.

Table 2.8 – Share of Total Employment for Select Agricultural Commodities, Georgia and U.S.

Industry	U.S. TOTAL	Georgia – Statewide ¹
Base Industry: Total, all industries	100.00%	100.00%
NAICS 111 Crop production	0.48%	0.31%
NAICS 11121 Vegetable and melon farming	0.08%	0.09%
NAICS 1113 Fruit and tree nut farming	0.15%	0.05%
NAICS 1114 Greenhouse and nursery production	0.15%	0.10%
NAICS 11191 Tobacco farming	0.00%	0.01%
NAICS 11192 Cotton farming	0.02%	0.02%
NAICS 111992 Peanut farming	0.00%	0.01%
NAICS 11211 Beef cattle ranching, farming, and feedlots	0.04%	0.01%
NAICS 11212 Dairy cattle and milk production	0.07%	0.03%
NAICS 1123 Poultry and egg production	0.04%	0.07%
NAICS 11231 Chicken egg production	0.01%	0.01%
NAICS 11232 Broilers and meat type chicken production	0.01%	0.02%
NAICS 11234 Poultry hatcheries	0.01%	0.04%
NAICS 11292 Horses and other equine production	0.01%	0.00%
NAICS 113 Forestry and logging	0.06%	0.18%
NAICS 1131 Timber tract operations	0.00%	0.02%
% of total employment employed in these selected NAICS	1.13%	0.97%

¹ Values in blue indicate commodities for which the employment LQ in Georgia exceeds that for the U.S.

²⁸ A Location Quotient (LQ) compares an area's distribution of employment by industry to a reference or base area's distribution and base industry. An LQ greater than 1 indicates an industry with a greater share of the local area employment than is the case in the reference area. Conversely for values less than 1. For more about the Location Quotient Calculator, see <http://www.bls.gov/qcew/qcewlq.htm>.

2. On the basis of the value of production, Georgia is not ranked among the top ten producers of agricultural commodities. Nevertheless, the State maintains a competitive advantage in selected commodities such as poultry and eggs, cotton, peanuts, broiler, timber and tobacco, for which the LQ was greater than 1. In all, 11 of the 19 categories reflected LS values greater than 1, with values well above 1 for peanuts, timber, broilers, and poultry hatcheries. All LQ values were calculated using data obtained from the Quarterly Census of Employment and Wages Data, 2006, BLS.

Table 2.9 – Location Quotients for Major Agricultural Commodities, Georgia, 2006

Industry	Georgia -- Statewide
Base Industry: Total, all industries	1.00
NAICS 111 Crop production	0.64
NAICS 11121 Vegetable and melon farming	1.06
NAICS 1113 Fruit and tree nut farming	0.33
NAICS 1114 Greenhouse and nursery production	0.67
NAICS 11191 Tobacco farming	3.55
NAICS 11192 Cotton farming	1.50
NAICS 11199 All other crop farming	0.72
NAICS 111992 Peanut farming	13.91
NAICS 112 Animal production	0.63
NAICS 11212 Dairy cattle and milk production	0.38
NAICS 1123 Poultry and egg production	2.05
NAICS 11231 Chicken egg production	0.53
NAICS 11232 Broilers and meat type chicken production	3.17
NAICS 11234 Poultry hatcheries	4.48
NAICS 11239 Other poultry production	2.63
NAICS 11292 Horses and other equine production	0.47
NAICS 113 Forestry and logging	2.94
NAICS 1131 Timber tract operations	6.02
NAICS 1132 Forest nursery and gathering forest products	1.64

¹ Values in blue indicate commodities for which employment in Georgia exceeds that for the U.S.

Source: BLS Location Quotient Calculator (Quarterly Census of Employment and Wages Data)

The economic significance of those commodities cannot be overstated. Despite the expected decline in job growth in those production activities, largely due to increases in labor productivity, the backward and forward linkages that exist with other sectors mean that crop and animal production will continue to be significant contributors to Georgia's economic growth. Job growth created in other sectors will depend, to some significant extent, on the performance of the agricultural production sectors. Agribusinesses, including manufacturing firms, use Georgia's farm commodities as inputs in their processing operations. As such, declines in the agricultural sector would lead to higher input costs for industries that depend on agricultural output, contributing to higher production costs and lower domestic and global competitiveness based on the linkages with the agricultural sector. Thus, although the farm production sector is not a major employer of college-educated workers, understanding the role of farm commodities is critical to understanding the projected trends in the demand for college-educated workers. Location quotients for the agribusiness industry as a whole depend on the competitiveness of Georgia's farm production activities.

Utilizing the IMPLAN model, additional location quotients were calculated for both employment and output for the entire agribusiness sector in Georgia by industry. These LQs highlight the industries that make up the agribusiness sector, demonstrating LQs greater than one or close to one for most in both employment and output. For the entire agribusiness sector, the location quotient is greater than one, demonstrating Georgia's concentration in this strategic area of our economy.

Table 2.10 – Location Quotients for Major Agribusiness Subsectors, Computed Using IMPLAN

Enterprises	<i>Location Quotients</i>	
	Employment	Output
Crop Production	0.73	0.63
Animal Production	0.71	1.11
Forestry and Logging Operations	2.15	2.45
Other Farming and Farm Support Activities ¹	0.97	1.08
Food, Beverage, Tobacco, Textile, and Leather Manufacturing	1.79	1.52
Wood and Paper Product Manufacturing	1.50	1.74
Agricultural Chemical and Machinery Manufacturing	1.45	1.28
Food Warehousing, Wholesaling, and Retailing Operations ²	0.95	0.97
Total Agribusiness	1.09	1.34
¹ Includes landscape services.		
² Food, drink, tobacco, and alcohol only.		

Further, when the location quotients were calculated for industries that use agricultural commodities as primary raw materials, the significance of the commodity groups is even more apparent. Food manufacturing, wood, and paper manufacturing, all had LQ values greater than 1, indicating Georgia's relative employment concentration in these areas.

Chart 2.8 - Location Quotients for Manufacturing Products, Based on Agricultural Commodities, Georgia, 2006

In chart 2.8, Location Quotients were calculated specifically for industries that use agricultural commodities as primary raw materials, making even more apparent the significance of these agribusiness groups. The highest LQ values were found for textile mills, paper and wood manufacturing, food manufacturing, and farm product warehousing and storage. Within the agribusiness industry, commodities with location quotients greater than 1 (Chart 2.9 A) and less than 1 (Chart 2.9 B) are shown below for selected NAICS codes.

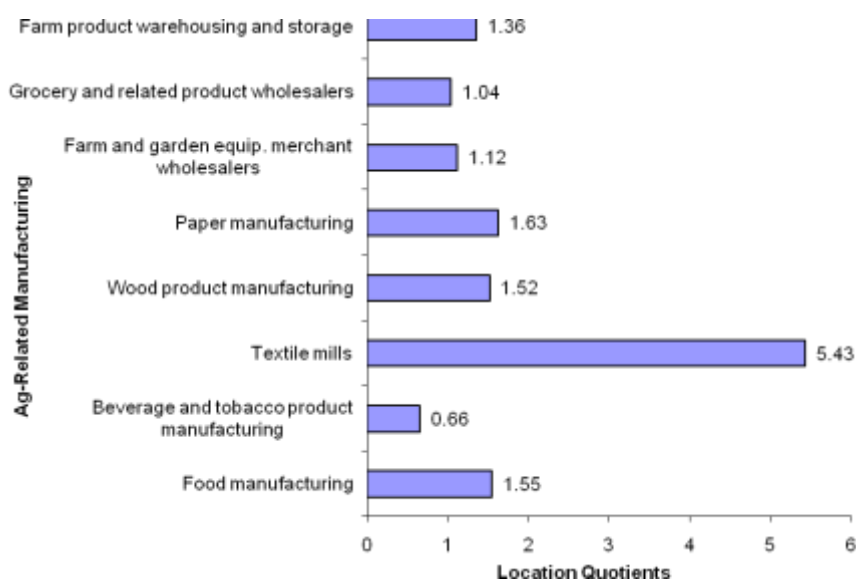
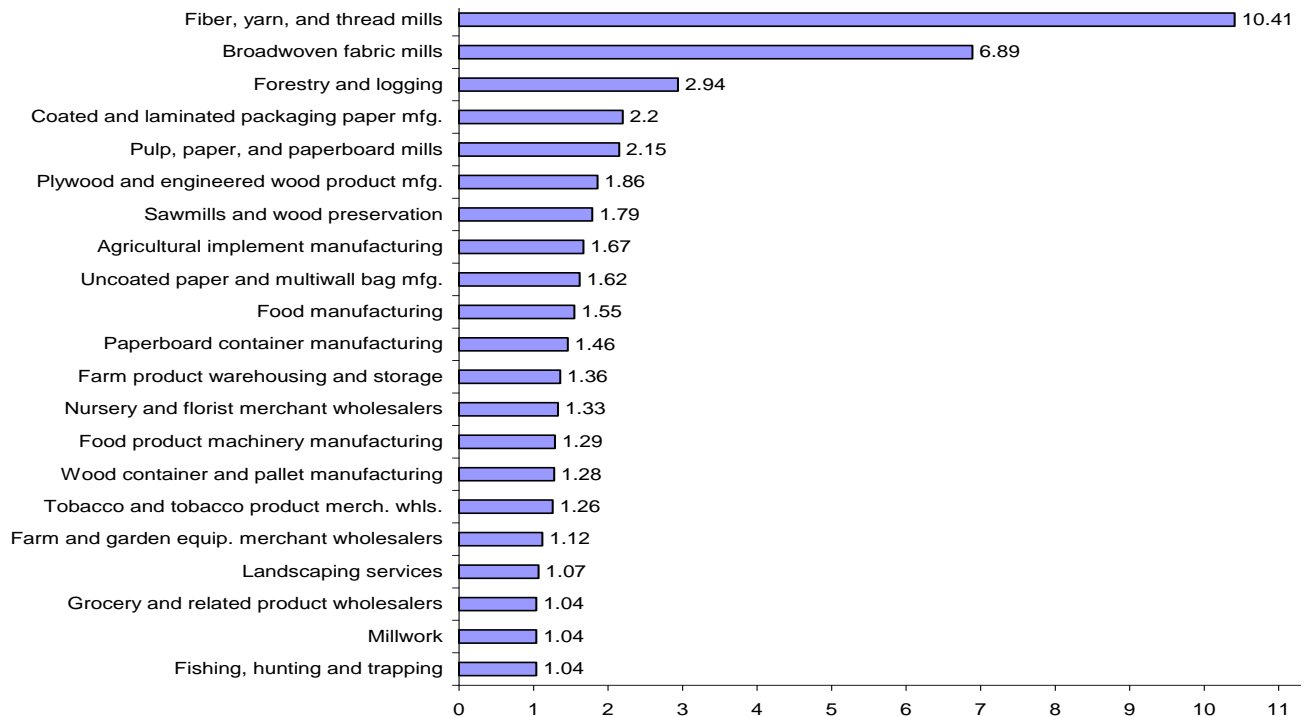
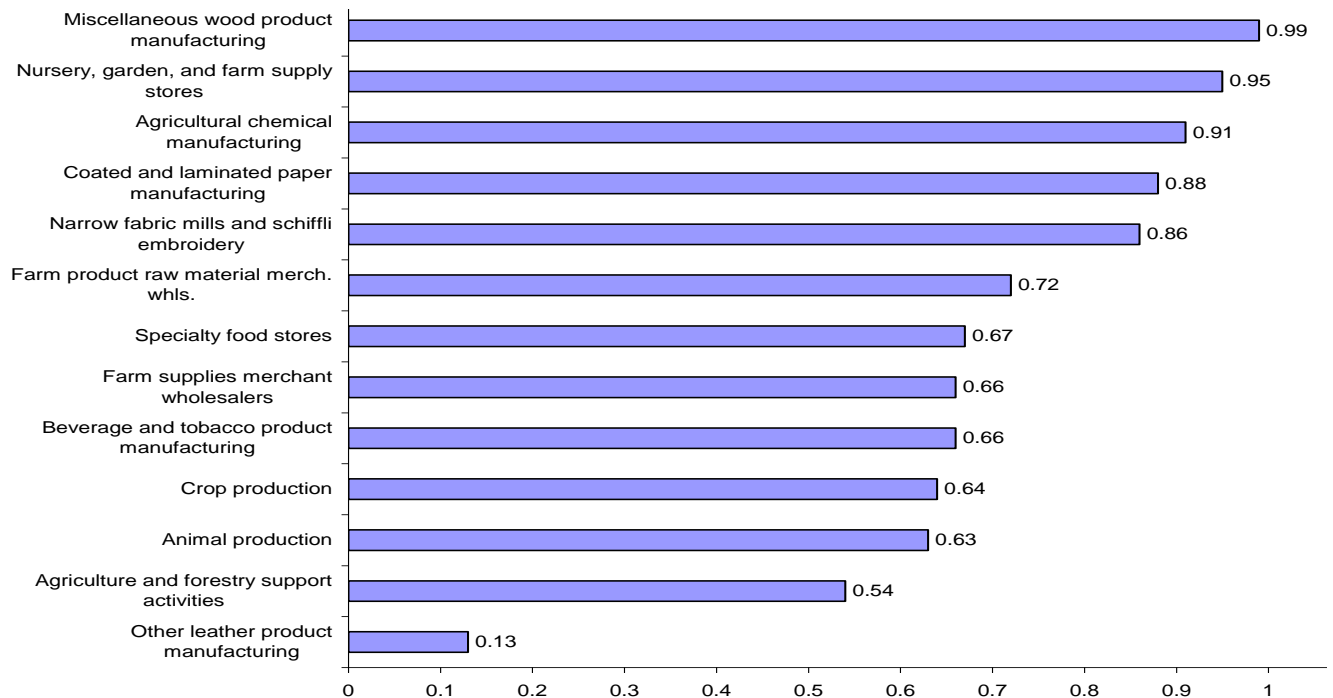


Chart 2.9 - Location Quotients by Selected NAICS Codes for Agribusiness Employment Concentrations, Georgia

A. Georgia - LQ Values Greater than 1



B. Georgia - LQ Values Less than 1



Source: U.S. Department of Labor Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2006

Summary

Georgia's agribusiness industry, composed of sectors involved in agricultural and forestry production (including support services); food and fiber processing and manufacturing; production inputs; food retail and wholesale trade; and food services, has significant economic impact on the State's economy. Performance of the farm producing subsector is of tremendous significance to the overall performance of the agribusiness sector because farm production is intricately intertwined with both forward (producers of agricultural raw materials and distribution and sale of value-added products) and backward (input supply) linkages with the rest of the economy. In addition, consumption of agricultural products, either in direct or processed forms, further adds to the economic impact of the farm subsector. When the direct and indirect impacts of the agribusiness sector to employment, output, and value added are considered, the contributions of the agribusiness sector to the level of economic activity in the State are even more impressive. The economic multipliers generated by activity in the agribusiness sector give credence to the fact that the agribusiness sector has significant direct and indirect impacts on Georgia's economy. As a result of economic activity, agribusinesses contributed almost \$120b in additional output within Georgia with major impacts felt in the manufacturing sector, services, and trade. In terms of employment, the agribusiness industry generated almost twice as many jobs in other sectors of the economy as persons directly employed in agribusiness.

Agricultural commodity and agribusiness production compare favorably to national statistics, giving the State a competitive advantage in the production of major agricultural and agribusiness commodities. The computed location quotients suggest that Georgia has a competitive advantage, based on such factors as its human resources and knowledge and physical capital and infrastructure, in the production of those commodities. Recognizing and exploiting these competitive advantages should be key concerns of policies aimed at increasing Georgia's competitive rank among the Nation's agribusiness producers and in generating future employment growth within the sector. Based on its competitive position, Georgia should be in a relatively strong position to respond to increased demand for food and fiber products from both U.S. and global markets.

Chapter 3: The Demand for a College–Educated Workforce in Georgia’s Agribusiness Industry

Introduction

In its report emphasizing relationships such as those between industry and education, the Spellings Commission²⁹ noted that “higher education in the United States has become one of our greatest success stories.” In explaining the increased demand for post-secondary education, the Commission pointed out that higher education is seen as “the means to accomplish both quality of life and economic development goals for the nation and its citizens...” That notion, combined with the projected annual increase in the numbers of high school graduates will continue to generate new and expanding demand for higher education. As noted by the Commission, “the United States increasingly needs what the best of higher education has to offer: *graduates* who contribute positively to economic development through increased private and public revenues, greater productivity, increased consumption, more workforce flexibility, and decreased reliance on government financial support; *services* that fill economic and social demands in agriculture, commerce, health care, energy, defense, human development, natural resources, and other subject areas vital to our society; and *research* that contributes to the growing fund of knowledge, fires the engines of innovation, and advances the future of the nation.”³⁰

To accomplish those goals, the higher education system will be challenged to respond to the needs of its varied constituents, especially students and employers. As the National Center for Public Policy and Higher Education so eloquently phrased it, one of the most fundamental roles that higher education must play in the economic growth of the U.S. is to “to provide graduates and the nation at large with the skills needed to be effective in a global, increasingly competitive economy...”. The report continues, “the most important educational goal confronting higher education in the 21st century is to optimize learning by students and by society in general: to educate a growing, increasingly diverse set of learners to be effective and fulfilled as workers and citizens...”³¹ The challenges are no less complex for Georgia.

Trends in Georgia’s Workforce, by Sectors and Agribusiness Groups

For the state of Georgia, the labor market has shown consistent growth since 1990. According to reports from the Georgia Department of Labor, Georgia has ranked fourth among all states in net labor force growth and became the sixth fastest growing labor force in the nation since 1990.³² Georgia’s labor market is projected to increase by more than 750,000 jobs by 2014, an annual increase of 1.7%. This

²⁹ A Commission appointed by Margaret Spellings, U.S. Secretary of Education, the Secretary of Education’s Commission on the Future of Higher Education (the Spellings Commission) was charged with developing a comprehensive national strategy for postsecondary education and also address the future economic and workforce needs. (See www.ed.gov for more information).

³⁰ “Setting the Context”, Charles Miller & Cheryl Oldham. A National Dialogue: The Secretary of Education’s Commission on the Future of Higher Education. Issue Paper. First in a series of Issue Papers released at the request of Chairman Charles Miller to inform the work of the Commission, p.1.

³¹ Engaging Higher Education in Societal Challenges of the 21st Century, NCPP&HE, April, 2008, pp.2-3

³² Georgia Annual Report Analysis, Georgia Department of Labor, Workforce Information & Analysis Division, p.4

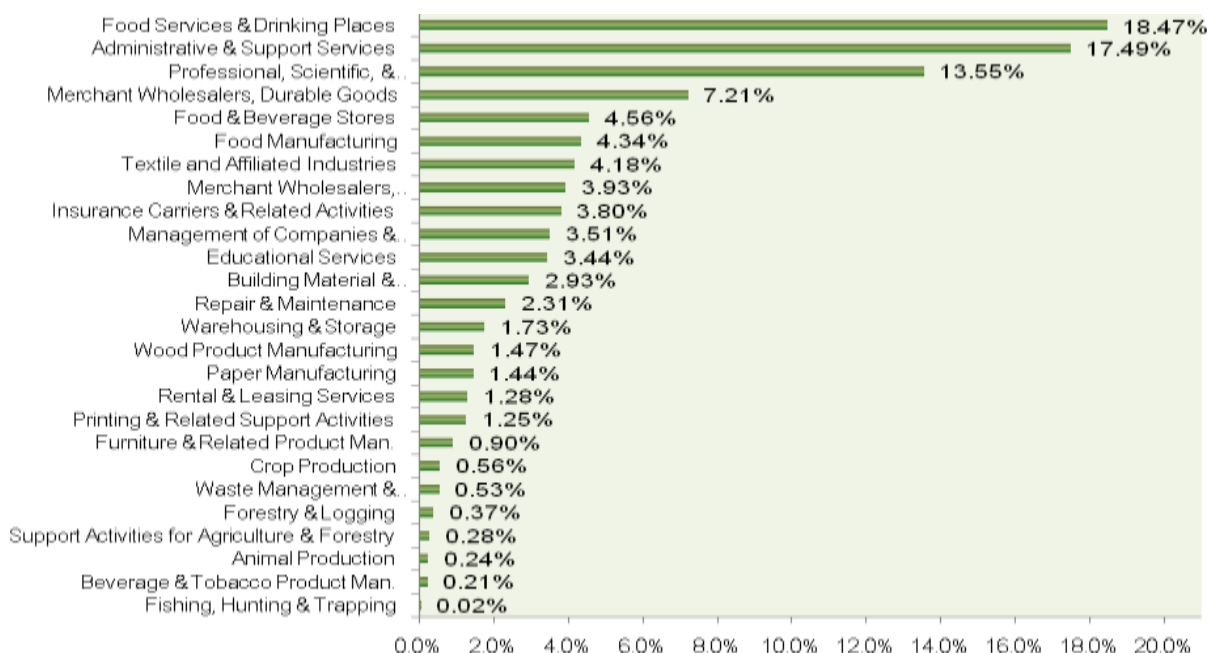
compares favorably with the projected numbers for the U.S. to 2016 of 1.0% annually.³³ However, growth will not occur in all sectors as many sectors will not add new positions. Indeed, as seen below, many sectors will experience negative growth rates. Yet, for others, despite negative growth rates, employment levels will grow due to replacement positions due to persons leaving the workforce for reasons such as retirement. Thus, the changes in employment must be analyzed from the perspective of new positions (due to growth) and replacements (due to attrition). This is particularly significant for subsectors such as crop production where technology changes and increases in productivity tend to limit the creation of new jobs but where replacements due to retirement or turnover are high, create job openings.³⁴

For purposes of this study, the “demand” for college-educated agribusiness labor is defined in terms of the projected employment in 2014 for those occupations (by SOC codes) identified by the Bureau of Labor Statistics (BLS) as typically requiring at least an associate’s degree, and by CIP codes identified by the National Center for Education Statistics (NCES).³⁵ However, where relevant to the discussion, reference will be made and statistics reported for certificates awarded within the University System

Georgia Employment - All Sectors and Educational Levels

For all educational levels, the data on average quarterly employment data for the 2006-07 period show that the largest employer of labor in Georgia is the food services and drinking services industry, while fishing, hunting, and trapping employs the fewest number of workers (Chart 3.1).

Chart 3.1 - Distribution of Quarterly Employment by Industry, Georgia July 2006 - June 2007



Source: Quarterly Workforce Indications, US. Census Bureau, 2007

³³ According to the BLS, national occupational projections are developed on a 2-year schedule for national and state level data. While the current national projections cycle cover the 2006-2016 period, state level data for the same period will not be available until late 2008. The most current state level data for Georgia covers the period 2004 -2014 (see www.bls.gov for more information).

³⁴ Job openings = sum of new + replacement positions

³⁵ SOC codes refer to the 2000 Standard Occupational Classification system used by federal statisticians to classify workers into occupational categories to facilitate the collection and dissemination of labor market. CIP codes refer to the Classification of Instructional Programs used to identify instructional degree specialties (majors and minors) for collection and reporting of education data. For more information about SOC, see www.bls.gov/SOC/. For information about the NCES, see www.nces.ed.gov/ipeds. More information about the definitions is contained in Appendix F.

On average, nearly one in every five employees in Georgia worked in food services and drinking places in 2006- 2007 (18.4%). On the other hand, fewer than 1% of Georgia's workforce was employed in crop production during that same period. The picture remained relatively unchanged when the sectors were ranked relative to the average number of new hires employed quarterly over the period 2006 – 2007 (including replacements). Food services and drinking places ranked second to administrative support services while fishing, hunting and trapping hired the least number of new employees. These numbers are more reflective of the turnover in those industries rather than growth in new positions. As shown below, 15 of the 27 subsectors experienced negative average quarterly growth rates for 2006/2007.

Chart 3.2 - Georgia Agribusiness Industry Employment Growth (as a %), 2006-2007

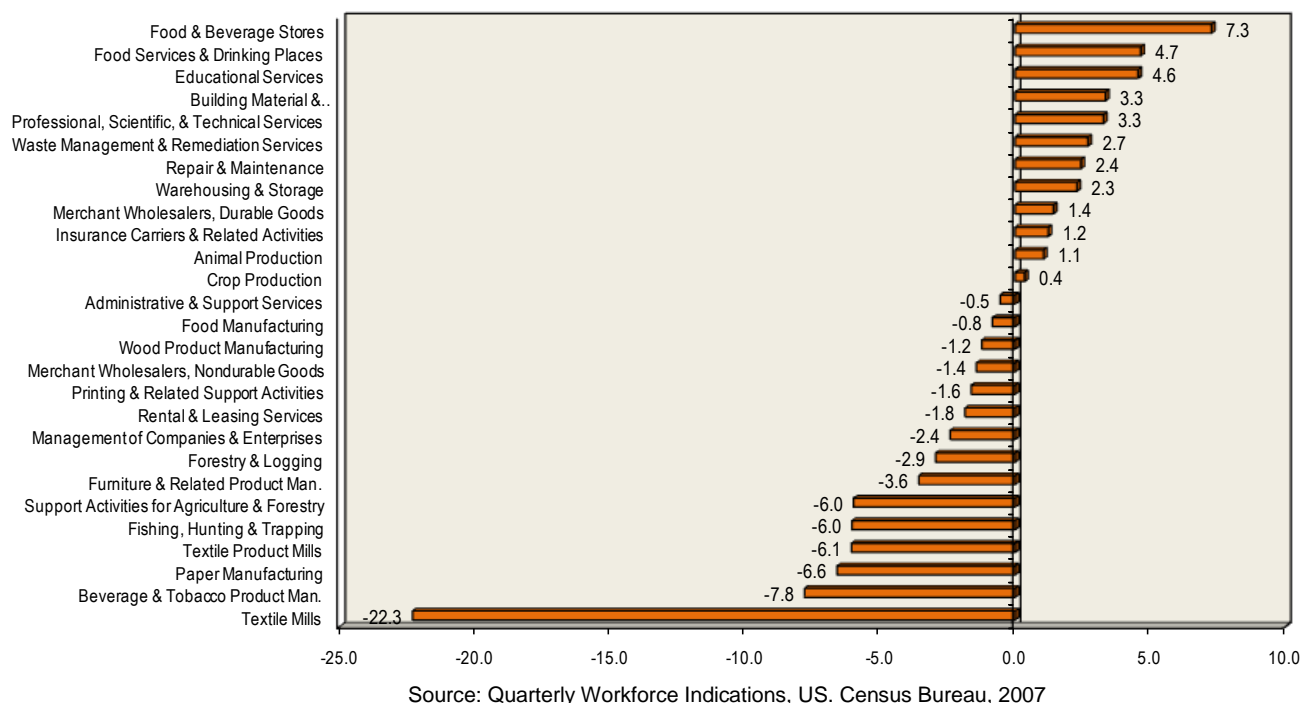
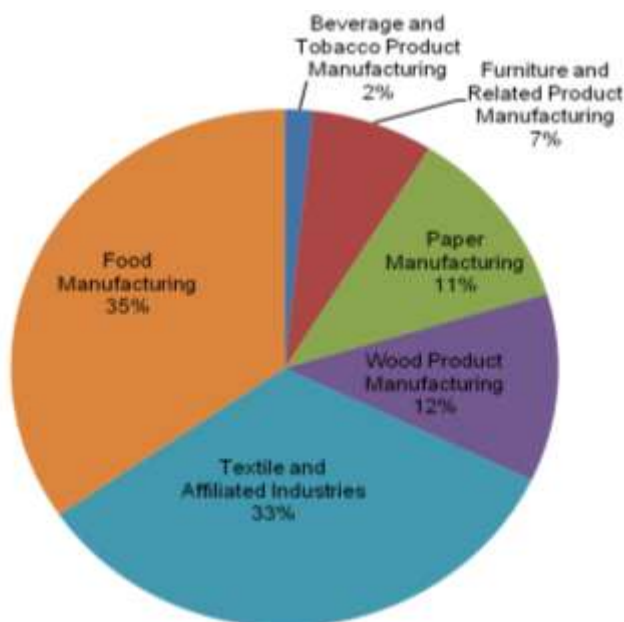


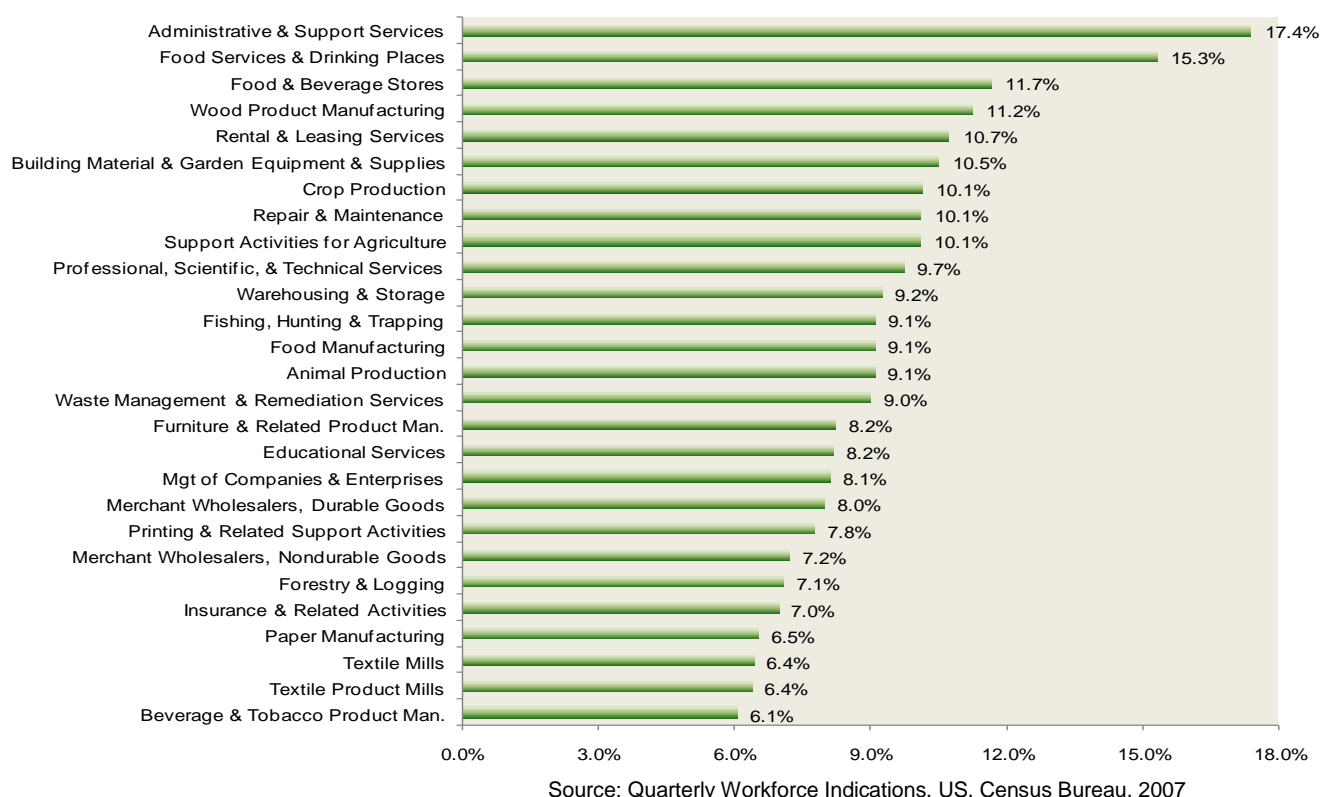
Chart 3.3 - Georgia Agribusiness-Related Manufacturing Employment, July 2006 to June 2007

With an average quarterly employment of nearly 70,000 workers (69,792), food manufacturing is the largest employer within those manufacturing industries that hire agribusiness-related workers. On the other hand, the smallest workforce (3,402) is employed in those companies that are involved in beverage and tobacco product manufacturing. Despite losing an average of more than 2000 jobs per quarter, the textile industry and affiliated product manufacturing companies are the second largest employers in agribusiness manufacturing.



When new hires were compared to the industry's total workforce, administrative support services ranked at the top, hiring one new person for nearly every six workers currently employed (17.4%). Similarly, the food services and drinking places industry had a large proportion of new hires (15.3%), while beverage and tobacco product manufacturers had a much smaller amount (6.1%).

Chart 3.4 - New Hires in Georgia as Percent of Employment by Industry, July 2006 – June 2007



Overall, in looking at employment trends, we see recurring patterns of particular industries that comprise much of the workforce in Georgia, such as food services and drinking places, administrative and support services, and professional, scientific & technical services. These occupational groups also account for much of the new hire activity around the State and represent large portions of Georgia's employment distribution. However, of the 29 subsectors for which data were reported, 22 had negative job growth, including administrative and support services where more than 10,000 jobs were lost even as that subsector hire almost 50,000 new hires. Such trends are indicative of a high level of turnover where hires are being made to replace lost workers rather than to fill newly created positions. A summary, by subsector, is provided below.

Table 3.1 – Comparison of Hiring Growth and Hires Made, Georgia, 2006 - 2007

Sub-Sector Group	Hiring Growth	Number of New Hires
Textile and Affiliated Industries	-2235	4294
Food Manufacturing	-2019	6343
Furniture and Related Product Manufacturing	-400	1190
Beverage and Tobacco Product Manufacturing	24	206
Paper Manufacturing	1044	1516
Wood Product Manufacturing	1471	2660

Source: Quarterly Workforce Indications, US. Census Bureau, 2007

Long term Projected Trends in the Agribusiness Labor Market

Projections from the Georgia Department of Labor predict that occupations linked to the agribusiness sector will experience a growth rate of 15.6% to 2014, a predicted annual growth rate of 1.42%. Although representing only 17% of the projected workforce, occupations for which a college education is typically required will grow at a rate just above the rate for those occupations for which no college education is necessary (15.1%). Over the 10 year period ending 2014, the college-educated workforce is expected to grow at an annual rate of 1.5% compared to the corresponding rates of 1.4% for both the non-degree occupations and the total agribusiness workforce. As a result of the slightly larger growth rate, the share of the college educated workforce is projected to rise from 16.9% in 2004 to 17.0% of the total agribusiness workforce by 2014. Much of that growth will be led by the growth in the demand for graduates with bachelor's degrees or higher which is expected to add 1,410 jobs annually from growth and replacements while the jobs for workers with associate's degrees is expected to increase by 170.

Table 3.2 – Long term Growth Projections by Occupation and Education

Long-Term Occupational Projections for Occupations in the Agribusiness-related NAICS Codes 2004-2014 Georgia – Statewide				
Type of Ag-related Occupation	Annual Openings from Growth	Annual Openings from Replacements	Total Annual Openings	Annual Growth Rate
Total - college-degree occupations for degree programs (education levels 1-6)	701	888	1,580	1.5%
Total - college-degree occupations for certificate programs (education level 7)	5	14	20	0.6%
Total college occupations (education levels 1 - 7)	706	902	1,600	1.5%
Total non-college occupations	3,223	4,517	7,740	1.4%
Total Georgia Agribusiness	3,924	5,405	9,320	
Total - college-degree occupations for associate's degree programs only (education levels 6 only)	89	97	170	1.4%

Source: Georgia Department of Labor

Note: Totals may not equal the sum of individual cells due to rounding and data suppression.

Table 3.3 – Summary of Occupational Growth Rates, Georgia

Among the 31 degree-required occupations for which data were available, almost one half (48.4%) are predicted to grow faster or much faster than the average for the State of 1.7%. Overall, almost 90% of agribusiness related occupations are projected to increase in terms of employment while another 13%, including conservation scientists and foresters will experience negative growth rates. Employment of environmental engineering technicians is expected to increase much faster than the state average at 3.2%. Details on occupational growth rates (by SOC) are provided in Appendix E.

(Growth Projections)	Distributions		
	Absolute	Relative	Cumulative
>1.7%	15	48.4%	48.4%
1.0% - 1.6%	6	19.4%	67.7%
0.0% - 0.9%	6	19.4%	87.1%
<0 (negative)	4	12.9%	100.0%

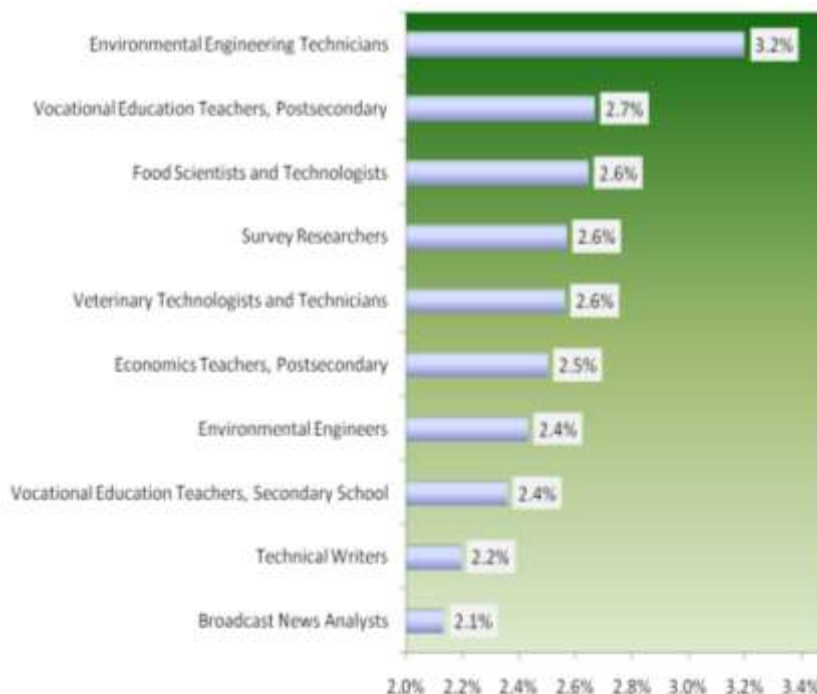
Source: Georgia Department of Labor

The occupational characteristics of the list of occupations included in the college-educated agribusiness workforce are included in Appendix F (in SOC order). This list includes occupations that are peripherally related to agribusiness, including reporters and technical writers, who may obtain degrees in agricultural communication, and loan officers, economists, and survey researchers with degrees in agribusiness related disciplines.

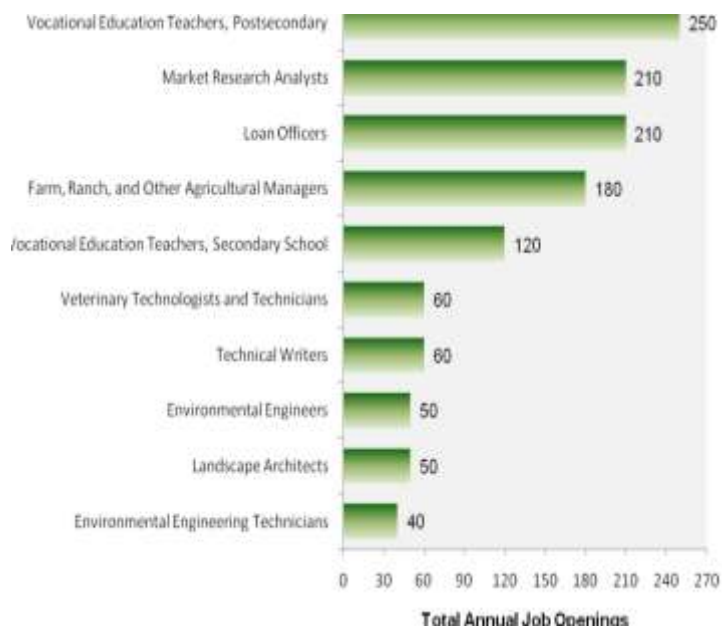
Chart 3.5 - Top Ten Agribusiness-Related Occupations: Fastest Growing Occupations in Georgia

Attention must be drawn to the distinction between growth rates and job openings. Labor market growth can be reported in one of two ways: i) as rates of growth (%) and ii) as absolute numbers of jobs created. Typically, emerging industries generally have higher growth rates because the employment base is small. Thus the creation of 1,000 jobs in an industry that currently employs 10,000 would be reported as a 10% increase. On the other hand, the same number of jobs created in a sector that employs 100,000 would be only a 1% increase.

A: Growth Rates (in %), 2004 - 2014



B: Growth (in Numbers), 2004-2014



Adding 2,000 jobs to the larger industry a growth twice as large as that for the smaller industry, would equal a 2% growth rate, still lower than the 1,000 jobs added to the smaller industry. Thus, although positions for environmental engineering technicians is projected to report the highest growth rates among agribusiness-related occupations (3.2%), the number of job openings is among the smallest among the top ten occupations, creating only 40 jobs throughout the State. The comparison is reversed for vocational education teachers where job growth is 2.4% but the number of jobs created ranks it at the top of the list, with an additional 250 jobs created annually.

Source: Georgia Department of Labor

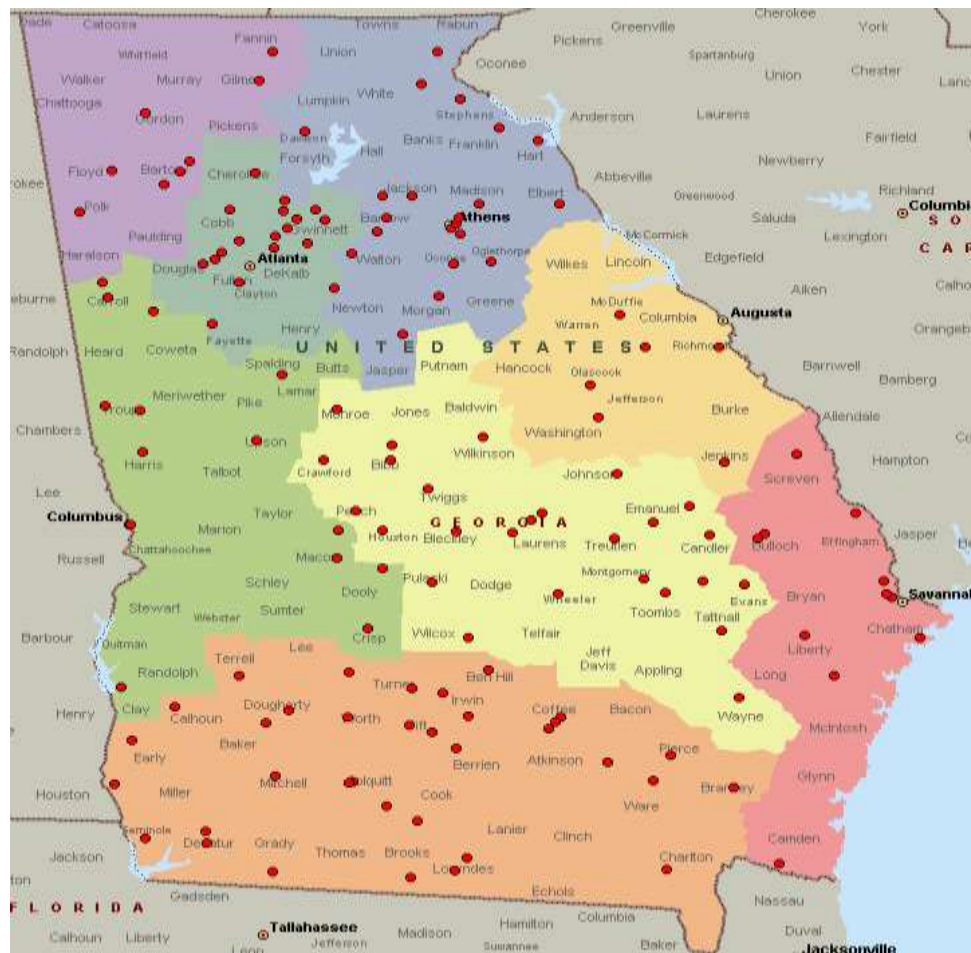
What Agribusinesses Want from Georgia's Higher Education System – Survey Findings

Overview

Having now provided a context for trends in the State's demand for college-educated workers, this section of the report is focused on analyzing the workforce needs expressed by respondents to the survey of agribusiness employers in terms of their projected demand for college-educated workers.³⁶ Additional sections of the report will analyze questions relating to their perceptions of the supply of college-educated workers and the implications of views expressed about the quality and quantity of higher education in Georgia. Note that for most of the tables, absolute values are reported as whole number and relative values as percentages in parentheses (%) below the absolute values. If necessary, exceptions will be noted. Note that the sum of responses may not equal the total reported due to rounding.

Survey respondents represented a diverse geographic region across the State covering a large share of the State (Chart 3.6). This gives a reasonable level of confidence in the information gathered and the opinions expressed by the respondents in the future trends in the agribusiness industry of being reflective of the diversity of respondents' needs by regions.

Chart 3.6 – Geographic Location of Survey Respondents



³⁶ A discussion of the survey methodology is contained in Chapter 1.

Diversity was also reflected in the NAICS categories represented among the survey respondents. Relatively speaking, the largest group of respondents was the crop and greenhouse production group who represented 17% of the total number of completed responses. Least represented were agricultural consultants, less than 2% of total respondents. However, there were no subsectors that were not represented in the distribution of respondents.

Chart 3.7 - Distribution of Respondents by Broad NAICS Categories

The distribution of respondents by broad NAICS categories also reflected the diversity of the industry. The only categories not represented were the mining and construction and utilities subsectors whose individual impacts on the Georgian economy are less than 1/2 of 1% (0.4).

Again, this provides support to the assumption that the responses received from the survey participants would be reflective of Georgia's agribusiness industry as a whole.

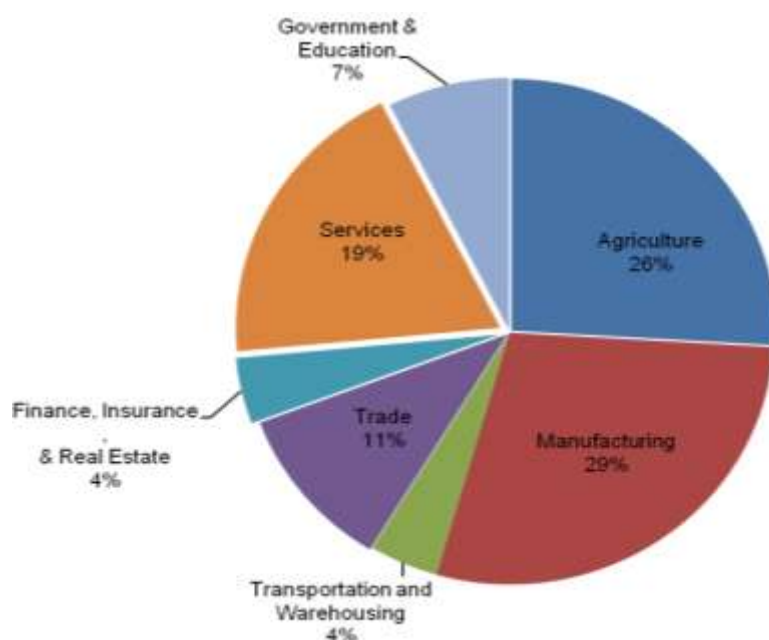


Table 3.4 – Distribution of Respondents by Primary Agribusiness Subsector

Which of the following is the primary agribusiness area for your company? (Choose only one.)		
Answer Options	Response Percent	Response Count
Crop and Greenhouse Production	17.4%	33
Other	12.1%	23
Other Farm Production & Farm Support Activities	10.5%	20
Wood and Paper Product Manufacturing	10.0%	19
Food, Beverage, & Tobacco Manufacturing	8.4%	16
Food Warehousing, Wholesaling, & Retailing Operations	7.9%	15
Agricultural Chemical & Machinery Manufacturing	6.3%	12
Animal and Animal Aquaculture Production	5.8%	11
Trade Organization/Association	5.8%	11
Forestry and Logging Operations	5.3%	10
Government/Education Related to Agricultural Production	5.3%	10
Agricultural Finance and Risk Minimization	3.7%	7
Agricultural Consulting	1.6%	3
Completed Responses		190

Other agribusiness areas mentioned by respondents included landscape design, maintenance and installation, container manufacturing, human resource consulting, and agricultural packaging and container manufacturing.

Given the diversity in both geographic coverage and agribusiness production areas, it is reasonable to assume that conclusions based on the survey responses would be a valid representation of the perceptions of the State's agribusiness employers. As such, the responses to questions contained on the survey are reported below and elsewhere in the report to serve as a base against which to compare the State and national data on employment trends and the future needs of agribusiness employers.

Current Size of College-educated Workforce

Responses to the question about the current size of their Georgia-based workforce revealed that, on average, survey participants employed approximately 116 workers in their Georgia locations. College degrees were required for almost 26% of the full-time positions for these employers. For those with multi-state operations, the average number of employees was 1,822 of which 23% had college degree requirements.

Chart 3.8 - Percentage of Full Time Positions Requiring a College Degree

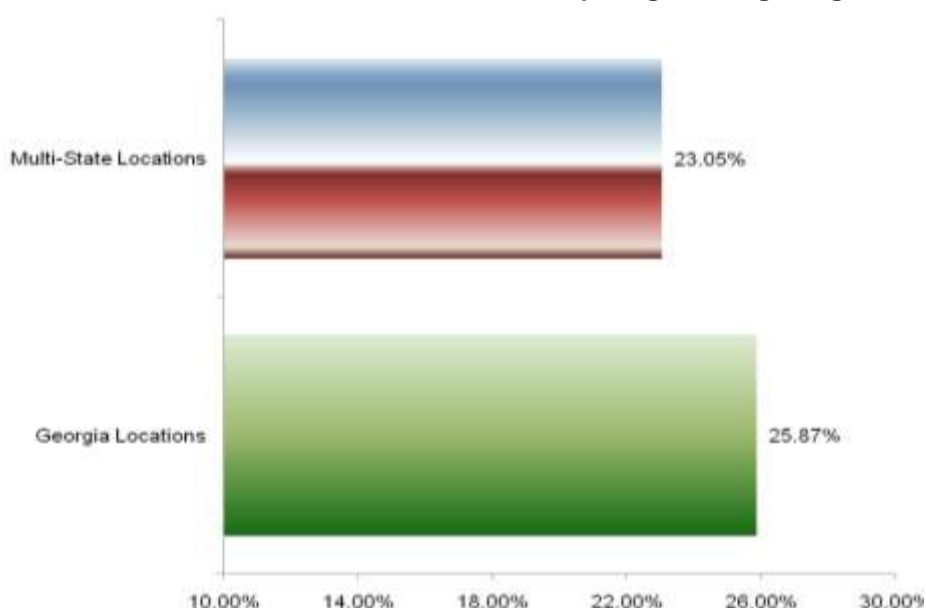


Table 3.5 - Full Time Positions Requiring a College Degree

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 Count
Approximate number of employees in Georgia?	115.95	182
Percent (%) of full time positions requiring a college degree: Georgia?	25.9%	180
Approximate number of employees in the U.S.?	1,822.03	138
Percent (%) of full time positions requiring a college degree: U.S.?	23.1%	136
Completed Responses	184	

However, when asked about specific subject matter needs, the majority of respondents (58%) indicated that a degree in a specific subject matter was not required for entry-level positions in their companies. Only 2% responded that a specific subject matter is required for all entry-level positions.

Table 3.6 - Need for Specific Subject Matter for Entry-level Positions

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
Completed Responses		185

For those respondents for whom a college degree in a specific subject matter was required (“yes” for all, most or some positions, equal to 42.2% of respondents), responses varied greatly by agribusiness enterprise. For agricultural consultants, all respondents (three) indicated that a specific degree was required. On the other hand, only 16% of those in crop production (five of 32) held that requirement.

Chart 3.9 – Distribution of Responses by Need for Specific Subject Matter

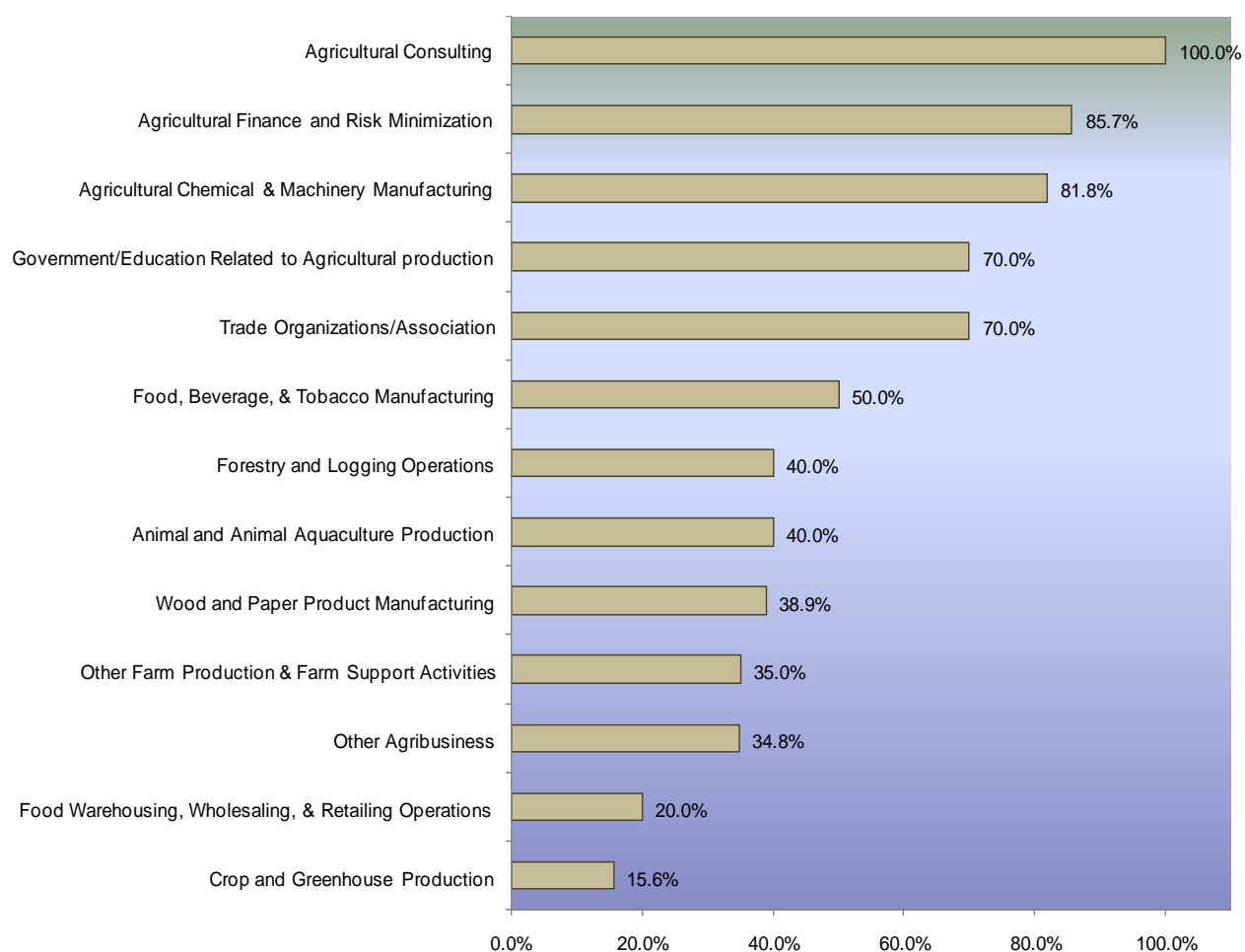
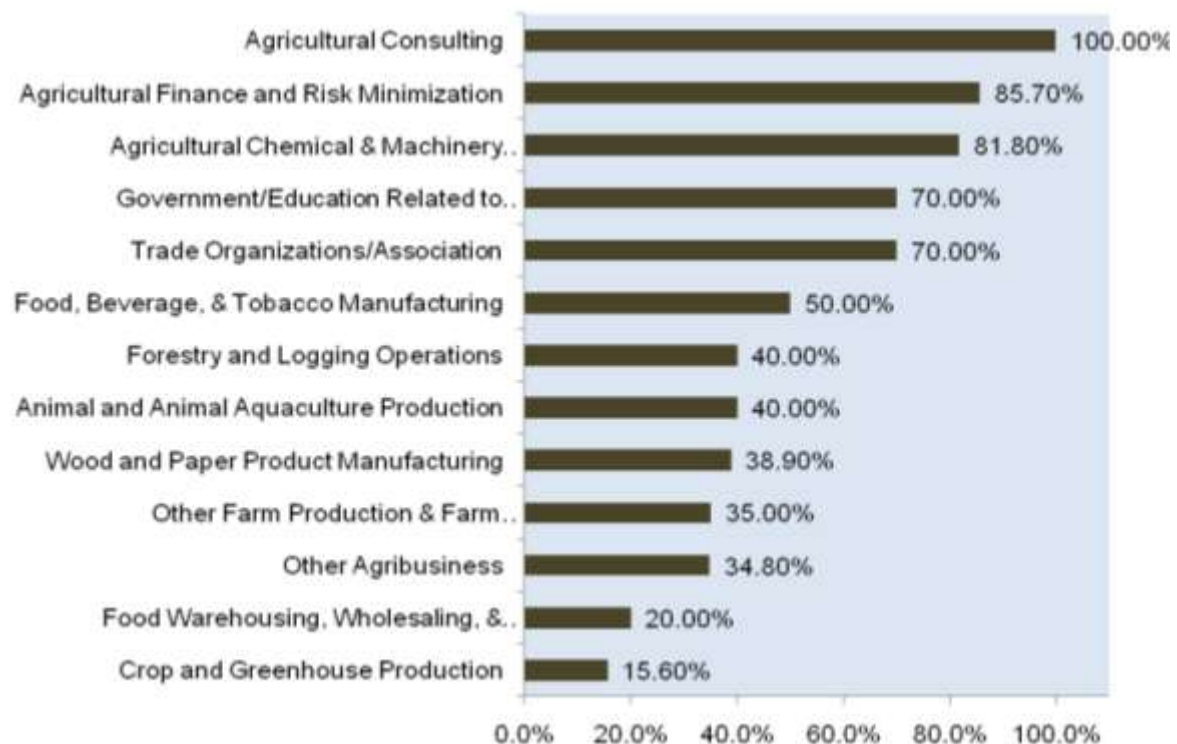


Table 3.7 – Distribution of Responses on Degree Requirements for Those Employers for Whom a Specific Requirement Exists

Agribusiness Enterprise	No	Yes	Total	Percent for which Specific degree required
Crop and Greenhouse Production	27	5	32	15.6%
Food Warehousing, Wholesaling, & Retailing Operations	12	3	15	20.0%
Other Agribusiness	15	8	23	34.8%
Other Farm Production & Farm Support Activities	13	7	20	35.0%
Wood and Paper Product Manufacturing	11	7	18	38.9%
Animal and Animal Aquaculture Production	6	4	10	40.0%
Forestry and Logging Operations	6	4	10	40.0%
Food, Beverage, & Tobacco Manufacturing	8	8	16	50.0%
Trade Organizations/Association	3	7	10	70.0%
Government/Education Related to Agricultural Production	3	7	10	70.0%
Agricultural Chemical & Machinery Manufacturing	2	9	11	81.8%
Agricultural Finance and Risk Minimization	1	6	7	85.7%
Agricultural Consulting		3	3	100.0%
Total respondents	107	78	185	42.2%

Represented graphically, it is clear to see that the more specialized the agribusiness enterprise, the more likely the respondent is to require a specific field for the degree which the employee holds.

Chart 3.10 – Distribution of Responses to Degree Field Requirement



For those employers who require a college degree in a specific subject matter, the most popular degree programs were those in business (agribusiness, general business, or agricultural economics). More than 75% of the 106 employers who required that degree for one or more position openings in their companies indicated that at least 25% of their positions required a degree in those fields. On the other hand, of the 61 employers who had one or more openings that required a food science degree, fewer than 10% reported that all or almost all of their position openings would require a degree in that field. Other fields reported included economic development, engineering, government relations, management, and sales.

Table 3.8 - Subject Matter Content for Degree Requirements

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 that apply. If none, leave blank. For "other", please specify.					
Answer Options	All or Almost All (>90%)	Most (51-90%)	Some (25-50%)	A Few (<25%)	Response Count
Agribusiness/Agricultural Economics/General Business	28 (26.4%)	29 (27.4%)	23 (21.7%)	26 (24.5%)	106
Animal Sciences (Including Dairy & Poultry)	9 (15.0%)	5 (8.3%)	9 (15.0%)	37 (61.7%)	60
Plant/Crop Sciences	11 (15.3%)	13 (18.1%)	19 (26.4%)	29 (40.3%)	72
Public Relations & Communications	18 (19.1%)	25 (26.6%)	21 (22.3%)	30 (31.9%)	94
Environmental Sciences	13 (17.8%)	13 (17.8%)	17 (23.3%)	30 (41.1%)	73
Agricultural Engineering	9 (11.8%)	11 (14.5%)	15 (19.7%)	41 (53.9%)	76
Food Science	5 (8.2%)	4 (6.6%)	11 (18.0%)	41 (67.2%)	61
Forestry	8 (10.7%)	10 (13.3%)	19 (25.3%)	38 (50.7%)	75
Geology/Earth Sciences	3 (5.4%)	1 (1.8%)	17 (30.4%)	35 (62.5%)	56
Horticulture & Landscaping	16 (23.5%)	6 (8.8%)	17 (25.0%)	29 (42.6%)	68
IT/Computer Science	12 (13.8%)	18 (20.7%)	29 (33.3%)	28 (32.2%)	87
Turfgrass Management	3 (4.9%)	10 (16.4%)	11 (18.0%)	37 (60.7%)	61
Agricultural Mechanization	5 (7.2%)	13 (18.8%)	19 (27.5%)	32 (46.4%)	69
Soil Science	4 (7.7%)	11 (21.2%)	14 (26.9%)	23 (44.2%)	52
Plant Protection and Pest Management	12 (15.8%)	16 (21.1%)	20 (26.3%)	28 (36.8%)	76
Agricultural Education	9 (12.3%)	12 (16.4%)	19 (26.0%)	33 (45.2%)	73
Food Technology	7 (10.6%)	3 (4.5%)	10 (15.2%)	46 (69.7%)	66
		Other (please specify below)			24

Projected Trends in Employment

In looking forward to the short and longer runs, employers perceived that it will be important for employees to hold college degrees. Nearly 1/3 of respondents speculated that a college degree will be very important in the next 2-5 years. In the longer run, nearly 45% of respondents felt that new employees will need to possess college degrees. The number who felt that it would not be important for new hires to hold college degrees fell from 17% in the short run to only 8% in the next 6-10 years.

Table 3.9 – Expectations of Future College Degree Requirements

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 (32.6%)	74 (41.6%)	31 (17.4%)	15 (8.4%)	178
In the next 6 - 10 years	76 (44.7%)	63 (37.1%)	14 (8.2%)	17 (10.0%)	170

For those employers who currently have college-educated workers on staff, the numbers were only slightly different from the responses from all survey participants. The number of respondents who supposed that it would not be important for new hires to hold college degrees was only 8% in the short run and less than 2% in the next 6-10 years.

Workplace Needs Derived from Survey Responses

When asked about specific skills and attributes likely to be in demand, responses mentioned ranged from customer service skills to critical thinking/problem solving. On the whole, initiative appeared to be the most required attribute demanded by respondents, followed by communication skills, critical thinking/problem solving, and ethics. Foreign language capabilities and study abroad experience were not perceived to be critical skill needs among the respondents.

Chart 3.11 – Top Five Skills/Attributes Identified as Requirements by Survey Respondents

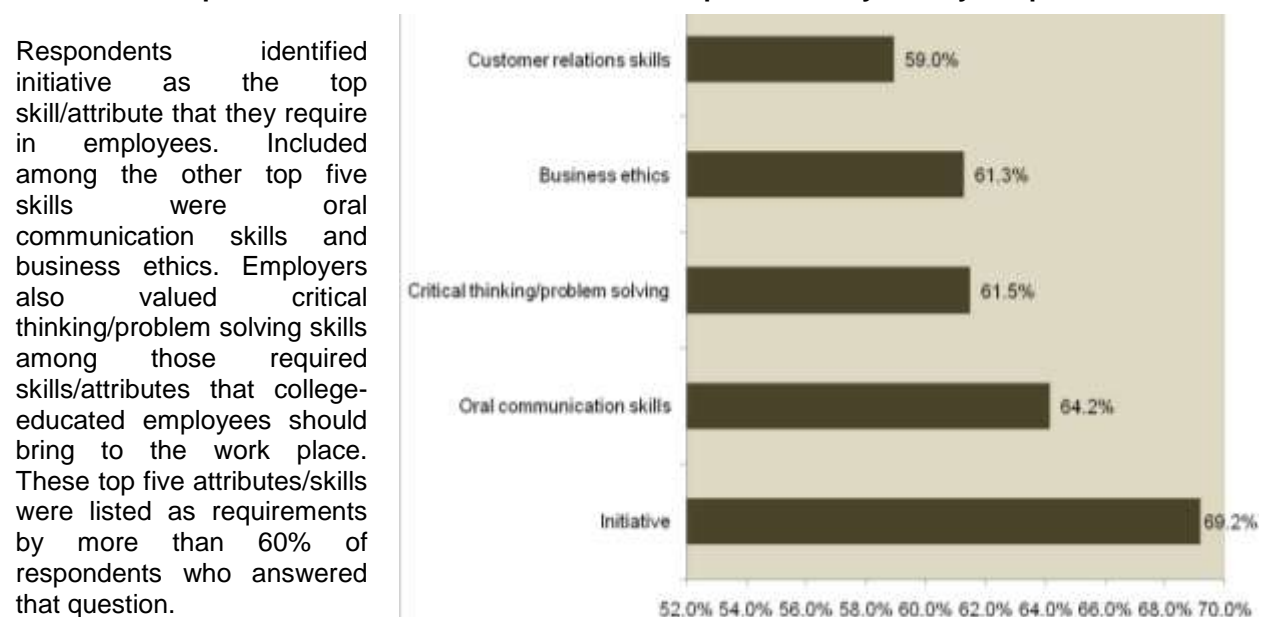
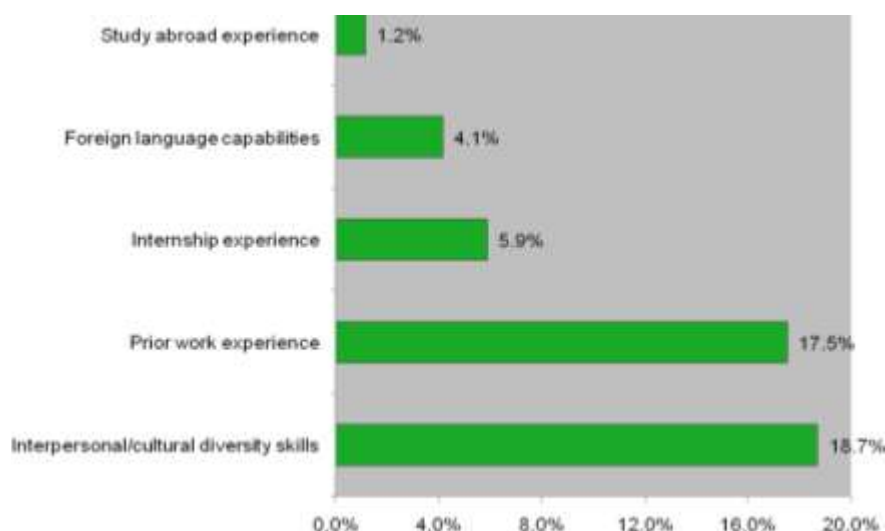


Chart 3.12 – Bottom Five Skills/Attributes Required by Survey Respondents

Study abroad experience and foreign language capabilities were not regarded by survey respondents as required skills for jobs in the agribusiness industry. Although prior work experience and interpersonal/cultural diversity skills were ranked in the bottom five among required skills, almost 20% of respondents considered them to be valuable skills that employees should possess.



Additional details about the responses to required and preferred skills/attributes are provided in Table 3.10. It should be noted that, although not in the top five requirements, office software/computer competency was required and preferred by a large group of respondents. On the other hand more than 80% of respondents did not regard study abroad experience as an important skill to be acquired by college graduates who would seek employment in the agribusiness industry.

Table 3.10 – Significance of Skill/Attributes

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
Initiative	119	69.2%	45	26.2%	8	4.7%	172
Oral communication skills	111	64.2%	57	32.9%	5	2.9%	173
Critical thinking/problem solving	107	61.5%	59	33.9%	8	4.6%	174
Business ethics	106	61.3%	61	35.3%	6	3.5%	173
Customer relations skills	102	59.0%	62	35.8%	9	5.2%	173
Office software/computer competency	91	52.6%	68	39.3%	14	8.1%	173
Written communication skills	81	47.9%	72	42.6%	16	9.5%	169
Leadership/team building skills	76	43.9%	87	50.3%	10	5.8%	173
Project management skills	40	23.7%	101	59.8%	28	16.6%	169
Statistics and mathematics	36	21.1%	97	56.7%	38	22.2%	171
Interpersonal/cultural diversity skills	32	18.7%	102	59.6%	37	21.6%	171
Prior work experience	30	17.5%	119	69.6%	22	12.9%	171
Internship experience	10	5.9%	92	54.1%	68	40.0%	170
Foreign language capabilities	7	4.1%	91	53.8%	71	42.0%	169
Study abroad experience	2	1.2%	25	14.5%	146	84.4%	173

Summary

The demand side of the market for college-educated workers in the agribusiness sector will be influenced by two factors:

1. The estimated numbers of workers needed to produce the projected demand for agribusiness products and services (quantity of labor demanded); and
2. The ability of the higher education system to graduate a college-educated workforce that reflects the kinds of skills sought by agribusiness employers (quality of labor demanded).

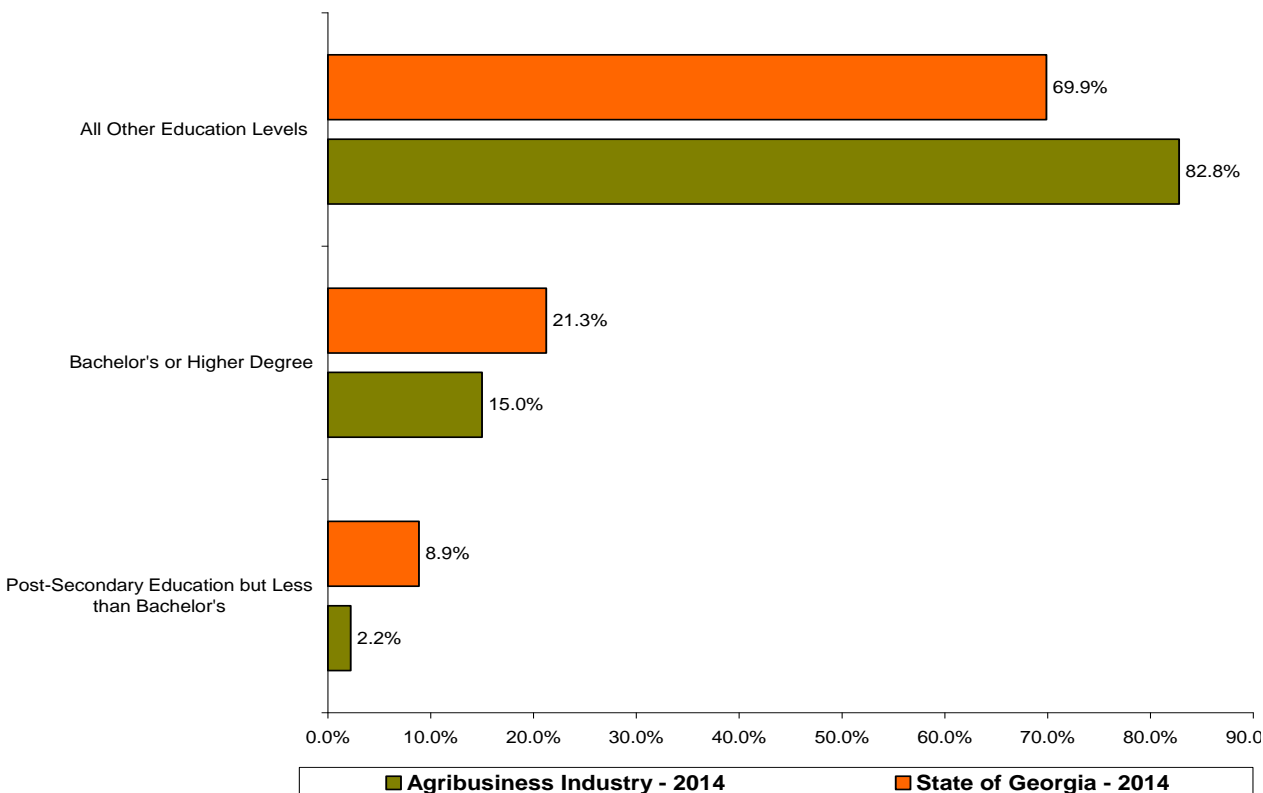
The quantity of labor demanded is calculated by the Georgia Department of Labor (DOL) as the total annual openings from two sources:

1. Employment growth – from the creation of new jobs/positions due to business expansion.
2. Replacements- due to such factors as retirement, relocation, or labor shifts to other occupations and industries.

Both sources of jobs play an important role in the demand for labor in Georgia's agribusiness sector. The conclusion to be drawn from the DOL projections is that occupations that require postsecondary education (education levels 1 – 7) will grow faster than the state average for all occupations. This growth will be led by increases in the demand for workers with an associate's degree.

DOL projections forecast that by the year 2014, workers with at least a bachelor's degree will account for 15% of the total agribusiness workforce. Although this is lower than the comparable figure for the State as a whole, this is significant given the large farm labor population who hold a high school diploma or less.

Chart 3.13 – Comparison of Projected Demand for Labor by Educational Levels: Agribusiness and Overall Economy



Addressing the issue of the quality of the college-educated workforce will require that attention be paid to the needs expressed by agribusiness employers for the types of workers for which they are and will be seeking. Beyond the technical knowledge, employers have expressed the need for workers who can think, problem solve, communicate, provide quality customer service, and take initiative. Responding to these quality issues will take creative thinking by higher education institutions as to the ways in which the development of these skills and attributes can be incorporated into curriculum design.

An understanding of the demand side of the labor market cannot be complete without an analysis of the supply side contained in the next chapter. Following that, the two sides of the market will be combined to determine the nature, if any, of the projected disequilibrium in the agribusiness labor market for college-educated workers.

Chapter 4: The Supply of College Educated Workers for Georgia's Agribusiness Industry

Introduction

According to statistics obtained from the University System of Georgia, there were more than 270,000 students enrolled in degree programs; 400,000 students enrolled in continuing education courses; 40,000 faculty and staff employed throughout the State.³⁷ These statistics support Chancellor Erroll Davis' comment made in his most recent "State of the System" address that, "[c]learly, we are making important and measurable progress toward these three goals: we are enrolling more students; we are keeping more students in college; and we are graduating more individuals to contribute to Georgia's economic and intellectual growth and quality of life." He continued, "[t]his System is continuing to add tremendous value to this state, as it always has. We are transforming the lives of thousands of individuals, and in the process, strengthening this state and this nation as well."³⁸ Indeed, participation rates from high school to college have shown continued increase, leading to overall increases in educational levels of Georgia's workforce. In its most recent report, the National Center for Public Policy and Higher Education confirmed the success of Georgia's efforts to increase college participation rates, reporting that those rates increased from 26% in 1992 to 30% in 2006 for 18-24 year olds.³⁹ Enrollment has increased for most categories of students, except at the professional level, with growth in enrollment at the undergraduate level up almost 50% over the 2000 to 2006 period.

Table: 4.1 – Growth in College Enrollment, US and Georgia

A: Growth in College Enrollment by Degree, Georgia, 2000- 2006

Georgia Trends	Undergraduate Student Enrollment	Graduate Student Enrollment	Professional Student Enrollment	Student enrollment - Full-time	Student enrollment - Part-time
2002	257,010	39,033	10,195	208,835	97,403
2006	377,266	49,019	7,998	291,726	142,557
Change: 2002 - 2006	46.8%	25.6%	-21.5%	39.7%	46.4%

These numbers compare very favorably to similar numbers for the Nation, with Georgia reporting higher growth rates at every level except professional students.

B: Growth in College Enrollment by Degree, U.S., 2000- 2006

National Trends	Undergraduate Student Enrollment	Graduate Student Enrollment	Professional Student Enrollment	Student enrollment - Full-time	Student enrollment - Part-time
Change: 2000 -2006	19.2%	23.3%	12.5%	25.9%	10.8%

Source: Measuring Up 2006, State facts

³⁷ ICAPP website <http://www.icapp.org/about/>

³⁸ Chancellor's State of the System Address, January 16, 2008, Chancellor Erroll B. Davis, Jr. "State of the System" from <http://www.usg.edu/chancellor/reports/2008/jan08.phtml>

³⁹ Measuring Up 2006, Georgia Report, p.7

With those trends in mind, it would be interesting to assess the impact on degrees conferred by the University System and the availability of college-educated workers who meet the needs of the agribusiness industry. Thus, we undertook an inventory of the agribusiness-related degree programs offered within the University System as a first step in assessing how well the programs meet the workforce needs of employers. The inventory was developed using System resources and the most current on-line course catalogs for each institution as of July 2008.

Current Capacity within the USG

Currently, the University System institutions offer a total of 151 degree programs and majors in agribusiness and allied disciplines. While details by discipline and institution are provided in Appendix G, suffice it to say that these programs represent a diverse set of disciplines, ranging from the “traditional” agribusiness fields such as crop production and livestock husbandry, to many emerging fields such as agricultural tourism and biotechnology. In all, 15 of the System’s institutions offered one or more degree programs in agribusiness or closely-related disciplines. Of those, 11 programs consisted of certificates of less than one year in such fields as agrosecurity, organic agriculture, and agricultural law. Another 34 programs were offered at the associate level (two-year programs), primarily in natural resources (forestry, wild life, and environmental studies) and crop and animal production. It was of interest that no schools currently offer any programs in agricultural mechanization, an observation that did not go unnoted by several of the employers from whom responses were received.

Table 4.2 – Degree Program Offerings by Discipline, USG, as of July 2008

Discipline/ Degree Emphasis	Number of Programs
Agribusiness/Agricultural Economics/General Business	7
Agricultural Education	7
Agricultural Mechanization	0
Animal Sciences (including dairy & poultry)	21
Engineering	16
Environmental Science	16
Food Science	3
Food Technology	1
Forestry/Forest Resources	17
Geology/Earth Sciences	0
Horticulture & Landscaping	13
IT/Computer Science	1
Plant Protection and Pest Management/Entomology	1
Plant/Crop Sciences	12
Public Relations & Communications	2
Turfgrass Management	2
Subtotal – core degree programs	119
Other fields (inc. Textiles, Biotechnology, Agrotourism, Development and Planning, and Organic Agriculture)	32

Overall, the largest number of degree programs was offered at the bachelor's level. Eight schools within the System's member institutions offered one or more degrees in core or allied agribusiness fields. Although more institutions offered associate's degrees, there were as many master's level programs as associate's.

Table 4.3 – Degree Program Offerings by Award Level, USG, as of July 2008

Degree Program Level	Number of Degree Programs	Number of Schools With Programs
Certificates of <1 year	11	4
Associate's Degrees	35	8
Bachelor's Degrees	49	8
Advanced Certificates/ dual BS/MS degree	4	3
Master's Degrees	35	5
Doctoral Degrees	17	2

By institution, the University of Georgia accounted for 79 of the 151 program offerings in agricultural and allied agribusiness disciplines while Abraham Baldwin Agricultural College offered 16 of the 35 associate degree programs within the University System.

Table 4.4 – Degree Program Offerings by Award level and Institution, USG, as of July 2008

Institutions	Cert	Assoc	BS	AC	MS	PhD	Total by Institution
University of Georgia	7	0	30	1	27	14	79
Abraham Baldwin Agricultural College	0	16	2	0	0	0	18
Georgia Institute of Technology	0	0	6	1	5	3	15
Fort Valley State University	0	4	7	0	1	0	12
Gainesville State College	2	7	1	0	0	0	10
Darton College	0	4	0	0	0	0	4
Georgia College and State University	0	1	1	0	0	0	2
Georgia State University	0	0	0	2	0		2
Southern Polytechnic State University	1	0	1	0	0	0	2
Bainbridge College	1	1	0	0	0	0	2
Columbus State University	0	0	0	0	1	0	1
East Georgia College	0	1	0	0	0	0	1
Georgia Highlands College	0	1	0	0	0	0	1
Georgia Southern University	0	0	1	0	0	0	1
University of West Georgia	0	0	0	0	1	0	1
Total Number by Award Level	11	35	49	4	35	17	151
Cert = Certificates of less than 1 year BS = Bachelor's degrees MS = Master's degrees Assoc = Associate' degrees AC = Advanced Certificates Ph.D. = Doctoral degrees							

Assessing Agribusiness Labor Availability

Arriving at an estimate of the size of the college-educated agribusiness workforce was no easy task. Several sources of data were used to create a data base that we felt was both reasonably accurate and most current. In addition to data produced by the University System, additional data were collected from the Georgia Department of Labor, the Occupational Supply Demand System, and the Food and Agricultural Education Information System. From information gathered from employers on their hiring patterns with regard to college-educated employees and with the assumption that entry and mid level management workers would have fewer than five years of experience, data on degrees conferred was limited to the 2002- 2006 time period. The CIP codes used fell into three broad categories as follows:

1. Natural Resources and Conservation - including forestry, environmental science and studies, wastewater management, resource conservation, and wetlands management.
2. Agriculture, Agriculture Operations, and Related Sciences - including crop production, animal and poultry sciences, plant and crop sciences, agribusiness, agricultural economics, farm management, and animal breeding and husbandry.
3. Allied disciplines - including education, architecture, and biological and biomedical sciences.

A complete list of the relevant CIP codes is provided in Appendix D. It should be noted that, in addition to recruiting among agribusiness graduates, agribusiness employers often look to graduates from programs offered by schools of business. Those CIP codes are also included below and in the Appendix.

Table 4.5 – Core and Allied Agribusiness Programs by 2-Digit CIP Codes.

2-Digit CIP	Descriptions	Included Subcategories
01	Agriculture, Agriculture Operations, And Related Sciences	01.0100 – 01.9999
03	Natural Resources And Conservation	03.0101 – 03.9999
04	Architecture And Related Services	04.0301; 04.0401; 04.0601
13	Education	13.1301
14	Engineering	14.0301; 14.1401; 14.2801; 14.340
19	Family And Consumer Sciences/Human Sciences	19.0901; 19.0902; 19.0504
26	Biological And Biomedical Sciences	26.0301 - 26.0399; 26.0701 - 26.0710; 26.1101; 26.1201

Table 4.6 – Related Business and Parks and Leisure Studies Programs⁴⁰ by CIP Codes:

2-Digit CIP	Descriptions	Included Subcategories
31	Parks, Recreation, Leisure, and Fitness Studies.	31.0101; 31.0301
45	Social Sciences (Economics)	45.0604
52	Business, Management, Marketing, And Related Support Services	52.0201; 52.0205; 52.0701; 52.0703; 52.0905

⁴⁰ Programs in Business and Leisure Studies are considered to complement those in agribusiness because of the similarity in skills among graduates. According to the latest FAEIS study, nearly 10% of openings in agricultural and forestry production occupations will be filled by persons with degrees in business or other related programs. For management occupations in the agricultural industry, that share is almost 40%.

Degrees Conferred USG: Agribusiness Core and Allied Degree Programs

Over the period 2002 to 2006, the University System of Georgia awarded an average of 608 undergraduate degrees and certificates and 255 graduate degrees and certificates in agribusiness-related (core and allied) programs. While the details of awards by level of award and CIP are provided in Appendix H, it is interesting to note that there were more than three times as many degrees awarded in related business-degree programs, many of whose graduates will supplement graduates from core and allied agribusiness majors in the agribusiness industry workforce.

Table 4.7 – Degrees Conferred by 2-Digit CIP, 2002 - 2006

2-Digit CIP	Description	Total - All Award Levels	Total Undergraduate (including certificates)	Total Graduate
01	Agriculture, Agriculture Operations, And Related Sciences	1480	1093	387
03	Natural Resources And Conservation	797	521	276
04	Architecture And Related Services	585	353	232
13	Education	129	105	24
14	Engineering	418	219	199
19	Family And Consumer Sciences/Human Sciences	160	135	25
26	Biological And Biomedical Sciences	201	81	120
	Total - Core and Allied Programs	3770	2507	1263
	average per year - Core and Allied Programs - all award levels	754	501	253
	Related Programs			
31	Parks, Recreation, Leisure and Fitness Studies	545	534	11
45	Social Sciences/Economics	9	9	0
52	Business, Management, Marketing, And Related Support Services – all award levels ⁴¹	13,404	9,258	4,146

Table 4.8 – Degrees Conferred in Agribusiness as Share of USG, 2002 - 2006

Unit	Total Degrees Conferred 2002 - 2006	Total Undergraduate Awards 2002 - 2006	Total Graduate Awards 2002 - 2006
All USG	213,545	158,328	55,217
Agribusiness as % of total degrees conferred	1.8%	1.6%	2.3%

Even though the University System institutions represent the major producer of agribusiness graduates in the State, of the more than 200,000 degrees awarded at System institutions over the 2002-2006 time period, only approximately 2% went to graduates in core and allied agribusiness programs.

⁴¹ This number represents only those CIP codes for programs selected as closely competitive with agribusiness degree programs in the agribusiness industry. A list of the included CIP codes is provided in Appendix D.

At the undergraduate level, the types of awards conferred are outlined in Table 4.9 A

Table 4.9 – Degrees and Certificates Conferred in Agribusiness Programs, 2002 - 2006

A: Undergraduate Degrees Conferred, by Type

	Degrees Awarded in Core and Allied Programs			
Degree Award year	Undergraduate Degrees			
	Certificates	Associate's	Bachelor's	Total Undergraduate
2002	8	119	363	490
2003	12	130	405	547
2004	4	86	441	531
2005	1	33	313	347
2006	4	74	514	592
Total: 2002 - 2006	29	442	2,036	2,507
5 year average	6	88	407	501

For graduate degree programs, the total and average numbers of awards conferred over the 2002-2006 period are reported in Table 4.9 B.

B: Graduate Degrees and Certificates Conferred, by Type

	Degrees Awarded in Core and Allied Programs			
Degree Award year	Graduate Degrees			
	Advanced Certificate	Master's	Doctorate	Total Graduate
2002	0	208	58	266
2003	1	190	66	257
2004	0	197	55	252
2005	0	177	41	218
2006	0	195	75	270
Total: 2002 - 2006	1	967	295	1263
5 year average	0	193	59	253

Agricultural-related Programs in Context:

An analysis of the relative number of graduates in agribusiness-related programs revealed that these programs represent a very small percentage of the System's total graduates. There were almost 40 CIP codes (excluding disciplines listed as 'other') identified as typically falling within agribusiness programs from which no students graduated in the 2002-2006 period.

Table 4.10 – Programs with No Awards Conferred for 2002 - 2006

CIP	Description		CIP	Description
01.0105	Agricultural/Farm Supplies Retailing and Wholesaling		01.1002	Food Technology and Processing
01.0106	Agricultural Business Technology		01.1101	Plant Sciences, General
01.0205	Agricultural Mechanics and Equipment/Machine Technology		01.1104	Agricultural and Horticultural Plant Breeding
01.0303	Aquaculture		01.1202	Soil Chemistry and Physics
01.0306	Dairy Husbandry and Production		01.1203	Soil Microbiology
01.0307	Horse Husbandry /Equine Science and Management		03.0199	Natural Resources, Conservation, and Research, General
01.0401	Agricultural and Food Products Processing		03.0204	Natural Resource Economics
01.0505	Animal Training		03.0205	Water, Wetlands, and Marine Resources Management
01.0507	Equestrian/Equine Studies		03.0206	Land Use Planning and Management/Development
01.0508	Taxidermy/Taxidermist		03.0506	Forest Management/Forest Resources Management
01.0603	Ornamental Horticulture		03.0508	Urban Forestry
01.0604	Greenhouse Operations and Management		03.0509	Wood Science and Wood Products/Pulp and Paper Technology
01.0606	Plant Nursery Operations and Management		03.0510	Forest Resources Production and Management
01.0608	Floriculture/Floristry Operations and Management		26.0307	Plant Physiology
01.0701	International Agriculture		26.0308	Plant Molecular
01.0902	Agricultural Animal Breeding		26.0701	Zoology/Animal Biology
01.0903	Animal Health		26.0708	Animal Behavior and Ethnology
01.0906	Livestock Management		26.0709	Wildlife Biology
			26.1101	Biometry/Biometrics

These programs included 11 in animal science and studies, five in conservation, four in forestry, eight in plant/crop/ horticultural studies, and two in food processing. In addition, there were no graduates from any of the System institutions in agricultural mechanics and equipment/machine technology. A check of the data for all U.S. institutions showed that, in 2005-06 reporting year, 24 of these programs were no more popular than they were in Georgia, with fewer than 100 graduates. For instance, there were only 18 graduates across the U.S. in agricultural mechanics and equipment/machine technology and 11 in plant nursery operations and management. However, 7 of these programs had more than 500 graduates including agricultural business and management (general); environmental design; equestrian/equine studies; farm/farm and ranch management; and natural resources management and policy.

From another perspective, an analysis of the degree offerings revealed that there were 21 undergraduate programs (including certificate and associate degree programs) for which no corresponding graduate degrees awarded and 10 graduate disciplines for which there were no corresponding undergraduate awards reported during the time period under review. Pending further research and analysis to more closely review the underlying issues, the cause of the discrepancy in programs cannot be determined at this time.

Table 4.11– Programs with Either Graduate or Undergraduate Awards Conferred

A: Graduate but No Undergraduate Awards, 2002-2006

Codes	Description		Codes	Description
01.0801	Agricultural and Extension Education Services		14.1401	Environmental/Environmental Health Engineering
01.0904	Animal Nutrition		19.0902	Apparel and Textile Manufacturing
01.1106	Range Science and Management		19.0904	Textile Science (did not exist until 2000 CIP)
03.0201	Natural Resources Management and Policy		26.0305	Plant Pathology/Phytopathology
04.0301	City/Urban, Community and Regional Planning		26.0707	Animal Physiology

B: Undergraduate but No Graduate Awards, 2002-2006

Codes	Description		Codes	Description
01.0000	Agriculture, General		01.0802	Agricultural Communication/Journalism
01.0101	Agricultural Business and Management, General		01.1103	Horticultural Science
01.0104	Farm/Farm and Ranch Management		01.1201	Soil Science and Agronomy, General
01.0199	Agricultural Business and Management, Other		01.9999	Agriculture, Agricultural Operation, and Related Sciences, Other
01.0201	Agricultural Mechanization, General		03.0103	Environmental Studies
01.0204	Agricultural Power Machinery Operation		03.0301	Fishing and Fisheries Sciences and Management
01.0302	Animal/Livestock Husbandry and Production		03.0511	Forest Technology/Technician
01.0304	Crop Production		03.0601	Wildlife and Wildlands Science and Management
01.0605	Landscaping and Groundskeeping		04.0401	Environmental Design/Architecture
01.0607	Turf and Turfgrass Management		26.1201	Biotechnology
01.0699	Applied Horticulture/Horticultural Business Services, Other			

It should be noted that offering programs at the undergraduate or graduate level only is not unique to Georgia. National wide, there were 19 programs offered at the bachelor's level for which no graduate degrees were conferred in 2005-06. Fewer numbers of programs (7) were offered only at the graduate level. These graduate programs included agricultural and horticultural plant breeding, plant physiology and zoology.

Survey participants were able to identify specific programs which may or may not prove to be helpful to the growth of their companies. Only a few programs were identified as being potentially “very helpful” to employers and the results did not produce any clear direction as to which programs should be expanded or contracted. The three programs identified as being “very helpful” to more than 20% of the respondents were integrated pest management; production management; and agricultural business technology. In addition, government and policy was potentially “very helpful” to 19% of respondents. Based on available data, no programs were identified in the listing of program offerings at any degree level within the University System in production management. Integrated pest management was identified as being offered at the certificate and master’s degree levels. Those programs that were classified as “not helpful” to at least 40% of the respondents included biodiversity, biotechnology; organic/sustainable agriculture, food/agro security, and integrated nutrient management. The numbers were almost evenly split on alternative fuel with 45% indicating that offering a program in that discipline would be somewhat to very helpful while 55% did not think it would be helpful or were unsure of their impact on the growth of their companies. Currently, no programs were listed in the available data bases that addressed alternative fuel technology. Whereas more than half of the respondents pointed out that program offerings in government and policy would be somewhat or very helpful, 45% did not share that opinion or were not sure of the impact of such a program on the growth of their businesses. Overall, the strongest support appeared to be for offering programs in production management and government and policy.

Table 4.12 – Evaluation of Program Offerings to Future Growth

How helpful would it be to the growth of your company if potential applicants had college-level training in the following subject matter/emphases?						Related Major Programs Currently Offered at USG?
Answer Options	Very Helpful	Somewhat Helpful	Not Helpful	Don't Know/ Not Sure	Response Count	Number and Level
Resource conservation	14.2%	37.2%	30.4%	18.2%	148	2 (AC, M)
Integrated pest management	20.3%	30.1%	34.0%	15.7%	153	2 (C, M)
Integrated nutrient management	9.5%	27.7%	41.9%	20.9%	148	0
Bio-diversity	3.4%	26.4%	40.5%	29.7%	148	0
Waste management	10.3%	29.5%	39.0%	21.2%	146	0
Biotechnology	9.3%	26.0%	40.7%	24.0%	150	1 (B)
Government and Policy	18.8%	36.2%	28.9%	16.1%	149	0
Alternative fuel technology	8.1%	36.5%	35.1%	20.3%	148	0
Production management	26.7%	46.7%	12.7%	14.0%	150	0
Food/agrosecurity	11.4%	25.5%	41.6%	21.5%	149	1 (C)
Organic/sustainable agriculture	12.0%	24.0%	44.7%	19.3%	150	1 (C)
Precision agriculture	11.9%	24.5%	39.1%	24.5%	151	0
Agricultural mechanization /engineering technology	12.0%	38.7%	32.7%	16.7%	150	2 (A, B)
Ag business technology /computers in agriculture	25.7%	35.5%	26.3%	12.5%	152	1 (A)
answered question					160	
AC= Advanced Certificate; C = Certificate; B = Bachelor's; M = Master's						

It was clear from the survey responses that employers who currently hire college-educated graduates often look to institutions outside of Georgia to find employees although they had the greatest success in recruiting college-educated graduates from the University of Georgia.⁴² Employers were less successful in their hiring efforts from Fort Valley State University and Abraham Baldwin Agricultural College. However, this difference in success rates should not be interpreted as a reflection of the quality of the graduates or of their performance in the workplace. It is likely that the difference is based on the total number and types of programs offered, the numbers of students matriculating through the programs, and the relatively shorter period over those these have been available at Fort Valley State University and Abraham Baldwin Agricultural College. The survey did not inquire as to the reason for the differences.

Table 4.13 – Likely Source of College-Educated Applicants

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%)
Abraham Baldwin Agricultural College	6.7%	16.2%	13.3%	9.5%	54.3%
Fort Valley State University	1.0%	3.1%	1.0%	8.3%	86.5%
Georgia Institute of Technology	1.0%	3.1%	9.4%	12.5%	74.0%
University of Georgia	11.8%	31.1%	25.2%	16.0%	16.0%
Other university/college in Georgia	4.7%	10.5%	17.4%	14.0%	53.5%
Auburn University	8.0%	14.0%	11.0%	14.0%	53.0%
Clemson University	2.2%	6.5%	4.3%	19.4%	67.7%
University of Florida	3.2%	4.2%	8.4%	14.7%	69.5%
University of Tennessee	4.2%	1.0%	9.4%	10.4%	75.0%
Other U.S. University	4.2%	4.2%	12.7%	16.9%	62.0%

Of the 52 employers who listed other schools as sources from which they were successful in hiring college-educated employees, 34 schools in Georgia were identified, of which 23 were University System institutions. The list also included 25 schools in other states.⁴³ Of the University System institutions, Georgia Southern University, accounted for 13 of the 23 identified System institutions as a source for making successful hires of college-educated employees. Other System institutions included Kennesaw State University, Valdosta State University, Augusta State University, and University of West Georgia.

Summary

Institutions within the University System of Georgia currently offer 151 degree programs and majors in agribusiness and allied disciplines ranging from certificates of less than one year to doctoral degrees. Although the majority of these programs are offered at the University of Georgia, diverse programs, primarily in allied disciplines, are offered throughout the System. Considering all award levels, the System graduated an average of 754 per year in these agribusiness and allied programs, a small portion of the System's total graduates of more than 40,000 annually. Employers' recruiting efforts are not limited to graduates from the University System or the state of Georgia, confirming early observations about inter-state labor mobility.

⁴² The data refer only to those respondents who reported employing college-educated graduates. Tables for all respondents are included in Appendix I.

⁴³ Multiple responses per respondent were permitted so the total exceeds 52.

Chapter 5: Projected Employment Opportunities and Potential Gaps

Introduction

As part of its mission to “create a more educated Georgia”, the USG created, in 1995, Georgia’s Intellectual Capital Partnership Program (ICAPP) to link “the intellectual resources of Georgia’s 35 public college and universities to the state’s business community in innovative ways” including access to college-educated employees.⁴⁴ Employers who responded to the survey expressed overall satisfaction with the quality of education received by college graduates. However, for agribusiness employers, access alone was not sufficient. Many of the survey respondents expressed concern about having access to the right kinds of employees who possessed the right combination of technical knowledge and professional skills. For the agribusiness sector, mention has already been made of the fact that employers were less interested in the specific field in which employees’ degrees were earned than they were in the soft skills acquired through their college education. Yet, the importance of a college degree was not minimized by the respondents, several of whom raised questions as to the issues that should be addressed in striking a balance between their workforce needs and the degrees offered/curricula adopted by the University System institutions. In the words of one individual interviewed, the task remains as to how to “bridge the gap between academics and the real world ... to bring academics and work together.” The first steps to bridging that gap appear to have been taken through ICAPP. However, for the agribusiness industry, successfully accomplishing that goal will require appropriate responses to several questions including:

1. For what type of college graduate do agribusinesses seek and what knowledge, skills and abilities should they possess?
2. Will the agribusiness industry provide sufficient job openings to employ the graduates generated within the University System and by other institutions of higher education in the State?
3. What steps can be taken to meet employers’ needs for college-educated workforce?

Addressing issues raised by the first two questions will be the focus of this chapter. We will explore projected growth in employment by sector as a proxy for growth in demand for labor. These numbers will be compared to the average graduation numbers by occupational cluster from the previous chapter. The potential gap analysis will discuss differences between the projected number of jobs in Georgia and the U.S. based on estimates using the latest industry employment figures. Occupational outlooks for the State will be discussed in light of projected growth and decline sectors within Georgia’s agribusiness industry. As previously noted, projections are available to 2014 for Georgia and to 2016 for the U.S. To determine potential gaps, the data will be analyzed by educational level requirements, only considering those job titles within occupational clusters that require some college training (associate’s degrees and above). This will provide an estimate of college-educated graduates available to fill positions within the State’s agribusiness sector. The focus of the discussion is on identifying the skills necessary to meet the market’s need for workers. Finally, the analysis compares the trends in supply and demand to identify areas for further research in terms of future program options. Potential responses to the third question will be raised in the subsequent chapter.

⁴⁴ ICAPP Overview at <http://www.icapp.org/about/>

Workforce Gap Analysis

To determine likely gaps in the agribusiness labor market, these projections must be compared to available agribusiness-trained graduates. The methodology used herein is based on that developed by Purdue University for the USDA in preparing its annual report on employment opportunities for college graduates in agricultural-related programs.⁴⁵ The methodology involves the following steps:

1. Identification of relevant NAICS codes, CIP codes, and SOC codes for the agribusiness industry.
2. Calculation of employment opportunities by SOC and educational levels for the State for those occupations identified with the relevant NAICS codes for the agribusiness industry. Using the Georgia Department of Labor projections (for state-level data) and the Bureau of Labor Statistics projections (for national-level data), estimates were derived for the number of job openings by educational level for those occupations developed by the Panel of Experts associated with the USDA study
3. Calculation of degrees and certificates awarded by University System institutions by CIP which were then organized into occupational clusters consistent with the USDA study.⁴⁶
4. Using the weights developed by the Panel of Experts associated with the USDA study, degrees and certificates awarded by CIP codes within the USG institutions were assigned to occupational clusters as follows:
 - a. management and business occupations
 - b. scientific and engineering occupations
 - c. agricultural and forestry production occupations
 - d. education, communication, and governmental services occupations
5. The projected job openings were weighted based on the weights developed by the Panel of Experts associated with the USDA study to reflect the percentage of jobs within each occupation (by SOC code) that would require expertise gained from agricultural-related disciplines. However, unlike the USDA study, for this report, the decision was made to exclude from the calculations all occupations that required less than 5% of expertise from agricultural-related disciplines. The USDA study included occupations that required as little as 1% of expertise within these disciplines.
6. Based on these occupational cluster allocations, the data on job opening projections for Georgia were compared to the average annual degrees awarded for the period 2002 – 2006. It should be noted that these annual figures do not represent the total available supply of labor in these disciplines for the following reasons:
 - a. the numbers exclude the small number of awards from non-member USG institutions.
 - b. there is no account made for migration of graduates into Georgia or from Georgia who seek employment in other states or internationally.
 - c. all graduates do not immediately seek employment upon graduation. The USDA estimates are that 2% of graduates do not enter the labor market. In addition, the experts estimated that 24.74% of undergraduates will pursue graduate degrees and 19.02% of master degree recipients will pursue doctoral level studies.⁴⁷

⁴⁵ Employment Opportunities for College Graduates in the U.S. Food, Agricultural, and Natural Resources System 2005-2010, USDA Cooperative State Research, Education, and Extension Service, pp 1- 6.

⁴⁶ The analysis was limited to USG institutions only as the number of degrees in agribusiness-related disciplines by other institutions in Georgia were insufficient to impact the results of the projections.

⁴⁷ Employment Opportunities for College Graduates, Methodology, p 2

7. The distribution of employment (projected job openings) was then compared to distribution of degrees and awarded (based on the 5-year average for the 2002-2006 period) within the University System. The analysis of potential gaps was then based on the comparison of the two distributions.

An Alternative View of the State Labor Market Picture

According to the 2014 long term employment projections published by the Georgia Department of Labor (DOL), total employment in Georgia is expected to increase from 4.21 million in 2004 to 4.97 million, a projected annual increase of 1.7%. By sectors, the goods-producing sectors, including agriculture, forestry, fishing, and hunting, is expected to add about 50,000 jobs over the ten year period, a growth rate of a mere 0.7% annually, largely accounted for by replacement positions. Within that sector, agriculture, forestry, fishing, and hunting will grow by a projected rate of just 0.2% per year. On the other hand, the service-producing sector is projected to add roughly 700,000 jobs by 2014, an increase about 14 times larger than that of the goods-producing sector. As a result, the goods-producing sector's share of total employment will fall from 16.6% to 15% while the service-producing sector's share will increase from 76.8% to 78.7%. The remaining share of total employment is accounted for by self-employment, which will fall from 6.6% to 6.3%. In the services-providing sector, professional and business services is projected to rise at an annual rate of 2.9%, the fastest growing of any occupational group. Slowest growth will be recorded in manufacturing (0.1%), natural resources and mining (0.4%) and government (0.6%).

Table 5.1 – Long Term Occupational Projections to 2014 by Industry

Long-Term Occupational Projections to 2014 Georgia - Statewide				
Category	INDUSTRY TITLE	2014 Projected Employment	Total Change in Employment	Annual Growth Rate
I	Total Self-Employed and Unpaid Family Workers, Primary Job	310,740	33,470	1.2%
II	Goods-Producing	747,845	48,580	0.7%
	Natural Resources and Mining	53,105	1,819	0.4%
	Construction	241,932	41,936	1.9%
	Manufacturing	452,808	4,825	0.1%
III	Services-Providing	3,913,016	684,692	1.9%
	Trade, Transportation, and Utilities	960,556	129,602	1.5%
	Information	137,859	18,422	1.5%
	Financial Activities	239,714	18,795	0.8%
	Professional and Business Services	676,635	165,964	2.9%
	Education and Health Services	919,327	205,193	2.6%
	Leisure and Hospitality	453,831	94,459	2.4%
	Other Services (Except Government)	199,731	34,176	1.9%
	Government	325,363	18,081	0.6%
IV	Total Employment, All Jobs	4,971,740	766,690	1.7%

Source: Georgia Department of Labor

While it is interesting to view the data by NAICS codes, given the wide range of NAICS codes across which agriculture-related programs cross, it is more useful to analyze the data by occupations and CIP in order to better understand the trends and projections.

By typical educational attainment, growth rates are projected to be highest for associate's (level 6) and certificate award holders (level 7) for all occupations across the State. Growth in occupations requiring some college education is expected to exceed growth in the State. However, the number of projected openings will be less than half that for positions for which the typical educational attainment level is a high school diploma or lower (51,560 and 126,420 respectively) for all occupations within the State.

Table 5.2 – Long Term Occupational Projections to 2014 by Educational Levels

Long Term Occupational Projections to 2014 Georgia – Statewide All Occupations by Education Levels					
Education & Training Code	2014 Projected Employment	Total Change in Employment	Annual Growth Rate	Annual Openings from Growth	Annual Openings from Growth and Replacements *
1 - First Professional	59,790	10,360	1.9%	1,039	1,800
2 - Doctorate	24,390	5,200	2.4%	521	960
3 - Master's	62,410	11,790	2.1%	1,193	2,230
4 - Bachelor's + exp	295,780	53,750	2.0%	5,374	9,870
5 - Bachelor's	603,590	120,510	2.3%	12,104	21,080
6 - Associate's	183,230	42,360	2.7%	4,255	6,870
7 - Postsecondary vocational	253,240	47,580	2.1%	4,779	8,750
8 to 11 - No college education	3,439,600	470,590	1.5%	49,892	126,420
Total of reported data (excluding suppressed data)	4,922,030	762,140	1.7%	79,157	177,980
Total State of Georgia DOL data (including suppressions)**	4,971,950	766,600	1.7%	79,642	179,500
* Data rounded by DOL ** Suppressed data are not revealed in the publically downloadable files but included in the totals computed by the DOL. Therefore, totals reported by educational level do not match the total number reported elsewhere.					

Assessing the Georgia Agribusiness Labor Market for College-educated Workers

Separating the state level data by occupations related to the previously-identified relevant NAICS codes, the picture changes substantially. Within the agribusiness sector, the number of job openings for occupations requiring a college degree (educational levels 1 - 6) is expected to increase at a rate just slightly faster (1.5%) than that for all occupations and educational levels for the overall agribusiness economy (1.4%). By 2014, the demand for college-educated workers in the agribusiness industry is expected to reach 18% of the total agribusiness workers, fueled in part by the increase in the annual openings from growth.

Table 5.3 – Long Term Occupational Projections to 2014, Agribusiness Industry by Educational Levels

Long-Term Occupational Projections to 2014 Georgia – Statewide Occupations Related to the Identified NAICS Codes Applicable to the Agribusiness Industry By Educational Levels					
Education & Training Code	2014 Projected Employment	Total Change in Employment	Annual Growth Rate	Annual Openings from Growth	Annual Openings*
2 – Doctorate	420	90	2.5%	9	20
3 – Master's	1,940	140	0.8%	18	60
4 – Bachelor's + experience	18,440	3,100	1.9%	311	650
5 – Bachelor's	23,500	2,660	1.2%	274	680
6 – Associate's	5,870	770	1.4%	89	170
Total- college-educated: degrees (levels 1-6)	50,170	6,760	1.5%	701	1,580
7 – Postsecondary vocational	700	40	0.6%	5	20
Total – college-educated: degrees + certificates (levels 1-7)	50,870	6,800	1.5%	706	1,600
Total – no college-education (levels 8 – 11)	244,720	32,100	1.4%	3,218	7,720
College-educated as % of agribusiness workforce	17.2%	17.5%	1.5%	18.0%	17.2%
Total Georgia Agribusiness	295,590	38,900	1.4%	3,924	9,320
* Data rounded by DOL ** suppressed data are not revealed in the publically downloadable files but included in the totals computed by the DOL. Therefore, totals reported by educational level do not match the total number reported elsewhere.					

Approximately 1/3 of the respondents expected their general and college educated workforces to grow at a rate similar to that of the overall agribusiness industry as projected by the DOL (more than 6% over the five year period) while roughly 25% projected a rate slower than that projected by the DOL.⁴⁸ These differences may be based on the fact that the survey respondents have a shorted projection time frame and more recent economic data on which to base their projections. Nevertheless, the rates are sufficiently similar to allow continued analysis on the basis of the DOL figures.

Table 5.4 – Projected Growth Rates based on Survey Responses

Workforce Considered	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%

⁴⁸ This assumes a simple average over the five year period and ignores the effects of compounding.

Future Job Growth

Using the framework provided by the USDA study, gap analyses were performed under various assumption and data projections to determine likely scenarios for the agribusiness labor market. In all scenarios, the available supply was based on the average number of degrees conferred within the University System for the five-year period of 2002-2006. For the first set of projections, the assumption was made that all graduates were available to enter the job market upon graduation. On that basis, the distribution of graduates by occupational clusters was compared to the same distribution for employment projections using the 2014 projections from the Georgia Department of Labor to estimate the demand in Georgia, and the 2016 projections from the Bureau of Labor Statistics for the US projections.

It is important to recognize the assumptions made by the Georgia Department of Labor in arriving at its projections and the data limitations imposed by suppressed data fields as these assumptions lead to an underestimation of the projected demand for college-educated labor.

1. No major changes are assumed in technology, economic trends and structure of the state and national economies, employer's staffing patterns or business practices, or population growth rates and age distributions.
2. Data for teachers is suppressed, underestimating the demand for master's level graduates

Notwithstanding these limitations and recalling the cautions discussed in Chapter 1, the data are useful in computing likely scenario for future demand for college-educated labor.

Those projections yielded the following result:

1. The distribution of graduate degrees for science and engineering occupations more closely matched the GA and US distributions than did the undergraduate distribution.
2. The distribution of undergraduate degrees for management and business occupations more closely matched the GA and US distributions than did the graduate distribution.
3. The distributions of both graduate and undergraduate degrees for agricultural and forestry production occupations closely matched the GA and US distributions.
4. Neither the distributions of graduate nor undergraduate degrees for education, communication, and governmental services occupations closely matched the GA or US distributions

Table 5.5 – Average Production of Awards by Occupation and Award Levels, USG, 2002 - 2006

Distribution of the Supply of Graduates in Agricultural and Allied Programs by Occupational Cluster, USG 2002 – 2006				
Occupational Clusters	Distribution of Undergraduate Awards	Distribution of Graduate Awards	GA Demand - 2014 Estimates¹	U.S. Demand - 2016 Estimates²
Scientific and Engineering	19.3%	32.6%	33.0%	28.3%
Management and Business	41.8%	28.6%	39.9%	43.5%
Agricultural and Forestry Production	21.1%	15.3%	14.7%	16.9%
Education, Communication, and Governmental Services	17.8%	23.5%	12.4%	11.3%
¹ Georgia - annual job openings to 2014 - using the 2004 DOL projections.				
² US - average job openings to 2016 generated using 2006 BLS national projections and the methodology of the USDA study.				

The results might suggest that the emphasis areas of graduates within the University System is well matched to projected demand for workers with undergraduate degrees in management and business, and agricultural and forestry production occupations. Graduate trends appear to be consistent with projected state and national demand in scientific and engineering, and agricultural and forestry production occupations. Conversely, the data might suggest a potential overemphasis on graduate degrees in management and business and on undergraduate programs in education, communication, governmental services. Further analysis would be necessary to ascertain the specific programs within these occupational occupation clusters that may have contributed to the skewed results.

For the second analysis, the five-year average number of degrees awarded by occupational cluster was compared to the projected number of job openings for positions requiring a college degree (at least an associate's degree) using the following projections:

1. 2004 Georgia Department of Labor estimates of job openings from growth and net replacements to 2014.
2. 2000 USDA study estimates of job openings from growth and net replacements using the Bureau of Labor Statistics (BLS) projections to 2010.
3. Average job openings to 2016 generated from 2006 BLS national projections and the methodology of the USDA study.

Relative to the projected demand, these projections indicate a potential over-emphasis on disciplines associated with programs in management and business, education, communication, agricultural and forestry production, and governmental services-related occupations. Conversely, there appears to be an under production of degrees in scientific and engineering occupations. On the national level, there would be sufficient demand to absorb the additional graduate, suggesting that an out-migration of graduates would be necessary. However, the analysis made no adjustments for differences in degree award level.

Table 5.6 – Average Production of Degrees by Occupation and Award Levels, USG, 2002 - 2006

5 Year Average Supply of Graduates and Projected Demand in Agricultural and Allied Programs by Occupational Cluster and Degree Level USG, 2002 – 2006						
Occupational Clusters	USG – Degrees Conferred in Agriculture and Allied Disciplines			Projected Annual Job Growth		
				Georgia ²	U.S. to 2010 Using USDA ³	U.S. to 2016 (Study Model) ⁴
	Total ¹	Undergraduate	Graduate			
Scientific and Engineering	179	97	82	242	12,916	14,080
Management and Business	280	208	72	293	24,125	21,611
Agricultural and Forestry Production	142	103	39	108	8,022	8,396
Education, Communication, and Governmental Services	147	88	59	91	6,967	5,594
Average Annual values	748	496	253	734	52,030	49,680
¹ Note: Numbers by category may not sum to the total due to rounding. The total includes only degrees (levels 1-6)						
² Georgia - annual job openings to 2014 - using the 2004 DOL projections.						
³ US - average job openings to 2010 based on the USDA study using 2000 BLS national projections.						
⁴ US - average job openings to 2016 generated from 2006 BLS national projections and the methodology of the USDA study.						

The third scenario involved the inclusion of adjustments to both the supply and demand sides of the projections to reflect the reductions necessary to account for:

1. the 2% of graduates who do not enter the workforce (USDA study findings)
2. the undergraduates who pursue graduate school (24.74%) and the master's graduates who pursue advanced certificates and/or doctoral programs (19.02%) (USDA study findings).
3. job openings in the agribusiness sector that may be filled by persons from programs other than agricultural and allied disciplines (including business). Adjustments were made to the number of job openings in agribusiness to be filled by persons with agricultural and allied discipline degrees using the estimates developed by the Panel of Experts associated with the USDA study.

These adjustments were based on the findings of the USDA study.⁴⁹ Subsequent to applying these adjustments, the analysis was rerun to compare the adjusted supply figures to the amended demand projections.

Based on the average degree production over the 2002 – 2006 period, the calculations show an overall shortfall between the number of graduates and the projected annual openings for all degree levels. The gaps are largest for education, communication, and government services occupations and smallest for scientific and engineering occupations.

Table 5.7 – Comparison of Supply and Demand for College-Educated Workers, by Occupational Cluster

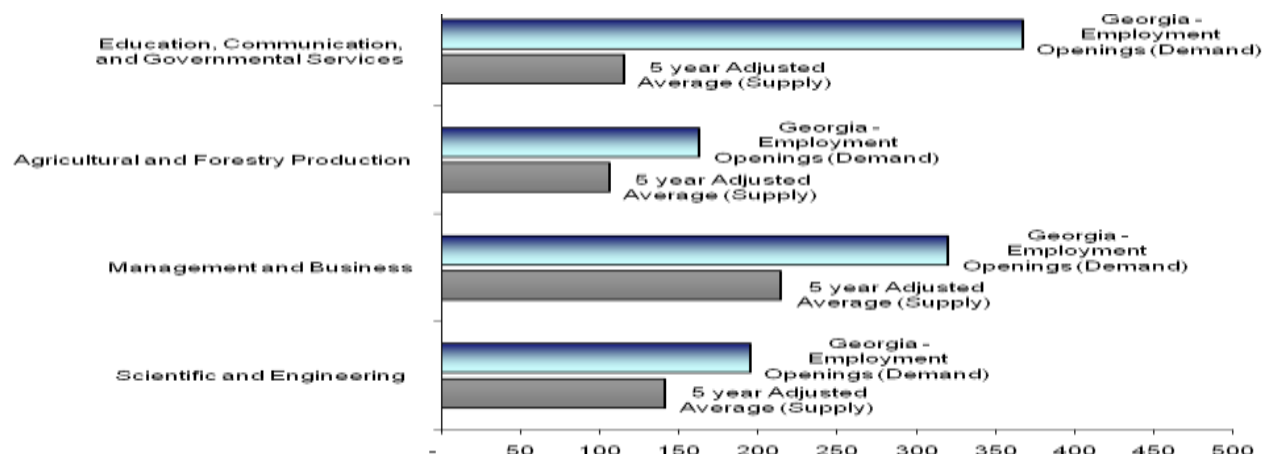
Calculations of Projected Demand (by Employment Openings) and Supply of Graduates (Average Degrees Conferred), Adjusted for Market Factors Agricultural and Allied Programs by Occupational Cluster, 2002 - 2006				
Occupational Clusters	5 year Adjusted Average (Supply)	Georgia – Annual Employment Openings to 2014 (Demand)	GA Gap Openings Less Average Graduates	Employment Openings Less Average Supply(Qd-Qs)
Scientific and Engineering	141	195	46	"Shortage"
Management and Business	214	320	65	"Shortage"
Agricultural and Forestry Production	106	163	57	"Shortage"
Education, Communication, and Governmental Services	115	367	219	"Shortage"
Total by Occupations	577	1,045	387	"Shortage"
Note: Numbers by category may not sum to the total due to rounding.				

The analysis by occupational clusters suggested that a shortage existed among all occupational clusters after adjustments were made for market factors. Again, pending further research, it would be too risky to hazard a guess as to the underlying factors contributing to the shortage. However, we should not ignore the underreporting of job openings at the graduate level due to data suppression in the publicly accessible data for vocational teachers and economics teachers at the state level. This additional demand is assumed on the basis of the reported shortage of master's level graduates at the national level where employment openings in education are not suppressed. For Georgia, the published projections indicate only 60 job openings per year for master's qualified applied which would appear to be an underestimation of the true opening were the suppressed data revealed. Since other occupations also

⁴⁹ Employment Opportunities for College Graduates, Methodology, p2.

contained suppressed data, it would be reasonable to assume that the projected job openings underestimate the likely number of job openings that would be available annually in the State.

Chart 5.1 – Projected Gap in Georgia’s Agribusiness Labor Market for College-Educated Workers, by Occupational Cluster, to 2014



Although the methodology has been useful in creating potential scenario for further discussion, it would be wise to note the limitations of the analysis, some of which include:

1. It ignores the tendency of employers to promote internal candidates so that the number of job openings open to external applicants and recent graduates may be significantly less than the projected number.
2. It ignores net migration of workers into the state of Georgia (increasing supply) and out of Georgia (decreasing supply).
3. It assumes that all applicants are equally qualified for all open positions so that a person holding an associate's degree, for example, could successfully apply for any positions requiring any level of college education.
4. It assumes that there is perfect mobility and transfer of information so that applicants know of all open positions and are unrestricted in their ability to apply for positions across the State.
5. It excludes any discussion of the fit between job applicants and open positions. As the survey responses demonstrated, employers are looking for more than just technical skills in filling agribusiness positions. Oral and written communication skills, leadership and initiative, customer service, among others, are attributes that employers value in the current labor market.

Notwithstanding, the analysis provides a good first base for further evaluation of degree program trends and foci for the future in the System's efforts to enhance its links and responsiveness to the needs of the State's agribusiness employers.

Survey Data – the Search for Knowledge, Skills, and Abilities

As noted, these projections provide an effective first step for further labor market analysis of the quantity of labor demanded and supplied. However, they ignore the issues of fit and quality of applicants in meeting the specific workforce needs of Georgia's agribusiness employers for college-educated workers. Recognizing the difference between the quantity of labor and the quality of labor, the DOL also computes

projections for 'skills-based' employment to 2014.⁵⁰ Consistent with the results from the survey of agribusiness employers, the DOL projected that communication skills, customer and personal service skills, decision and problem-solving skills, and interpersonal skills will be critical skills needed in the workforce of the future. These critical issues must receive attention in addressing agribusiness employers' needs for both the quantity and quality of workers produced by Georgia's higher education system.

Considering that the labor market projections say little about the content of programs or curricula design, the impacts on the type of workers sought by employers due to the anticipated changes in the agribusiness industry must be evaluated. In responding to the question about the impact that future technological changes in the agribusiness industry will have on the skills needed by the industry, more than 75% of the survey respondents indicated that there are likely to be some industry changes that would impact the skills or training needed in the workforce (responses other than "no"). Of the respondents, thirty four provided more detail of the likely changes. Those changes included information technology, bio energy, sustainability, waste management, and marketing. A summary of the responses is provided below.

Table 5.8 - Projections of Anticipated Changes in Technology and Innovations by Agribusiness Employers

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
<i>answered question</i>		168

Table 5.9 – Examples of Types of Anticipated Changes in Technology and Innovations by Agribusiness Employers

Anticipated Technology Changes and Innovations	Examples of Expected Changes
Alternative Energy	i. Biofuel From Forest operations ii. Alternative energy sources
Conservation	i. Sustainability and Organics ii. Energy Conservation
Food Safety	i. Food Distribution Safety/Safety and quality foods (SQF) ii. New Food applications to improve shelf stability
Management and Marketing	i. Office Management/Time Management ii. Marketing of value-added or organic products
Skill Needs	i. More training for workers in operating fertigation systems ii. Knowledge of waste-energy solutions and engineering software iii. New machinery skills such as New pulping technology
Technology	i. Computerization of Farmers Grain Tickets and Records ii. Transportation Technology iii. Precision Agriculture iv. Nanotechnology; Artificial Intelligence (AI); mapping skills

⁵⁰ Georgia Skills-based Employment Projections, downloadable from www.dol.state.ga.us

While it is yet unclear as to the extent to which these anticipated changes will impact survey respondents in the long run, it is clear that the respondents are already seeking solutions to the issues that they raise for the agribusiness labor market. Employers appear to have developed diverse strategies for finding college-educated applicants for positions. They are relying less on graduate placement resources available at colleges and more on internal promotions and employee referrals. Surprisingly, GeorgiaHIRE was not a resource with which employers were familiar; 85% of respondents had not availed themselves of the opportunities available through GeorgiaHIRE to reach college-educated applicants. Also surprising was the low reliance on college career fairs and placement offices, although the reason was not apparent.

Table 5.10 – Recruitment Strategies Employed by Survey Respondents

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	6.0%	35.6%	32.9%	10.1%	15.4%	149
Hire current interns	2.1%	6.9%	25.0%	21.5%	44.4%	144
Recruit competitors' employees	0.0%	14.8%	27.5%	20.4%	37.3%	142
Recruit at college career fairs	4.2%	4.9%	16.8%	23.8%	50.3%	143
Use recruiting/search firms	1.4%	9.9%	12.0%	21.8%	54.9%	142
Referrals from employees	3.4%	21.6%	41.9%	16.9%	16.2%	148
University placement offices	2.1%	4.2%	21.0%	32.2%	40.6%	143
Personal contacts at universities	7.6%	11.8%	23.6%	19.4%	37.5%	144
GeorgiaHIRE.com	0.0%	1.5%	3.7%	9.7%	85.1%	134
					Other	24

“Other” recruitment outlets included industry contacts, Craig’s List, and the Internet, including Monster.com. Despite the fact the effectiveness of those alternative outlets cannot be established, the conclusions that can be drawn from these results are that employers are inclined to seek alternative recruitment strategies for reaching college-educated applicants and are not limiting themselves to the traditional outlets provided by colleges. However, they were open to exploring closer contacts with universities in their search for qualified applicants who are college-educated. Employers were optimistic that access to a university-managed resume bank and established internship programs would be somewhat or very important to the growth of their companies. In addition, other recommendations from employers included the establishment of agricultural-degree specific university career centers that would serve only those students majoring in agricultural-related degree programs (17 responses).

Table 5.11 – Programs Appropriate to Responding to Future Recruitment Needs

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 (21.7%)	65 (41.4%)	32 (20.4%)	26 (16.6%)	157
Established internship programs	36 (22.8%)	68 (43.0%)	33 (20.9%)	21 (13.3%)	158
University sponsored on-site instruction	19 (12.3%)	61 (39.4%)	45 (29.0%)	30 (19.4%)	155
Answered question					160

Nearly 2/3 of the respondents indicated that growth of their companies was not limited by lack of access to quantity or quality of college graduates.

Table 5.12 – Effect of the Quantity and Quality of Graduates on Business Expansion

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	2.4%	16.5%	15.3%	65.9%	170
Quantity	3.4%	13.4%	15.4%	67.8%	149
If appropriate, please share how plans have been impacted					21

Varied types of problems were reported by the 21 respondents who disclosed the nature of the impacts on business expansion. A summary of the responses is provided below:

Table 5.13 – Summary of Issues Raised by Respondents that Limit Business Expansion

Issues Raised that Limit Expansion
Lack of diversity of graduates
Difficulty filling rural and remote counties, especially with county agents
Inadequate level of technical knowledge in forestry
A lack of "broad perspective" and knowledge in food industry
Graduates not "workforce ready"
Longer work days and careers required for skilled professionals because of difficulty finding qualified workers
A lack of work ethic
Forced to leave positions unfilled because of labor shortage

For employers with current college-educated staff members, unrealistic employees' promotion and/or salary expectations was the single most significant factor in employer's ability to recruit and retain college-educated workers. Lack of interest in relocating did not pose a significant problem for employers with more than 30% of respondents indicating that this issue was not important.

Table 5.14 – Impact of Employee Characteristics on Recruitment and Retention

What has been the impact of the following on your company's ability to recruit and retain college-educated employees?					
Answer Options	More than 50% of the time	Average 31-50%	Less than 30% of the time	Not at All	Response Count
Inadequate subject matter knowledge	28.1%	21.5%	31.4%	19.0%	121
Lack of prior work experience	20.7%	34.7%	24.8%	19.8%	121
Lack of interest in relocating	28.3%	14.2%	26.7%	30.8%	120
Employee expectations not consistent with actual job requirements	32.8%	27.9%	23.0%	16.4%	122
Employees' unrealistic promotion and/or salary expectations	38.7%	27.4%	22.6%	11.3%	124

Employers who had college graduates currently on staff expressed having few difficulties in filling vacant positions. Major recruiting problems were reported only in the areas of food/agricultural security and mid-level management where more than one third of the respondents experienced recruitment problems in filling at least 50% of their vacant positions in those fields. More than 25% of respondents expressed some problems, at least 50% of the time, in filling positions in entry-level management, marketing and sales, and business operations. On the other hand, fewer than one in five employers who had prior vacancies experienced problems filling positions in waste management or communications and public relations. Of those who reported recruiting problems in other areas, statistics and agricultural mechanization were most often cited.

Table 5.15 - Difficulties Experienced in Filling Vacant Positions

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 you have had vacancies in a particular field but never experience problems filling the vacancies, select "Never"			
Answer Options	Frequently (More than 50%)	Never (0%)	Response Count
Mid-level management	31.8%	29.4%	85
Entry level management	29.4%	18.8%	85
Engineering and technical	30.9%	21.8%	55
IT/Computer science	21.5%	20.0%	65
Marketing and sales	26.2%	16.9%	65
Business operations	28.8%	19.2%	73
Communications & Public Relations (P.R.)	15.4%	32.3%	65
Waste management	18.5%	44.4%	27
Research/education	21.2%	39.4%	33
Production and processing	23.8%	17.5%	63
Food/agricultural security	42.1%	15.8%	19

In spite of their relative success in finding college-educated workers, employers were interested in seeking assistance in providing additional training to their current employees. Interest in specific subject matter course work and foreign language training was low. On the other hand, strong interest was expressed in professional development and moderate to strong interest in technology training.

Table 5.16 – Interest in Educational/Training Programs for Current Employees

How interested would you be in considering the following educational/ training programs for your current workforce? Level of interest:					
Answer Options	Very	Moderately	Slightly	Not	Responses
Job-specific education and training	20.4%	32.2%	20.4%	27.0%	152
Professional development (incl. customer service, team building, cultural competence, leadership)	23.8%	28.8%	23.1%	24.4%	160
Technology training (including agricultural mechanization, computer hardware and software)	16.3%	26.8%	27.5%	29.4%	153
Specific subject matter college course work or certificates	12.8%	20.3%	24.1%	42.9%	133
Basic skills (including written & oral communication, mathematics, statistics)	18.6%	24.8%	20.5%	36.0%	161
Foreign language training	12.1%	16.6%	24.2%	47.1%	157
					166

Summary

As with all projections, concern must be expressed for the static nature under which such estimates are computed including the assumption that little change will occur in the fundamental economic structure. As we have seen in recent months, factors such as energy and food prices or salmonella outbreaks can have significant effects on consumer spending and the overall economy. In addition, population shifts and changes in participation rates of high school students to college can also impact labor market patterns. However, while caution should be exercised in interpreting the projections, it is clear from the analyses that some consideration should be given to the degree programs offered and the content of these programs. For instance, repeated requests from employers for students with an understanding of both the technical and business sides of agribusiness should not go unheeded.

Further, given the higher mobility rates of the current generation of workers, the labor force cannot be viewed exclusively in terms of regional or state boundaries. At the same time that graduates from other states may seek employment in Georgia, persons earning degrees within Georgia may seek employment in other states or in international labor markets. The effect of this labor migration in the agribusiness sector is not yet fully understood or researched. For this reason, for further analysis, an analysis of Georgia's graduation numbers in the context of the national picture would be critical to framing a more accurate picture of the potential labor market for college-educated graduates in Georgia's agribusiness sector.

Regardless of the data shortcomings, from all indications, Georgia's agribusiness employers are pleased with the quality and quantity of graduates produced by the University System. The question that remains, however, is how these responses will correlate with the state and national projections of labor market shifts in the next six to ten years. It is yet to be determined whether or not the projected changes will significantly impact production and labor market patterns in the agribusiness industry. From all indications, the agribusiness industry will continue to play a significant role in the State's economy from both an output and employment perspective. Nonetheless, the labor market shortages suggested by the previous analyses must be reviewed in light of the skills shortages suggested by the survey responses. That technological change will generate changes in the demand for skills is no surprise. The labor market success will depend on the adoption of successful strategies to both anticipate and respond to these changes. For instance, the congruence between the skills identified by the survey respondents and those identified by the DOL, suggests that attention should be paid to the agribusiness curriculum in responding to employers' needs.

Chapter 6: Implications and Recommendations

Introduction

Without question, Georgia's agribusiness industry has played, and will continue to play, a critical and strategic role in sustained economic growth in the State. However, changes in the structure of the State's economy, due largely to national and global economic shifts, will result in substantial changes in the structure of production. This has already been observed in textile and apparel manufacturing where job losses had led to changes in the relative share of those commodities in the State's economy. Considerations of workforce demand and supply conditions cannot ignore these shifts over time and their impacts on projections. As Georgia's competitive advantages change with national and global competition, the link between higher education and industry needs to be more cohesive to ensure that graduates possess the skills and knowledge needed to support changing industries. As demand shifts from graduates in disciplines linked to declining industries to ones with training in emerging industries, higher education must stand ready to expand and contract programs and redesign curricula as necessary. This point is made clear by Chaffee who stressed the importance of viewing employers as "customers of institutions of higher education": As he stated "like it or not, and whatever else may be in the mission statement, preparing future employees is absolutely fundamental to the purpose of all postsecondary education".⁵¹

Agribusiness Employers' Workforce Perspective

When asked to comment on various aspects of the agribusiness college-educated workforce in Georgia, employers identified several shortcomings about the quality of workers, the effectiveness of the higher education system, and offered suggestions for enhancing the future role that the USG can play in improving the workforce quality. Overall, employers were pleased with the level of technical training received by USG graduates. However, several employers expressed concern about the lack of professional skills such as oral and written communication, leadership/team building, initiative, and problem-solving skills. Industry-related experience, general agricultural knowledge, more realistic workplace expectations, and degrees in engineering were most often cited as skills/attributes desired by employers.

The need for responsiveness from higher education to industry was expressed by the respondents to the agribusiness needs assessment survey. Despite comments about their overall satisfaction with the quality and quantity of graduates produced by the University System, employers were generous in offering proposals to make the University System of Georgia more responsive to anticipated changes in the U.S. agribusiness industry. While several of the survey participants held the opinion that no changes were necessary (5 responses) or that they were not sufficiently aware of the issues to offer any recommendations (11 responses), the remaining respondents offered a wide range of proposals primarily focusing on the need for changes in curriculum and program content/design to changes in the structure of Georgia's higher education system. By and large, recommendations focused on changes to the design and content of curricula so as to broaden the students' training in a wide range of issues beyond

⁵¹ Chaffee, E. E. (1990). Strategies for the 1990s. In L. W. Jones & F. A. Nowotony (Eds.). *New directions for higher education: An agenda for the new decade*. (No. 70, pp. 59-65). San Francisco: Jossey-Bass cited in Carmelita A. Acciola

“textbook” matters. Respondents felt that students should be able to understand and respond to changes in government policy, be able to develop niche markets for Georgia’s specialty crops, and receive additional training in subjects such as economics and accounting principles, business ethics, statistics, and leadership.

A few representative examples of the specific recommendations include the following:

- “[Offer] degrees in food processing and manufacturing, management, or engineering with an emphasis in a commodity, meat, poultry, vegetables, fruits.”
- “Business courses - how to make a profit- common sense business classes - the need for ETHICS (emphasis theirs) in business.”
- “More emphasis on agricultural government and policy.”
- “More real business world curricula, in the form of sales training, marketing, and budget writing.”
- “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.”
- “Emphasize written and oral communication skills.”
- “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.”
- “More business applications; real world; leadership, coaching and building a successful business and team.”
- “Make more agricultural related courses available at community college, i.e. Darton College. Also, put back into force short courses on production methods, especially organic and sustainable.”
- “More on farm training at the top facilities in Georgia. Taking Ag and Vet students out to actual good working farms.”

Overall, recommendations relating to curriculum content and design represented almost 60% of all recommendations received, followed by program changes that required more hands-on training through internships, cooperative agreements, and job shadowing. The full text of the recommendations for degree and curricula changes by the categories identified below is contained in Appendix K.

Table 6.1 - Recommendations from Agribusiness Employers to Improve System Responsiveness Through Changes in Degree Programs and Curricula

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?		
Broad Topic	Number of Recommendations	% of Total Recommendations
Programs - Curriculum Content/Design	38	57.6%
Programs - Hands-on Learning	14	21.2%
Programs - Skill Development	2	3.0%
Higher Education Structure	6	9.1%
Other Recommendations	6	9.1%
Total number of recommendations	66	

In summary, the recurring themes mentioned were business applications, communication, government/policy implications, internships and other “real world” types of preparation. Other topics mentioned included training in such fields as alternative fuels, water management, food security, immigration issues, work ethic, and increased emphasis on production agriculture. Some specific degrees/majors mentioned included ecosystem management; endangered species habitat management; GIS/GPS field use; prescribed fire management; wetland recognition, analysis and protection; and food processing and manufacturing, management.

In addition to the recommended changes in degrees and curricula, agribusiness employers also proposed several recommendations to be considered by the University System for improving its responsiveness to their needs. Recommendations were submitted by almost 20% of survey respondents. Again, responses were wide ranging in scope, with recommendations ranging from the need for internship and hands-on farm experience, to the establishment of real-world expectations for graduating students in areas such as salary and promotions. Others mentioned the pressing need for college educated farm managers, the importance of migrant worker issues, the need for access to top performing students prior to graduation, and the need for more graduates with degrees in agriculture and related fields. It was also suggested that a variety of classes be offered at locations around the State.

Included among the specific recommendations are the following:

- “We just need more graduates with degrees in agriculture and related fields.”
- “Graduate students with a work ethic and useable skills”
- “Specific training in both wholesale and retail farm supply marketing and business operations. In Georgia today there is a need for students in Ag to be better educated in the both the retail farm supply business, and the wholesale aspects of agribusiness.”
- “More regular ongoing communications between the field work management site officials and the developers/managers of the college curriculum programs.”
- “Not all positions require a 4 year technical degree. A good two year degree in basic subjects (math, English, people skills, scheduling, problem solving, teams, etc). would satisfy 75% of our labor requirements.”
- “The majority of the available positions in the poultry industry are in the processing area. While the class load spends most of the time dealing with bird development.”
- “UGA needs to better define Bio and Ag Engineering Degree and correlation with business needs.”
- “Better access to the top performing students, one semester prior to graduation.”
- “Help students understand what they will encounter when entering the job force - culture, pay, work expectations, ability to apply classroom knowledge to job, etc..”
- “The market is changing rapidly. A course in self insured market planning for retirement for those of us with smaller companies. We might have a shot at some larger caliber players if they had additional nontraditional options.”
- “We are desperate for college educated farm managers who are forward thinking, excellent in people management and have good organizational and multi tasking skills. An ability to speak Spanish would be a major plus. A farm manager also needs mechanical skills for operating and servicing equipment. I have personally solicited EVERY Agriculture University/College in the Nation seeking a farm manager with an ag degree or an ag degree student interested in produce marketing. I had 2 applicants from CA, neither were (sic) interested in a job or a paid internship in GA.”

- "...We should direct our efforts to a program that creates interactions between ABAC, Fort Valley and Tifton Center to create the Agriculture and Mechanical College of Georgia."
- "Combine training available at technical colleges and UGA and ABAC and Fort Valley State degree programs with intern programs so that the graduate understands theory, technology, and applied technology in real world settings. Many applicants today don't have rural agricultural backgrounds and you can't assume they have farming 101 as in the past."
- "The graduates need hands on practical agribusiness experience. They need to know how to run machinery.... They need to know the ins and outs of working livestock. The technical knowledge are (sic) great but they need to be prepared for more than just a job with the Extension Service or teaching."
- "...looking down the road I think character is the most single attribute for my operation- certainly knowledge is important but I believe we all need to know more about "business" and what makes some successful and others less so- High Ethical Standards are still needed even in this hi tech computer age- but as anyone can see we, in our society, are losing this important item- I'm not sure you can teach it like say math- but without it- it would be difficult to succeed."

Table 6.2 – Additional Workforce Issues to be Considered by the University System in Ensuring Responsiveness to Agribusiness Workforce Needs

Recommendations ⁵²	Number of Responses	Relative Distribution
Addressing program design and curriculum needs	17	43.6%
Changing the USG structure	3	7.7%
Establishment of USG/industry partnerships and placement opportunities	2	5.1%
Anticipating and responding to industry and labor market changes	11	28.2%
None/ No comments/ Not Sure	3	7.7%
Other responses	3	7.7%
Total Number of Recommendations Received	39	

Based on the data analysis, the recommendations offered by the survey respondents, and information gathered in preparing this report, the following proposals are submitted for further consideration. These recommendations offered below reflect those proposed by the Commission for a New Georgia's Workforce Development Task Force that include:

1. Focusing on enhancing public/private partnerships;
2. Insuring that infrastructure and processes enable goal attainment; and
3. Communicating to all stakeholders the capabilities and successes of WFD [Work Force Development] in Georgia.⁵³

⁵² See Appendix K for full details of the recommendations offered.

⁵³ Work Force Development Task Force Final Report , October 2004, p. 3

Some Specific Strategies/Recommendations

A. Build Stronger Public/Private Partnerships

Enhancing the connection between the agribusiness industry and the higher education community is but the first step in the workforce development process. As identified by one of the respondents, one of the key elements of an enhanced public/private partnership must be a more transparent communication channel between higher education and industry that allows for clear and frequent discussion of the issues so as to identify and implement effective solutions. However, these links between the mission of the higher education system and Georgia's agribusiness industry's workforce development needs must remain sufficiently flexible to recognize and respond to shifts in global competitiveness and technological changes that are likely to impact the industry. Such a system could be accomplished by:

1. Including businesses leaders in advisory capacities on curricula and program development issues; inviting industry leaders to participate in the education process through guest lecturers; and the use of business information in case studies. Several survey respondents indicated their willingness to serve in such capacities; follow up with these businesses should be done, preferably by a single coordinator to establish consistent standards and expectations for the follow-ups.
2. Recognizing, as one respondent suggested, that faculty and students need to get out in the field and interact on a direct level with agribusiness leaders.
3. Providing broader and easier access to students by voluntary registration and placement surveys.

It should be noted that the recommendations included in the sections below draw from institutions outside the University System of Georgia. This in no way is meant to diminish the innovative practices already in place within the System. For instance, programs within the College of Agricultural and Environmental Sciences at the University of Georgia, including the Agriscience and Environmental Systems degree that combines technical knowledge in science to business principles, demonstrate many of the recommendations included. However, efforts were made to include recommendations that could be adopted by institutions with small agribusiness programs or those without existing agribusiness degrees for whom these recommendations could serve to supplement degree offerings in colleges of business or science and technology.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
<p>Establish faculty and student relationships with professional organizations such as the University Food Industry Coalition⁵⁴ to provide opportunities for faculty and student research.</p> <p>The current membership in the University Food Industry Coalition does not include any USG institutions.</p>	<p>The University Food Industry Coalition was formed in 2004 for the purpose of identifying ways to collaborate in order to maximize the value of combined academic and research programs to the food industry.</p>	<p>Dr. Dennis Degeneffe The Food Industry Center University of Minnesota Department of Applied Economics 1994 Buford Avenue St. Paul, MN 55108-6040</p> <p>Phone: 612-625-7019 Fax: 612-625-2729</p> <p>E-Mail: ddegeneff@umn.edu</p> <p>URL: http://foodindustrycenter.umn.edu/</p>

⁵⁴ Downloaded September 12, 2008 from <http://www.nationalgrocers.org/UniverCoalition/University%20Coalition.html>.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
	Penn State's outreach efforts include the involvement of students in industry-based research through internships and cooperative arrangements.	<p>■ Dr. Timothy Franklin, Director Office of Economic and Workforce Development (OEWD) The Pennsylvania State University 503 Keller Building University Park PA 16802</p> <p>Phone: 814-865-0427 Fax: 814-865-3589</p> <p>E-Mail: tvf2@psu.edu</p> <p>URL: http://oewd.psu.edu</p>
Create an interdisciplinary research program that connects faculty to industry leaders to identify and explore agribusiness-related issues and concerns.	<p>The Unified Industry-Based Agriculture Initiative at Washington State is an academic-industry partnership designed to address the needs of the agricultural sector.</p> <p>The University of Minnesota has established partnerships with poultry producers as part of the Midwest Poultry Consortium. Students can earn credit for poultry courses completed through the Consortium's summer program at the University of Wisconsin's Madison campus. Tuition and room and board are paid for by the Consortium.</p>	<p>■ Dr. Ralph Cavaliere, Assoc. Dean and Director, Agricultural Research Center College of Agricultural, Human, & Natural Resource Sciences Washington State University PO Box 646240 Pullman, WA 99164-6240</p> <p>Phone: 509-335-4563 Fax: 509-335-6751</p> <p>E-Mail: agresearch@wsu.edu</p> <p>■ Dr. Sally L. Noll, Professor Poultry (Turkeys) Science Department of Animal Science 1364 Eckles Avenue St. Paul, MN 55108-6118</p> <p>Phone: 612-624-2722 Fax: 612-625-5789</p> <p>Direct line: 612-624-4928</p> <p>E-Mail: nollx001@umn.edu</p> <p>URL: http://www.mwpoultry.org/</p>
Establish and/or enhance relationships (through a designated liaison) with the USDA's Student Career Experience Program to provide internship and job opportunities for students and graduates.	<p>The Student Educational Employment Program has two components; student temporary employment and student career experience. It is available to all levels of students: high school, vocational and technical, associate degree, baccalaureate degree, graduate degree, and professional degree students. (http://www.usajobs.gov/STUDENTS.asp)</p> <p>Access to a current list of available opportunities is available at http://www.opm.gov/employ/students/index.htm.</p>	<p>The program is in place at several schools including:</p> <p>■ College of Agriculture California State Polytechnic University, Pomona 3801 West Temple Avenue Pomona, CA 91768</p> <p>Contact; Dr. Mon Yee USDA Liaison Officer Building 94, Room 358</p> <p>Phone: 909-869-2191 Fax: 909-869- 2464</p> <p>E-Mail: Mon.Yee@ca.usda.gov</p> <p>URL: http://www.csupomona.edu/~agri/</p>

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
<p>Establish and/or expand opportunities for academia and industry representatives to interact on relevant industry developments and needs. These discussions can be facilitated through seminars and workshops.</p>	<p>The SAREP invites Cooperative Extension personnel, researchers, administrators, government agencies, nonprofits, farmers and community participants to learn together about new county and regional food systems activities; share and discuss lessons learned, share ideas and insights across disciplines and between university and community partners; and network. (for more information, see http://sarep.ucdavis.edu/cdpp/lfs08/)</p> <p>The Cornell Institute of Food Science is an interdisciplinary team of faculty scientists in food-related disciplines who, through the Cornell Associates Program, interact with industry representatives.</p>	<p>■ Dr. Tom Tomich, Director Sustainable Agriculture Research and Education Program (SAREP) University of California One Shields Ave. Davis, CA 95616</p> <p>Phone: 530- 752-7556 Fax: 530-754-8550</p> <p>Direct line: (530) 752-2379 E-Mail: tptomich@ucdavis.edu URL: http://www.sarep.ucdavis.edu/</p> <p>■ Dr. Joseph H. Hotchkiss, Director Cornell Institute of Food Science Department of Food Science Cornell University 116 Stocking Hall Ithaca, New York, 14853-7201</p> <p>Phone: 607-255-7616 Fax: 607-254-4868</p> <p>Direct line: 607-255-7912 E-Mail: jhh3@cornell.edu URL: http://www.foodscience.cornell.edu/</p>
<p>Develop a catalog of industry leaders, by enterprise/commodity, who might be available, across the State, to serve as guest lecturers, hosts for interns, volunteers on advisory boards, etc.</p>	<p>Ambitious yet invaluable undertaking.</p>	<p>Although several lists of speakers for specific programs/workshops exist, no single source was identified as currently providing such a catalog in the U.S.</p>

B. Promote the Business of Agribusiness

Employers desired more generalized knowledge of the business side of agribusiness by incorporating management and entrepreneurship training into the curriculum. The message appeared to be the need for the development of skills such as initiative, problem-solving, collaboration in teams, rather than on simply knowing the text book material.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
Develop an introductory class on the economics of agribusiness at the freshman level that lays the foundations of agribusiness principles. Can be team taught as an elective in Area B and taught in agribusiness or business colleges.	<p>Survey of Agribusiness courses that provide an Introduction to agribusiness management, including risk management, economic principles, finance, decision making, business law, marketing and careers in agribusiness.</p> <p>Although outside the college of agriculture, this “best practice” provides a frame for developing a success-oriented environment for incoming freshmen whereby students learn by interacting with others to create solutions to problems.</p>	<p>■ Dr. Larry Van Tassell, Dep’t Head Department of Agricultural Economics and Rural Sociology Agricultural Science Bldg., Room 39A P. O. Box 442334 University of Idaho Moscow, ID 83844-2334</p> <p>Phone: 208-885-7635 Fax: 208-885-5759</p> <p>Direct line: 208-885-6264 E-Mail: larryv@uidaho.edu URL: http://www.ag.uidaho.edu/aers/</p> <p>■ Dr. Steven Waller, Dean College of Agricultural Sciences and Natural Resources University of Nebraska-Lincoln 103 Agricultural Hall P. O. Box 830702 Lincoln, NE 68583-0702</p> <p>Phone: 402-472-2201 Fax: 402-472-2201 E-Mail: swaller1@unl.edu URL: http://casnr.unl.edu/Home</p> <p>■ Engineering Fundamentals Division 103 Estabrook Hall Knoxville, TN 37996-2353</p> <p>Phone: 865-974-9810 Fax: 865-974-6162 E-Mail: efdinfo@utk.edu URL: http://www.engr.utk.edu/efd/</p>
Require a capstone course designed with the objective of integrating the agribusiness curriculum through hands-on applications, research, oral and written presentations, and case analyses. ⁵⁵	<p>The course should include the application of knowledge to current agribusiness management issues and problems. The course can be interdisciplinary and offered in colleges of business and/or agriculture and allow students the opportunity to collaborate with faculty members in other disciplines on issues such as bioengineering, food safety, immigration law, environmental regulation, agricultural policy, sustainability, or bioterrorism.</p> <p>The course offered by Dr. Fairchild is “Contemporary Issues in Agribusiness Management.”</p>	<p>■ Dr. Gary F. Fairchild Food & Resource Economics Dept College of Agricultural & Life Sciences University of Florida McCarty Hall A (MCCA) P.O. Box 110240 Gainesville, FL 32611-0240</p> <p>Phone: 352-392-1826 ext. 217 E-Mail: gff@ufl.edu</p> <p>URL: http://www.fred.ifas.ufl.edu/undergraduate_syllabi.php</p>

⁵⁵ See “Integrating Experiential Learning into College of Agriculture Capstone Courses: Implications and Applications for Practitioners” by Randall J Andreasen, (North American Association of Colleges and Teachers of Agriculture) *NACTA Journal*, March 2004 and “Agribusiness Capstone Courses Design: Objectives and Strategies” by Charles R. hall et al, *International Food and Agribusiness Management Review*, Volume 6, Number 4, 2003.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
	The capstone 'experience' at Cornell University is designed for seniors and involves team identification and analysis of agricultural problems. Working in interdisciplinary groups, students design a project to evaluate and synthesize the problem, and develop possible options for dealing with the problem. The course also incorporates guest speakers and field trips	<p>■ Dr. Antonio (Toni) DiTommaso Program Director 903 Bradfield Hall Cornell University Ithaca, NY 14853</p> <p>Phone: 607- 254-4702 Fax: 607- 255-3207 E-Mail: ad97@cornell.edu URL: http://agsci.css.cornell.edu/</p>
Incorporate business and management concepts into existing production/technical courses so that students understand the application of the technical knowledge to the management of the enterprise.	<p>The University of Nebraska-Lincoln and Texas A & M University offer joint degree programs between business and Agricultural Sciences that include case studies, directed research, and practicum courses.</p> <p>At Clemson University, management principles are integrated into several agricultural-related programs, including forestry, animal science, and crop/plant science.⁵⁶</p> <p>The University of Kentucky offers a course in the economic analysis of biosystems that explores the financial and managerial aspects of biosystems in evaluating design alternatives.</p>	<p>■ Ms. Michelle Jacobs University of Nebraska-Lincoln Agribusiness Program, CBA 310 P.O. Box 880492 Lincoln, NE 68588-0492</p> <p>Phone: 402- 472-2316 Fax: 402-472-9777 E-Mail: mjacobs1@unl.edu URL: www.cba.unl.edu/academics/agribusiness/</p> <p>■ Dr. John P. Nichols, Prof. & Head Department of Agricultural Economics Texas A & M University 332 Blocker, 2124 TAMU, College Station, TX 77843-2124</p> <p>Phone: 979- 845-2116 Fax: 979- 862-1563 E-Mail: jpn@tamu.edu URL: http://agecon.tamu.edu/</p> <p>■ Dr. John Sweeney, Interim Associate Dean for Academics College of Agriculture, Forestry & Life Sciences Clemson University Clemson, SC 29634-0101</p> <p>Phone: 864- 656-3013</p> <p>Direct line; 864-656-5333 E-Mail: jrswny@clemson.edu URL: http://www.clemson.edu/cafls/</p> <p>■ Dr. Sue Nokes Director of Undergraduate Studies Biosystems & Agricultural Engineering University of Kentucky 128 C.E. Barnhart Building Lexington, KY 40546-0276</p> <p>Phone: 859-257-3000 ext. 215 E-Mail: snokes@bae.uky.edu URL: http://www.bae.uky.edu/</p>

⁵⁶ More information on course descriptions is available at <http://www.registrar.clemson.edu/publicat/catalog/2008/courses.htm> (Accessed on-line on September 12, 2008)

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
<p>Develop interdisciplinary courses that can be cross listed across campus that integrate agriculture and agribusiness concepts through case studies, applied research, and group/team approaches.</p>	<p>Existing best practices examples at Florida A & M University and the University of Idaho, Moscow Campus include the integration of management and economics principles across the curriculum and the involvement of student and faculty teams to address real issues using a problem-oriented approach and case studies.</p> <p>Other cross-discipline programs at the University of Idaho include Political Science, Philosophy, Recreation, and Conservation Social Sciences.⁵⁷</p> <p>Southern Illinois University offers an interdisciplinary class that incorporates concepts from the biological, physical and social sciences, economics, humanities and law, to environmental issues. Students will develop and demonstrate problem-solving skills as part of a team analyzing a regional environmental issue. Team-taught seminar style discussions.⁵⁸</p>	<p>■ Dr. Makola Abdullah, Dean & Director College of Engineering Sciences, Technology and Agriculture (CESTA) Florida A & M University Perry-Paige Bldg., Room 217 South. Tallahassee, Florida 32307</p> <p>Phone; (850) 561-2644 E-Mail: makola.abdullah@famu.edu</p> <p>URL: http://www.famu.edu/index.cfm?a=cesta&p=DegreePrograms</p> <p>■ Dr. Jan Boll, Director of Waters of the West</p> <p>Phone; 208- 885-7324 E-Mail: jboll@uidaho.edu OR</p> <p>■ Dr. Jon Van Gerpen, Professor and Department Head</p> <p>Phone; 208- 885-7891 E-Mail: jonvg@uidaho.edu</p> <p>Department of Biological & Agricultural Engineering University of Idaho, Moscow Campus P.O. Box 440904 Moscow ID 83844-0904</p> <p>URL: http://www.agls.uidaho.edu/bae/</p> <p>■ Dr. Steven Edwin Kraft, Dep't Chair Department of Agribusiness Economics Agriculture Building - Mailcode 4410 Southern Illinois University-Carbondale 1205 Lincoln Drive Carbondale, Illinois 62901</p> <p>Phone: 618-453-2421 Fax: 618-453-1708 E-Mail: sekraft@siu.edu</p> <p>URL: http://www.coas.siu.edu/</p>
<p>Develop an interdisciplinary, freshman seminar course on <i>Georgia's Strategic Industries</i> that discusses Georgia's economy, its challenges and opportunities, and the degree programs that contain course content appropriate to those challenges and opportunities.</p>	<p>Use of a seminar format would serve as an opportunity to include industry leaders, case studies, and written research analyses. Such a course could also serve as a recruitment tool to existing agribusiness-related undergraduate programs within each institution and advise students of available external degree programs.</p> <p>Ambitious yet invaluable undertaking.</p>	<p>No existing 'best practice' identified.</p>

⁵⁷ Additional information about these courses can be obtained from the University of Idaho's Undergraduate Course Catalog at <http://www.students.uidaho.edu/catalogs/> (downloaded September 12, 2008).

⁵⁸ ABE 470-3 Interdisciplinary Approaches to Environmental Issues. For further information, see http://www.coas.siu.edu/default2.asp?active_page_id=1301. (Accessed September 12, 2008)

C. Expand Opportunities for Hands-on Learning

The development of professional skills could be enhanced in program curricula through more hands-on learning opportunities such as internships, job shadowing, and cooperative education experiences that allow students to interact with industry professionals. Despite the low level of significance attached to internship experiences among the required skills that employers value, the frequent recommendations of established internship and hands-on learning programs suggest that many employers appreciate the skills developed through such programs but were unsuccessful in establishing programs individually. In the words of one employer, “[we have] tried internship programs and discontinued them – interns did not show a pattern of returning as permanent employees. [We] would be willing to try again in conjunction with University system.” This attitude is clearly reflected in the responses to the preferred skills for which employers seek where. Thus, although internships and prior work experience are not requirements for which employers seek, there is a strong preference for such experience; more than 50% of respondents preferred that employees have internship experience and more than 70% would prefer that employees have prior work experience. Nearly 90% of employers required or preferred that college-educated employees enter the workforce with prior work experience. In the final analysis, a structured hands-on learning process that affords students the opportunity to gain prior work experience in their disciplines, whatever the nature of that process, should be implemented. This will require the establishment of clear guidelines and expectations for both the student and employer and coordination across the University System so that there is inter-institutional exchange of information regarding interested students and employers. There is a need to enhance professional skills such as team building, customer service, interpersonal communication, and problem solving/critical thinking. As these skills tend to improve with actual workplace experience, increasing hands-on learning opportunities would directly benefit the growth of these skills through participation in such programs.

Expansion of hands-on learning opportunities could be implemented through existing infrastructure provided by the cooperative extension offices with coordination from a dedicated staff member within the System Office. Such an approach would be advantageous given the existing public/private partnerships between personnel in the extension offices and agribusiness enterprises throughout the State.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
Introduce a required introductory agribusiness orientation course for students admitted into the major/minor. It could also serve as an elective and recruitment tool for undeclared students.	This allows the student to gain a broader perspective of the issues within the major and to place those issues within the broader context of both the discipline and the macro economy. It would also introduce majors within the college, provide information that linked majors within a career path, and create opportunities for cross discipline research for both students and faculty.	<p>■ Dr. Thomas Wahl, Chairperson Department of Agribusiness and Applied Economics North Dakota State University Morrill Hall 217 Fargo, ND 58105</p> <p>Phone: 701- 231-7441 Fax: 701- 231-7400 Direct line: 701-231-9481 E-Mail: tom.wahl@ndsu.edu URL: http://www.ext.nodak.edu/agecon</p> <p>■ Dr. Craig Infanger, Director of Undergraduate Studies Department of Agricultural Economics University of Kentucky 400 Charles E. Barnhart Bldg Lexington, KY 40546-0276;</p> <p>Phone: 859-257-5762 Fax: 859-323-1913;</p> <p>Direct line: 859 257-7274 E-Mail: craig.infanger@uky.edu URL: http://www.uky.edu/Ag/AgEcon/</p>

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
<p>Given the significance attached to this experience by employers, explore the addition of hands-on student learning experiences through a practicum course or a required internship in the major.</p>	<p>Several of the top agribusiness schools require an internship or practicum experience for graduating seniors. Clemson University's animal science program offers both sophomore and advanced level internship programs and requires multi-semesters of "Experience-Based Activity" in the animal agribusiness concentration in the junior and senior years.</p> <p>The College of Agriculture, Food and Natural Resources at University of Missouri offers internships that can be either on campus (shadowing and conducting research with a faculty member) or off campus (with external employers).</p>	<p>■ Dr. Mary Beck, Department Chair Animal & Veterinary Sciences College of Agriculture, Forestry & Life Sciences Clemson University Clemson, SC 29634</p> <p>Phone: 864- 656-2570 Fax: 864- 656-3131 E-Mail: mbeck@clemson.edu</p> <p>URL: http://www.clemson.edu/cafls/departments/</p> <p>■ Dr. Jan Dauve, Associate Professor & Director of Undergraduate Studies Department of Agricultural Economics 200 Mumford Hall Columbia, MO 65211</p> <p>Phone: 573-882-6368 Fax: 573-882-3958</p> <p>Direct line: 573-882-0137 E-Mail: dauvej@missouri.edu</p> <p>URL: http://www.dass.missouri.edu/agecon/</p>
<p>Introduce a 'Professional Practices Course' that allows students to identify the soft skills with the technical knowledge needed to succeed within their career fields.</p>	<p>The University of Florida requires a one-hour course on professionalism and technical skills that covers such topics as ethics, continuing education, placement skills and professional development.</p>	<p>■ Dr. Dorota Z. Haman Professor and Chair Department of Agricultural and Biological Engineering University of Florida PO Box 110570 Gainesville, FL 32611-0570</p> <p>Phone: 352-392-1864 Fax: 352- 392-4092</p> <p>Direct line: 352-392-1864 ext. 120 E-Mail: dhaman@ufl.edu</p> <p>URL: www.aom.ufl.edu</p>
<p>Incorporate more interactive instructional methods into major classes that allow for discussion and team projects, analysis of case studies, computer simulations, etc. in applying business concepts to agricultural-related problems.</p>	<p>Purdue University offers courses in strategic management that make extensive use of "management case studies and a major term project with an agribusiness firm that focuses on developing managerial problem-solving skills." In addition, the program also includes classes in computer use in agricultural business and foundational and professional internship experiences. An orientation to agribusiness course is also a part of the curriculum.</p>	<p>■ Dr. Ken Foster, Professor & Interim Department Head Department of Agricultural Economics Purdue University 403 West State Street, Krannert Bldg. West Lafayette, IN 47906</p> <p>Phone: 765-494-4191 Fax: 765-494-9176</p> <p>Direct line: (765) 494-4191 E-Mail: kfoster@purdue.edu</p> <p>URL: http://www.agecon.purdue.edu/undergrad/</p>

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
	The case studies approach at Cameron University involves students in identifying problems and recommending solutions in actual business situations.	<p>■ Dr. John Courington Professor of Economics & Chair School of Business Cameron University North Shepler Hall, Room 713 2800 W Gore Blvd Lawton OK 73505</p> <p>Phone: 580.581.2267 Fax: 580.581.2954 E-Mail: johnc@cameron.edu URL: http://www.cameron.edu/business/</p>
Revamp programs offered through career services offices that prepare students for careers by expanding program offerings to include enhancement of soft skills in addition to resume writing and interviewing techniques.	Yale School of Forestry offers a 'Professional Skills Module (PSM)' Program aimed at equipping students with the professional skills needed to succeed in careers as foresters, resource managers, and environmentalists. Managed by students with advice from the Career Development Office, the modules cover topics such as interpersonal, business, leadership, communication, and research skills. ⁵⁹	<p>■ Dr. Gordon Geballe, Associate Dean (other advisors: Professor Timothy G. Gregoire, Peter Otis, Director Career Development, and Professor Lloyd Irland)</p> <p>Yale School of Forestry & Environmental Studies 205 Prospect St. New Haven, CT 06511</p> <p>Tel: (203) 432-5122 Tel: (203) 436-4830 Direct line: 203- 432-5122 Email: gordon.geballe@yale.edu</p> <p>URL: http://environment.yale.edu/current/Career-Development/</p>

D. Introduce More Flexibility in Curricula and Program Design

As one of the survey participants commented, "Some current degree programs are too specific. [We] need more candidates with broader range of expertise." There was a recurring theme among survey respondents of the need for the following:

1. more business and management classes
2. a requirement for interpersonal communication
3. a focus on completing assignments through teams
4. more internship opportunities for students
5. the ability for students to understand state and federal policies that impact the agribusiness industry
6. more business applications, real world leadership, coaching and building a successful business and team
7. the incorporation of technology changes in classroom preparation
8. curricula that respond to emerging issues in the agribusiness industry, including government and policy, production management, and resource.

⁵⁹ Further information is available at <http://environment.yale.edu/current/Professional-Skills-Modules/>. Accessed on September 9, 2008.

Table 6.3 - Top 5 Programs Helpful for Future Agribusiness Growth: In Ranked Order of Highest Responses to the Sum of Columns 2 (Very Helpful) and 3 (Somewhat Helpful)

How helpful would it be to the growth of your company if potential applicants had college-level training in the following subject matter/emphases?					
Top 5 responses only (very helpful and somewhat helpful) – (The complete list of responses is included in Appendix I)					
Answer Options	Very Helpful	Somewhat Helpful	Not Helpful	Don't Know/Not Sure	Response Count
Production Management	26.7%	46.7%	12.7%	14.0%	150
Ag Business Technology /Computers in Agriculture	25.7%	35.5%	26.3%	12.5%	152
Government and Policy	18.8%	36.2%	28.9%	16.1%	149
Resource Conservation	14.2%	37.2%	30.4%	18.2%	148
Agricultural Mechanization /Engineering Technology	12.0%	38.7%	32.7%	16.7%	150

Attention should be drawn to the fact that the System currently offers an associate's degree in agricultural business technology but no programs in agricultural mechanization /engineering technology. However, the IPEDS reporting system does not include a CIP code for Production Management or Government and Policy. Production management topics are generally covered in Agricultural Production Operations (01.0301 and) 01.0399), animal science (01.0905, 0906, and 0907) and plant science (01.1101 and 1103) classes. Government and Policy issues are generally included in the syllabi for Farm/Farm and Ranch Management and Land Use Planning and Management/Development courses (01.0104 and 03.0206) respectively. The System currently offers several courses in resource economics (03.0101).

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
Explore the development of additional course work and electives in programs not currently available across the University System. The development of new business or agribusiness courses should focus on those fields where interest is highest among employers and for which institutions nationwide have experienced steady or increasing enrollments in the most recent years.	<p>On the basis of the requests from the survey respondents, classes in government and policy, agribusiness technology/computers in agriculture, agricultural mechanization, production management and precision agriculture should be explored.</p> <p>Nationwide, more than 900 degrees were awarded in CIP code 01-02 fields in 2005-06 at schools such as University of Illinois, Purdue University, California Polytechnic State University - San Luis Obispo, and Iowa State University. Nationwide, 501 degrees were awarded in Agricultural Production Operations (CIP 01.0301) (OSDS data).</p>	<p>■ Dr. K. C. Ting Professor and Department Head Department of Agricultural and Biological Engineering Agricultural Engineering Sciences Building, Room 338, MC-644 1304 W. Pennsylvania Avenue Urbana, IL 61801 Phone: 217- 333-3570 Fax: 217- 244-0323 E-Mail: kcting@illinois.edu URL: http://abe.illinois.edu/</p> <p>■ Dr Rameshwar Kanwar, Chair Department of Agricultural and Biosystems Engineering 104 Davidson Hall Iowa State University Ames, IA 50011 Phone: 515-294-1434 Fax: 515-294-6633 E-Mail: rskanwar@astate.edu URL: http://www.abe.iastate.edu/</p>

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
<p>As an alternative to the previous recommendation, efforts should be made to redesign existing courses to incorporate emerging topics in agribusiness such as the legal, ethic, and political environment of agribusiness, sustainable agriculture, and technology and production systems management.</p> <p>These can be structured as interdisciplinary 'special topics or problems' courses within existing majors/minors that integrate agribusiness issues and problems within and without the colleges of agriculture to develop solutions that have widespread applicability across disciplines.</p>	<p>The plant pathology and microbiology program at Texas A & M University is designed for "students with an interest in solving complex environmental problems." The program offers cross-listed courses in GIS applications in resource management, landscape restoration, and the environmental aspects of engineered works and products.⁶⁰</p> <p>The University of California-Berkeley's program includes courses in the economics of race, agriculture, and the environment, and special topics in environmental science, policy, and management as part of its <i>Society and the Environment</i> major.</p> <p>Florida A & M University offers a course that integrates concepts from economics, the environment, and social science in the design of water management systems (ABE 4232).⁶¹</p>	<p>■ Mr. Sam Murdock, Academic Advisor Dep't of Plant Pathology & Microbiology 120 Peterson Building, 2132 TAMU Texas A & M University College Station, TX 77843-2132</p> <p>Phone: 979-845-7311 Fax: 979-845-6483</p> <p>Direct line: 979-845-2388 E-Mail: semurdock@tamu.edu URL: http://plantpathology.tamu.edu/</p> <p>■ Dr. Jeffrey Romm, Professor Department of Environmental Science, Policy, and Management College of Natural Resources University of California 137 Mulford Hall #3114 Berkeley, CA 94720-3114</p> <p>Phone: 510- 643-7430 Fax: 510-643-2504</p> <p>Direct Line: 510-642-6499 E-Mail: jeffromm@nature.berkeley.edu URL: http://cnr.berkeley.edu/site/about_us.php</p> <p>■ Ms. Crystal Spruill Carter, Research Associate, & Program Coordinator Biological & Agricultural Systems Engineering Florida A & M University Perry-Paige Building, Room 307 North Tallahassee, Florida 32307</p> <p>Phone: 850-561-2198</p> <p>Direct line:850-561-2977 E-Mail: crystal.carter@famu.edu URL: http://www.famu.edu/</p>
<p>Introduce into degree programs the option for self-designed, interdisciplinary studies majors/minors that allow students the ability to incorporate experimental learning options in courses taught by faculty across the university and external to the university (through distance learning technology options).</p>	<p>Although self-directed and tailored to the interest of the individual student, the degree program is structured to meet the academic rigor of the individual college and must be approved by a review committee of faculty advisors. It is limited to academically strong students with career goals that are clearly-articulated prior to registration for the program. As such, it is not equivalent to a general studies major.</p>	<p>■ Dr. Wayne Howard, Chair Agribusiness Department College of Agriculture, Food and Environmental Sciences California Polytechnic State University San Luis Obispo, CA 93407</p> <p>Phone: 805-756-2161 Fax: 805-756-504021</p> <p>Direct line: 805-756-5000 E-Mail: whhoward@calpoly.edu URL: http://agribusiness.calpoly.edu</p>

⁶⁰ More details are available at http://plantpathology.tamu.edu/besc/besc_main.html Accessed 09/10/08.

⁶¹ More details are available at <http://www.famu.edu/index.cfm?a=cesta&p=BiologicalandAgriculturalSystemsEngineering#C> Accessed 09/08/08.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
	<p>The University of Vermont site contains much information on procedures and requirements for self-designed majors.</p> <p>Although not a self-designed major, Auburn's agricultural business and economics program allows students to select 'professional electives' from upper division courses offered in the Colleges of Agriculture, Business, Mathematics and Sciences or the School of Forestry and Wildlife, as well as the departments of Sociology, Anthropology, Geography, Political Science, or Statistics.</p>	<p>■ Dr. Josie Davis, Associate Dean for Academic Programs College of Agriculture and Life Sciences 106 Morrill Hall The University of Vermont Burlington, VT 05405</p> <p>Phone: 802-656-0137 Fax: 802- 656-0290</p> <p>Direct line; 802-656-1032 E-Mail: Josie.Davis@uvm.edu</p> <p>URL: http://www.uvm.edu/cals/?Page=closerlook/selfdesmajor.html</p> <p>■ Dr. William Hardy, Jr., Professor Department of Agricultural Economics. & Rural Sociology 012 Comer Hall Auburn University , AL 36849-5406</p> <p>Phone: 334-844-4800 Fax: 334-844-5639</p> <p>Phone: 334- 844-5620 E-Mail: hardywe@auburn.edu URL: http://www.ag.auburn.edu/agec/undergraduate/</p>

E. Establish a USG Workforce Development Strategy

The recommendations from agribusiness employers pointed to the need for the University System to develop a comprehensive workforce policy. The goals of such a program should be linked to the goals of the Commission for a New Georgia on workforce development and focused on developing the student from matriculation through job placement and career growth.

The recommendations offered by the Task Force regarding Georgia's workforce development system are no less appropriate for the University System's efforts to be "responsive, since change is inevitable and occurring at an ever increasing rate. Therefore, the processes need to be dynamic and resilient in order to continually meet the needs of the marketplace ... [and] must take into account regional aspects of the overall solution."⁶² In addition to being responsive, the workforce development strategy must also anticipate changes that may require changes in the labor demand. Given that increases in the supply of graduates is a long-term process of at least three years (based on current graduation rates following the completion of core requirements), the expansion or addition of programs must be forward thinking, looking toward changes at the national level in consumer demand for alternative energy and bioenergy, 'green' technology, and agrotourism.

Existing initiatives within the University System clearly demonstrate the ability to be forward thinkers. The projected shortage of college-educated workers to meet the agribusiness labor market demand will require swift and immediate action. The administrative infrastructure, including BOR policies, already exists to support external degrees and cross institutional collaborative programs like GTREP and RETP. Thus, expanding such efforts to include collaboration on agribusiness-related curricula should not prove

⁶² Work Force Development Task Force Final Report , October 2004, p. 8

to be difficult. Institutions within the University System have already implemented many “best practices” for addressing the workforce development needs. As such, recommendations for this section will focus primarily on modifying and expanding existing University System initiatives and programs that could address the needs of the agribusiness industry.

Managers expressed the need for employees with degrees plus skills – communication, business, integration of technical knowledge and business skills and professional “soft” skills. Similar results were found by the National Food and Agribusiness Management Education Commission (NFAMEC).⁶³ On the other hand, the majority of survey respondents were less concerned about degree/major fields than they were about the types of training/skills received. Thus, courses across the curriculum that can incorporate agribusiness principles and issues into their curricula would serve to both increase the number of students who could be employed in the agribusiness sector as well as broadening their appeal to agribusiness companies. A few University System institutions currently offer stand-alone interdisciplinary studies degrees as well as majors in interdisciplinary studies. The University of Georgia also offers a Bachelor of Science in Agriculture degree with an honors interdisciplinary studies major.⁶⁴ Thus, making modifications to that program⁶⁵ and extending its availability, as an external degree,⁶⁶ can be one step in increasing the number of graduates with training in agribusiness. As an example of a similar best practice outside the University System, the Penn State University offers intercollege undergraduate programs that it describes as “in addition to conventional baccalaureate degree programs” that “draw on the resources of the faculty and courses from several colleges.”⁶⁷ The proposal offered herein would extend the concept of ‘intercollege’ programs to cross both discipline and institutional lines through distance learning. The existing external bachelor of science in agriculture degree offered by the University of Georgia, the WebBSIT degree,⁶⁸ the Abraham Baldwin Agricultural College/Georgia Southwestern State University collaborative bachelor’s degrees,⁶⁹ and the recent approval of external degree requests from Georgia Institute of Technology (with the Politecnico di Torino in Italy) and Georgia Southern University (with Savannah State University)⁷⁰ support the feasibility of expanding such programs in agribusiness.⁷¹

Measuring the success of the workforce development program will require the establishment of a graduate tracking program. While the practice of tracking graduates through student placement surveys that depend on self-reported data is fairly widespread, the flaws of such a process limit the usefulness of the data.⁷² Undoubtedly, much is said about the need for a college degree but there are no consistent measures of accountability for the dollars spent on producing those degrees. For instance, does a degree earned in viticulture produce the same or better return to the State than one in animal husbandry? Or home economics? What economic contributions are persons with degrees making to the State? Research indicates that, on average, a person with a college degree earns more than persons holding a GED. Statistics on starting salaries by occupation and discipline are well documented. Those are important and

⁶³ “A summary of Undergraduate Curricula in Agribusiness Management Degrees” National Food and Agribusiness Management Education Commission Working Paper # 1. National Food and Agribusiness Management Education Commission, Michael Boland and Jay Akridge, co-chairs. Purdue University Center for Food and Agricultural Business The report also cites 16 studies with similar findings. P. 5

⁶⁴ A listing of degrees and majors was obtained from the searchable data base maintained by the University System of Georgia at <https://app.usg.edu>. Accessed on September 10, 2008.

⁶⁵ Administered through the University Honors Program, the major is open only to Honors students enrolled in the College of Agricultural and Environmental Sciences. Twelve hours of senior division courses must be in one subject (primary).

⁶⁶ Extended education options are covered under Academic Policy Statement #17, Academic Affairs handbook, BOR.

⁶⁷ Information obtained from the *University Bulletin*, accessed at <http://bulletin.psu.edu/bulletins> on September 4, 2008

⁶⁸ For further information, see www.webbsit.org. Accessed on-line on September 9, 2008.

⁶⁹ For further information, see www.abac.edu/GSW. Accessed on-line on September 9, 2008.

⁷⁰ BOR Board Actions, March 19, 2008, Committee on Academic Affairs, items 12-14. Accessed online at www.usg.edu/regents/acton/mar08.phtml on September 10, 2008.

⁷¹ University System of Georgia institutions currently offer over 100 programs for which at least 50 % of a degree is available via distance learning technologies [online, video conferencing (GSAMS), video cassette, telecourse, and satellite]. For more information see http://www.usg.edu/academics/programs/distance_ed/.

⁷² The flaws of the self-reporting system include the fact that participation rates are often low and salaries may be incorrectly reported due to data entry errors, exaggeration, or a need for secrecy. As an example, a recent graduate holding a bachelor’s degree in agricultural communications reported a starting salary of \$250,000. Data reported by NACE (National Association of Colleges and Employers) in its annual *Salary Survey* frequently have fewer than five observations by discipline.

useful bits of information. However, for workforce development/investment purposes, information is needed on the relation between program/degree offerings and labor market outcomes in terms of impact on the State's economy.

Currently, there is no existing process for collecting system-wide data on retention of Georgia college graduates within the State, starting salaries, placement within degree field, and similar measures that would indicate the level of success of the State's higher education system. With no system in place to determine the migration of Georgia-educated college graduates, there is as yet no basis on which to calculate the costs and benefits to the State of higher education. A placement tracking system would provide the tools by which to calculate those costs and returns and to measure the value of a college graduate to the State. Thus, a key component of the workforce plan must be the establishment of a formal system for tracking graduates from the classroom to the workforce and for follow-up surveying of employers to be better informed of changes in the industry that may require program changes. An effective tracking system would require coordination at the State level, between the University System, and state agencies. Such a system is in place in Florida where an extensive system has been implemented through the Florida Education and Training Placement Information Program that provides a one-stop shop for K-20 data.⁷³ A program with similar goals but a different methodology is in place in Minnesota. Administered by the Minnesota Office of Higher Education, the program involves the development of a statewide accountability system to measure the higher education sector's effectiveness in meeting stated goals.⁷⁴

Requests from employers for a coordinated internship program highlighted the difficulties that many employers faced in administering their own programs. Recognizing the benefits to both employers and students of participation in hands-on learning programs, it is recommended that, as a start, the BOR develops a directory of agribusiness/businesses across the State who are interested in hosting college interns. This should be maintained and updated at the System level so that businesses are not contacted about positions that are already filled. A basic, coordinated internship program could be structured similar to the one existing within the University of Wisconsin system which coordinates positions with the Wisconsin Department of Transportation and is available to all students enrolled in any Wisconsin state university.⁷⁵

The lack of collaboration between industry and the academic institutions in recruiting and placing college-educated applicants through university placement offices and the surprisingly low levels of usage of GeorgiaHIRE suggest that efforts should be made to improve the link between employers and placement services. The survey results implied that employers were open to exploring closer contacts with universities in their search for qualified applicants who are college-educated. Given that employers were optimistic that access to a university-managed resume bank and established internship programs would be somewhat or very important to the growth of their companies, it is recommended that such programs be implemented to include the establishment of agricultural-degree specific university career centers that would serve only those students majoring in agricultural-related degree programs. Although not offered at the System level, the University of South Florida at St. Petersburg offers a comprehensive career services program that is designed to meet the needs of both students and employers. Among other things, the site maintains a searchable data base of graduation data by college, department, and major and an alphabetical listing of majors offered.⁷⁶ A similar program could serve to replace or supplement the services provided by GeorgiaHire, a program that, based on the survey results, has had little impact on the agribusiness industry. However, the success of such a program will be critically dependent on publicity to agribusiness employers.

Implementation of many of the earlier recommendations will require an increase in the levels of agricultural literacy among faculty members outside colleges of agriculture. The University System has demonstrated the ability to infuse technology, global issues, and multiculturalism into the curriculum. The

⁷³ Further information is available at <http://www.fldoe.org/fetpip/default.asp>. Accessed September 22, 2008.

⁷⁴ "Minnesota Measures: 2008 Report on Higher Education Performance" (.pdf, 72 pgs). Downloadable from <http://www.ohe.state.mn.us/mPg.cfm?pageID=1733>. Accessed September 22, 2008.

⁷⁵ More information is available at www.dot.state.wi.us/about/docs/intern-uw.pdf.

⁷⁶ For more information see the Center's website at <http://www.stpt.usf.edu/career/>. Accessed on September 22, 2008.

same approaches used for those initiatives could be extended to the infusion of agribusiness issues into the curriculum. The practice has been successfully implemented in K-12 education through the federally funded Agriculture in the Classroom initiative.⁷⁷ Extending agriculture into the college classroom could be accomplished through faculty development programs that include collaboration with industry in a field outside one's academic discipline/academic exchanges, faculty internships/externships/fellowships, or the development of interdisciplinary seminar series for USG faculty. The System currently has in place the infrastructure to provide "Learning Opportunities" through the USG Faculty Development Monthly Series⁷⁸ so expansion to include agribusiness-related training should not prove to be problematic.

The Big 12 institutions⁷⁹ offer to their faculty members the opportunity to participate in a Faculty Fellowship Program whereby they can travel to member institutions for exchanging ideas, mentoring, across institutions, and stimulating scholarship.⁸⁰ California State University- Chico's college of business offers a faculty exchange program that allows faculty members "to solve practical business problems, conduct important research, and develop mutually-beneficial relationships with industry partners."⁸¹

Summary of Recommendations and Contact Information:

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
Modify the University of Georgia's Bachelor of Science in Agriculture with an honors interdisciplinary studies major and extend its availability as an external degree.	The intercollege minor at Penn State is available to all regularly enrolled undergraduates with the objective of allowing students the opportunity to gain multiple perspectives on issues and to increase collaborative and problem-solving skills. The program engages students actively in learning experiences outside their major course of study. This minor is intended not to replace existing minors but to be a true intercollege, interdisciplinary minor. ⁸²	<p>■ Dr. Amy K. Glasmeier , Professor Department of Geography College of Earth and Mineral Sciences 312 Walker Building The Pennsylvania State University University Park, PA 16802</p> <p>Phone: 814- 865-3433 Fax: 814-863-7943</p> <p>Direct Line: 814-865-7323 E-Mail: akg1@psu.edu URL: http://www.envi.psu.edu/</p>
Develop a system to track USG graduates as they enter the workforce.	The Florida Education and Training Placement Information Program is a data collection and consumer reporting system established by Florida Statutes to provide follow-up data on former students and others. The information collected include civilian and federal employment and earnings, continuing education experiences, military service and other measures that address accountability issues. ⁸³	<p>■ Ms. Trina Condo, Director, Florida Education & Training Placement Information Program (FETPIP) 325 West Gaines Street, Suite 1454 Tallahassee, FL 32399-0400</p> <p>Phone: 850- 245-0505 Fax: 850- 245-9667</p> <p>Direct Line: 850- 245-0428; E-Mail: Trina.Condo@fldoe.org URL: http://www.fldoe.org/fetpip/</p>

⁷⁷ See <http://www.agclassroom.org/> for more information.

⁷⁸ Additional information can be obtained by contacting Linda Noble Office of Faculty Affairs, USG. Phone: 404-656-0763 or 404-656-0764; E-Mail: Linda.noble@usg.edu

⁷⁹ The 12 institutions are: Baylor University, University of Colorado, Iowa State University, Kansas State University, University of Kansas, University of Missouri, University of Nebraska, Oklahoma State University, University of Oklahoma, Texas A & M University, Texas Tech University, University of Texas at Austin.

⁸⁰ Information about the program is available at <http://www.k-state.edu/provost/academic/big12/big12guide.htm> or http://provost.missouri.edu/faculty/faculty_development/big12.html.

⁸¹ Accessed online at <http://www.csuchico.edu/cob/busCommunity/fellowship.shtml> on September 11, 2008.

⁸² Downloaded from http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=31&program=env_i.htm on October 6, 2008.

⁸³ Downloaded from <http://www.fldoe.org/fetpip/> October 6, 2008.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
	<p>The Minnesota program consists of a system of accountability designed to measure progress toward academic and workforce goals.</p>	<p>■ The contact information for the Minnesota Measures program is: Ms. Susan Heegaard, Director Minnesota Office of Higher Education 1450 Energy Park Drive, Suite 350 St. Paul, MN 55108-5227</p> <p>Phone: (651) 642-0567; Fax: (651) 642-0675</p> <p>Direct Line: 651-259-3900 E-Mail: susan.heegaard@state.mn.us URL: http://www.ohe.state.mn.us/</p>
<p>Develop a state-wide internship program.</p>	<p>With the Wisconsin Department of transportation, the University of Wisconsin Internship Program is offered to undergraduate (only Junior and Senior status), graduate, and post-graduate students enrolled in a state-system UW school through an Interagency Agreement, where the University hires the student, and then assigns the student to work in one of the Department of Transportation Offices.⁸⁴</p>	<p>■ Questions regarding the Internship Program may be directed to:</p> <p>Jay Neider: 608-267-7943; jay.neider@dot.state.wi.us</p> <p>OR</p> <p>Rita Williams at 608-267-9390; rita.williams@dot.state.wi.us</p> <p>Wisconsin Department of Transportation Bureau of Human Resource Services 4802 Sheboygan Ave., Room 651 Madison, WI 53702</p> <p>■ Questions about the application process should be directed to:</p> <p>Ms. Susan R. Anderson Wisconsin Department of Transportation Bureau of Human Resource Services 4802 Sheboygan Ave., Room 410 PO Box 7915 Madison, WI 53707-7915</p> <p>Phone: 608-266-2615</p> <p>Direct Line: 608- 266-7321 E-Mail: susan.anderson@dot.state.wi.us</p>
<p>Create career services centers with enhanced employer-focused missions.</p>	<p>In addition to having access to students' résumés, The Career Center at USF provides employers with current data on enrollments, degrees offered by college and major, institutional guidelines on internships and employment policies, and links to academic course catalogs.</p>	<p>■ Mr. Terry Dowling, M.A., Career Counselor The Career Center - Terrace 200 University of South Florida- St. Petersburg 140 7th Avenue South, TER 200 St. Petersburg, Florida 33701-5016</p> <p>Phone: 727-873-4129 Fax: 727-873-4828</p> <p>E-Mail: tdowling@spadmin.usf.edu URL: http://www.career.usf.edu/</p>

⁸⁴ Downloaded from <http://www.dot.wisconsin.gov/about/docs/intern-uw.pdf> October 6, 2008.

Recommended Practice to be Adopted	Brief Description of the Practice/Program	Contact Information to Obtain More Details
	<p>The Ohio State University's center caters exclusively to students in the College of Food, Agricultural, and Environmental Sciences. Students can voluntarily upload their résumés to a searchable web site. The Center also serves as the liaison between faculty and the business community to expand faculty professional development opportunities such as consulting or temporary employment.</p>	<p>■ Ms. Pat Whittington Career Services Center College of Food, Agricultural, and Environmental Sciences The Ohio State University 100 Agricultural Administration Building Columbus, Ohio 43210</p> <p>Phone: 614-292-1589 Fax: 614-292-1218</p> <p>Direct Line: 614-247-6236 E-Mail: pwhittington@osu.edu</p> <p>URL: http://www.ag.ohio-state.edu/~cfaes/career/</p>
<p>Negotiate cross institutional agreements for collaboration that allow faculty members to enhance their levels of agricultural literacy and develop cross discipline solutions to agricultural problems. Arrangements can also involve faculty exchanges/externships with the business community.</p>	<p>The faculty fellowship program among Big 12 institutions offers the faculty the opportunity for cross-campus faculty exchanges to expand research opportunities and develop new ideas.</p> <p>The program at California State University, Chico is geared toward expanding partnerships between faculty and the business community.</p>	<p>■ Dr. M. Duane Nellis, Provost and CAO 106 Anderson Hall Kansas State University Manhattan, KS 66506</p> <p>Phone; 785- 532-6224 Fax; 785- 532-6507</p> <p>E-Mail: dnellis@ksu.edu</p> <p>URL: http://www.k-state.edu/provost/academic/</p> <p>OR</p> <p>■ Dr. Kenneth D. Dean, Deputy Provost 116 Jesse Hall University of Missouri Columbia, MO 65211</p> <p>Phone: 573-882-6597 Fax: 573-882-0080</p> <p>E-Mail: DeanK@missouri.edu</p> <p>URL: http://provost.missouri.edu/</p> <p>■ Dr. Willie Hopkins, Dean College of Business California State University, Chico Tehama Hall 301 Chico, CA 95929-0001</p> <p>Phone: 530-898-6271 Fax: 530-898-4584</p> <p>Direct Line: 530-898-6272 E-Mail: wehopkins@csuchico.edu</p> <p>URL: http://www.csuchico.edu/cob/busCommunity</p>

A Note about Funding

The recommendations proposed above were selected in light of the State's critical budget constraints and the ensuing limitations imposed on the System institutions. As such, many of the recommendations could be implemented through curricula changes that would require little to no funding beyond the internal grant processes. However, in those cases where additional funds may be necessary to make significant changes or to have a wider impact, two sources of funding would be of particular interest. First, *Higher Education Challenge Grants* are available through the U.S. Department of Agriculture "to improve academic instruction in food and agricultural sciences" for efforts that include enhancing curricula and increasing faculty teaching competencies.⁸⁵

The second source of external funding is available through the National Science Foundation's *Research Experiences for Undergraduates (REU)* program and the *Industry/University Cooperative Research Centers Programs (I/UCRC)*. The funding cycle for both programs is generally in late summer/early fall.⁸⁶

Summary

As a strategic industry, it will take more than just the agribusiness graduates to enhance and expand Georgia's agribusiness industry and in sustaining the State's economic growth. Graduates from diverse degree programs should understand the relationships that exist between their majors and Georgia's strategic industries and be able to contribute to the identification of solutions for long term sustainability of the State's economy. The introduction of agricultural concepts, issues, and themes in traditional courses in business, biology, architecture, engineering, parks and recreation, family and consumer science, political science, and law could be undertaken to improve agricultural literacy among college graduates. Integrating agribusiness, environment, resource conservation, sustainability, green initiatives into existing curricula could be an effective means of accomplishing that goal. For instance knowledge of horticulture or soils or plants could be used in interior design to understand landscaping best practices, plant choice for optimum landscaping effects. Similarly information technology and engineering applications can be extended to the agricultural industry. To respond to the needs expressed by agribusinesses and the findings of the agribusiness survey, several recommendations are submitted for consideration that address key components such as sustainability, expanding the business side of agribusiness programs, increasing the interdisciplinary components of degree programs, an integrative capstone course, and preparation of graduates for the work environment. Further, collaborative degrees would allow institutions that lack the agribusiness-related resources to utilize resources already available within the University System and to benefit from the expertise of current faculty members at other institutions who hold the requisite academic qualifications and experience. Existing degree programs can serve as a starting point for developing a new course or for modifying an existing course to incorporate issues of sustainability and the management of agricultural businesses.

The recommendations can best be summed in the words of from one-on-one interviewees:

"Job candidates (and hires) usually overly focused on technical skills – not business side of the industry. Need to focus on how to make money – technical skills in the context of business management. New candidates need more education directed at preparing them for the business world. Current curriculums do a great job of teaching them the technical aspects of their discipline. Major gaps in candidate's skills – insufficient writing skills, poor communications skills, inability to read and understand financials, P&L's, cash flow statements, etc. General lack of leadership skills. Need more emphasis on leadership skills, critical thinking, problem solving, and analytical skills. Expectations of new candidates are usually too high – need real world expectations. Graduates need to understand that they will be "test driven", moved often – key retention issues and a major factor in new hire turnover.

⁸⁵ Additional information is available at http://www.csrees.usda.gov/funding/rfas/hep_challenge.html or from www.grants.gov.

⁸⁶ Information about both programs can be accessed at www.nsf.gov/funding. Accessed on September 4, 2008.

Company X (name of business entity omitted) considers itself too small for its own intern program. Has tried it and didn't meet expectations – not enough interns returned for permanent positions. Historically, interns may go elsewhere and return to Company X (name of business entity omitted) later. Looks for a balance of academics and leadership skills, such as roles in academic organizations. Work experience (anywhere) that gives evidence of experience in a work environment. Suggestions: To build leadership consider internships – maybe coop arrangements with industry. Work to build better relationships with industry. Blend this collaborative model into classes if possible. Teach students to function as a team in school – model this on some of the good executive MBA programs. Add emphasis to the financial/business aspects of technical classes. Teach students to take (and give) feedback. Emphasis on communications throughout program of study – not just a freshman speech class, but continuation through their college career. Bring business and industry people in to coach classes, bridge the gap between academics and the real world, preferably by building partnerships with industry. Programs for simultaneous work and course work to bring academics and work together, but also to teach students to manage multiple priorities.”

As supported by the findings of this research, there is a need within the agribusiness industry to enhance public/private partnerships and to establish a comprehensive workforce development program to increase the System's ability to respond to the needs of agribusiness employers. Employers need workers with strong technical skills that are complemented by an appropriate level of professional skills. An effective workforce development program in agribusiness must focus on preparing graduates for successful transition into the workforce and their careers. Agribusinesses have called for stronger public/private partnerships that

“allow students to see how classroom concepts play out in the real world, could use tours and lectures from guest speakers as part of classroom instruction. Any kind of hands-on industry knowledge would be useful as students move from college to employment. Added emphasis in writing, speaking, problem solving skills, working with the public with tact. Classroom instruction needs to keep pace with current technology used in the field – most processing plants are now highly mechanized and computer controlled. Students going into inspection positions need experience with modern plant operating systems.”⁸⁷

The success of the System's workforce development efforts will depend, in large, part, on its ability to respond to these recommendations. To borrow further from the Workforce Development Taskforce, workforce development, at any level, including higher education must ensure that “Georgia can grow and deliver an effective workforce ... [t]hrough its processes – integrated end-to-end across the state with key customers, agencies, partners and suppliers.”⁸⁸ Strategic efforts must be undertaken to address the major survey finding that the projected demand for college-educated workers with the requisite “soft” skills will exceed the projected supply generated by the University System.

⁸⁷ Comments made by one of the individuals who participated in a one-on-one interview.

⁸⁸ Work Force Development Task Force Final Report , October 2004, p. 19

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Appendices

Appendix A:

Comparison of NAICS Codes to Define the Agribusiness Industry for this Study and Those Included in the Commission for a new Georgia's (CNGA) Report⁸⁹

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	

⁸⁹ NAICS codes taken from Appendix B-2 of the Commission for a new Georgia's Report.

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 B:

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, 32199, 3221, 32221, 32222 EXCI.322225 (32111, 32121, 32191, 32192, 32199, 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:

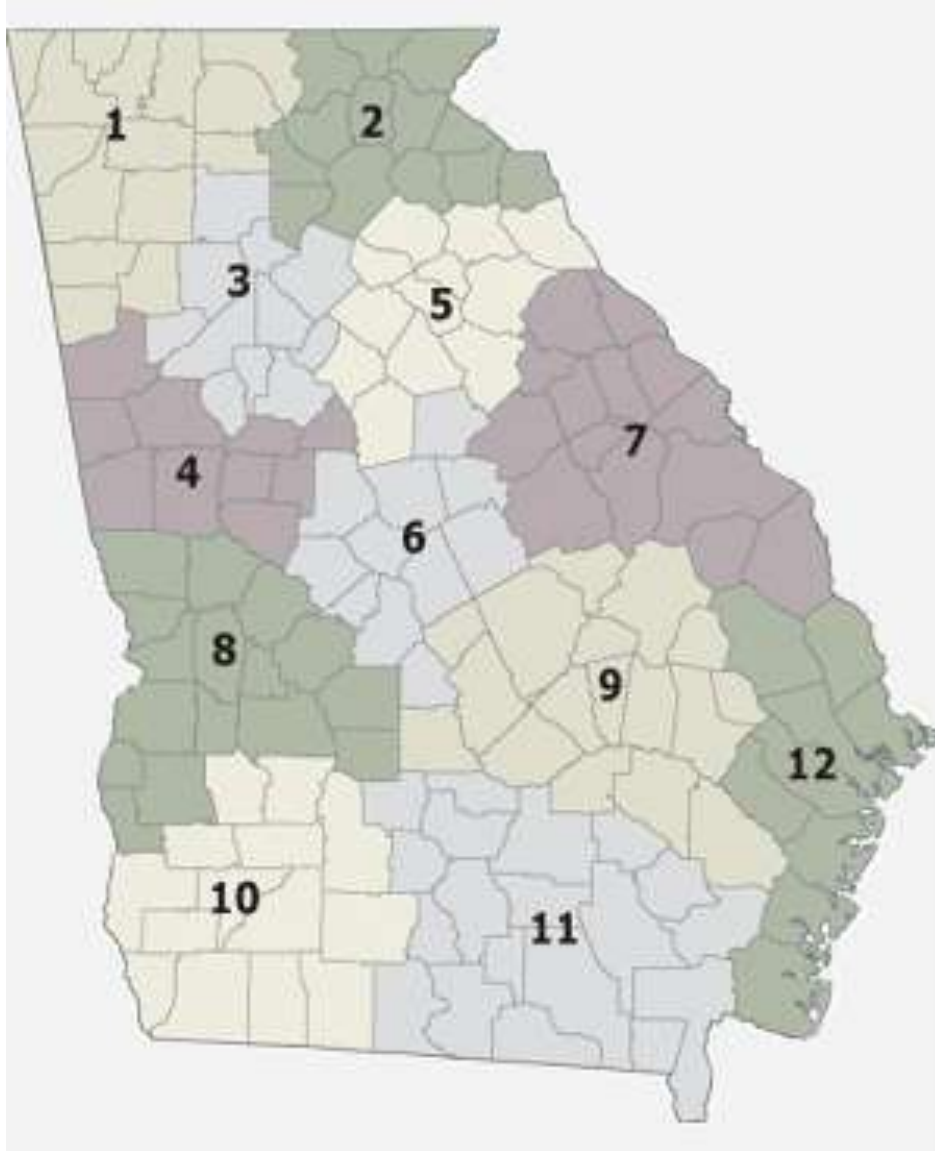
Crosswalk: Workforce Investment Area (WIA) to Aggregated Regions/Service Delivery Regions (SDR)

County	Aggregated Regions/ SDR	WIA	County	Aggregated Regions/ SDR	WIA
Region 1			Region 4		
Catoosa County	1	1	Butts County	4	8
Chattooga County	1	1	Carroll County	4	8
Dade County	1	1	Coweta County	4	8
Fannin County	1	1	Heard County	4	8
Floyd County	1	1	Lamar County	4	8
Gilmer County	1	1	Meriwether County	4	8
Gordon County	1	1	Pike County	4	8
Haralson County	1	1	Spalding County	4	8
Murray County	1	1	Troup County	4	8
Paulding County	1	1	Upson County	4	8
Pickens County	1	1	Region 5		
Polk County	1	1	Barrow County	5	9
Walker County	1	1	Clarke County	5	9
Whitfield County	1	1	Elbert County	5	9
Region 2			Greene County	5	9
Banks County	2	2	Jackson County	5	9
Dawson County	2	2	Jasper County	5	9
Forsyth County	2	2	Madison County	5	9
Franklin County	2	2	Morgan County	5	9
Habersham County	2	2	Newton County	5	9
Hall County	2	2	Oconee County	5	9
Hart County	2	2	Oglethorpe County	5	9
Lumpkin County	2	2	Walton County	5	9
Rabun County	2	2	Region 6		
Stephens County	2	2	Bibb County	6	10
Towns County	2	2	Baldwin County	6	11
Union County	2	2	Crawford County	6	11
White County	2	2	Houston County	6	11
Region 3			Jones County	6	11
Fulton County	3	3	Monroe County	6	11
Cobb County	3	4	Peach County	6	11
DeKalb County	3	5	Pulaski County	6	11
Cherokee County	3	7	Putnam County	6	11
Clayton County	3	7	Twiggs County	6	11
Douglas County	3	7	Wilkinson County	6	11
Fayette County	3	7	Region 7		
Gwinnett County	3	7	Burke County	7	12
Henry County	3	7	Richmond County	7	12
Rockdale County	3	7	Columbia County	7	13
			Glascoc County	7	13
			Hancock County	7	13

County	Aggregated Regions/ SDR	WIA		County	Aggregated Regions/ SDR	WIA
Region 7 Continued				Region 10		
Jefferson County	7	13		Dougherty County	10	17
Jenkins County	7	13		Early County	10	17
Lincoln County	7	13		Grady County	10	17
McDuffie County	7	13		Lee County	10	17
Screven County	7	13		Miller County	10	17
Taliaferro County	7	13		Mitchell County	10	17
Warren County	7	13		Seminole County	10	17
Washington County	7	13		Terrell County	10	17
Wilkes County	7	13		Thomas County	10	17
Region 8				Worth County	10	17
Chattahoochee County	8	14		Region 11		
Clay County	8	14		Atkinson County	11	18
Harris County	8	14		Bacon County	11	18
Muscogee County	8	14		Brantley County	11	18
Quitman County	8	14		Charlton County	11	18
Randolph County	8	14		Clinch County	11	18
Stewart County	8	14		Coffee County	11	18
Talbot County	8	14		Pierce County	11	18
Crisp County	8	15		Ware County	11	18
Dooly County	8	15		Ben Hill County	11	19
Macon County	8	15		Berrien County	11	19
Marion County	8	15		Brooks County	11	19
Schley County	8	15		Cook County	11	19
Sumter County	8	15		Echols County	11	19
Taylor County	8	15		Irwin County	11	19
Webster County	8	15		Lanier County	11	19
Region 9				Lowndes County	11	19
Appling County	9	16		Tift County	11	19
Bleckley County	9	16		Turner County	11	19
Candler County	9	16		Region 12		
Dodge County	9	16		Bryan County	12	20
Emanuel County	9	16		Bulloch County	12	20
Evans County	9	16		Camden County	12	20
Jeff Davis County	9	16		Chatham County	12	20
Johnson County	9	16		Effingham County	12	20
Laurens County	9	16		Glynn County	12	20
Montgomery County	9	16		Liberty County	12	20
Tattnall County	9	16		Long County	12	20
Telfair County	9	16		McIntosh County	12	20
Toombs County	9	16				
Treutlen County	9	16				
Wayne County	9	16				
Wheeler County	9	16				
Wilcox County	9	16				

Map: Service Delivery Regions

Regional Georgia Map



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Appendix D:

List of Relevant CIP Codes – Core and Allied Programs

CIP Code	Description	CIP Code	Description
01.0000	Agriculture, General	01.0603	Agricultural and Domestic Animal Services, Other
01.0101	Agricultural Business and Management, General	01.0604	Applied Horticulture/Horticulture Operations, General
01.0102	Agriculture, General	01.0605	Ornamental Horticulture
01.0103	Agricultural Business and Management, General	01.0606	Greenhouse Operations and Management
01.0104	Agribusiness/Agricultural Business Operations	01.0607	Landscaping and Groundskeeping
01.0105	Agricultural Economics	01.0608	Plant Nursery Operations and Management
01.0106	Farm/Farm and Ranch Management	01.0699	Turf and Turfgrass Management
01.0199	Agricultural/Farm Supplies Retailing and Wholesaling	01.0701	Floriculture/Floristry Operations and Management
01.0201	Agricultural Business Technology	01.0801	Applied Horticulture/Horticultural Business Services, Other
01.0204	Agricultural Business and Management, Other	01.0802	International Agriculture
01.0205	Agricultural Mechanization, General	01.0899	Agricultural and Extension Education Services
01.0299	Agricultural Power Machinery Operation	01.0901	Agricultural Communication/Journalism
01.0301	Agricultural Mechanics and Equipment/Machine Technology	01.0902	Agricultural Public Services, Other
01.0302	Agricultural Mechanization, Other	01.0903	Animal Sciences, General
01.0303	Agricultural Production Operations, General	01.0904	Agricultural Animal Breeding
01.0304	Animal/Livestock Husbandry and Production	01.0905	Animal Health
01.0306	Aquaculture	01.0906	Animal Nutrition
01.0307	Crop Production	01.0907	Dairy Science
01.0399	Dairy Husbandry and Production	01.0999	Livestock Management
01.0401	Horse Husbandry /Equine Science and Management	01.1001	Poultry Science
01.0505	Agricultural Production Operations, Other	01.1002	Animal Sciences, Other
01.0507	Agricultural and Food Products Processing	01.1099	Food Science
01.0508	Animal Training	01.1101	Food Technology and Processing
01.0599	Equestrian/Equine Studies	01.1102	Food Science & Technology, Other
01.0601	Taxidermy/Taxidermist	01.1103	Plant Sciences, General

CIP Code	Description	CIP Code	Description
01.1104	Agronomy and Crop Science	03.0601	Wildlife and Wildlands Science and Management
01.1105	Horticultural Science	03.9999	Natural Resources and Conservation, Other
01.1106	Agricultural and Horticultural Plant Breeding	04.0301	City/Urban, Community and Regional Planning
01.1199	Plant Protection and Integrated Pest Management	04.0401	Environmental Design/Architecture
01.1201	Range Science and Management	04.0601	Landscape Architecture
01.1202	Plant Sciences, Other	13.1301	Agricultural Teacher Education
01.1203	Soil Science and Agronomy, General	14.0301	Agricultural/Biological Engineering and Bioengineering
01.1299	Soil Chemistry and Physics	14.1401	Environmental/Environmental Health Engineering
01.9999	Soil Microbiology	14.2801	Textile Sciences and Engineering
03.0101	Soil Sciences, Other	14.3401	Forest Engineering (did not exist until 2000 CIP)
03.0102	Agriculture, Agricultural Operation, and Related Sciences, Other	19.0505	Foodservice Systems Administration/Management
03.0103	Natural Resources/Conservation, General	19.0901	Apparel and Textiles, General
03.0104	Environmental Science (was combined with 03.0103 as 03.0102 prior to 2000 CIP)	19.0902	Apparel and Textile Manufacturing
03.0199	Natural Resources, Conservation, and Research, General	19.0904	Textile Science (did not exist until 2000 CIP)
03.0201	Natural Resources Management and Policy	26.0301	Botany/Plant Biology
03.0204	Natural Resource Economics	26.0305	Plant Pathology/Phytopathology
03.0205	Water, Wetlands, and Marine Resources Management	26.0307	Plant Physiology
03.0206	Land Use Planning and Management/Development	26.0308	Plant Molecular Biology (did not exist until 2000)
03.0299	Natural Resources Management and Policy, Other	26.0399	Botany/Plant Biology, Other
03.0301	Fishing and Fisheries Sciences and Management	26.0701	Zoology/Animal Biology
03.0501	Forestry, General	26.0702	Entomology
03.0502	Forest Sciences and Biology	26.0707	Animal Physiology
03.0506	Forest Management/Forest Resources Management	26.0708	Animal Behavior and Ethnology
03.0508	Urban Forestry	26.0709	Wildlife Biology
03.0509	Wood Science and Wood Products/Pulp and Paper Technology	26.0710	Zoology/Animal Biology, Other
03.0510	Forest Resources Production & Management	26.1101	Biometry/Biometrics
03.0511	Forest Technology/Technician	26.1201	Biotechnology
03.0599	Forestry, Other	.	-
.	-	.	-

CIP Code	Description	CIP Code	Description
List of Relevant CIP Codes – Related Programs (Business and Parks and Leisure Studies)			
31.0101	Parks, Recreation and Leisure Studies	52.0201	Business Administration and Management, General.
31.0301	Parks, Recreation and Leisure Facilities Management	52.0205	Operations Management and Supervision
45.0602	Applied Economics	52.0701	Entrepreneurship/Entrepreneurial Studies
45.0604	Development Economics and International Development	52.0703	Small Business Administration/Management (did not exist until 2000 CIP)
		52.0905	Restaurant/Food Services Management
Cells in bold indicate degrees/certificates awarded for the 2002-2006 period, USG			

Appendix E:

Long-Term Occupational Projections to 2014, Georgia, by SOC Code

Long-Term Occupational Projections 2004-2014 Georgia - Statewide							
SOC Code	Occupation	Education & Training Code	2014 Projected Employment	% Change in Employment	Annual Growth Rate	Annual Openings from Growth	Annual Openings
11-9011	Farm, Ranch, and Other Agricultural Managers	4	6,320	15.3%	1.4%	84	180
11-9121	Natural Sciences Managers	4	1,320	3.3%	0.3%	4	30
13-2072	Loan Officers	5	10,040	5.7%	0.6%	54	210
17-1012	Landscape Architects	5	1,960	21.9%	2.0%	35	50
17-2021	Agricultural Engineers	5	60	10.5%	1.0%	1	0
17-2081	Environmental Engineers	5	1,330	27.2%	2.4%	28	50
17-3025	Environmental Engineering Technicians	6	1,000	37.0%	3.2%	27	40
19-1011	Animal Scientists	5	*	*	*	*	*
19-1012	Food Scientists and Technologists	5	360	29.9%	2.6%	8	10
19-1013	Soil and Plant Scientists	5	570	9.3%	0.9%	5	10
19-1023	Zoologists and Wildlife Biologists	5	660	6.8%	0.7%	4	20
19-1031	Conservation Scientists	5	440	-9.5%	-1.0%	0	10
19-1032	Foresters	5	400	-1.0%	-0.1%	0	10
19-1099	Life Scientists, All Other	5	250	22.3%	2.0%	5	10
19-2041	Environmental Scientists and Specialists, Including Health	3	1,160	10.2%	1.0%	11	30
19-3011	Economists	3	260	-10.3%	-1.1%	0	10
19-3021	Market Research Analysts	5	5,270	21.0%	1.9%	92	210
19-3022	Survey Researchers	5	470	28.9%	2.6%	11	20
19-3051	Urban and Regional Planners	3	520	14.9%	1.4%	7	20
19-4011	Agricultural and Food Science Technicians	6	*	*	*	*	*
19-4021	Biological Technicians	6	830	0.1%	0.0%	0	10
19-4091	Environmental Science and Protection Technicians, Including Health	6	760	22.5%	2.0%	14	30
19-4093	Forest and Conservation Technicians	6	860	-12.8%	-1.4%	0	20
25-1041	Agricultural Sciences Teachers, Postsecondary	2	*	*	*	*	*
25-1043	Forestry and Conservation Science Teachers, Postsecondary	2	*	*	*	*	*
25-1053	Environmental Science Teachers, Postsecondary	2	*	*	*	*	*
25-1063	Economics Teachers, Postsecondary	2	420	28.0%	2.5%	9	20
25-1194	Vocational Education Teachers, Postsecondary	4	6,030	30.1%	2.7%	140	250
25-2023	Vocational Education Teachers, Middle School	4	430	22.5%	2.1%	8	20
25-2032	Vocational Education Teachers, Secondary School	4	2,850	26.3%	2.4%	59	120
25-9021	Farm and Home Management Advisors	5	270	12.3%	1.2%	3	10

Long-Term Occupational Projections 2004 -2014 Georgia - Statewide							
SOC Code	Occupation	Education & Training Code	2014 Projected Employment	% Change in Employment	Annual Growth Rate	Annual Openings from Growth	Annual Openings
27-3021	Broadcast News Analysts	4	520	23.5%	2.1%	10	20
27-3022	Reporters and Correspondents	4	970	7.0%	0.7%	6	30
27-3042	Technical Writers	5	1,420	24.3%	2.2%	28	60
29-2056	Veterinary Technologists and Technicians	6	1,980	28.8%	2.6%	44	60
33-3031	Fish and Game Wardens	6	440	11.0%	1.0%	4	10
Total- college-educated levels 1 - 6		1-6	50,170	15.6%	1.5%	701	1,580
49-3041	Farm Equipment Mechanics	7	700	7.0%	0.6%	5	20
Total- college-educated levels 1 - 7		1-7	50,870	22.6%	1.5%	706	1,600
11-9051	Food Service Managers	8	12,760	21.2%	1.9%	223	400
13-1021	Purchasing Agents and Buyers, Farm Products	8	260	15.3%	1.4%	4	10
35-1012	First-Line Supervisors/Managers of Food Preparation and Serving Workers	8	32,200	27.2%	2.4%	689	1,290
37-1012	First-Line Supervisors/Managers of Landscaping, Lawn Service, and Grounds-keeping Workers	8	9,040	18.2%	1.7%	139	210
41-1011	First-Line Supervisors/Managers of Retail Sales Workers	8	55,680	9.3%	0.9%	474	1,390
45-1011	First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	8	3,130	10.3%	1.0%	29	90
45-1012	Farm Labor Contractors	8	60	-1.8%	-0.2%	0	0
45-2011	Agricultural Inspectors	8	700	5.7%	0.6%	4	20
45-2041	Graders and Sorters, Agricultural Products	8	1,400	9.5%	0.9%	12	50
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	8	26,210	10.6%	1.0%	252	750
11-9012	Farmers and Ranchers	9	*	*	*	*	*
51-3021	Butchers and Meat Cutters	9	5,910	13.5%	1.3%	70	180
37-3012	Pesticide Handlers, Sprayers, and Applicators, Vegetation	10	850	17.8%	1.6%	13	30
39-2011	Animal Trainers	10	1,070	27.1%	2.4%	23	40
45-2091	Agricultural Equipment Operators	10	1,930	9.3%	0.9%	16	70
45-3011	Fishers and Related Fishing Workers	10	*	*	*	*	*
45-3021	Hunters and Trappers	10	*	*	*	*	*
45-4011	Forest and Conservation Workers	10	630	8.0%	0.8%	5	20
45-4021	Fallers	10	950	-2.7%	-0.3%	0	20
45-4022	Logging Equipment Operators	10	3,310	8.6%	0.8%	26	80
45-4023	Log Graders and Scalers	10	460	-10.9%	-1.1%	0	10
45-4029	Logging Workers, All Other	10	370	-5.3%	-0.5%	0	10
51-3023	Slaughterers and Meat Packers	10	7,930	19.4%	1.8%	129	280
37-3011	Landscaping and Grounds keeping Workers	11	36,630	20.1%	1.8%	613	1,280

Long-Term Occupational Projections 2004-2014 Georgia - Statewide							
SOC Code	Occupation	Education & Training Code	2014 Projected Employment	% Change in Employment	Annual Growth Rate	Annual Openings from Growth	Annual Openings
37-3013	Tree Trimmers and Pruners	11	1,040	13.1%	1.2%	12	30
45-2021	Animal Breeders	11	450	37.2%	3.2%	12	20
45-2092	Farm workers and Laborers, Crop, Nursery, and Greenhouse	11	24,670	10.3%	1.0%	230	860
45-2093	Farm workers, Farm and Ranch Animals	11	2,720	3.6%	0.4%	10	80
45-2099	Agricultural Workers, All Other	11	400	13.8%	1.3%	5	10
51-3022	Meat, Poultry, and Fish Cutters and Trimmers	11	9,540	22.1%	2.0%	172	340
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	11	550	20.3%	1.9%	9	20
51-3092	Food Batch makers	11	2,350	16.0%	1.5%	32	80
51-3093	Food Cooking Machine Operators and Tenders	11	1,520	11.0%	1.1%	15	50
Total non-college educated (levels 8 - 11)		8-11	244,720		1.4%	3218	7,720
Total Georgia Agribusiness			295,590		1.4%	3,924	9,320
College educated as % of total (levels 1-6)			17.0%				17.0%
College educated as % of total (levels 17)			17.2%				
* Suppressed data							

Appendix F:

Occupational Characteristics by SOC Codes

SOC Code	Occupation	Education & Training Code	BLS Description of Education and Training Characteristics
11-9011	Farm, Ranch, and Other Agricultural Managers	4	Most farmers receive their training on the job, often by being raised on a farm. However, the completion of a 2-year associate degree or a 4-year bachelor's degree at a college of agriculture is becoming increasingly important for farm managers and for farmers and ranchers who expect to make a living at farming. A degree in farm management or in business with a concentration in agriculture is important.
11-9121	Natural Sciences Managers	4	These managers usually have education similar to that of the workers they supervise. Natural science managers interested in more technical management may earn traditional master's or Ph.D. degrees in natural sciences or master's degrees in science that incorporate business management skills. Those interested in more general management may pursue an MBA. Given the rapid pace of scientific developments, science managers must continuously upgrade their knowledge.
13-2072	Loan Officers	5	Loan officers usually need a bachelor's degree in finance, economics, or a related field. Previous banking, lending, or sales experience is also highly valued by employers.
17-1012	Landscape Architects	5	A bachelor's or master's degree in landscape architecture usually is necessary for entry into the profession. Almost every state requires landscape architects to be licensed. While requirements vary among the states, they usually include a degree in landscape architecture from an accredited school, work experience, and the passage of the Landscape Architect Registration Exam.
17-2021	Agricultural Engineers	5	Agricultural engineers apply knowledge of engineering technology and science to agriculture and the efficient use of biological resources. A bachelor's degree in engineering is required for almost all entry-level engineering jobs. Agricultural engineers often work in research and development, production, sales, or management.
17-2081	Environmental Engineers	5	Environmental engineers develop solutions to environmental problems using the principles of biology and chemistry. A bachelor's degree in engineering is required for almost all entry-level engineering jobs.
17-3025	Environmental Engineering Technicians	6	Most engineering technicians enter the occupation with an associate degree in engineering technology. Training is available at technical institutes, community colleges, extension divisions of colleges and universities, public and private vocational-technical schools, and in the Armed Forces.
19-1011	Animal Scientists	5	Most agricultural and food scientists need at least a master's degree to work in basic or applied research, whereas a bachelor's degree is sufficient for some jobs in applied research or product development, or jobs in other occupations related to agricultural science.

SOC Code	Occupation	Education & Training Code	BLS Description of Education and Training Characteristics
19-1012	Food Scientists and Technologists	5	Food scientists and technologists usually work in the food processing industry, universities, or the Federal Government to create and improve food products. Most agricultural and food scientists need at least a master's degree to work in basic or applied research, whereas a bachelor's degree is sufficient for some jobs in applied research or product development, or jobs in other occupations related to agricultural science.
19-1013	Soil and Plant Scientists	5	Soil scientists study the chemical, physical, biological, and mineralogical composition of soils as it relates to plant growth. Most agricultural and food scientists need at least a master's degree to work in basic or applied research, whereas a bachelor's degree is sufficient for some jobs in applied research or product development, or jobs in other occupations related to agricultural science.
19-1023	Zoologists and Wildlife Biologists	5	Zoologists and wildlife biologists study animals and wildlife—their origin, behavior, diseases, and life processes. Most biological scientists need a Ph.D. degree in biology or one of its subfields to work in research or development positions. A period of postdoctoral work in the laboratory of a senior researcher has become common for biological scientists who intend to conduct research or teach at the university level.
19-1031	Conservation Scientists	5	Most conservation scientist jobs require a bachelor's degree. Research and teaching positions usually need a graduate degree. Conservation scientists generally have at least a bachelor's degree in fields such as ecology, natural resource management, agriculture, biology, or environmental science. A master's degree or Ph.D. is usually required for teaching and research positions.
19-1032	Foresters	5	A bachelor's degree in forestry, biology, natural resource management, environmental sciences, or a related discipline is the minimum educational requirement for careers in forestry. Research and teaching positions usually need a graduate degree.
19-1099	Life Scientists, All Other	5	No specific description.
19-2041	Environmental Scientists and Specialists, Including Health	3	Environmental scientists conduct research to identify, abate, and eliminate hazards that affect people, wildlife, and their environments. A bachelor's degree in an earth science is adequate for a few entry-level positions, but environmental scientists increasingly need a master's degree in environmental science, hydrology, or a related natural science.
19-3011	Economists	3	Many economists apply economics to health, education, agriculture, urban and regional economics, law, history, energy, the environment, or other issues. Some entry-level positions for economists are available to those with a bachelor's degree, but higher degrees are required for many positions. Prospective economists need good quantitative skills.

SOC Code	Occupation	Education & Training Code	BLS Description of Education and Training Characteristics
19-3021	Market Research Analysts	5	Market research analysts devise methods and procedures for obtaining the data they need. A bachelor's degree is usually sufficient for entry-level market and survey research positions. Higher degrees may be required for some positions, however. Continuing education and keeping current with the latest methods of developing, conducting, and analyzing surveys and other data also is important for advancement.
19-3022	Survey Researchers	5	Survey researchers also gather information about people and their opinions, but these workers focus exclusively on designing and conducting surveys. A bachelor's degree is usually sufficient for entry-level market and survey research positions. Higher degrees may be required for some positions, however. Continuing education and keeping current with the latest methods of developing, conducting, and analyzing surveys and other data also is important for advancement.
19-3051	Urban and Regional Planners	3	Most entry-level jobs in Federal, State, and local governments require a master's degree from an accredited program in urban or regional planning or a related field, such as urban design or geography. Students are admitted to master's degree programs in planning with a wide range of undergraduate backgrounds; a bachelor's degree in economics, geography, political science, or environmental design is especially good preparation.
19-4011	Agricultural and Food Science Technicians	6	Agricultural and food science technicians work with related scientists to conduct research, development, and testing on food and other agricultural products. Many employers prefer applicants who have at least 2 years of specialized training or an associate degree in applied science or science-related technology. Because employers' preferences vary, however, some science technicians have a bachelor's degree in chemistry, biology, or forensic science or have completed several science and math courses at a 4-year college.
19-4021	Biological Technicians	6	Biological technicians work with biologists studying living organisms. Many employers prefer applicants who have at least 2 years of specialized training or an associate degree in applied science or science-related technology. Because employers' preferences vary, however, some science technicians have a bachelor's degree in chemistry, biology, or forensic science or have completed several science and math courses at a 4-year college.
19-4091	Environmental Science and Protection Technicians, Including Health	6	Environmental science and protection technicians perform laboratory and field tests to monitor environmental resources and determine the contaminants and sources of pollution in the environment. Many employers prefer applicants who have at least 2 years of specialized training or an associate degree in applied science or science-related technology. Because employers' preferences vary, however, some science technicians have a bachelor's degree in chemistry, biology, or forensic science or have completed several science and math courses at a 4-year college.

SOC Code	Occupation	Education & Training Code	BLS Description of Education and Training Characteristics
19-4093	Forest and Conservation Technicians	6	Forest and conservation technicians compile data on the size, content, and condition of forest land. Many employers prefer applicants who have at least 2 years of specialized training or an associate degree in applied science or science-related technology. Because employers' preferences vary, however, some science technicians have a bachelor's degree in chemistry, biology, or forensic science or have completed several science and math courses at a 4-year college.
25-1041	Agricultural Sciences Teachers, Postsecondary	2	The education and training required of postsecondary teachers varies widely, depending on the subject taught and educational institution employing them. Educational requirements for teachers are generally highest at research universities, where a Ph.D. is the most commonly held degree; at career and technical institutes, experience and expertise in a related occupation is the principal qualification.
25-1043	Forestry and Conservation Science Teachers, Postsecondary	2	The education and training required of postsecondary teachers varies widely, depending on the subject taught and educational institution employing them. Educational requirements for teachers are generally highest at research universities, where a Ph.D. is the most commonly held degree; at career and technical institutes, experience and expertise in a related occupation is the principal qualification.
25-1053	Environmental Science Teachers, Postsecondary	2	The education and training required of postsecondary teachers varies widely, depending on the subject taught and educational institution employing them. Educational requirements for teachers are generally highest at research universities, where a Ph.D. is the most commonly held degree; at career and technical institutes, experience and expertise in a related occupation is the principal qualification.
25-1063	Economics Teachers, Postsecondary	2	The education and training required of postsecondary teachers varies widely, depending on the subject taught and educational institution employing them. Educational requirements for teachers are generally highest at research universities, where a Ph.D. is the most commonly held degree; at career and technical institutes, experience and expertise in a related occupation is the principal qualification.
25-1194	Vocational Education Teachers, Postsecondary	4	The education and training required of postsecondary teachers varies widely, depending on the subject taught and educational institution employing them. Educational requirements for teachers are generally highest at research universities, where a Ph.D. is the most commonly held degree; at career and technical institutes, experience and expertise in a related occupation is the principal qualification.
25-2023	Vocational Education Teachers, Middle School	4	The traditional route to becoming a public school teacher involves completing a bachelor's degree from a teacher education program and then obtaining a license. Aspiring secondary school teachers most often major in the subject they plan to teach while also taking a program of study in teacher preparation.

SOC Code	Occupation	Education & Training Code	BLS Description of Education and Training Characteristics
25-2032	Vocational Education Teachers, Secondary School	4	Traditional education programs for kindergarten and elementary school teachers include courses designed specifically for those preparing to teach. These courses include mathematics, physical science, social science, music, art, and literature, as well as prescribed professional education courses, such as philosophy of education, psychology of learning, and teaching methods.
25-9021	Farm and Home Management Advisors	5	Advise, instruct, and assist individuals and families engaged in agriculture, agricultural-related processes, or home economics activities. Demonstrate procedures and apply research findings to solve problems; instruct and train in product development, sales, and the utilization of machinery and equipment to promote general welfare. Include county agricultural agents, feed and farm management advisors, home economists, and extension service advisors.
27-3021	Broadcast News Analysts	4	Most employers prefer individuals with a bachelor's degree in journalism or mass communications, but some hire graduates with other majors. They look for experience at school newspapers or broadcasting stations, and internships with news organizations. Large-city newspapers and stations also may prefer candidates with a degree in a subject-matter specialty such as economics, political science, or business.
27-3022	Reporters and Correspondents	4	Most employers prefer individuals with a bachelor's degree in journalism or mass communications, but some hire graduates with other majors. They look for experience at school newspapers or broadcasting stations, and internships with news organizations. Large-city newspapers and stations also may prefer candidates with a degree in a subject-matter specialty such as economics, political science, or business.
27-3042	Technical Writers	5	Increasingly, technical writing requires a degree in, or some knowledge about, a specialized field—for example, engineering, business, or one of the sciences. Knowledge of a second language is helpful for some positions. A background in web design, computer graphics, or other technology field is increasingly practical, because of the growing use of graphics and representational design in developing technical documentation.
29-2056	Veterinary Technologists and Technicians	6	There are primarily two levels of education and training for entry to this occupation: a 2-year program for veterinary technicians and a 4-year program for veterinary technologists.
33-3031	Fish and Game Wardens	6	Fish and game wardens must meet specific requirements. Most States require at least 2 years of college study. Once hired, fish and game wardens attend a training academy lasting from 3 to 12 months, sometimes followed by further training in the field.

Occupations typed **in red** indicate those for which data were suppressed.

Source, Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2008-09 Edition*, Engineering and Natural Sciences Managers, on the Internet at <http://www.bls.gov/oco/ocos009.htm> (visited August 01, 2008).

Appendix G:

Degree Programs Offered, University System of Georgia

Degrees and Majors as of Summer 2008	Abraham Baldwin Agricultural College	Bainbridge College	Fort Valley State University	University of Georgia	Georgia Institute of Technology
Certificate of Less than One Year					
Certificate in Forest Technology		x			
Certificate in Agrosecurity				x	
Certificate in Agribusiness Law				x	
Certificate in Community Forestry				x	
Certificate in International Agriculture				x	
Certificate in Integrative Pest Management				x	
Certificate in Organic Agriculture				x	
Certificate in Water Resources				x	
Associate and Career Associate					
Associate of Applied Science in Agricultural Business Technology	x				
Associate of Applied Science in Agricultural Engineering Technology	x		x		
Associate of Applied Science in Environmental Horticulture Technology*	x*				
Associate of Applied Science in Forest Technology	x				
Associate of Science in Agribusiness and Agricultural Economics	x				
Associate of Science in Agriculture	x				
Associate of Arts in Communication - Agricultural Communication Track	x				
Associate of Science in Agricultural Education	x				
Associate of Science in Agriscience and Environmental Systems	x				
Associate of Science in Animal Sciences	x				
Associate of Science in Plant Sciences	x				
Associate of Science in Biological and Agricultural Engineering	x				
Associate of Science in Forest and/or Wildlife Management	x				
Associate of Applied Science in Livestock Production Technology	x				
Associate of Applied Science in Agricultural Production Technology	x				
Associate of Applied Science in Wildlife Technology	x				
Associate of Applied Science in Forest Technology		x			
Associate of Applied Science in Ornamental Horticulture			x		

Degrees and Majors as of Summer 2008	Abraham Baldwin Agricultural College	Bainbridge College	Fort Valley State University	University of Georgia	Georgia Institute of Technology
Associate of Applied Science in Veterinary Technology			x		
Associate of Science in Pre-Agricultural Engineering			x		
Associate In Arts in Agriculture					
Bachelor's					
Bachelor of Applied Science (BAS) with a major in Diversified Agricultural	x				
Bachelor of Applied Science with a major in Turfgrass and Golf Course Management	x				
Bachelor of Science in Agricultural Education (with Teacher Certification)			x		
Bachelor of Science in Agriculture with a major in Agricultural Economics			x		
Bachelor of Science with a major in Agricultural Engineering Technology			x		
Bachelor of Science with a major in Veterinary Technology			x		
Bachelor of Science in Agriculture with a major in Animal Science			x		
Bachelor of Science in Agriculture with a major in Ornamental Horticulture			x		
Bachelor of Science in Agriculture with a major in Plant Sciences			x		
Bachelor of Science in Agriculture with a major in Agribusiness				x	
Bachelor of Science in Agriculture with a major in Agricultural and Applied Economics				x	
Bachelor of Science in Agriculture with a major in Agricultural Communications				x	
Bachelor of Science in Agriculture with a major in Agricultural Education				x	
Bachelor of Science in Agriculture with a major in Agriscience and Environmental Systems				x	
Bachelor of Science in Agriculture with a major in Animal Science				x	
Bachelor of Science in Agriculture with a major in Animal Health				x	
Bachelor of Science in Agriculture with a major in Avian Biology				x	
Bachelor of Science in Agriculture with a major in Biological Science				x	
Bachelor of Science in Agriculture with a major in Dairy Science				x	
Bachelor of Science in Agriculture with a major in Food Science				x	

Degrees and Majors as of Summer 2008	Abraham Baldwin Agricultural College	Bainbridge College	Fort Valley State University	University of Georgia	Georgia Institute of Technology
Bachelor of Science in Agriculture with a major in Horticulture				X	
Bachelor of Science in Agriculture with a major in Landscape and Grounds Management				X	
Bachelor of Science in Agriculture with a major in Poultry Science				X	
Bachelor of Science in Agriculture with a major in Turfgrass Management				X	
Bachelor of Science in Agricultural Engineering				X	
Bachelor of Science in Applied Biotechnology				X	
Bachelor of Science in Biological Engineering				X	
Bachelor of Science in Environmental Sciences with a major in Entomology				X	
Bachelor of Science in Environmental Sciences with a major in Environmental Economics and Management				X	
Bachelor of Science in Environmental Chemistry				X	
Bachelor of Science in Environmental Sciences with a major in Environmental Resource Science				X	
Bachelor of Science in Environmental Sciences with a major in Water and Soil Sciences				X	
Bachelor of Landscape Architecture				X	
Bachelor of Science in Forest Resources with a major in Forestry				X	
Bachelor of Science in Forest Resources with a major in Forest Resources				X	
Bachelor of Science in Forest Resources with a major in Fisheries and Aquaculture				X	
Bachelor of Science in Forest Resources with a major in Water and Soils				X	
Bachelor of Science in Forest Resources with a major in Wildlife				X	
Bachelor of Science in Forest Resources with a major in Natural Resource Recreation and Tourism				X	
Bachelor of Science with a major in Environmental Engineering					X
Bachelor of Science with a major in Textile Sciences and Engineering					X
Bachelor of Science with a major in Textiles					X
Bachelor of Science with a major in Polymer and Fiber Engineering					X

Degrees and Majors as of Summer 2008	Abraham Baldwin Agricultural College	Bainbridge College	Fort Valley State University	University of Georgia	Georgia Institute of Technology
Bachelor of Science with a major in Polymer and Textile Chemistry					X
Bachelor of Science with a major in Textiles Enterprise Management					X
BS / MCRP in City & Regional Planning					X
Advanced Certificate					
Graduate Certificate in Conservation Ecology and Sustainable Development				X	
Master's					
Master of Science in Animal Science **			X **	X	
Master of Science in Agricultural Economics				X	
Master of Science in Agricultural Engineering				X	
Master of Science in Biological Engineering				X	
Master of Science in Conservation Ecology and Sustainable Development				X	
Master of Science in Crop and Soil Sciences				X	
Master of Science in Dairy Science				X	
Master of Science in Entomology				X	
Master of Science in Environmental Economics				X	
Master of Science in Food Science				X	
Master of Science in Forest Resources				X	
Master of Science in Horticulture				X	
Master of Science in Plant Biology				X	
Master of Science in Plant Pathology				X	
Master of Science in Poultry Science				X	
Master of Science in Textile Merchandising and Interiors				X	
Master of Science in Veterinary Biomedical Science				X	
Master of Agricultural Leadership				X	
Master of Crop and Soil Sciences				X	
Master of Food Technology				X	
Master of Plant Protection and Pest Management ***				X ***	
Master of Landscape Architecture				X	
Master of Forest Resources				X	
Master of Food Animal Medicine				X	
Master of Avian Medicine				X	
Master of Animal and Dairy Science				X	

Degrees and Majors as of Summer 2008	Abraham Baldwin Agricultural College	Bainbridge College	Fort Valley State University	University of Georgia	Georgia Institute of Technology
Master of Agricultural Economics				x	
Master of Science with a major in Environmental Science					
Master of City and Regional Planning					x
Master of Science with a major in Environmental Engineering					x
Master of Science in Environmental Engineering					x
Master of Science with a major in Paper Science and Engineering					x
Master of Science with a major in Polymer, Textile, and Fiber Engineering					x
Doctorate					
Doctor of Philosophy in Agricultural and Applied Economics				x	
Doctor of Philosophy in Animal and Dairy Science				x	
Doctor of Philosophy in Animal Nutrition				x	
Doctor of Philosophy in Biological and Agricultural Engineering				x	
Doctor of Philosophy in Crop and Soil Sciences				x	
Doctor of Philosophy in Entomology				x	
Doctor of Philosophy in Forest Resources				x	
Doctor of Philosophy in Food Science				x	
Doctor of Philosophy in Horticulture				x	
Doctor of Philosophy in Plant Biology				x	
Doctor of Philosophy in Plant Pathology				x	
Doctor of Philosophy in Poultry Science				x	
Doctor of Philosophy in Textile Sciences				x	
Doctor of Philosophy in Veterinary Pathology				x	
Doctor of Philosophy with a major in Bioengineering					x
Doctor of Philosophy with a major in Paper Science and Engineering					x
Doctor of Philosophy with a major in Environmental Engineering					x
Doctor of Philosophy with a major in Polymer, Textile, and Fiber Engineering					
Note: Degree program offerings are subject to frequent changes that may not be reflected in available print and on-line resources due to timing of the research. Degrees may be verified by visiting the links for prospective students at each institution's web page or at https://app.usg.edu/portal/page?_pageid=93,1&_dad=portal&_schema=PORTAL					
* with specializations in Commercial Turf Management, Golf Course Management; Ornamental Production; Golf Clubhouse Management; Landscape Design and Grounds Management; and Sports Turf Management					
** with specialization in: Animal Nutrition; Reproductive Biology; Animal Products Technology					
*** with emphases in Crop and Soil Science; Entomology; Horticulture; and Plant Pathology					

Degrees and Majors as of Summer 2008	Columbus State University	Darton College	East Georgia College	Gainesville State College	Georgia College and State University
Certificate of Less than One Year					
Certificate in Environmental Studies				x	
Certificate in Environmental Science				x	
Associate and Career Associate					
Associate of Applied Science in Services with an Option in Environmental Horticulture (in cooperation with North Georgia Technical College)				x	
Associate of Applied Science in Services with an Option in Turf and Golf Course Management (in cooperation with North Georgia Technical College)				x	
Associate of Applied Science in Pre-Forestry and Natural Resources					x
Associate of Science in Agriculture		x	x	x	
Associate of Science in Biological Science		x		x	
Associate of Science in Agricultural Engineering				x	
Associate of Science in Biological Engineering				x	
Associate of Science in Environmental Science		x			
Associate of Science in Forestry/Forest Resources		x		x	
Bachelor's					
Bachelor of Science with a major in Environmental Science					x
Bachelor of Science with a major in Applied Environmental Spatial Analysis - Environmental Science and Environmental Studies				x	
Master's					
Master of Science with a major in Environmental Science	x				

Degrees and Majors as of Summer 2008	Georgia Highlands College	Georgia Southern University	Georgia State University	Southern Polytechnic State University	University of West Georgia
Certificate of Less than One Year					
Certificate in Land Development				x	
Associate and Career Associate					
Associate of Applied Science in Services with an Option in Environmental Horticulture in cooperation with North Georgia Technical College	x				
Bachelor's					
Bachelor of Science in Apparel Textile Technology				x	
Bachelor of Business Administration with a major in Rural Economic Development		x			
Bachelor of Science with a major in Environmental Science					
Bachelor of Science with a major in Applied Environmental Spatial Analysis - Environmental Science and Environmental Studies					
Advanced Certificate					
Graduate Certificate in Natural Resource Management			x		
Certificate in Planning and Economic Development			x		
Master's					
Master of Science Rural and Small Town Planning					x
Master of Science with a major in Environmental Science					

Note: Degree program offerings are subject to frequent changes that may not be reflected in available print and on-line resources due to timing.

Appendix H:

Degrees and Certificates Conferred, University System of Georgia, 2002 – 2006

CIP Codes	Description	Total Awards 2002 - 2006	Total Undergraduate Awards 2002 - 2006	Total Graduate Awards 2002 - 2006	Analysis
01.0000	Agriculture, General	33	33	-	
01.0101	Agricultural Business and Management, General	38	38	-	
01.0102	Agribusiness/Agricultural Business Operations	105	87	18	
01.0103	Agricultural Economics	154	92	62	
01.0104	Farm/Farm and Ranch Management	1	1	-	
01.0105	Agricultural/Farm Supplies Retailing and Wholesaling	-	-	-	
01.0106	Agricultural Business Technology	-	-	-	
01.0199	Agricultural Business and Management, Other	17	17	-	
01.0201	Agricultural Mechanization, General	1	1	-	
01.0204	Agricultural Power Machinery Operation	40	40	-	
01.0205	Agricultural Mechanics and Equipment/Machine Technology	-	-	-	
01.0299	Agricultural Mechanization, Other	-	-	-	
01.0301	Agricultural Production Operations, General	-	-	-	
01.0302	Animal/Livestock Husbandry and Production	37	37	-	
01.0303	Aquaculture	-	-	-	
01.0304	Crop Production	7	7	-	
01.0306	Dairy Husbandry and Production	-	-	-	
01.0307	Horse Husbandry /Equine Science and Management	-	-	-	
01.0399	Agricultural Production Operations, Other	-	-	-	
01.0401	Agricultural and Food Products Processing	-	-	-	
01.0505	Animal Training	-	-	-	
01.0507	Equestrian/Equine Studies	-	-	-	
01.0508	Taxidermy/Taxidermist	-	-	-	
01.0599	Agricultural and Domestic Animal Services, Other	-	-	-	
01.0601	Applied Horticulture/Horticulture Operations, General	262	246	16	

CIP Codes	Description	Total Awards 2002 - 2006	Total Undergraduate Awards 2002 - 2006	Total Graduate Awards 2002 - 2006	Analysis
01.0603	Ornamental Horticulture	-	-	-	
01.0604	Greenhouse Operations and Management	-	-	-	
-					
01.0605	Landscaping and Groundskeeping	26	26	-	
01.0606	Plant Nursery Operations and Management	-	-	-	
01.0607	Turf and Turfgrass Management	26	26	-	
01.0608	Floriculture/Floristry Operations and Management	-	-	-	
01.0699	Applied Horticulture/Horticultural Business Services, Other	4	4	-	
01.0701	International Agriculture	-	-	-	
01.0801	Agricultural and Extension Education Services	8	-	8	
01.0802	Agricultural Communication/Journalism	31	31	-	
01.0899	Agricultural Public Services, Other	-	-	-	
01.0901	Animal Sciences, General	295	229	66	
01.0902	Agricultural Animal Breeding	-	-	-	
01.0903	Animal Health	-	-	-	
01.0904	Animal Nutrition	2	-	2	
01.0905	Dairy Science	7	5	2	
01.0906	Livestock Management	-	-	-	
01.0907	Poultry Science	93	57	36	
01.0999	Animal Sciences, Other	-	-	-	
01.1001	Food Science	167	49	118	
01.1002	Food Technology and Processing	-	-	-	
01.1099	Food Science and Technology, Other	-	-	-	
01.1101	Plant Sciences, General	-	-	-	
01.1102	Agronomy and Crop Science	66	14	52	
01.1103	Horticultural Science	22	22	-	
01.1104	Agricultural and Horticultural Plant Breeding	-	-	-	
01.1105	Plant Protection and Integrated Pest Management	4	1	3	
01.1106	Range Science and Management	4	-	4	
01.1199	Plant Sciences, Other	-	-	-	
01.1201	Soil Science and Agronomy, General	16	16	-	
01.1202	Soil Chemistry and Physics	-	-	-	
01.1203	Soil Microbiology	-	-	-	
01.1299	Soil Sciences, Other	-	-	-	

CIP Codes	Description	Total Awards 2002 - 2006	Total Undergraduate Awards 2002 - 2006	Total Graduate Awards 2002 - 2006	Analysis
01.9999	Agriculture, Agricultural Operation, and Related Sciences, Other	14	14	-	
03.0101	Natural Resources/Conservation, General	43	9	34	
03.0102	Environmental Science/Studies	20	17	3	
03.0103	Environmental Studies (was combined with 03.0104 as 03.0102 prior to 2000 CIP)	20	20	-	
03.0104	Environmental Science (was combined with 03.0103 as 03.0102 prior to 2000 CIP)	61	47	14	
03.0199	Natural Resources, Conservation, and Research, General	-	-	-	
03.0201	Natural Resources Management and Policy	1	-	1	
03.0204	Natural Resource Economics	-	-	-	
03.0205	Water, Wetlands, and Marine Resources Management	-	-	-	
03.0206	Land Use Planning and Management/Development	-	-	-	
03.0299	Natural Resources Management and Policy, Other	-	-	-	
03.0301	Fishing and Fisheries Sciences and Management	25	25	-	
03.0501	Forestry, General	145	104	41	
03.0502	Forest Sciences and Biology	200	17	183	
03.0506	Forest Management/Forest Resources Management	-	-	-	
03.0508	Urban Forestry	-	-	-	
03.0509	Wood Science and Wood Products/Pulp and Paper Technology	-	-	-	
03.0510	Forest Resources Production and Management	-	-	-	
03.0511	Forest Technology/Technician	54	54	-	
03.0599	Forestry, Other	-	-	-	
03.0601	Wildlife and Wildlands Science and Management	228	228	-	
03.9999	Natural Resources and Conservation, Other	-	-	-	
04.0301	City/Urban, Community and Regional Planning	157	-	157	
04.0401	Environmental Design/Architecture	1	1	-	
04.0601	Landscape Architecture	427	352	75	
13.1301	Agricultural Teacher Education	129	105	24	

CIP Codes	Description	Total Awards 2002 - 2006	Total Undergraduate Awards 2002 - 2006	Total Graduate Awards 2002 - 2006	Analysis
14.0301	Agricultural/Biological Engineering and Bioengineering	182	154	28	
14.1401	Environmental/Environmental Health Engineering	132	-	132	
14.2801	Textile Sciences and Engineering	85	55	30	
14.3401	Forest Engineering (did not exist until 2000 CIP)	19	10	9	
19.0505	Foodservice Systems Administration/Management	49	44	5	
19.0901	Apparel and Textiles, General	104	91	13	
19.0902	Apparel and Textile Manufacturing	2	-	2	
19.0904	Textile Science (did not exist until 2000 CIP)	5	-	5	
26.0301	Botany/Plant Biology	52	8	44	
26.0305	Plant Pathology/Phytopathology	20	-	20	
26.0307	Plant Physiology	-	-	-	
26.0308	Plant Molecular Biology (did not exist until 2000 CIP)	-	-	-	
26.0399	Botany/Plant Biology, Other	-	-	-	
26.0701	Zoology/Animal Biology	-	-	-	
26.0702	Entomology	82	31	51	
26.0707	Animal Physiology	5	-	5	
26.0708	Animal Behavior and Ethnology	-	-	-	
26.0709	Wildlife Biology	-	-	-	
26.0799	Zoology/Animal Biology, Other	-	-	-	
26.1101	Biometry/Biometrics	-	-	-	
26.1201	Biotechnology	42	42	-	
	Core Ag and Allied Programs	3770	2507	1263	
	Key to Analysis				
	Graduate but No Undergraduate awards				
	Undergraduate but No graduate awards				
	No Certificates or Degrees awarded				
	Graduate and undergraduate awards conferred 2002- 2006				
	Programs typed in bold indicate that awards were conferred for 2002-2006				

Appendix I:

Summary of Responses to Survey Questions, Georgia Agribusiness Needs Assessment Survey

Georgia Agribusiness Needs Assessment Survey		
Which of the following in the primary agribusiness area for your company? (Choose only one.)		
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
<i>answered question</i>		190

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	21103	182
Percent (%) of full time positions requiring a college degree: Georgia?	25.87	4657	180
Approximate number of employees in the U.S.?	1822.03	251440	138
Percent (%) of full time positions requiring a college degree: U.S.?	23.05	3135	136
<i>answered question</i>			184

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
<i>answered question</i>		185

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 skills	81	72	16	169
Oral communication skills	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 skills	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
<i>answered question</i>				178

Other responses:

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

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
<i>answered question</i>					181

Over the next five years, what are your expectations about your workforce needs?								
Answer Options	Increase > 10%	Increase 6-10%	Increase 3-5%	Increase 1-2%	No Change	Decrease	Don't Know/ Not Sure	Count
General Workforce	36 20.1%	17 9.5%	27 15.1%	23 12.8%	53 29.6%	6 3.4%	17 9.5%	179
College-educated Workforce	30 17.6%	26 15.3%	20 11.8%	27 15.9%	43 25.3%	0 0.0%	24 14.1%	170
<i>answered question</i>								182

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 that apply. If none, leave blank. for "other", please specify.)					
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
<i>answered question</i>					150

Other responses (number of occurrences in parentheses):

- Association management; meeting planning
- Business – A few
- Engineering - a few (3)
- Entomology and Plant Pathology essential
- Forestry -timber - a few
- Math and Statistics 15 hours' min.
- Accounting/Finance - A few
- Economic Development
- Engineering - all/almost all (2) – Some (2)
- Food Science (3)
- Government Relations
- Manufacturing

For positions requiring a college degree, for what portion of your openings would you REQUIRE specific subject matter in the following fields? "Other" Continued:

- Chemical, electrical or mechanical engineering
- Quality, R&D
- Type of Degree not important
- Rural Development Skill - building Up rural areas with jobs/housing/water/sewer
- Other - a few
- Retail Farm Supply Store
- Sales

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"

Answer Options	Always (>90%)	Often (51-90%)	Sometimes (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
- In our nonprofit, these 3 positions are grouped into one which was filled by an applicant with a degree
- Ag mechanization - always
- Field testing and statistical knowledge

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	
<i>answered question</i>						160	

Other responses:

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

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
GeorgiaHIRE.com	0	2	5	13	114	134
						24
<i>answered question</i>						155

Other responses (number of occurrences in parentheses):

- Craig's list
- Industry contacts/networks (2)
- Industry contacts - always
- Industry contacts - never
- Industry contacts/networks – often (3)
- Industry contacts/networks – seldom
- We don't currently have any college educated employees
- industry contacts/networks - sometimes (7)
- Web sites such as www.gsae.org
- Monster.com (2)
- Trade Association Job Sites
- Newspaper ads (2)
- Referrals from members

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
University of Georgia	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
						52
						150
						50

Other responses (number of occurrences in parentheses):

- Agnes Scott College
- Alabama A & M
- Area Technological Colleges, Virginia Tech
- Athens Tech - seldom
- Anderson college - seldom
- Augusta State
- Berry College
- College of Charleston, Macon State
- Columbus State
- Georgia Southern (13)
- Georgia College and State
- Valdosta State University
- University of South Carolina
- Mercer
- Southeastern Tech Inst
- Middle Tennessee
- Mercer
- Ohio State
- Georgia State
- Georgia State and Western GA
- Kennesaw State
- Mercer
- Michigan State and Perdue
- Mississippi State (2)
- Austin Peavy State University
- Texas A & M
- NC State
- NC State - Sometimes
- FSU - Seldom
- South Florida - Seldom
- West Virginia - Sometimes"
- Never used
- North Carolina State University
- North Metro Tech
- North Metro Technical College
- Ogeechee Technical College
- Colorado State University
- Penn State
- Purdue
- Ohio State
- Samford University, Birmingham, AL
- Southern Tech, Kennesaw State
- Southwestern
- Stanford, Ohio State
- Texas A & M
- University of Alabama
- University of Arkansas
- University of Puerto Rico"
- University of Kentucky
- University of Nebraska
- University of North Carolina
- University of Texas
- University of West Georgia,
- Iowa St.
- Valdosta State (3)
- West Florida, Okaloosa Walton College, Florida
- Western Kentucky

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 (Please specify below)	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
<i>answered question</i>					166

Other responses:

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

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

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

- Statistics 6 Hour Minimum

- Timber - don't know/not sure

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
<i>answered question</i>		168

Additional information provided:

- Ag Mechanization/Engineering with new equipment and automation
- Alternative energy sources
- Creative solutions to water shortages
- ARCGIS and other mapping skills
- Automated packaging/processing equipment
- Bioenergy
- Biofuel From Forest operations
- Bio-fuels
- Biotech (2)
- Computer programs, food safety, GPS
- Computerization of Farmers Grain Tickets and Records
- Constantly changing pesticides
- Energy generation (methane etc), AI
- Entomology and plant pathology
- Food Distribution Safety
- Bio Fuels"
- Forest waste Bio Energy Utilization
- GIS GPS Innovations
- Genetics
- Web based decision models and databases
- High speed equipment
- Internet Technology, Taxes Requirements, Office Management/Time Management
- 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
- Organics
- Fuel alternatives in machinery
- Precision Ag, Air Quality, and Energy Conservation
- Precision farming technology
- Propagation
- Rain harvest technology
- Safety and quality foods (SQF)
- ASQ auditing
- Total Quality and performance skills
- 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
- Transportation Technology
- The rapid advancement of fertigation in the blueberry industry may demand a more trained worker to operate those systems

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
<i>answered question</i>					173

Responses 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, Worth ethic that earning to company funds expansion and growth

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
Other (please specify)					17
<i>answered question</i>					160

Other responses (number of occurrences in parentheses):

- University career centers specifically for students majoring in ag-related degree programs - not important (3)
- University career centers specifically for students majoring in ag-related degree programs - don't know/not sure (2)
- University career centers specifically for students majoring in ag-related degree programs - very helpful
- University career centers specifically for students majoring in ag-related degree programs – somewhat important (7)
- University career centers specifically for students majoring in ag-related degree programs - very important (3)

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
<i>answered question</i>		121
<i>skipped question</i>		79

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
<i>answered question</i>		152
<i>skipped question</i>		48

Appendix J:

Responses to Degree and Curricula Changes Needed to Improve USG Responsiveness

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
<i>answered question</i>	78
<i>skipped question</i>	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 skills
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 skills.
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

Responses Provided by Survey Participants to Question About Changes in Degrees and Curricula to Improve Responsiveness

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.
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 <u>ethic</u>
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.

Responses Provided by Survey Participants to Question About Changes in Degrees and Curricula to Improve Responsiveness

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

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 ABAC 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 the 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

Responses Provided by Survey Participants to Question About Changes in Degrees and Curricula to Improve Responsiveness
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
None
Not familiar enough with degrees and curricula to make reasoned recommendation.
Not Sure
Not sure
not sure
unknown - we mostly hire engineers

Appendix K:

List of Additional Workforce Issues to be Considered by the USG in Responding to Agribusiness Workforce Needs

Please use this space to discuss any additional workforce issues that ought to be considered in ensuring that the University System of Georgia can respond effectively to the workforce needs of the agribusiness industry.	
Answer Options	Response Count
	39
<i>answered question</i>	39
<i>skipped question</i>	161

Response Text
A. Industry and Labor Market Changes
Bio Fuel Information
On the Job training is provided. Salary does not attract college-degree applicants.
Finding a physical labor workforce is nearly impossible. Technical training for everyday working people is needed.
Set realistic expectations for graduates on pay scales
80% to 90% of our workforce does not need a college education.
We tend to forget that other than management in the ag section the people that are on the ground and doing the work are slowly being eliminated. We will close the company when this happens
Personal development in getting along with people and maintain a strong work ethic. It is not an 8 to 5 world.
I am a relatively small operation not needing large numbers of workers with college degrees. The Horticulture industry is growing and will have a need for skilled employees in the future. So many of the horticulture businesses are like me; one, two, or three skilled people and the majority of the workforce unskilled.
Faculty is creating false expectation as to the value of holding a degree - it is like a sticker on a suit case in that it tells me where you have been, but not where you are going.
Maybe as an option. The market is changing rapidly. A course in self insured market planning for retirement for those of us with smaller companies. We might have a shot at some larger caliber players if they had additional nontraditional options.
The greatest challenge is not the college educated employee, but the uneducated mass of workers that are poorly served by the local school systems and maybe indirectly by the University System.
B. Partnerships and Placement
More regular ongoing communications between the field work management site officials and the developers/managers of the college curriculum programs.
Better access to the top performing students, one semester prior to graduation.

Response Text
C. Program Design and Curriculum Needs
The majority of the available positions in the poultry industry are in the processing area. While the class load spends most of the time dealing with bird development.
finding persons with an actual farm/rural environment with the ag course work to go along with the degree
Graduate students with a work ethic and useable skills
UGA needs to better define Bio and Ag Engineering Degree and correlation with business needs
Help students understand what they will encounter when entering the job force - culture, pay, work expectations, ability to apply classroom knowledge to job, etc..
we are desperate for college educated farm managers who are forward thinking, excellent in people management and have good organizational and multi tasking skills. An ability to speak Spanish would be a major plus. A farm manager also needs mechanical skills for operating and servicing equipment. I have personally solicited EVERY Agriculture University/College in the Nation seeking a farm manager with an ag degree or an ag degree student interested in produce marketing. I had 2 applicants from CA, neither were interested in a job or a paid internship in GA.
At "Company A" we have but two full time employees- we have about 185 head of beef cattle on the place now. Both employees are 41 years old- 1 graduated in Animal Science at UGA in 1990- he's been on the farm since he was 14 (his father was my 1 st manager) The 2 nd ran a cattle farm in west Georgia for 4-5 years and has been with us for nine years. I say all this as background in answering some of your questions- certainly I feel blessed to have two very capable folks working with me- looking down the road I think character is the most single attribute for my operation- certainly knowledge is important but I believe we all need to know more about "business" and what makes some successful and others less so- High Ethical Standards are still needed even in this hi tech computer age- but as anyone can see we, in our society, are losing this important item- I'm not sure you can teach it like say math- but without it- it would be difficult to succeed.
Speak and understand Spanish
Work ethic, timeliness, initiative are extremely important in the poultry business. Respect is earned and is not an entitlement of a degree.
Need more opportunities for graduates to have real world experiences as fewer and fewer have farm backgrounds.
The graduates need hands on practical ag experience. they need to know how to run machinery or be able to. They need to know the ins and outs of working livestock. The technical knowledge are (sic) great but they need to be prepared for more than just a job with the Extension Service or teaching.
Language skills especially Spanish Working Knowledge
Undergraduates need some industry experience during their educational program either part-time job or internships. Communication and computer skills are a must. As a consultant we come in contact with many jobs which need college graduates with defined skills in actual processing applications but little or no training is available for students to receive this type of skill. Governmental regulation is a must for the food industry.
Specific training in both wholesale and retail farm supply marketing and business operations. In Georgia today there is a need for students in Ag to be better educated in the both the retail farm supply business, and the wholesale aspects of agribusiness.

Response Text
D. Program Design and Curriculum Needs
Not all positions require a 4 year technical degree. A good two year degree in basic subjects (math, English, people skills, scheduling, problem solving, teams, etc). would satisfy 75% of our labor requirements
add a comprehensive engineering program to include chemical, electrical and mechanical engineering
We just need more graduates with degrees in agriculture and related fields.
E. Higher Education Structure
More classes around the state in different locations
Personally I feel UGA is a lost cause and we should direct our efforts to a program that creates interactions between ABAC, Fort Valley and Tifton Center to create the Agriculture and Mechanical College of Georgia. UGA can then concentrate on being the social and sports educational center for the state.
Combine training available at technical colleges and UGA and ABAC and Fort Valley State degree programs with intern programs so that the graduate understands theory, technology, and applied technology in real world settings. Many applicants today don't have rural ag backgrounds and you can't assume they have farming 101 as in the past.
F. Other Responses
Georgia Ag WILL FLOP without migrant workers. We must have a guest worker plan in place that is affordable or we need to back off of harassing the current work force (migrants of course) that is currently in GA.
Probably the GA Cooperative Council is not the type firm your workforce needs assessment is oriented to. The council is a support organization for cooperative in the state to assist them in providing education of cooperatives in the state and on leadership skills to youth and cooperative couples through a conference each year for each of these groups
The media has done a poor job in getting accurate information out regarding drought causes and effects and its relationship to agribusiness. There is a critical need to blanket the public with not only updated information , but change the public's perception about resource management specifically water. EXAMPLE: Less than 2 years ago, condensate from AC units & gutter downspout were perceived to cause moisture related "problems" like foundation settlement and mold related "sick house syndrome". Today we need to be focusing on the harvest of this valuable moisture to ease drought conditions.
G. None/No Comments/Not Sure
No Comment
None
Not sure