
Logistics Centered Talent: A Perspective on Supply and Demand

Final Report

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Executive Summary

The Intellectual Capital Partnership Program (ICAPP) of the University System of Georgia (USG) asked Georgia Tech to investigate the extent to which current or future needs of the logistics industry can be enhanced by the type or level of talent coming out of the state's higher educational system. We define logistics as the management of the physical movements of materials, goods, and services.

Summary of Findings

- More than 8.3 million employees worked in core logistics industries (wholesale and transportation sectors) in the U.S. and 263,000 in Georgia. Logistics comprised 6 percent of the workforce in both the national and the state. Core logistics industries are projected to add a further 12 percent nationally and 17 percent in Georgia by 2012.
- Related industries in the business services sector accounted for 4.7 million U.S. workers and 150,000 Georgia workers in 2002. Taking core wholesale and transportation together with related service sector employment, we estimate that there will be nearly half a million logistics workers in Georgia by 2012 that will account for 10 percent of the state's workforce.
- The state is somewhat more specialized in logistics than the nation but not substantially so. Georgia is projected to be rather more competitive than the nation in its ability to add logistics jobs through 2012.
- Georgia is the only state located that is most proximate to new population projected for 2025 and nearest the fast-growing South Florida region.
- Current job openings in logistics that require some college education encompass business, engineering, and computing/information technology (IT). These positions tend to have a more substantial experience requirement than we have seen in other fields.
- Georgia graduated nearly 700 students in core logistics concentration areas in 2003. Seventeen higher educational institutions in Georgia had programs to produce these graduates, although only five demonstrated the capacity to turn out at least 25 graduates per year. The state has a distinctive concentration of engineering graduates, which account for three-quarters of the supply. Georgia appears rather weak in business specializations such as logistics and materials management.
- Projections of long-term demand for logistics workers estimate that Georgia will need 1,100 workers annually in core logistics occupations and 12,170 workers

annually in related logistics occupations through 2012. Nearly half of these occupations have experience requirements.

- When comparing long-term demand to supply of graduates, we did not see many occupations with many shortfalls. Only one core occupation, Purchasing Managers, exhibited a shortfall (of more than 70 unfilled positions annually). There are more potential shortfalls evident in related IT and financial occupations.
- Even though there were no overt areas of shortfall, we emphasize that Georgia's output may not be sufficient as the state moves forward with its efforts to develop a logistics cluster.

Top Recommendations

- Strengthen the state's business offerings in logistics and supply chain management. Selected programs with existing capabilities should be further developed into world class business supply chain management and steps should be taken to ensure that the field is explicitly incorporated into all business programs. Attention should be paid to having undergraduate, masters, and doctoral level capabilities in business-based logistics in the state. If Georgia wants to have a world-class logistics cluster, the state needs programs ranked among the top institutions in the logistics/supply chain management area.
- Leverage Georgia's strengths in engineering and maintain current IT capacity.
- Encourage interdisciplinary programming to capitalize on the interrelationship that the logistics field demarcates among business, engineering, and IT.
- Incorporate opportunities for students to gain industry experience through the following: internships, coops/part-time jobs, student projects, seminar programs, formal partnerships, involvement of students and business leadership in curricula design, and adjunct positions provided for industry executives.



Acknowledgements

The project team gratefully acknowledges the helpful support received from the University System of Georgia. We thank Joy Hymel, Executive Director, Office of Economic Development, for her assistance with data acquisition and conceptual ideas regarding the place of logistics in the university system's economic development horizon. Final responsibility for the analyses and conclusions contained in this report rests with the authors.

Introduction

During the past three years, the Governor and his staff have focused on identifying industry clusters that will serve to keep Georgia competitive and innovative. The Logistics industry has been identified by the Governor's Commission for a New Georgia as one of the top six strategic industry clusters and is targeted for further growth within the state. The Harvard Business School 2001 Clusters of Innovation study cited the metro Atlanta's logistics cluster as one of the strongest in the nation with high growth and employment potential. Savannah, Georgia and the Georgia Ports Authority are also cited as being one of the fastest growing ports in the nation. Georgia's attractiveness for logistics functions has been recognized recently by Expansion Management magazine, with Georgia ranking number one as both "top state for logistics" and for its "logistics industry climate." To enhance this, the state of Georgia has invested in a number of Centers of Innovation throughout the state also focused on logistics: Maritime Logistics Center in Savannah, and the Middle Georgia Innovation Center for Life-Cycle Support in Macon.

Given the importance of the logistics industry to the state's economic development strategy, the Intellectual Capital Partnership Program (ICAPP) of the University System of Georgia (USG) is interested to understand the extent to which there may be current or future logistics industry needs that are unmet by the type or level of talent coming out of the state's higher educational system. It is this concern that we address in this report.

Definition of Logistics

Logistics is sometimes thought of as concerning the movement of materials from unfinished raw sources to intermediate to finished goods. The definition of logistics is sometimes perceived as coming from the perspective of a single firm and its immediate customers. The broader term supply chain management is deemed to take into account more than just the manufacturer and its immediate customers. It considers the whole supply chain from raw materials to end user, encompassing vendors, customers, carriers, facilitators, distributors, and other intermediaries. In practicality, the two terms are often used interchangeably.

One important element in the definition of logistics (or supply chain management) is that the term is not associated solely with the physical movement of goods. It also more specifically concerns the management of this movement. Various definitions speak of this element as planning, tracking, organization, controlling, cost-estimating, designing, modeling, analyzing, coordinating, collaborating, integrating, and executing. For all intents and purposes, most agree that logistics is a science learned through education in addition to being an art acquired through on-the-job experience. (See Appendix 1 for a list of definitions of logistics and supply chain management.)

Logistics does not appear in any standardized definitions of industries or occupations. This is because it is a cross-cutting function or importance to virtually all industries. To address

the challenge of identifying a logistics industry, occupation, or academic program, we have defined two types of components:

Core: any academic program, occupational classification, or industrial classification that is most closely related to the logistics cluster

Related: any academic program, occupational classification, or industrial classification that is important to the logistics cluster but for the most part feeds other industries in addition to logistics.

History and Approach

The University System of Georgia has partnered with Georgia Tech since 1997 to develop a systematic methodology for assessing the supply of graduates relative to the projected demand for these graduates in the workplace. Previous studies have assessed demand for employees in various occupations at the national, state, and substate regional levels. We have also assembled information on the supply of graduates from both public and private postsecondary institutions in Georgia. We have broadly measured shortfalls across a range of occupations requiring some college education. These studies have pioneered methods for tracking and estimating intra- and inter-state migration of university graduates as they move from their school environment to taking their first job based on the acquisition of matched graduate data from the Georgia Department of Labor. In addition, we have focused on the talent needs of particular occupations such as those related to bioscience. Previous studies also have measured the value of higher education based on a new education-related measurement approach. (Drummond and Youtie 1997, Drummond and Youtie 1999, Drummond and Youtie 2001, Drummond and Youtie 2003a, Drummond and Youtie 2003b) This knowledge is drawn upon to address the unique challenge of measuring talent needs in the logistics industry.

Objective

The primary aim of this project is to assess current and future needs for educational programs to serve knowledge workers in the logistics industry. More specifically, the objectives are to

- Understand the workforce development needs of the Logistics industry in Georgia
- Determine what jobs, current and future, are involved in this industry
- Assess the current strengths and weaknesses of USG academic programs that serve to provide the necessary workforce for this industry
- Create economic development in Georgia as it relates to the logistics industry
- Make recommendations that address the workforce needs of the logistics industry

Method and Report Organization

Logistics Industry Overview

The logistics industry analysis is designed to assess the size of the industry and Georgia's competitive position relative to the nation. We utilize employment data from the U.S. Bureau of Labor Statistics and Georgia Department of Labor to gauge the size of the logistics industry, its share of total employment in the U.S. and Georgia, projected growth to 2012, and competitive position of Georgia relative to the nation. Chapter 2 presents the results of this analysis.

Current Demand

Web sites of logistics companies and other sources are reviewed and data on job advertisements and their characteristics considered. Type of job, experience requirements, certifications, and particularly educational requirements are analyzed and presented in Chapter 3.

Academic Supply

Graduates of postsecondary institution specializations in Georgia and across the nation have been probed to assess where Georgia's educational strengths and weaknesses in logistics programs. Chapter 4 presents this information for graduates of public and private institutions in 2003 which we obtained from the Integrated Postsecondary Educational Dataset (IPEDS) of the National Center of Educational Statistics (NCES).

Projected Demand and Shortfall Analysis

Occupational employment projections in the 2002-to-2012 time period are matched with postsecondary institution graduate specializations to identify significant areas of unmet need or shortfalls in Georgia. Results are depicted in Chapter 5.

Recommendations

We conducted more than a dozen interviews with logistics company executives, academic professionals, and managers of state transportation infrastructure. These interviews along with the results of the above analyses are presented in Chapter 6.

Logistics and Georgia's Competitive Position

The logistics function is propelled by strategic, technological, and population considerations. First at the firm level, the U.S. economy has been dramatically affected by business strategies that focus on "core competencies" (such as manufacturing goods or retailing) and outsource non-core functions. For a growing number of firms, distribution is such a non-core function. This shift of functions from the inside of firm to external sources has given rise to an expanding cluster of industries that fulfill the management of the logistics function in areas such as transportation routing, inventory management, and just-in-time delivery. Second, the use of Internet and other electronic commerce technologies by consumers and businesses stimulates the demand for more warehousing, transportation, and logistics services. Third, population growth in and of itself feeds the demand for these services. Although the logistics industry is becoming more productive, it is not predicted achieve productivity gains at as rapid a pace as the demand for logistics will grow. As a result, more workers will be necessary to maintain the increasing level of output. (U.S. Bureau of Labor Statistics, 2004).

These factors suggest that logistics is an important growth industry. This chapter addresses various factors that bear on Georgia's competitive position in this sector.

Infrastructure

Why is logistics so important to Georgia? One reason is infrastructure. Georgia offers capabilities along the multi dimensional elements of land, air, and sea. Georgia's interstate and road system connects the state with the rest of the nation in all directions. Hartsfield/Jackson Atlanta International Airport is a world leader in passenger and cargo transportation. The port of Savannah is the fifth largest container port in the United States. Georgia's infrastructure not only provides an advantage for logistics growth in Georgia but serves to connect Georgia companies to resources and business around the world.

Population and Geography

A second reason is geography and population. The state is uniquely proximate to new population growth, which often drives logistics activity. Figure 1.1 is a thematic map of the number of new people projected to be within 750 miles of a county centroid by 2025. This map is a measure of how accessible a particular county is to future population centers. Counties that are most accessible to future population centers are colored dark blue, and those least accessible are colored yellow. The most accessible area is an oval that comprises the non-coast southeast, including the northern half of Georgia and Alabama and the state of Tennessee. The only major metropolitan area (of more than two million in population) in this oval is Atlanta. Georgia is also located near one of the fastest population growth clusters in the nation in south Florida. (See Figure 1.2.) It is the only state in the oval with closest accessibility to this fast growing Florida region.

Figure 1.1 2000-2005 New Population within 750 Miles in Thousands of Persons

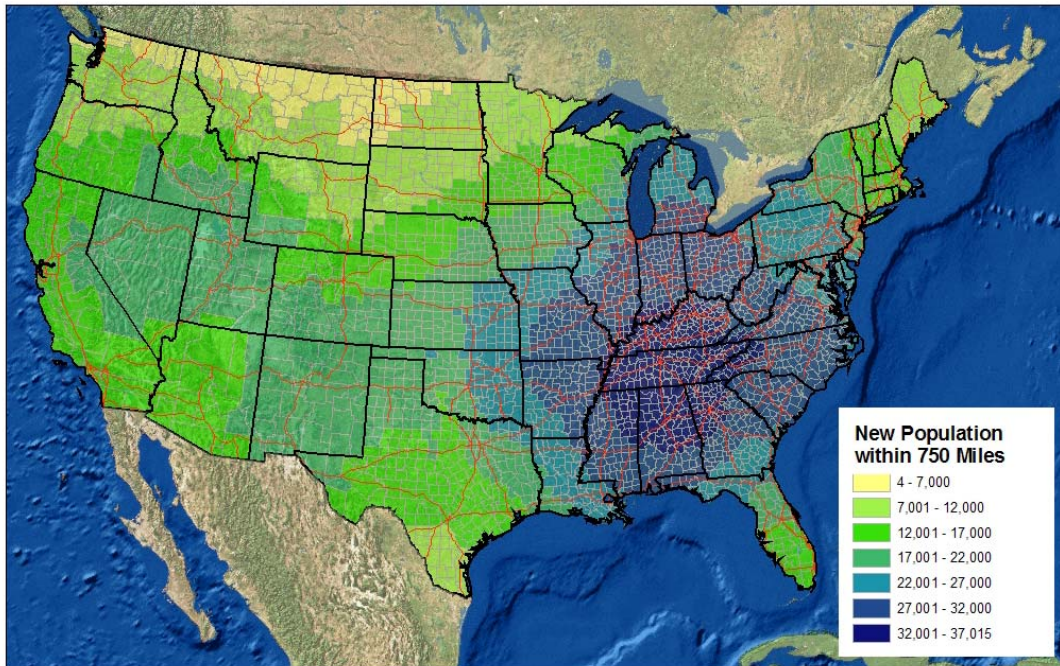
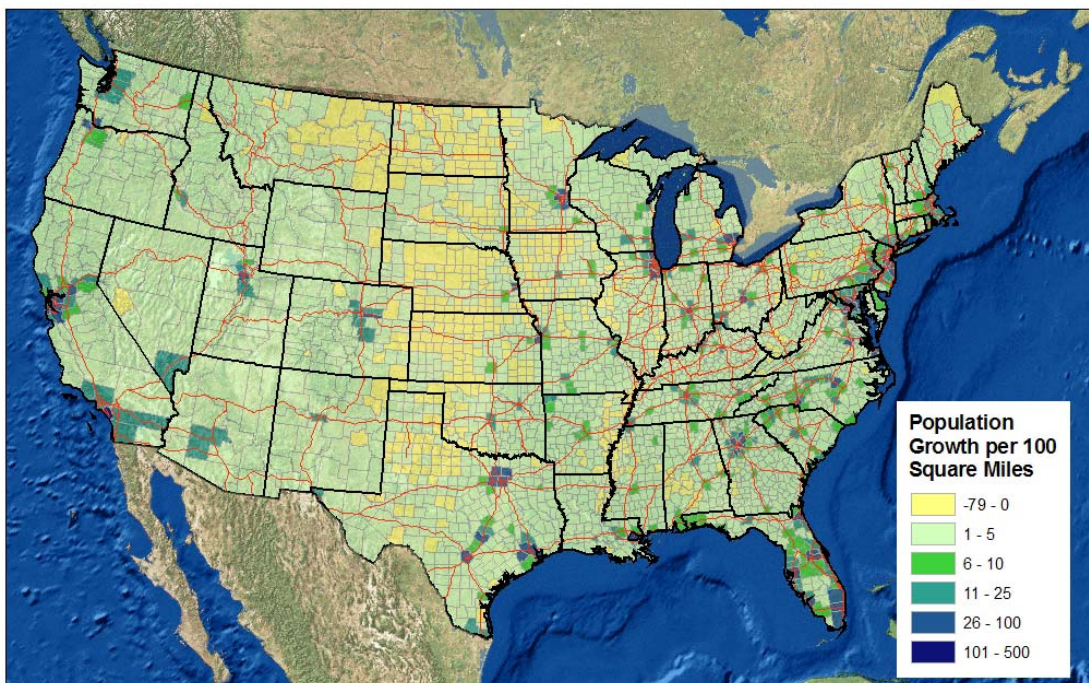


Figure 1.2 2000-2005 Projected Population Growth



Employment and Competitive Advantage

A third reason is the attractiveness of the logistics industry itself. Logistics is a growing and important function. However it is not an industry segment in the way one thinks of say the automobile industry. It is in essence a cross-cutting function that involves almost every industry—manufacturing, wholesale, retail, services. It may be more appropriate to perceive logistics as an emerging cluster rather than an established industry.

Information about employment is primarily available based on established classification systems. There is really no clear logistics industry. Warehousing transportation is most commonly associated with logistics. But so is manufacturing. Moreover, the classification systems do not distinguish between the physical movement of goods and services and the management of this movement. One reason is because many firms do both. UPS is a logistics firm which physically moves goods but also directs the management of this movement. A second reason is that so many sectors are engaged in logistics. Third, many of the logistics management functions are actually embedded in large business service sectors. For example, when we put the term “logistics” into the North American Industrial Classification System (NAICS) search engine, we come up with “logistics management consulting services” which is a subcategory of management, scientific, and technical consulting services.

We can define a “core” element of the logistics industry based on the wholesale and transportation sectors. Selected business services might be viewed as a “related” grouping because certain subindustries within these business service classifications are important to the logistics cluster and at the same time comprise other unrelated enterprises as well.

More than 8.3 million employees worked in core logistics industries in the U.S. in 2002. Another million workers are projected for 2012 in these wholesale and transportation sectors. Georgia had about 263,000 workers in core logistics industries in 2002. The state’s core logistics sector will be well over 300,000 by 2012 as a further 43,500 are added. Based on this level of wholesale and transportation sector workers, logistics comprises 6 percent of the workforce.

Related industries in the business services sector accounted for 4.7 million U.S. workers and 150,000 Georgia workers in 2002. These service sectors are expected to add employees at twice the rate of the core wholesale and transportation sectors. Taking core wholesale and transportation together with related service sector employment, we estimate that there will be nearly half a million logistics workers in Georgia by 2012 (and 15.6 million nationally). This means that logistics will make up 9 percent of the national workforce and 10 percent of employees in Georgia.

These percentages show that the state is about even with the nation in its concentration of logistics employment. To further explore Georgia’s competitive advantage relative to the nation, we have calculated location quotients. An LQ is a statistic that measures the relative concentration of a given industry in a given place. It is calculated by dividing the proportion of the area’s activity in a category by the proportion of the nation’s activity, in that same category. The formula is shown in Box 1.)

**Table 2.1. Current and Projected Employment in Core Logistics Occupations:
Georgia and the U.S.**

Georgia and the U.S.					
NAICS	Description	U.S. Employment		GA Employment	
		2002	2002-12	2002	2002-12
Core Industries					
4231	Motor vehicle mcht. wholes.	345,500	47,300		
4232	Furniture mcht. wholes.	107,900	18,300	5,215	736
4233	Lumber, construction mcht. wholes.	225,100	44,600	10,775	2,934
4234	Commercial equipment mcht. wholes.	659,400	130,300		
4235	Metal, mineral mcht. wholes.	125,900	20,700	2,994	100
4236	Electrical, electronic goods mcht. wholes.	367,200	83,000	12,975	2,080
4237	Hardware, plumbing, heating equip. mcht. wholes.	233,200	33,400		
4238	Machinery, equipment, supplies mcht. wholes.	675,700	48,100	21,892	4,008
4239	Misc. durable goods mcht. wholes.	267,200	31,500	6,323	1,179
4241	Paper mcht. wholes.	159,900	15,800	6,420	1,014
4242	Drugs mcht. wholes.	212,500	38,900	5,612	967
4243	Apparel mcht. wholes.	150,100	9,700	4,585	799
4244	Grocery product wholesalers	676,000	48,800	21,015	5,197
4245	Farm product mcht. wholes.	75,200	(18,500)	1,638	(377)
4246	Chemical mcht. wholes.	133,100	14,000	6,005	773
4247	Petroleum mcht. wholes.	111,400	(34,400)	3,116	(473)
4248	Alcoholic beverage mcht. wholes.	132,700	5,400	2,982	68
4249	Misc. nondurable goods mcht. wholes.	364,300	29,000	9,439	1,946
4251	Wholesale electronic markets, agents, brokers	618,800	72,300	35,896	767
4811	Scheduled Air Transportation	515,900	48,000	39,886	8,735
4812	Nonscheduled Air Transportation	43,400	18,900	592	318
4821	Rail Transportation	218,100	(21,200)	6,600	(1,062)
4831	Deep Sea, Coastal, G.L. Water Transportation	31,700	400	197	24
4832	Inland Water Transportation	19,900	(1,800)		
4841	General Freight Trucking	956,900	199,300	35,524	8,657
4842	Specialized Freight Trucking	382,300	75,500	10,409	2,666
4860	Pipeline Transportation	41,500	-	289	(72)
4881	Support Activities for Air Transportation	140,600	20,400	3,274	394
4883	Support Activities for Water Transportation	95,500	(8,900)	2,309	(240)
4884	Support Activities for Road Transportation	70,500	20,000	1,723	481
4885	Freight Transportation Arrangement	167,000	45,900	5,936	1,928

NAICS	Description	U.S. Employment		GA Employment	
		2002	2002-12	2002	2002-12
Related Industries					
5112	Software Publishers	256,000	173,700	12,345	3,897
5324	Commercial, Industrial Machinery, Equipment Leasing	102,200	40,600	2,392	769
5412	Accounting, Tax Preparation, Bookkeeping, Payroll Services	867,100	214,700	28,364	5,606
5413	Architectural, Engineering Services	1,251,100	54,400	33,623	3,391
5415	Computer Systems Design Services	1,162,700	635,000	44,441	21,209
5416	Management, Scientific, Technical Consulting	731,800	405,600	24,277	10,223
5619	Other Support Services	289,300	72,400	7,795	1,017
	Core Industries Total	8,324,400	1,034,700	263,621	43,547
	Core, Related Industries Total	12,984,600	2,631,100	416,858	89,659

Source: U.S. Bureau of Labor Statistics, Georgia Department of Labor, 2005.

LQs are typically used in economic development to assess whether an industry is basic or nonbasic but they can be applied to a variety of situations and have been used in recent years to assess occupational employment strengths and weaknesses. (Bendavid-Val 1991; Markusen and Schrock 2001). An LQ above one is typically interpreted as an indicator of specialization and human capital advantage. An LQ below one may be interpreted as an under-representation of human capital relative to the nation.

Georgia's location quotient for core logistics industries is 1.10 and for total logistics industries (core plus related) is 1.11. This number indicates that the state as a slightly though not overwhelmingly greater specialization in logistics than the nation.

Box 1. Location Quotients

$$\frac{e_{ir}}{\sum e_{ir}}$$

e_{ir} = employment in some group (i) in some region (r)

$$\frac{E_i}{\sum E_i}$$

$\sum e_{ir}$ = total employment in the region

E_i = national employment in some group (i)

$\sum E_i$ = total national employment

We also examined the state's competitive advantage through a "shift share analysis."¹ This analysis tells us that if the state were to follow national growth projections, we should be adding about 28,000 logistics jobs from 2002 to 2012. However, Georgia is actually projected to add about 40,000. This extra 11,000 represents the state's competitive advantage. It says that 75 percent of the state's growth in logistics jobs will occur because of the national economy and 25 percent because of Georgia's distinctive capabilities. This is substantial but not overwhelming.

¹ A shift share analysis breaks down employment growth into national share, national industry mix, and regional shift components to estimate a region's competitiveness relative to that of the nation.

Summary

Georgia is a solid player in the logistics sector and there is room to build on that strength. The state is somewhat more specialized in logistics than the nation but not substantially so. Georgia is projected to be rather more competitive than the nation in its ability to add logistics jobs through 2012. The state may be bucking slower national trends because of its advantageous position to population growth centers, particularly those in the Southeast from Virginia, the Carolinas, Florida, and west beyond the Mississippi.

National growth rates, which are less robust than those projected for Georgia, may presume that logistics is becoming more efficient and therefore needs less low end employment. One strategy to counter this trend may be to focus on the high end management level positions. If the state is perceived to be good at managing logistics and developing and adopting relevant technologies, more companies may be attracted to Georgia. This high end strategy calls for a good educational underpinning.

Logistics Firms and Demand for Knowledge Workers in Georgia

This chapter will examine the current demand for logistics services, with a particular emphasis on employment implications. As we indicated in Chapter 1, there is no one logistics industry. Moreover, we find that it is difficult to separate the actual physical movement of materials or goods from higher-end positions in the management of this movement. Because of these factors, there is no simple relevant analytic approach. We will uncover the demand for logistics through several methods, with this chapter focusing on present needs for college-educated knowledge workers in the logistics field.

Measuring Current Demand

We measure current demand for logistics-related employment by analyzing a sampling of job advertisements for open positions in Georgia. We use two sources of data for this analysis: (1) job advertisements registered on the Web pages of firms listed in the Metro Atlanta Logistics Directory in the “talent and innovation” section, which focuses on 3PLS and logistics software and technology, and (2) the 100 most relevant job titles in monster.com with open positions in Georgia. This gives us a knowledge base that places a bit more emphasis on positions in metro Atlanta in part because of the availability of the metro Atlanta directory. All data were collected in April and early May of 2005.

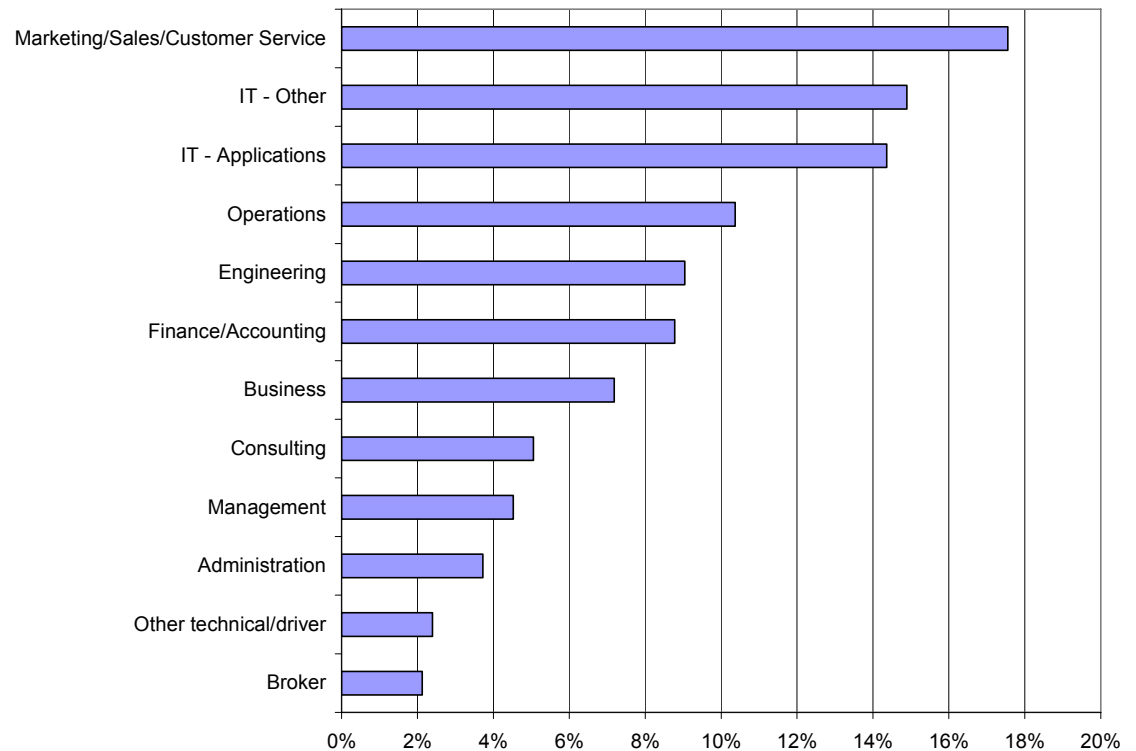
There were approximately 380 advertisements from about 100 companies for logistics-oriented positions in Georgia that required at least some postsecondary education. We set this educational bar because we wanted to focus on the jobs most relevant to USG programs. There were many more positions for warehouse workers, forklift drivers, material handlers, and the like but these positions did not have an educational requirement beyond the high school level. At the same time, some advertisements did not specify an educational requirement, but really appeared to require at least some college, so we did include these in our database. The 100 companies are listed in Appendix 2 and specific job titles in Appendix 3.

These advertisements are illustrative but by no means do they constitute all logistics-related jobs in Georgia for college-educated workers. Some positions are filled through word-of-mouth or unadvertised searches for talent. This is particularly the case for the highest level of jobs requiring the most experience. Nevertheless this knowledge base is helpful in illuminating the types of knowledge workers for which the logistics industry is advertising today.

Occupational Category

Company advertisements for college-educated logistics workers were classified into occupational categories based on their job title and job description. Nearly half the advertised positions involved business functions such as marketing, sales, or finance. About 30 percent involved information technology, either application development or support, and 20 percent dealt with engineering or operational activities. (See Figure 3.1.)

Figure 3.1. Nearly Half of the Logistics Related Job Openings Involve Business Functions



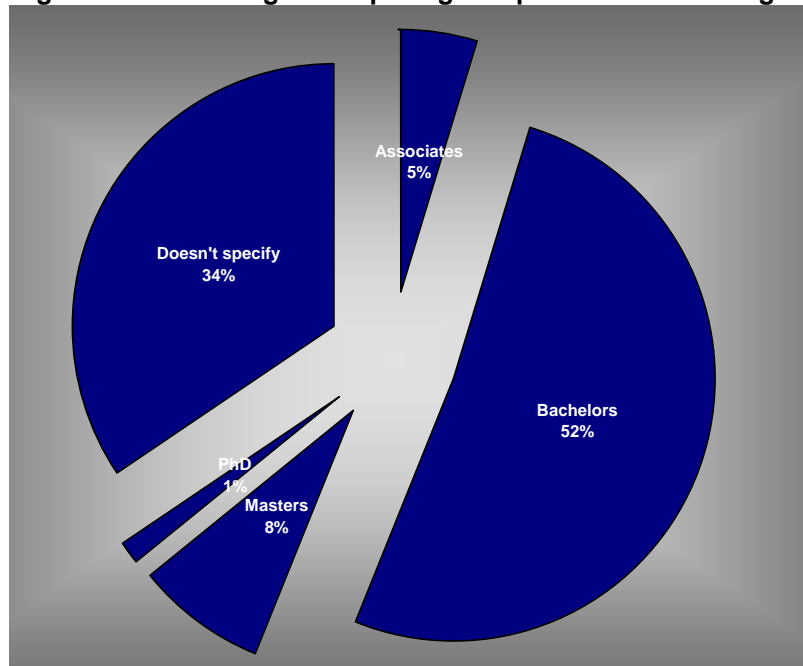
Source: Georgia Tech Survey of 380 logistics-related openings, April/May 2003.

Educational Level and Major Area

Two-thirds of the advertisements specified some formal education requirement. This analysis focuses on the preferred degree level designated in the job advertisement. That is, an advertisement may indicate that a certain degree is required but a higher degree is preferred. We emphasize the preferred degree because it suggests that a candidate would have a competitive advantage with such a degree, which would in turn give the firm a competitive advantage with such an individual.

More than half of the jobs advertised required a bachelors degree. Masters degrees were preferred in 8 percent of the advertisements, and associates degrees in 5 percent. (See Figure 3.2.)

Figure 3.2. Half of Logistics Openings Require a Bachelors Degree



Source: Georgia Tech Survey of 380 logistics-related openings, April/May 2003.

We further examined the types of majors that logistics companies valued in their job advertisements. Nearly 40 percent of the advertisements listed one or more majors or academic concentrations that they expect. Some of these advertisements specified only one specialization. Others listed as many as three or four. The areas of academic concentration fell into three categories: engineering, information technology, and business. Some type of engineering degree was referenced in 53 percent of the advertisements, some type of IT degree was referenced in 52 percent of advertisements (with an academic specialization requirement), and some type of business degree was referenced in 45 percent of the advertisements. Logistics does appear to be at the intersections of these three disciplines (see Figure 3.3.)

Figure 3.2. Logistics Encompasses Three Academic Specializations

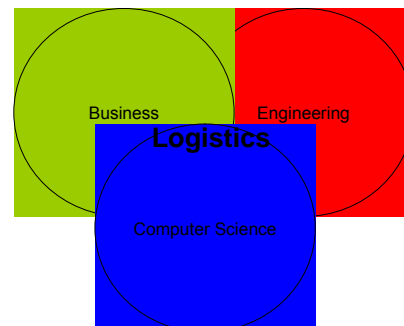


Table 3.1. shows detailed academic specialization requirements in recent logistics-related job advertisements. The most common detailed specialization requirements were computer science degrees, logistics specializations, finance, and accounting.

Table 3.1. Engineering, Information Technology, and Business-related Academic Specialization Requirements Appear in 40 percent of Logistics-related Job Advertisements

Academic Specialization	Number of Advertisements
Computer Science	51
Engineering (general)	33
Logistics	21
Information Systems/IT	20
Business (general)	18
Finance	16
Accounting	16
Technical degree (general)	14
Industrial Engineering	9
Electrical Engineering	7
Marketing	6
Transportation	5
Computer Engineering	4
Mathematics	4
MIS	4
Supply chain management	4
Communications	3
Science	3
Law	2
Architecture	1
Economics	1
Electronics	1
English	1
Journalism	1
Mechanical Engineering Tech	1
Operations Research	1
Physics	1
Secretarial	1
Statistics	1
Doesn't specify	233
Total	380

Georgia Tech Survey of 380 logistics-related openings, April/May 2003.

Experience

Logistics is a field that requires college-educated candidates to have some level of experience. Interviewees call this being able to “hit the ground running.”

Sixty-five percent of all current job positions for college graduates had an experience requirement. Two-thirds of the advertisements specified some formal education requirement. Experience requirements in the 1-3 year range were evidenced in 23 percent

of the job descriptions. About one-quarter of the advertisements required at least 5 years of experience. (See Figure 2.4.) This percentage may be low because our database may under represent openings at the high end which typically require substantial experience.

Experience levels differ based on the type of job being advertised. Certain technical positions in engineering and IT support are more likely to allow for fewer (three or less) years of experience. Positions in management, operations, and other engineering fields are more apt to require at least five years experience. (See Figure 2.5.)

Figure 2.3. Experience Requirements in College-Level Logistics-Related Job Advertisements

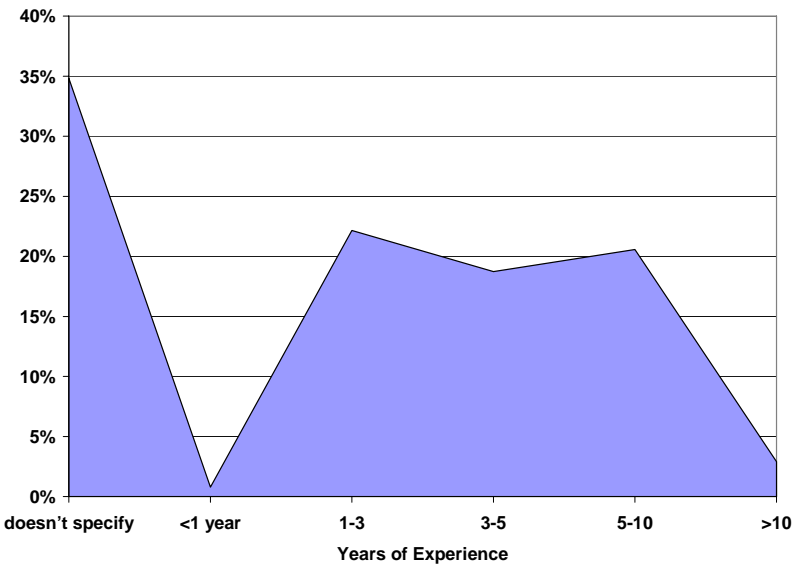
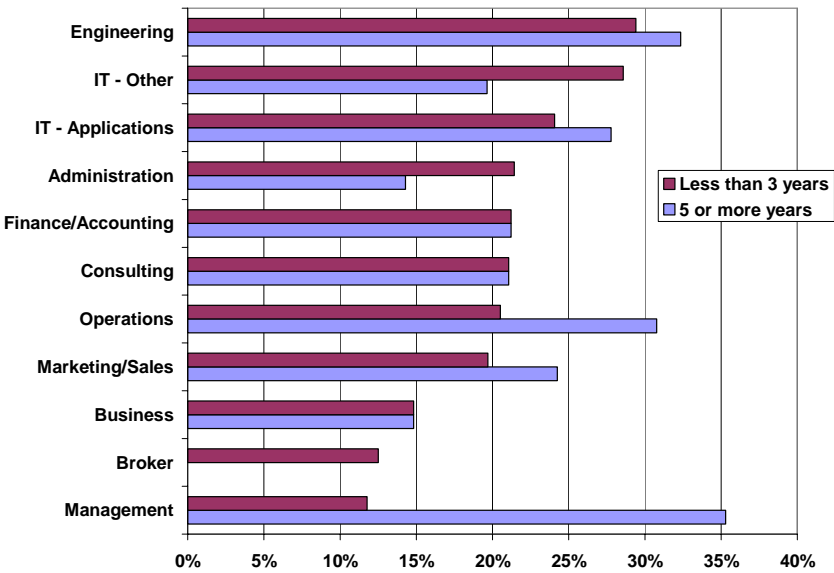


Figure 2.4. Experience Requirements in Logistics Job Advertisements by Type of Job



Summary

This chapter suggests that there is current demand for employment at the college level. We uncovered nearly 400 position advertisements for college-level logistics workers. Two-thirds of the advertisements specifically spelled out an educational requirement, most commonly a bachelors degree. Academic specializations called for in logistics-related job advertisements verged near the intersection of engineering, business, and information technology. Most of these jobs required at least a few years of experience, particularly for positions in management, operations, and some technical fields.

Supply of Logistics Graduates

The previous chapter showed that there are a number of logistics-related job openings in Georgia that require some educational capability. This chapter examines the extent to which the state's public and private postsecondary educational system supplies graduates for these job openings.

Any examination of the supply of logistics graduates is based on the primary field of study or academic major. All primary fields of study leading to degrees or certificates are structured around what is known as the classification of instructional programs (CIP). There are nearly 900 CIPs. CIPs are organized hierarchically such that similar fields of study are organized into the same major grouping.

What is a Logistics Instructional Program

Logistics is easiest to define at the CIP level. At the most basic level, some of the CIPs actually have logistics embedded in their title. The instructional program description for CIP 52.0203 is "Logistics and Materials Management."

We also can review the fields of study listed near the obvious majors and include them to the extent that they appear relevant. Thus we take account of CIP 52.0209 – Transportation/Transportation Management, and CIP 52.0202 – Purchasing, Procurement/Acquisitions and Contracts Management. These three fields of study are typically found in a business school.

We additionally included certain related engineering degrees because of the large number of engineering specializations that were listed as requirements in our job advertisement analysis. These primary fields of study involved in the engineering component of logistics were defined as: systems engineering, industrial engineering, industrial/manufacturing engineering, and operations research. Several parallel occupations existed at the technician level as well, so we incorporated them into our information base.

The above academic majors constituted "core" logistics programs. These core areas are considered to be most closely associated with the logistics field. We acknowledge that these do not comprise all the logistics-related academic majors. Our job advertisement analysis also picked up several additional peripheral but important areas of academic concentration such as IT, finance, and accounting. These fields of study were prominent in several of the current advertisements of logistics workers. At the same time, we recognize that these fields are found in almost any modern firm. For this reason, we classify them as "related" programs (Table 4.1) and proceed by orienting our analysis toward the core academic majors.

Table 4.1. Core and Related Academic Majors

Logistics Relevance	CIPCODE	CIP Description
Core	14.2701	Systems Engineering
Core	14.3501	Industrial Engineering
Core	14.3588	Industrial/Manufacturing Engineering
Core	14.3701	Operations Research
Core	15.0612	Industrial Technology/Technician
Core	15.0688	Industrial/Manufacturing Technology/Technician
Core	15.1501	Engineering/Industrial Management
Core	52.0202	Purchasing, Procurement/Acquisitions and Contracts Management
Core	52.0203	Logistics and Materials Management
Core	52.0209	Transportation/Transportation Management
Related	11.0101	Computer and Information Sciences, General
Related	11.0103	Information Technology
Related	11.0199	Computer and Information Sciences, Other
Related	11.0201	Computer Programming/Programmer, General
Related	11.0202	Computer Programming, Specific Applications
Related	11.0203	Computer Programming, Vendor/Product Certification
Related	11.0301	Data Processing and Data Processing Technology/Technician
Related	11.0401	Information Science/Studies
Related	11.0501	Computer Systems Analysis/Analyst
Related	11.0701	Computer Science
Related	11.0801	Web Page, Digital/Multimedia and Information Resources Design
Related	11.0802	Data Modeling/Warehousing and Database Administration
Related	11.0803	Computer Graphics
Related	11.0899	Computer Software and Media Applications, Other
Related	11.0901	Computer Systems Networking and Telecommunications
Related	11.1001	System Administration/Administrator
Related	11.1002	System, Networking, and LAN/WAN Management/Manager
Related	11.1004	Web/Multimedia Management and Webmaster
Related	11.1099	Computer/Info Tech Services Administration & Management, Other
Related	11.9999	Computer and Information Sciences and Support Services, Other
Related	14.0101	Engineering, General
Related	14.0901	Computer Engineering, General
Related	14.0903	Computer Software Engineering
Related	14.0999	Computer Engineering, Other
Related	14.1001	Electrical, Electronics and Communications Engineering
Related	14.3601	Manufacturing Engineering
Related	15.0613	Manufacturing Technology/Technician
Related	15.1201	Computer Engineering Technology/Technician
Related	15.1202	Computer Technology/Computer Systems Technology
Related	15.9999	Engineering Technologies/Technicians, Other
Related	30.0601	Systems Science and Theory
Related	30.0801	Mathematics and Computer Science
Related	52.0101	Business/Commerce, General

Logistics Relevance	CIPCODE	CIP Description
Related	52.0201	Business Administration and Management, General
Related	52.0299	Business Administration, Management and Operations, Other
Related	52.0499	Business Operations Support and Secretarial Services, Other
Related	52.0601	Business/Managerial Economics
Related	52.0801	Finance, General
Related	52.0899	Finance and Financial Management Services, Other
Related	52.1201	Management Information Systems, General
Related	52.1299	Management Information Systems and Services, Other
Related	52.1301	Management Science, General
Related	52.1399	Management Sciences and Quantitative Methods, Other
Related	52.1801	Sales, Distribution, and Marketing Operations, General
Related	52.1802	Merchandising and Buying Operations
Related	52.1803	Retailing and Retail Operations
Related	52.1899	General Merchandising/Sales/Related Marketing Operations, Other
Related	52.9999	Business, Management, Marketing & Related Support Services, Other

Source: National Center for Educational Statistics and author classifications.

Top U.S. Logistics Programs

Logistics covers a substantial set of programs in U.S. academic institutions. U.S. News and World Report has recognized this by creating a distinct classification of university business specialties called “supply chain/logistics.”

We obtained information on graduates (or “completions” as the National Center for Education Statistics calls them) by CIP in academic year 2003 for all public and private postsecondary institutions in the country. Using our definition of core logistics programs, we estimate that there were more than 15,500 graduates of logistics programs in the United States in 2003.

Core graduates largely came out of the nearly 200 logistics-related academic programs with at least 25 completions. These relatively larger academic programs are listed in Appendix 4. Figure 4.1 maps these programs at institutions across the nation. The magnitude of graduates in all logistics programs at a particular institution is symbolized in proportionally-sized circles. The map shows that most of the large logistics programs are located east of the Mississippi, particularly in the Midwest. At the same time, the Southeast is well represented by programs in Tennessee, Georgia, Florida and Virginia.

The top business programs in logistics by numbers of graduates were at:

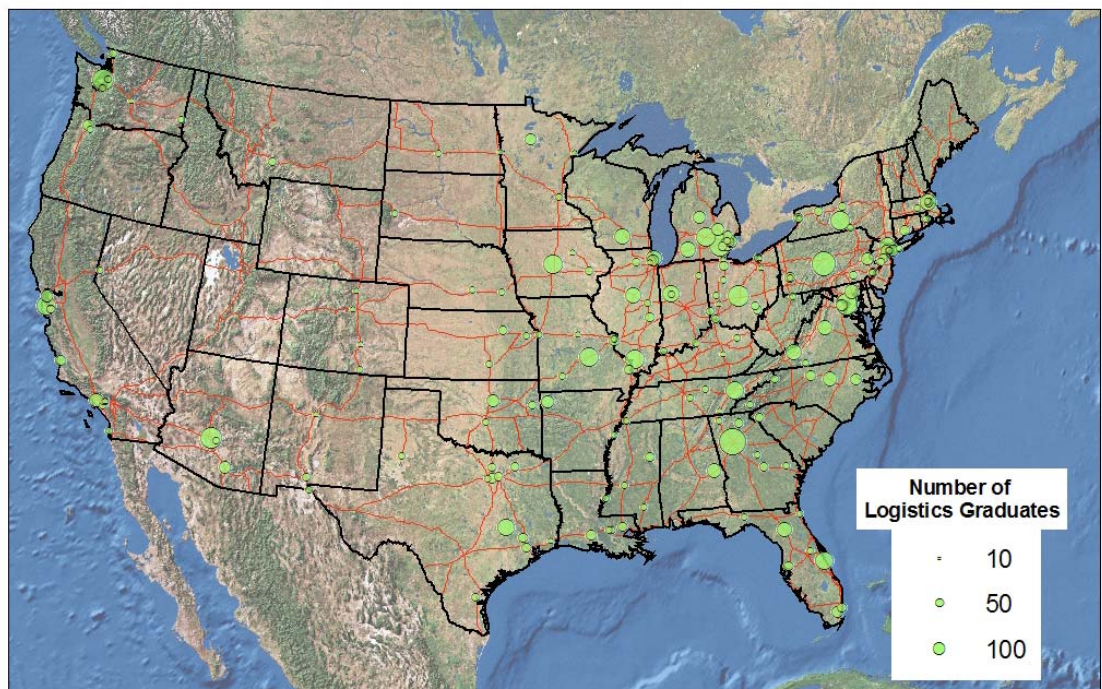
- Michigan State University (244 graduates)
- Penn State University (216 graduates).
- Arizona State University (185 graduates)
- Ohio State University (179 graduates)

- University of Tennessee (174 graduates)

And the top engineering programs in logistics by number of graduates were at:

- Georgia Tech (478 graduates)
- University of Michigan (313 graduates)
- Cornell University (241 graduates)
- Purdue University (198 graduates)

Figure 4.1. Most Large Logistics Programs are Located in the Eastern United States
(Circles Represent the Location of Institutions with Logistics programs and are Proportionally Sized based on Number of Graduates in 2003)

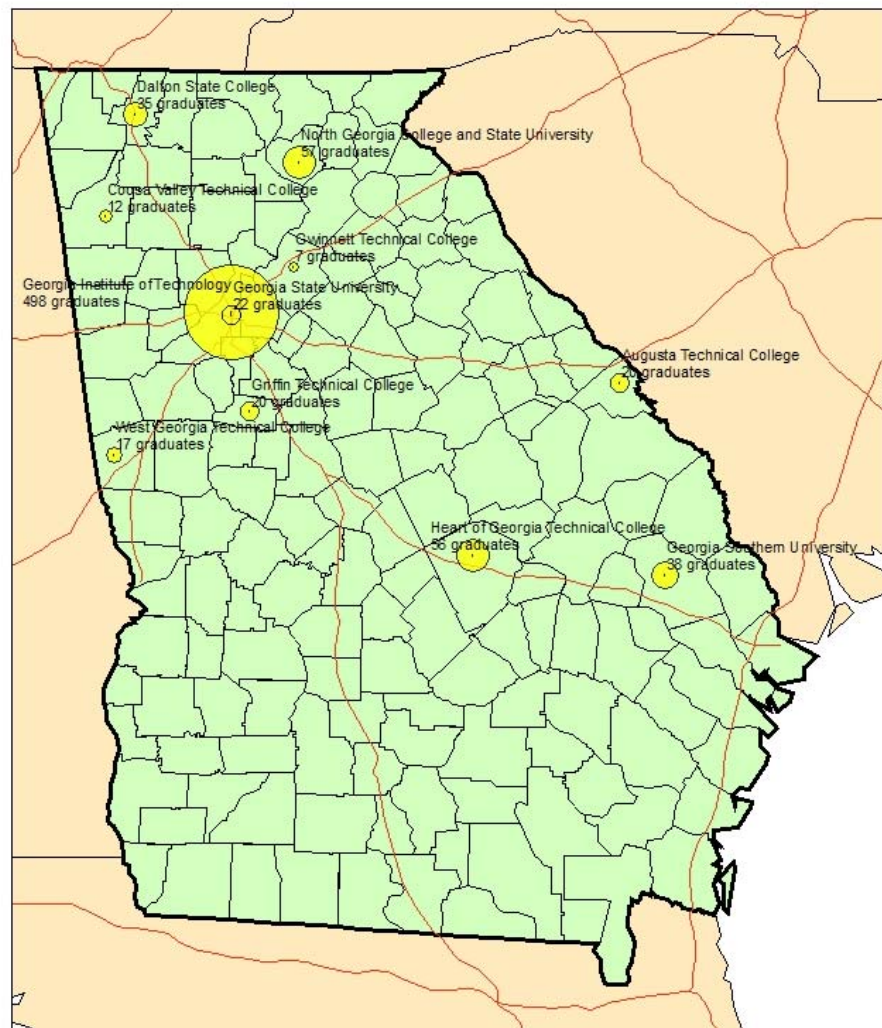


Georgia's Relative Position

Georgia had nearly 700 graduates in the core logistics CIPs in 2003. There were an additional 14,600 graduates in related programs that logistics along with other industries.

This analysis will focus on the core logistics specializations because they are most directly relevant to the logistics cluster. Georgia graduates in the core logistics specializations came from 17 institutions across the state. Figure 4.2 maps these institutions geographically. Again, the proportionally-sized circles represent the magnitude of graduates in all logistics programs at a particular institution. The map shows that most of the programs reside in Atlanta, but there is also capacity in North and Middle Georgia.

Figure 4.2. Most Large Logistics Programs are in North and Central Georgia
 (Circles Represent the Location of Institutions with Logistics programs and are Proportionally Sized based on Number of Graduates in 2003)



The five largest programs that served a broad population (e.g., were not on a military base) were: Georgia Tech, North Georgia College and State University, Heart of Georgia Technical College, Georgia Southern University, and Dalton State College. Figure 3.3 lists these and all other Georgia institutions by their total number of graduates in 2003. The particular majors offered by all the Georgia Schools are further detailed in Table 4.2. These programs include business, engineering, and technician-level fields of study.

The numbers in and of themselves do not tell us much about whether they are at sufficient levels. One way to assess the sufficiency of the quantity of Georgia's logistics graduates is to make a comparison with the number of graduates in the national logistics educational system. Those areas in which Georgia is producing a higher concentration of graduates relative to the national system could be viewed as comprising the state's areas of specialization. Alternatively, areas in which the state is producing fewer graduates could be viewed as being under represented.

Figure 4.3. Georgia Institutions with Core Logistics Instruction Program and Number of Graduates in 2003

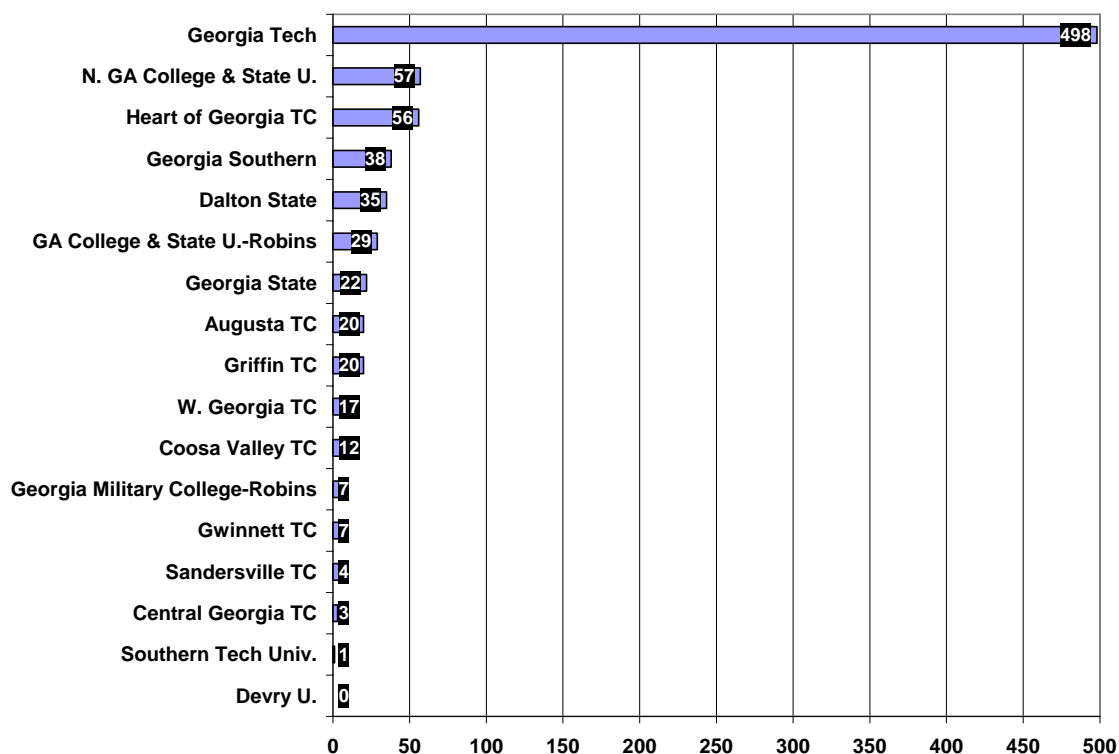


Table 4.2. Georgia Institutions with Core Logistics Instruction Program and Number of Graduates

Institution	CIP Description	Degree	Grads.
Georgia Institute of Technology-Main Campus	Industrial/Manufacturing Engineering	Bachelors degree	298
Georgia Institute of Technology-Main Campus	Industrial/Manufacturing Engineering	Masters degree	149
North Georgia College and State University	Purchasing, Procurement/Acquisitions and Contracts Management	Bachelors degree	57
Heart of Georgia Technical College	Logistics and Materials Management	Award of less than 1 academic year	56
Georgia Southern University	Logistics and Materials Management	Bachelors degree	36
Dalton State College	Industrial/Manufacturing Technology/Technician	Associates degree	35
Georgia Institute of Technology-Main Campus	Operations Research	Masters degree	31
Georgia College and State University–Robins Air Force Base	Logistics and Materials Management	Masters degree	29

Institution	CIP Description	Degree	Grads.
Augusta Technical College	Logistics and Materials Management	Award of less than 1 academic year	20
Griffin Technical College	Logistics and Materials Management	Award of less than 1 academic year	20
Georgia Institute of Technology-Main Campus	Industrial/Manufacturing Engineering	Doctors degree	18
West Georgia Technical College	Logistics and Materials Management	Award of less than 1 academic year	16
Georgia State University	Operations Research	Bachelors degree	16
Coosa Valley Technical College	Logistics and Materials Management	Award of less than 1 academic year	12
Georgia Military College-Robins Air Force Base Ctr	Logistics and Materials Management	Associates degree	7
Georgia State University	Operations Research	Masters degree	6
Gwinnett Technical College	Industrial Technology/Technician	Associates degree	5
Sandersville Technical College	Logistics and Materials Management	Award of less than 1 academic year	4
Georgia Institute of Technology-Main Campus	Logistics and Materials Management	Masters degree	2
Central Georgia Technical College	Logistics and Materials Management	Associates degree	2
Gwinnett Technical College	Logistics and Materials Management	Award of at least 1 but less than 2 academic years	1
Southern Polytechnic State University	Industrial/Manufacturing Engineering	Award of less than 1 academic year	1
Georgia Southern University	Logistics and Materials Management	Bachelors degree	1
Gwinnett Technical College	Logistics and Materials Management	Associates degree	1
West Georgia Technical College	Logistics and Materials Management	Award of at least 1 but less than 2 academic years	1
Central Georgia Technical College	Logistics and Materials Management	Award of at least 1 but less than 2 academic years	1
Georgia Southern University	Industrial/Manufacturing Technology/Technician	Bachelors degree	1
Devry University-Georgia	Purchasing, Procurement/Acquisitions and Contracts Management	Postbaccalaureate certificate	0

We calculated location quotients for each of the core primary fields of study, comparing Georgia and the nation. Our calculation focuses on all educational institutions that serve a broad population; specialty programs for military or other personnel are excluded. Table 4.3 shows these results.

Georgia has a concentration of graduates in the industrial/manufacturing engineering and operations research areas. In 2003 there were 465 industrial/manufacturing engineering graduates and 53 operations research graduates. This relatively high number of graduates gave the state location quotients of 4.49 in the industrial/manufacturing CIP and 3.48 in the operations research CIP. Although there were no completions in the systems engineering and industrial engineering classifications, these programs are cross-fertilized by industrial/manufacturing engineering graduates. Taking the four core engineering programs together, Georgia's location quotient is 2.54 in engineering. This high location quotient suggests that the state has a human capital advantage on the engineering side of logistics

In contrast, technician-level logistics majors show under representation. Georgia had only 41 graduates with associates degrees in the technician-level logistics majors. This gave the state a combined LQ of .27 for industrial, manufacturing, and engineering technicians programs. One reason for this weakness is that institutions in several Midwestern states (Michigan, Ohio, Indiana) have large numbers of industrial technicians that feed their automobile industry.

In the business area, Georgia had 57 graduates in purchasing management programs and 39 graduates in logistics and materials management programs. There were no transportation management programs in the state. The resulting LQ for purchasing management was 2.58. However for the more common logistics and materials management CIP, the state's LQ was only .83. Taking all these business majors in the logistics area together, the state LQ was slightly over one (1.31).

Table 4.3. Georgia is Specialized in Engineering, Under-represented in Business
(Location Quotient Analysis of Number of Graduates in Georgia and US CIPs, 2003)

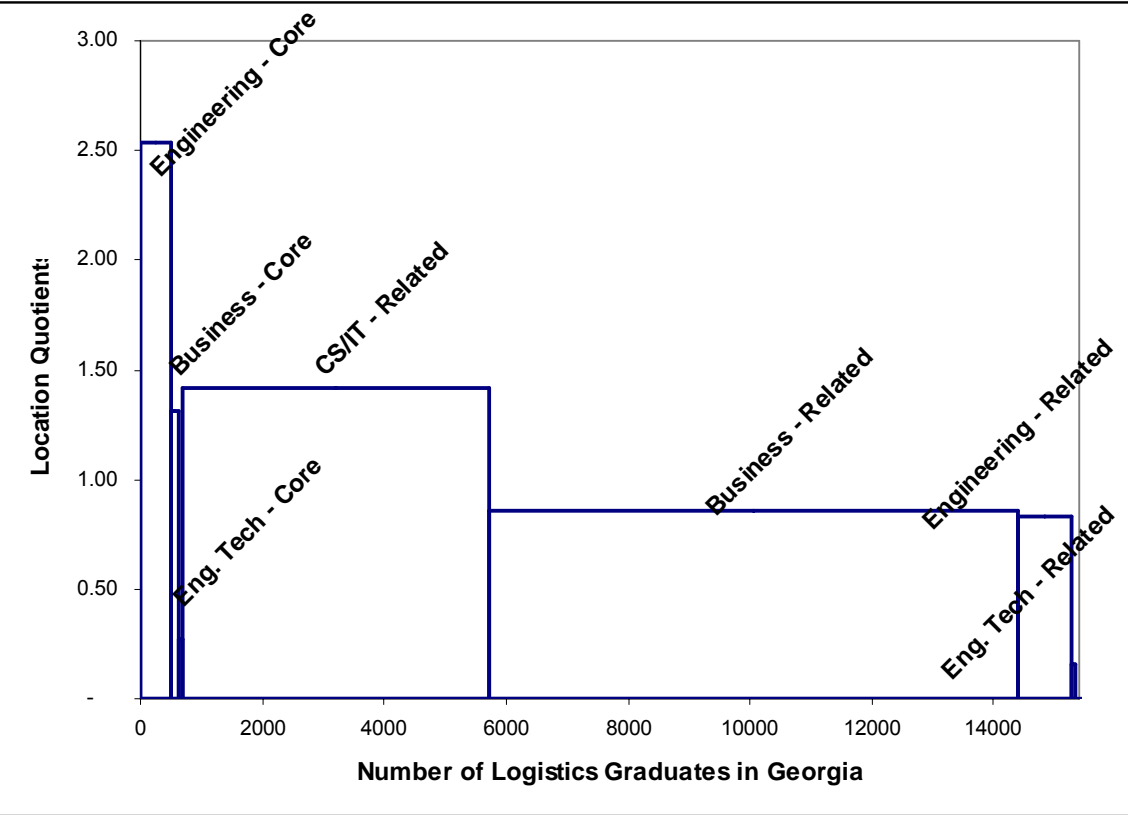
Core CIP	Description	US Grads.	Georgia Grads.	LQ
14.2701	Systems Engineering	1004	0	-
14.3501	Industrial Engineering	2063	0	-
14.3588	Industrial/Manufacturing Engineering	3751	465	4.49
14.3701	Operations Research	551	53	3.48
15.0612	Industrial Technology/Technician	1261	5	0.14
15.0688	Industrial/Manufacturing Technology/Technician	2462	36	0.53
15.1501	Engineering/Industrial Management	1762	0	-
52.0202	Purchasing, Procurement/Acquisitions and Contracts Management	799	57	2.58
52.0203	Logistics and Materials Management	1705	39	0.83
52.0209	Transportation/Transportation Management	156	0	-

This LQ does not denote weakness in the state's business programs, but it may well indicate a possible bottleneck for growing a logistics cluster in the state. Considerable growth the demand for logistics-related employees would probably require employers to recruit from schools in nearby states such as the University of Tennessee. Alternatively,

companies could draw on Georgia graduates in related business fields and provide logistics-specific training in-house. Georgia institutions had 8,694 graduates in related business CIPs. This is a substantial number of graduates; however the LQ associated with these graduates is only .86.

Figure 4.4 summarizes Georgia’s position in the national logistics educational system’s core and related specializations. This is a “waterfall chart” in which the horizontal x-axis depicts the number of graduates in each logistics academic specialization and the y-axis represents location quotients that signify Georgia’s position relative to the national educational system. The figure further demonstrates that Georgia is well situated in the technical disciplines associated with logistics—engineering and computer science (depicted as CS/IT in the chart)—but is less strong in the business disciplines and fields associated with technical degrees. The figure also indicates that the core disciplines have relatively fewer graduates than do the related disciplines.

Figure 4.4. Location Quotients Show That Georgia Has an Advantage in the Core Engineering, Core Business, and Related IT Logistics Fields



Summary

Having a strong and balanced educational presence is integral to developing a logistics cluster. This chapter has shown that Georgia graduated nearly 700 students in core logistics concentration areas in 2003. Seventeen higher educational institutions in Georgia had programs to produce these graduates, although only five demonstrated the capacity to turn out at least 25 graduates per year.

Location quotients were employed to measure the state's relative specialization in logistics compared to the national academic system. The analysis showed that the state had a distinctive concentration of engineering graduates in the logistics area. Engineering students account for more than 75 percent of all logistics graduates in Georgia. At the same time, there was a weakness in technician level programs based on the number of graduates with an associates degree coming out of programs at Georgia institutions relative to national proportions.

Business specializations in the logistics fields posed a more subtle challenge. Fewer than 20 percent of the state's logistics graduates are in business or management disciplines. Georgia had a smaller proportion of graduates in the important field of logistics and materials management than existed nationally. This under-representation was balanced to some extent by a presence in the purchasing management field, but further weaknesses in several of the peripheral related business disciplines suggest that the state could face obstacles in growing a foremost logistics cluster as a result of having an undersized quantity of graduates in the business logistics field.

Future Demand, Graduates, and Shortfalls

Having sufficient numbers of employees with the right capabilities has become increasingly important in economic development strategies in a knowledge economy propelled by ideas and talent. For the last 10 years, the USG has examined the extent to which mismatches between the demand for knowledge workers and the supply of university graduates exist in various occupations. The objective of this type of supply-demand analysis is to avoid obvious gaps that occur when industry structure transforms, consumer tastes change, demand for products or services shifts, and/or technological advances occur. Lack of labor mobility, rapid pace of change, and regional industrial concentrations can make it difficult for industries on the upswing to find the skills they need. The ability to foresee potential gaps in demand for various types of jobs can accelerate attention on certain educational programs such that employers in the state have the supply of knowledge workers from the universities when they need them.

This chapter utilizes long-term projections of employment in occupations in the logistics cluster and matches these projections to current levels of graduates from logistics specializations in the state's postsecondary educational institutions. The analysis basically looks at long-range mismatches between projected demand for certain types of workers and current supply of graduates. It does not take into account any changes that may occur in demand as a result of new and highly successful economic development business recruitment strategies. Also, because logistics does not have a clear-cut occupational and industry definition, we are not analyzing the extent to which out-of-state labor may migrate to Georgia to take up any open positions in logistics firms. It gives us a first cut at any long-range employment disparities in the logistics field that could restrict Georgia's economic development recruitment strategy.

What are Logistics Occupations

There is no standard agreement on what is and what is not a logistics occupation. The 2000 Standard Occupational Classification (SOC) system published by the U.S. Bureau of Labor Statistics is used in all dissemination of occupational employment projections and analyses. All workers are classified into one of over 820 occupations. To facilitate classification, occupations are combined to form 23 major groups, 96 minor groups, and 449 broad occupations. Each broad occupation includes detailed occupation(s) requiring similar job duties, skills, education, or experience. There is a major classification called "transportation and material moving occupations" (51-0000) but as we discussed in the first chapter, we consider logistics to concern the management of materials moving, not the actual physical movement per se.

We defined a set of eight core occupations and 26 related logistics occupations based on what we learned from our job advertisement analysis. We also drew on the SOC-CIP crosswalk to help guide our decisions about logistics occupations. Table 5.1 presents the resulting list of occupations. All of these occupations require some type of university or college degree.

Table 5.1. Core and Related Logistics Occupations and Type of Educational Requirement

SOC	SOCTITLE	Type	Educational Requirement
11-3011	Administrative Services Managers	Core	Work experience, plus a bachelor's or higher degree
11-3061	Purchasing Managers	Core	Work experience, plus a bachelor's or higher degree
11-9041	Engineering Managers	Core	Work experience, plus a bachelor's or higher degree
15-2031	Operations Research Analysts	Core	Master's degree
17-2112	Industrial Engineers	Core	Bachelor's degree
17-3026	Industrial Engineering Technicians	Core	Associate degree
25-1011	Business Teachers, Postsecondary	Core	Master's degree
25-1032	Engineering Teachers, Postsecondary	Core	Doctoral degree
11-1021	General and Operations Managers	Related	Work experience, plus a bachelor's or higher degree
11-3021	Computer and Information Systems Managers	Related	Work experience, plus a bachelor's or higher degree
11-3031	Financial Managers	Related	Bachelor's degree
11-3051	Industrial Production Managers	Related	Work experience, plus a bachelor's or higher degree
13-1111	Management Analysts	Related	Work experience, plus a bachelor's or higher degree
13-1199	Business Operations Specialists, All Other	Related	Bachelor's degree
13-2051	Financial Analysts	Related	Bachelor's degree
13-2099	Financial Specialists, All Other	Related	Bachelor's degree
15-1011	Computer and Information Scientists, Research	Related	Doctoral degree
15-1021	Computer Programmers	Related	Bachelor's degree
15-1031	Computer Software Engineers, Applications	Related	Bachelor's degree
15-1032	Computer Software Engineers, Systems Software	Related	Bachelor's degree
15-1041	Computer Support Specialists	Related	Associate degree
15-1051	Computer Systems Analysts	Related	Bachelor's degree
15-1061	Database Administrators	Related	Bachelor's degree
15-1071	Network and Computer Systems Administrators	Related	Bachelor's degree
15-1081	Network Systems and Data Communications Analysts	Related	Bachelor's degree
15-1099	Computer Specialists, All Other	Related	Associate degree
15-2041	Statisticians	Related	Master's degree
17-2061	Computer Hardware Engineers	Related	Bachelor's degree
17-2071	Electrical Engineers	Related	Bachelor's degree
17-3023	Electrical and Electronic Engineering Technicians	Related	Associate degree
19-3021	Market Research Analysts	Related	Master's degree
25-1021	Computer Science Teachers, Postsecondary	Related	Master's degree
25-1022	Mathematical Science Teachers, Postsecondary	Related	Master's degree

Long-Term Demand

Projections by the Georgia Department of Labor from 2002 to 2012 tell us that the state will need 1,100 workers annually in core logistics occupations and 12,170 workers annually in related logistics occupations.

Figure 5.1 and 5.2 breaks down the number of annual openings by the various logistics occupations. The top core occupations with at least 100 annual openings per year include:

- Administrative Services Managers
- Engineering Managers
- Industrial Engineers
- Business Teachers, Postsecondary

Also important are Purchasing Managers, Operations Research Analysis, and Industrial Engineering Technicians which are projected have 70 to 80 openings a year. Sixty percent of these occupations also require work experience in addition to a postsecondary degree—most likely a bachelors degree.

In the related industries, the top occupations based on projected annual openings are:

- General and Operations Managers
- Business Operations Specialists, All Other
- Computer Systems Analysts
- Computer Software Engineers, Applications
- Management Analysts
- Computer Software Engineers, Systems Software
- Computer Support Specialists

Forty percent of the annual openings in related occupations are projected to have a work experience requirement. Nine out of 10 of these related occupations have a bachelor's degree requirement.

These numbers indicate that there will be considerable growth in logistics-related knowledge occupations over the next 10 years.

Figure 5.1. Annual Openings in Core Logistics Occupations: 2002-2012

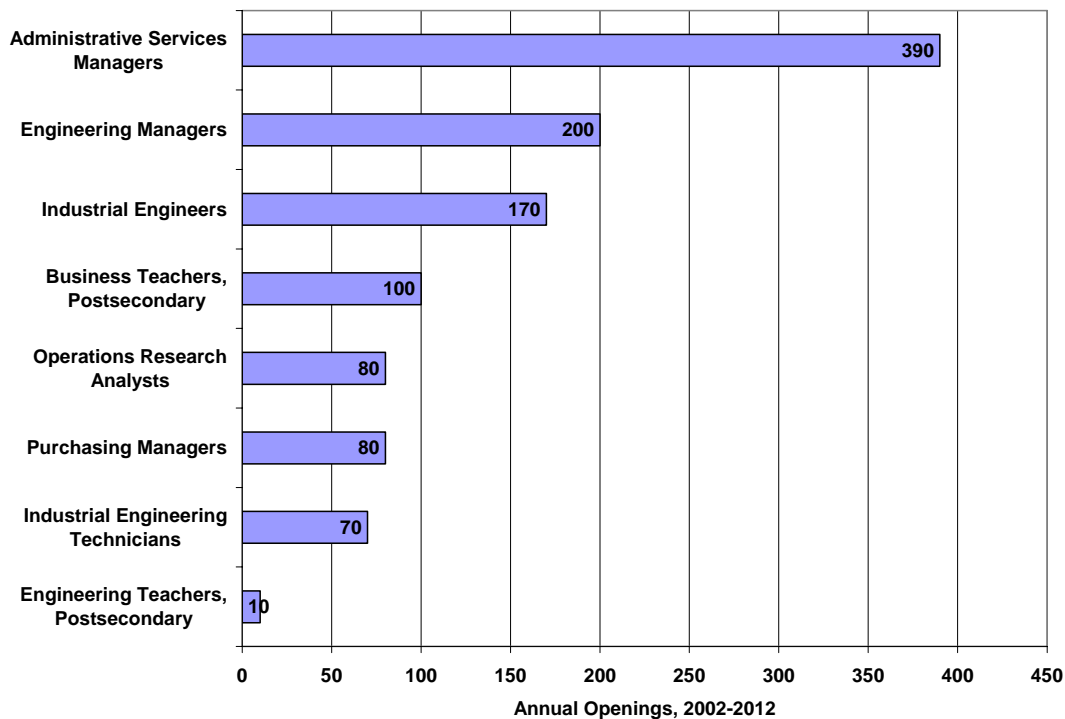
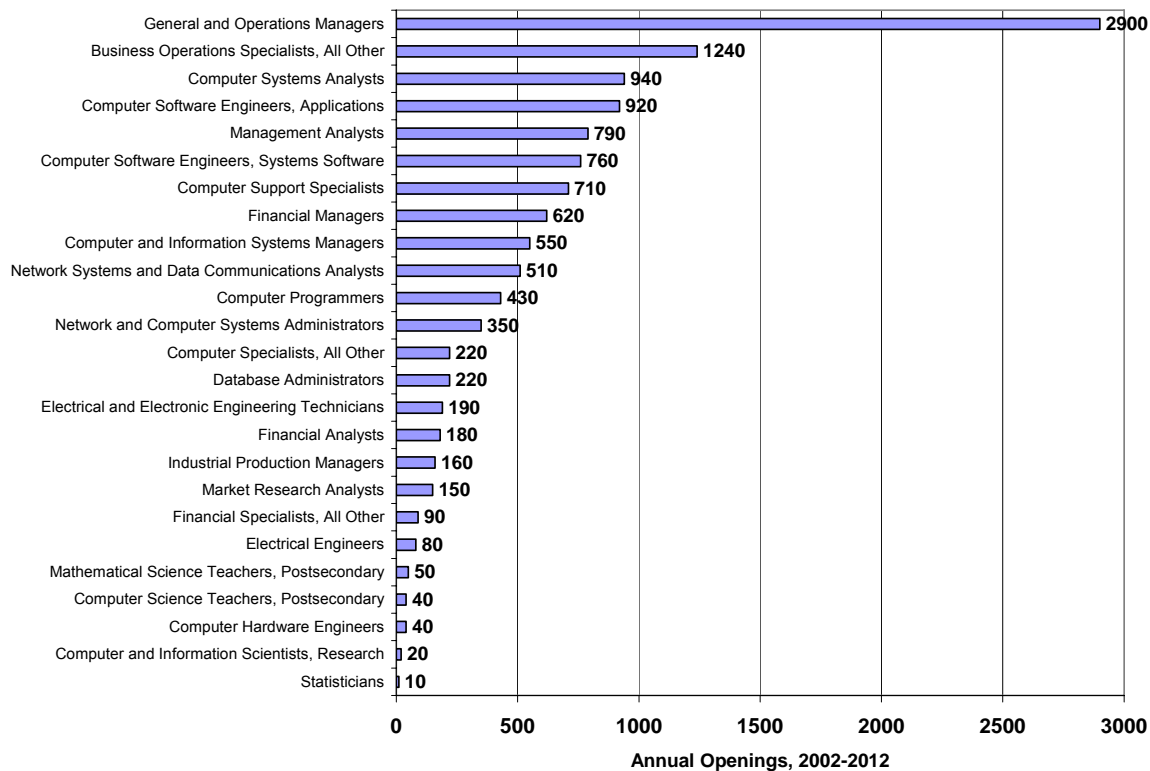


Figure 5.2. Annual Openings in Related Logistics Occupations: 2002-2012



Shortfall Analysis

As a rough measure of the extent to which there are short falls in logistics occupations, we compared these projected annual openings to the number of graduates that Georgia's postsecondary educational institutions put out in 2003. We allocated graduates to these logistics occupations using a modified CIP-SOC crosswalk. The results are presented in Table 5.2.

The results do not show substantial numbers of shortfalls. Only one core occupation, Purchasing Managers, exhibits a shortfall (or more than 70 unfilled positions annually). There are more potential shortfalls evident in related IT and financial occupations.

Despite the lack of gross numbers of unfilled occupations projected particularly in the core occupations, we emphasize that there are limitations to this analysis. In particular, it does not take into account the state's economic development strategy. To the extent that the state continues to build up a significant cluster in this area will not be accounted for in the projections.

Table 5.2. Annual Openings, Graduates, and Shortfall in Core and Related Logistics Occupations

SOCTITLE	Annual Openings	Graduates	Shortfall
<i>Core Occupations</i>			
Purchasing Managers	80	4	76
Administrative Services Managers	390	390	0
Engineering Managers	200	200	0
Industrial Engineers	170	170	0
Business Teachers, Postsecondary	100	100	0
Operations Research Analysts	80	80	0
Industrial Engineering Technicians	70	70	0
Engineering Teachers, Postsecondary	10	10	0
<i>Related Occupations</i>			
Computer Systems Analysts	940	797	143
Financial Managers	620	477	143
Financial Analysts	180	134	46
Computer Hardware Engineers	40	6	34
Financial Specialists, All Other	90	67	23
Computer Software Engineers, Systems Software	760	745	15
General and Operations Managers	2900	2900	0
Business Operations Specialists, All Other	1240	1240	0
Computer Software Engineers, Applications	920	920	0
Management Analysts	790	790	0
Computer Support Specialists	710	710	0
Computer and Information Systems Managers	550	550	0
Network Systems and Data Communications Analysts	510	510	0
Computer Programmers	430	430	0
Network and Computer Systems Administrators	350	350	0
Database Administrators	220	220	0
Computer Specialists, All Other	220	220	0
Electrical and Electronic Engineering Technicians	190	190	0
Industrial Production Managers	160	160	0
Market Research Analysts	150	150	0
Electrical Engineers	80	80	0
Mathematical Science Teachers, Postsecondary	50	50	0
Computer Science Teachers, Postsecondary	40	40	0
Computer and Information Scientists, Research	20	20	0
Statisticians	10	10	0

Recommendations

This section draws on the quantitative analysis in the previous chapters to develop recommendations. In addition, we undertook a “qualitative” analysis to further information these recommendations. More than a dozen corporate executives in logistics firms (e.g., 3PLS, software firms, and wholesalers), university faculty, and management of government logistics infrastructures were interviewed. Appendix 5 highlights the results of these interviews.

We reinforce that few logistics occupations appeared to have significant shortfalls when comparing projected job openings against graduates of existing higher educational programs. Therefore most of our recommendations involve the need for strengthening aspects of the logistics cluster in light of the state economic development strategy.

Grow High-end Logistics Jobs

Logistics is a solid strategic industry for Georgia’s economic development focus. The state has the infrastructure and proximity to current and future population centers to make it attractive from a geographic perspective. Georgia is rather more specialized in logistics employment than is the nation and is expected to add logistics at a higher rate than national trends would support.

Expert interviews suggest a further important aspect of logistics. One interviewee indicated that in the past, the vast majority of logistics positions involved transaction-based manual labor. However, the growth of IT and importance of linking members of a supply chain together reinforce the need for college-educated workers in logistics positions. The requirements are not about moving the boxes but where the boxes should be, how to send them, and how to set the right amount of inventory.

Another respondent reported that it was a competitive advantage to have individuals in first level supervisory positions with college degrees. These individuals had a better understanding of the strategic business importance of their decisions.

Leverage Georgia’s Technical Strengths

One of Georgia’s critical strengths in the logistics field is engineering. Georgia is a leading state in terms of number of graduates in logistics-related engineering fields. The state’s instructional program location quotient for engineering of 2.54 shows that Georgia is already strong in engineering. Logistics-related engineering has an international reputation, which is important for the state to maintain as it seeks to develop recognition of its logistics sector across the globe.

The question is whether the state can build on this strength and leverage it for the entire logistics cluster. Our recommendations apply not so much to engineering as much as in other areas.

Strengthen Business Offerings

Georgia does not have a substantial national presence in logistics-related business programs. Interviewees recognized only one business program as have a logistics specialization—Georgia Southern’s undergraduate degree in Business Administration with a major in Logistics and Intermodal Transportation. The state does not have any programs among the national leaders in business logistics as recognized program rankings, magnitude of graduates, and by business interviewees. Business interviewees either hire graduates from well-known out-of-state programs (University of Tennessee, Arizona State University were mentioned in particular) or hire in-state graduates and train them on the job. The latter approach is not desirable because of the importance of timeliness to logistics firms.

The most critical need is for more undergraduate business programs with logistics concentrations. Interviewees emphasized the desirability of having a broad-based program that covers the range of activities including transportation, warehousing, purchasing, and network design. One respondent pointed to Penn State University’s Supply Chain and Information Systems major as a good model.

Logistics is not a skill that can be quickly learned through a continuing education course, but rather an academic discipline. Thus, addressing gaps in business education requires careful consideration. Two approaches for developing such programs might be regarded. First the state can build on existing strengths. This report contains a listing of existing programs with business logistics capabilities. There are also a few programs not listed that do in fact have some logistics resources, but not enough for an official major. Georgia College and State University has one faculty member that teaches formal courses in logistics and places graduates in logistics firms located near the airport. Georgia Tech’s College of Management achieved a ranking of 15 in U.S. News and World Report’s top business programs in logistics/supply chain management and several faculty conduct research in this area. University of Georgia has an instructor that teaches a logistics module in an executive MBA program. As these programs are further developed, Georgia should aim to have a more recognizable academic reputation on the business side of logistics. The state should set a goal to have at least one of its business logistics program in the top 20 rankings of logistics/supply chain management at undergraduate and graduate levels.

Second, it is important to incorporate some logistics/supply chain management instruction into the core curriculum of every major business program in the state. One interviewee proposed that modular curricula could be built into existing business programs. For example, logistics-related instructional toolkits have been developed by the Council of Supply Chain Management Professionals for use by academic programs. Further examination should be made into the extent to which logistics is taught into the state’s postsecondary business programs and how best to enhance this instruction.

It was also suggested that the state may wish to establish a doctoral program in business-related logistics. This type of program would enable the roll out of additional instructional capacity from an in-state source. Doctoral programs typically require considerable

investment to attract faculty and support research, but they are an important element in reputation building.

Promote Interdisciplinary Specialization

Our analysis suggested that logistics embraces the juncture of business, engineering, and computing disciplines. We recommend that the state encourage development of programs crossing one or more of these disciplinary boundaries. Ohio State University recently announced the creation of a joint program between its engineering and business schools called “Master of Business Logistics”. This program will be offered for the first time in the fall of 2005. If successful, it could serve as a model for a similar program in Georgia.

Maintain Computing Competency

Previous studies that suggested a shortfall of graduates in IT and computer science disciplines have backtracked in the face of the dot.com bust and economic downturn that occurred in the 2000-to-2003 time period. The tendency in this situation is to pull back the number of computing graduates.

We propose that IT competency is important to the logistics field. To be sure, workers with IT specializations who go into logistics are a small proportion of the total employment base in the discipline. But the future of logistics will depend in part on robust computing capabilities to address modeling-related problems. Computing is still a crucial element of the state’s success in this field.

Evaluate the Need for a Maritime Program Resource

Georgia’s ports are a critical logistics resource. Positions in marine transportation or maritime business are filled from graduates of one of the seven maritime academies in the United States. Table 6.1. lists these institutions. Not only is there not maritime academy in Georgia, but there are no academies between New York and Texas.

Table 6.1. Maritime Academies in the United States

Academy	Location
California Maritime Academy	Vallejo, California
Great Lakes Maritime Academy	Traverse City, Michigan
Maine Maritime Academy	Castine, Maine
Massachusetts Maritime Academy	Buzzards Bay, Massachusetts
Seattle Maritime Academy	Seattle, Washington
SUNY Maritime College	Throgs Neck, New York
Texas Maritime Academy	Galveston, Texas

The establishment of a maritime academy is a risky strategy because most of these academies were established decades if not centuries ago. Moreover, Georgia Port Authority management does not view an in-state maritime academy to be essential. The

biggest bottleneck that the port faces is moving cargo on land from the port to the intermediary or final customer warehouse.

Evaluate Technician Offerings

Quantitative analysis of graduates suggests that there may be a need for more educational activity at the technician level. We found that the state does not graduate many logistics-related technicians, but at the same time, no shortfalls were evident in these types of occupations. Executive interviewees were mixed in their views regarding deficiencies in the availability of logistics technicians. Whether technicians are important in the state's logistics cluster should be evaluated in light of the cross-over of related technician level occupations in manufacturing.

Promote Opportunities to Gain Industry Experience

Because the logistics industry places such a premium on time, it is important that there be an experienced base of knowledge workers in the state. Industry executives emphasized the need for the following efforts to integrate academic and experience requirements: internships, coops/part-time jobs, student projects, seminar programs, formal partnerships, involvement of students and business leadership in curricula design, and adjunct positions provided for industry executives.

Conclusion

Georgia's geographic position and existing industries give it great potential for developing a world-class logistics industry. The state's higher educational system can greatly enhance the knowledge segment of the industry through its programmatic offerings and quality graduates.



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Appendices

Appendix 1. Definitions of Logistics and Supply Chain Management Elicited from Google

Definitions of **logistics** on the Web:

- Logistics Management is that part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.
<http://www.cscmp.org/Website/AboutCSCMP/Definitions/Definitions.asp>
- The concept of logistics covers all activities relating to the procurement, transport, transshipment and storage of goods. Logistics as generally understood is concerned particularly with material flow (raw materials, interim and final products), but also involves providing companies with services and information.
www.lehnkering.com/leh/struktur/metatop/glossar/index.language=en.html
- the science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of material; movement, evacuation, and hospitalization of personnel; acquisition or construction, maintenance, operation, and disposition of facilities; acquisition or furnishing of services (Joint Pub 1-02)
www.globalsecurity.org/military/library/policy/army/fm/100-8/gloss.htm
- the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of conforming to customer requirements.
<https://www.ism.ws/AboutISM/MediaRoom/KeySupplyMgmtTerms.cfm>
- The tracking and movement of raw materials to finished products and consumption throughout the supply chain.
home.intermec.com/eprise/main/Intermec/Content/About/GlossarySubpages/Glossary_KL
- The organisation of any project or operation, including transportation and housing for example the warehousing of goods as they are being transferred from one country to another.
www.scottish-enterprise.com/sedotcom_home/help/help-glossary.htm
- The art of calculating material amounts and arranging their delivery to the proper place at the proper time.
www.yourwebassistant.net/glossary/l9.htm
- The KreW facilitates the flow of matter, energy and information through the DesignShop event or the Management Center environment. Logistics focuses on the flow of matter and energy. This includes providing the physical environment, tools, equipment, materials, food. It also calls for the continual refreshing and maintenance of these elements. [Of course, these all comprise messages bearing information... darn that interconnected, fractal, feedback driven, recursive nature of the universe!]
www.mgtaylor.com/mgtaylor/glossary.htm
- The aspect of military operations that deals with the procurement, distribution, maintenance, and replacement of materiel and personnel.
www.army-technology.com/contractors/publications/l.html
- The total process of moving goods from a manufacturer to a customer in the most timely and cost-efficient manner possible.
www.prenhall.com/rm_student/html/glossary/l_gloss.html
- Meetings will be held primarily in Ottawa. The use of teleconference or other means will be facilitated to maximize participation and reduce barriers.
www.canadian-health-network.ca/servlet/ContentServer
- The planning, execution and control:
www.eyefortransport.com/glossary/kl.shtml

- The art of moving and quartering troops, and especially of supplying them. *
www.geocities.com/Athens/Acropolis/2354/directory.html
- In an industrial context, logistics means the art and science of obtaining, producing, and distributing material and product in the proper place and in proper quantities. In a military sense, its meaning can also include the movement of personnel.
www.homercomputer.com.au/homer_software_guide/glossary.htm
- the process of transporting, supplying and supporting a field project.
farahsouth.cgu.edu/dictionary/
- are the shipping and distribution functions used by an organisation and are sometimes used to define a role that manages all the company's resources.
www.tecc.com.au/tecc/guide/glossary.asp
- The planning, execution and control -of the movement and placement of people and/or goods - and of the supporting activities related to such movement and placement within a system organized to achieve specific objectives.
www.shipping.francoudi.com/main/main.asp
- The movement of materials and information in a supply chain. (697)
www.csus.edu/indiv/f/freemand/Class%20Notes/Ch%2016%20key%20terms.htm
- Providing resources and other services to support incident management. Logistics Section: The section responsible for providing facilities, services, and material support for the incident.
www.emacintl.com/nims_3_04/glossary_of_key_terms.htm
- The procurement and physical transmission of material through the supply chain, from suppliers to customers.
enbv.narod.ru/text/Econom/ib/str/261.html
- the handling and movement of inbound raw materials and other supplies as well as outbound physical distribution.
wps.pearsoned.co.uk/wps/media/objects/1452/1487687/glossary/glossary.html
- In an industrial context, this term refers to the functions of obtaining and distributing material and product.
www.optas.net/glossary.htm
- The time-related positioning of resources to meet user requirements.
www.blinco.com/solutions/glossary/schainfn.htm
- handling an operation that involves providing labor and materials be supplied as needed
www.cogsci.princeton.edu/cgi-bin/webwn2.1
- Logistics is the art and science of managing and controlling the flow of goods, energy and information.
en.wikipedia.org/wiki/Logistics

Definitions of **supply chain management** on the Web:

- Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies..
<http://www.cscmp.org/Website/AboutCSCMP/Definitions/Definitions.asp>
- The delivery of customer and economic value through integrated management of the flow of physical goods and associated information, from raw materials sourcing to delivery of finished products to consumers.
www.ediuniversity.com/glossary/
- the design and management of seamless, value-added processes across organizational boundaries to meet the real needs of the end customer.
<https://www.ism.ws/AboutISM/MediaRoom/KeySupplyMgmtTerms.cfm>
- The management and control of all materials, funds, and related information in the logistics process from the acquisition of raw materials to the delivery of finished products to the end

user.

www.blinco.com/solutions/glossary/logisticsoz.htm

- The interlocking series of transactions necessary to convert crude oil into marketable products.
www.conocophillips.com/newsroom/other_resources/energyglossary/glossary_s.htm
- procurement, contracts, bids, supplier opportunities
www.vita.virginia.gov/services/voiceServices/cellular/commonTerms.cfm
- A broader concept than logistics; extends the concept of logistics beyond the firm to all firms in the supply chain, including vendors, customers, carriers, facilitators, and channel intermediaries.
vtm.com/glossary.asp
- Inter-company planning control and monitoring of central functions such as procurement, production and sales to increase their efficiency.
www.karstadtquelle.com/englisch/konzern/3652.asp
- The control of the supply of Parts from vendor through to customer. There is no fundamental difference in principle between Supply Chain Management and Manufacturing Resource Planning. SCM is also used to refer to short cycle manufacturing, which is the manufacturing elements of Just in Time.
www.bpic.co.uk/jargon.htm
- An attempt to coordinate processes involved in producing, shipping and distributing products, generally with large suppliers. Net markets can extend supply chain management to all trading partners regardless of size because they provide a central hub to integrate information from buyers and sellers.
www.eyefortransport.com/glossary/st.shtml
- A systematic approach to handling the constituent links in the supply chain.
www.itilpeople.com/Glossary/Glossary_s.htm
- The process of material control including purchasing electronic and mechanical components using a variety of e-commerce data base sources and key vendors with an established track record.
www.naso.com/pages/news_glossary.html
- The integration of the supplier, distributor, and customer logistics requirements into one cohesive process to include demand planning, forecasting, materials requisition, order processing, inventory allocation, order fulfillment, transportation services, receiving, invoicing, and payment.
www.vpa.org.vn/english/maritime_term/glossary1/s.htm
- Supply chain management (SCM) deals with the planning and execution issues involved in managing a supply chain.
en.wikipedia.org/wiki/Supply_chain_management

**Appendix 2. Selected Companies in Georgia with Advertised Logistics-related Positions
Requiring Some Postsecondary Education**

Company	Number of Advertisements
3C Software	2
Advanced Solutions for Tomorrow Inc	3
Advantage Solutions Group Inc	1
Allen Lund Co Inc	3
APL Logistics Inc	1
ARAMARK Uniform Services	1
Arch Chemicas	1
ASAP	3
Associated Global Systems Inc	4
Atlantic Paper & Foil Corp	1
BDP International Inc	2
C D Group	1
CNH America LLC	1
[company name confidential]	8
Computer Sciences Corporation	1
ConAgra Foods, Inc.	1
Concord Business Systems Inc	3
CORESTAFF Services	1
Crawford & Company	1
Custom Recruiting Solutions	1
Daifuku America Corporation	1
Datascape.com Incorporated	3
Delta Technology Inc	3
Descartes Systems (USA) LLC	2
DHL Danzas	1
Dunhill Staffing	1
Enforcer	1
FedEx Ground	3
Friendly Systems Inc	1
FSC Securities Corporation	1
GENCO Distribution Systems	2
General Freight Services Inc	4
Giant International	1
Global Logistics	8
Gypsum Express Ltd	1
Handler	1
Horizon Software International LLC	3
I-Business Network	1
Inovis Inc	5
Insourse Software Solutions LLC	7
IT Solutions Inc	8
JCPenney, Inc.	1
Kraiburg TPE Corp.	1

Company	Number of Advertisements
LeasePlan USA Inc	10
LMS	1
Local ContractJobs Inc.	1
Logility	2
LXE Inc	19
Management Recruiters Intntl	3
Manhattan Associates Inc	46
MARC Global	2
Maristaff, Inc.	1
MeadWestvaco	1
Metasys Technologies Inc	17
Mro International Software	1
MTC Technologies, Inc.	1
Nations Express	3
Navy	1
Neenah Paper In	1
New ERA of Networks Inc	6
New Frontiers International Ltd	24
Openhr America Inc	3
Oracle	19
Ozburn-Hessey Logistics LLC	1
Pacer Global Logistics	22
Paperless Office Inc	6
Peach State Integrated Technologies Inc	4
Penske Logistics	5
Procuri Inc	1
Randstad	1
Resource Technologies	1
Retail Publication	1
Ruan Transport	2
Ryder	2
Ryder System, Inc.	2
Saddle Creek Corporation	4
SAP America Inc	4
SCM Resources Inc	1
Servigistics Inc	3
Siemens Communications, Inc	3
SolomonEdwardsGroup	1
Spherion	1
SPL World Group, Inc.	1
Sprint	1
Stanley Associates Inc	2
Stone Connection	1
StorePerform Technologies	1
Target	1

Company	Number of Advertisements
Target Logistic Services	1
The Coca-Cola Company	1
The Home Depot	13
The Robin Shepherd Group	1
TNT Logistics	1
TRX Inc	17
Turner Transfer	1
Twin Engines Inc	1
UPS Headquarters	8
Viewlocity Inc	1
Vignette Corporation	1
Grand Total	380

Appendix 3. Titles of Advertised Logistics-related Positions Requiring Some Postsecondary Education

Title	Number of Advertisements
ABA Developer for Web Applications	1
Account Executive	2
Account Executive-emerging fleet	1
Account Executive-Sales, Atlanta based	1
Account Management Consultant 5-Suport	1
Account Manager	1
Account Manager-Electronic Print and Document Management	1
Accounts Payable Representative	1
Account Auditor	1
Account Executive	1
Administrative Assistance A3 (3)	1
Administrative Assistant	4
Administrative Asst South	1
Antenna Engineer	1
Antenna Systems Engineer	1
Application Developer	1
Application Engineer	1
Applications Sales Representative III	1
AS/400 Computer System Operator	1
ASP.net Developer Architect Programmer	1
Assistant Manager	1
Assistant Network Administrator	1
Associate Software Consultant (VB, C#)	1
Associate/Software Consultant-RFID	1
Associate/Software Consultants/Rfid	1
Audit Manager (Sr. Staff Auditor)	1
Audit Supervisor	1
Billing Documentation Specialist	1
Billing Specialist	2
Body Shop Technician	1
Branch Office Examiner	1
Broker's Assistant	1
Business Analyst	4
Business Analyst 3-Ops	1
Business Architect	1
Business Architect/Project Manager	1
Business Consultant	2
Business Development Executive	1
Busness Analyst	1
Cargo and Credit Insurance Manager	1
CDL A Driver	1
Client Relations Specialist	1
Communications Specialist	1
computer professionals	1
Consulting Engagement Director-South	1
Consulting Project Manager	1

Title	Number of Advertisements
Consulting Project Principal Consultant	1
Consulting Sales Director	1
Consulting Technical VP	1
Contract Technical Recruiter (3 months)	1
Controller	2
Corporate Logistics Manager	1
Corporate Recruiter	1
Credit Manager	1
Customer Logistics Coordinator	1
Customer Service	1
Customer Service Representative	2
Customer Support Analyst	1
Customer Support Representative	1
Data Migration Testers	1
Data Migration/SQL Server DBA	1
Data Warehouse Data Steward	1
Data Warehouse Quality Assurance-Level 2	1
Data Warehouse Quality Assurance-Level 3	1
Data Warehouse Requirements Analyst-Level 2	1
Data Warehouse Requirements Analyst-Level 3	1
Database Administrator/Developer	1
Demand-Supply Manager GSM/UMTS	1
Desktop Support Coordinator	1
Developer	2
Director of Product Management, TMS	1
Director of Sales	1
Director of Sales and Marketing	1
Directors of Technical Support	1
Director-Sales and Marketing	1
Dispatcher (Logistics)	1
Drivers	1
Drivers (3-Atlanta, Cedartown, and Savannah)	1
Drivers (Logistics)	1
EDI Coordinator	1
EDI Software Developer	1
Education Consultant	1
Engineering Manager? Fleet Operations	1
Engineer-Technical Sales, South Eastern Region	1
Entry Level Transportation Freight Broker	1
Entry Specialist	1
ERP (multiple positions)	1
Executive Assistant	1
Experienced Transportation Freight Broker	1
Express Center Owner	1
Express Truck(s) Owner	1
Facilities Manager	1
Field Service Engineer	1
File Room Assistant	1

Title	Number of Advertisements
Financial Analyst	1
Financial Reporting Manager	1
Fixed Asset/General Accountant	1
Forecasting Analyst	1
Freight Claims Assistant	1
graduate web developer	1
Help Desk Administrator	1
Human Resources Generalist	1
Implementation Consultant	1
Implementation Consultant (CONSULTANT)	1
Implementation Manager	1
Implementation Managers	1
Implementation Specialists	1
Import Manager	1
Industrial Engineer	1
Industrial Engineers/Logistics Engineers	1
Information Architect	1
Information Technology	1
Inside Sales Representative	1
Instructional Design Intern	1
Instructor	1
Instructor-PLM	1
International Financial Analyst	1
International Sales Manager	1
IS Support Analyst	2
IT	1
IT Defense	2
Java Programmer/Java Developer	1
Java Programmers (multiple positions)	1
Junior Programmer	1
Lead Accountant (1108)	1
Lead General Analyst	1
Lead Programmer/Analyst	1
Lead QA Engineer	1
Logistics Analyst	3
Logistics Analyst-International	1
Logistics and Administrative Assistant	1
Logistics Coordinator	3
Logistics Engineer	1
Logistics Engineer-3PL	1
Logistics Engineer-Distribution Engineering	1
Logistics Engineer-Supply Chain Security Process Engineer	1
Logistics Manager	2
Logistics Manager-Delivery	1
Logistics Planer/Coordinator	1
Logistics Planner	1
Logistics Specialist	1
Logistics Specialist/Coordinator	1

Title	Number of Advertisements
Logistics Supervisor	1
Logistics Supervisor-2nd shift	1
Logistics/Warehouse Manager	1
Management Analyst	1
Management Trainee (3)	1
Manager	1
Manager of Logistics	1
Manager, Business Consulting Services	1
Manager, Quality Assurance	1
Manager, Technology Solution Center & NOC	1
Marketing Programs Specialist	1
Marketing Support Representative	1
Mechanic	2
Mechanical Engineer (2)	1
MIC Manufacturing/Process Engineer (2)	1
MicroStrategy 7i Developer/Lead	1
Microwave Enginner-Active	1
Multi National Logistics Officer	1
Netegrity Experts	1
Network Administrator	1
Network Billing Analyst	1
no title	2
Ocean Export Customer Service Representative	1
Office Administrator	1
Operations Assistant	1
Operations Management	1
Operations Manager	1
Operations Research Architect	1
Operations Supervisor	1
Operations Support	1
Oracle Developers (multiple positions)	1
Oracle Development DBA	1
Paralegal	1
Paralegal/Secretary	1
Paralegals-Intellectual Property Law	1
Part-time Logistics Clerk	1
Plant Operations Manager	1
Pricing Analyst	1
Process Analyst	1
Process Manager	1
Product Management Consultant	1
Product Manager	1
Production Software Engineer	1
Productions Support Developer	1
Professional Services Project Manager-Web-based Enterprise SW Implementations	1
Program Manager	1
Programmer	1

Title	Number of Advertisements
Programmer Analyst I	1
Programmer/Analyst	1
Programmer/Analyst, ERP Systems	1
Project Analyst	1
Project Engineer-Conveyor	1
Project Manager	2
Project Manager-eBUSINESS (Logistics/DSN)	1
Project Manager-Level 2	1
Project Managers	1
Proposal Coordinator	1
Purchasing Manager	1
QA Manager	1
QA Testers	1
Quality Assurance Analyst	1
Quality Assurance Analyst II	1
recent veteran to support anti-terrorism training at Fort McPherson, Ga	1
Receptionist	1
Recruiters	1
Regional Sales Manager	1
Reliability Engineer	1
Remarketing Assistant	1
Remarketing Coordinator	1
Remedy Developer/Programmer	1
Report Analyst	1
Report Developer (2)	1
Reporting Analyst	1
Requirements Analyst	1
Requirements Analyst-Level 2	1
Requirements/Implementation Tester-Level 1	1
Research Mgmt Manager	1
Revenue Analyst	1
S/W Eng II- Dev	1
S/W Eng-Dev	1
Sales	1
Sales	1
Sales & Marketing Representatives	1
Sales Agent	1
Sales and Marketing Manager with Motorcycle or ATV Industry experience	1
Sales Associate	1
Sales Consultant	1
Sales Director	1
Sales Executive	1
Sales Executive-Transportation	1
Sales Executive-WMS	1
Sales Representative	2
Sales Support Analyst	1

Title	Number of Advertisements
sales/marketing person	1
Salesrep	1
SAP Business Analyst	1
SAP SD Functional/Supply Chain & Logistics	1
Senior .NET Developer	1
Senior Account Executive	1
Senior Account Manager	1
Senior Client Relations Analyst	1
Senior Commercial Underwriter	1
Senior Consultant	1
Senior Consultant (Labor Management)	1
Senior Consultant-Labor Management	1
Senior Financial Analyst	2
Senior Great Plains Consultant	1
Senior Level Accountant	1
Senior Product Consultant - iseries	2
Senior Product Marketing Manager	1
Senior Programmer	1
Senior Programmer/Analyst	1
Senior Project Manager-WMS Implementation	1
Senior Sales Consultant	1
Senior Sales Consultant (3)	1
Senior Sales Engineer	1
Senior SAP HR Consultant	1
Senior Software Analysts-AS/400	1
Senior Software Engineer	1
Senior Technical Implementation Consultant	2
Senior Technical Support	1
Senior Trainer	1
Senior VP Sales and Marketing	1
Service Team Leaders	1
Site Manager	1
Software Analyst-Build/Configuration Engineer	1
Software Analysts-J++/C#	1
Software Architect Pocket PC Windows CE	1
Software Consultants	1
Software Developer	2
Software Developer for Web Applications	1
Software Distribution Administrator	1
Software Engineer	1
Software Managers-EJB	1
Software Support Analyst (Labor Management)	1
Software Support Analyst -C++/Unix	1
Software Support Consultant	1
Solutions Consultant-RFID	1
SOX 404 Analyst	1
Specialist-Meetings and Events	1
SQL Business Intelligence Software Developers	1

Title	Number of Advertisements
SQL Server Database Programmer/Analyst	1
Sr Analyst International Logistics	1
Sr Logistics Engineer-SDI	1
Sr S/W Eng- Dev	2
Sr S/W Eng-QA	1
Sr. Business Systems Analyst	1
Sr. Communication & Training Specialist	1
Sr. Digital/Analog Design Engineer	1
Sr. Financial Analyst	1
Sr. Level Accountant	1
Sr. RF Hardware Design Engineer	1
Staff or Principal Engineer	1
Staff S/W Eng I-Prod Mgmt	1
Support Consultant-Implementation	1
Support Consultants	1
System Administrator	1
System Administrator (Hosting)	1
System Engineer	1
Systems Administrator	1
Systems Development Director	1
Systems Engineer/DBA	1
Systems Support Specialist (Applications Programmer)	1
Technical Architect-Level 1	1
Technical Architect-Level 2	1
Technical Architect-Level 3 (6)	1
Technical Consultant	1
Technical Consultant, Level 1	1
Technical Consultant, Level 2	1
Technical Implementation Consultant	2
Technical Manager-Cons (8)	1
Technical Order Manager	2
Technical Software Manager-EJB	1
Technical Support Technician	1
Technical Writer	1
Technology Sales Representative II (4)	1
Telemarketing Manager	1
Telephone Marketing Position	1
Telesales Representative III	1
Test Engineer/Manager	1
TL Sales Consultant	1
TMS Senior Consultant- Carrier Management Solutions	1
TMS Senior Consultant-Carrier Management Solutions	1
TMS Senior Consultant-Transportation Planning & Execution	2
TMS Senior Consultant-Transportation Procurement	1
Trade Show Manager	1
Traffic Manager	1
Trainer & Application Developer	1
Tranportation and Logistics Opportunities (2)	1

Title	Number of Advertisements
Tranportation, Supply Chain, Logistics Professionals	1
Transportation Broker	1
Transportation Customer Logistics Manager	1
Transportation, Supply Chain, Logistics Professionals	1
Unix/Application Server Administrators (multiple positions)	1
VB and .Net Programmers (multiple positions)	1
VB Programmer	1
Vehicle Maintenance Mechanics/Technicians	1
Visual Basic.NET programmer	1
VP of Logistics and Operations	1
VP, Technology Development	1
Warehouse Operations Manager	1
Warehouse Supervisor-Distribution Center	2
web developer	1
Web Developer, Mid Level	1
Web Testers	1
Windows Network Administrators (multiple positions)	1
Grand Total	380

**Appendix 4. Large U.S. Logistics Programs by Number of Graduates (Completions) in 2003
(programs with at least 25 graduates in core CIPS)**

Institution	CIP Description	State	Degree	Grads.
Community College of the Air Force	Logistics and Materials Management	AL	Associates degree	752
Georgia Institute of Technology-Main Campus	Industrial/Manufacturing Engineering	GA	Bachelors degree	298
Michigan State University	Logistics and Materials Management	MI	Bachelors degree	244
Southern Illinois University-Carbondale	Industrial Technology/Technician	IL	Bachelors degree	238
Olympic College	Industrial Technology/Technician	WA	Award of less than 1 academic year	212
Arizona State University-Main Campus	Purchasing, Procurement/Acquisitions and Contracts Management	AZ	Bachelors degree	185
University of Michigan-Ann Arbor	Industrial/Manufacturing Engineering	MI	Bachelors degree	179
The University of Tennessee	Logistics and Materials Management	TN	Bachelors degree	174
Illinois State University	Industrial Technology/Technician	IL	Bachelors degree	169
Pennsylvania State University-Main Campus	Logistics and Materials Management	PA	Bachelors degree	154
Stanford University	Engineering/Industrial Management	CA	Masters degree	153
George Washington University	Engineering/Industrial Management	DC	Masters degree	152
Georgia Institute of Technology-Main Campus	Industrial/Manufacturing Engineering	GA	Masters degree	149
University of Missouri-Rolla	Engineering/Industrial Management	MO	Masters degree	146
Cornell University-Endowed Colleges	Industrial/Manufacturing Engineering	NY	Bachelors degree	141
Purdue University-Main Campus	Industrial/Manufacturing Engineering	IN	Bachelors degree	139
University of Michigan-Ann Arbor	Industrial/Manufacturing Engineering	MI	Masters degree	134
Pennsylvania State University-Main Campus	Industrial/Manufacturing Engineering	PA	Bachelors degree	130
United States Naval Academy	Systems Engineering	MD	Bachelors degree	127
Community College of the Air Force	Purchasing, Procurement/Acquisitions and Contracts Management	AL	Associates degree	126
George Washington University	Engineering/Industrial Management	DC	Postbaccalaureate certificate	122
Northeastern University	Industrial Engineering	MA	Masters degree	117
Columbia University in the City of New York	Industrial/Manufacturing Engineering	NY	Masters degree	110
Florida Institute of Technology-Melbourne	Purchasing, Procurement/Acquisitions and Contracts Management	FL	Masters degree	109

Institution	CIP Description	State	Degree	Grads.
Virginia Polytechnic Institute and State Univ	Industrial/Manufacturing Engineering	VA	Bachelors degree	104
Cornell University-Endowed Colleges	Industrial/Manufacturing Engineering	NY	Masters degree	100
Ohio State University-Main Campus	Logistics and Materials Management	OH	Bachelors degree	100
Texas A & M University	Industrial Engineering	TX	Masters degree	100
University of Virginia-Main Campus	Systems Engineering	VA	Bachelors degree	100
Auburn University Main Campus	Logistics and Materials Management	AL	Bachelors degree	93
University of Florida	Systems Engineering	FL	Masters degree	92
Cuny York College	Operations Research	NY	Bachelors degree	92
Olympic College	Industrial Technology/Technician	WA	Associates degree	91
University of Wisconsin-Madison	Industrial Engineering	WI	Bachelors degree	89
Devry University-Illinois	Purchasing, Procurement/Acquisitions and Contracts Management	IL	Masters degree	89
University of Puerto Rico-Mayaguez	Industrial Engineering	PR	Bachelors degree	87
Northwestern University	Engineering/Industrial Management	IL	Masters degree	86
Texas A & M University	Industrial Engineering	TX	Bachelors degree	85
Florida Institute of Technology-Melbourne	Logistics and Materials Management	FL	Masters degree	85
Quinnipiac University	Purchasing, Procurement/Acquisitions and Contracts Management	CT	Bachelors degree	82
Western Michigan University	Logistics and Materials Management	MI	Bachelors degree	81
Iowa State University	Transportation/Transportation Management	IA	Bachelors degree	81
Ohio State University-Main Campus	Industrial/Manufacturing Engineering	OH	Bachelors degree	79
Ohio State University-Main Campus	Logistics and Materials Management	OH	Bachelors degree	79
Bemidji State University	Industrial/Manufacturing Technology/Technician	MN	Bachelors degree	77
Webster University	Purchasing, Procurement/Acquisitions and Contracts Management	MO	Masters degree	76
California Polytechnic State Univ-San Luis Obispo	Industrial/Manufacturing Engineering	CA	Bachelors degree	75
Iowa State University	Industrial Engineering	IA	Bachelors degree	75
University of Michigan-Dearborn	Engineering/Industrial Management	MI	Masters degree	70
Baker College Corporate Services	Industrial/Manufacturing Technology/Technician	MI	Associates degree	70
United States Military Academy	Systems Engineering	NY	Bachelors degree	69
Columbia University in the City of New York	Industrial/Manufacturing Engineering	NY	Bachelors degree	69
Northwestern University	Industrial Engineering	IL	Bachelors degree	67

Institution	CIP Description	State	Degree	Grads.
East Carolina University	Industrial/Manufacturing Technology/Technician	NC	Bachelors degree	67
Central Michigan University	Logistics and Materials Management	MI	Bachelors degree	65
Johns Hopkins University	Systems Engineering	MD	Masters degree	65
The University of Texas at Arlington	Industrial Engineering	TX	Masters degree	64
University of Florida	Systems Engineering	FL	Bachelors degree	64
Southeast Missouri State University	Industrial Technology/Technician	MO	Bachelors degree	62
North Carolina State University at Raleigh	Industrial/Manufacturing Engineering	NC	Bachelors degree	62
Pennsylvania State University-Main Campus	Logistics and Materials Management	PA	Award of less than 1 academic year	62
Lehigh University	Industrial Engineering	PA	Bachelors degree	62
Stanford University	Engineering/Industrial Management	CA	Bachelors degree	62
Purdue University-Main Campus	Industrial/Manufacturing Engineering	IN	Masters degree	59
Focus Hope Machinist Training Institute	Industrial/Manufacturing Technology/Technician	MI	Award of less than 1 academic year	59
University of Arkansas Main Campus	Industrial/Manufacturing Engineering	AR	Bachelors degree	58
New Jersey Institute of Technology	Engineering/Industrial Management	NJ	Masters degree	57
North Georgia College and State University	Purchasing, Procurement/Acquisitions and Contracts Management	GA	Bachelors degree	57
North Harris Montgomery Community College District	Industrial/Manufacturing Technology/Technician	TX	Award of less than 1 academic year	57
Heart of Georgia Technical College	Logistics and Materials Management	GA	Award of less than 1 academic year	56
Bowling Green State University-Main Campus	Logistics and Materials Management	OH	Bachelors degree	55
University of Missouri-Rolla	Engineering/Industrial Management	MO	Bachelors degree	54
University of Pittsburgh-Main Campus	Industrial/Manufacturing Engineering	PA	Bachelors degree	53
Arizona State University-Main Campus	Industrial/Manufacturing Engineering	AZ	Masters degree	52
University of California-Berkeley	Operations Research	CA	Bachelors degree	52
United States Merchant Marine Academy	Systems Engineering	NY	Bachelors degree	50
University of Wisconsin-Madison	Industrial Engineering	WI	Masters degree	50
Virginia Polytechnic Institute and State Univ	Industrial/Manufacturing Engineering	VA	Masters degree	48
University of Southern California	Industrial Engineering	CA	Masters degree	47
Baker College Corporate Services	Industrial/Manufacturing Technology/Technician	MI	Bachelors degree	47
Universidad Politecnica De Puerto Rico	Engineering/Industrial Management	PR	Masters degree	47
Florida International University	Industrial Engineering	FL	Masters degree	46

Institution	CIP Description	State	Degree	Grads.
Arizona State University-Main Campus	Industrial/Manufacturing Engineering	AZ	Bachelors degree	46
University of Louisiana at Lafayette	Industrial/Manufacturing Technology/Technician	LA	Bachelors degree	45
University of Virginia-Main Campus	Systems Engineering	VA	Masters degree	45
Syracuse University	Industrial/Manufacturing Engineering	NY	Masters degree	44
Hocking College	Purchasing, Procurement/Acquisitions and Contracts Management	OH	Award of less than 1 academic year	44
Millersville University of Pennsylvania	Industrial/Manufacturing Technology/Technician	PA	Bachelors degree	43
Princeton University	Operations Research	NJ	Bachelors degree	43
Central Michigan University	Logistics and Materials Management	MI	Bachelors degree	43
University of North Texas	Logistics and Materials Management	TX	Bachelors degree	43
Wayne State University	Industrial Engineering	MI	Masters degree	43
University of South Florida	Industrial Engineering	FL	Masters degree	43
Jackson State University	Industrial/Manufacturing Technology/Technician	MS	Bachelors degree	42
University of California-Berkeley	Operations Research	CA	Masters degree	42
Bates Technical College	Transportation/Transportation Management	WA	Award of less than 1 academic year	42
Southeastern Louisiana University	Industrial/Manufacturing Technology/Technician	LA	Bachelors degree	42
Florida International University	Systems Engineering	FL	Bachelors degree	41
Oklahoma State University-Main Campus	Industrial/Manufacturing Engineering	OK	Masters degree	41
Eastern Michigan University	Industrial/Manufacturing Technology/Technician	MI	Masters degree	41
North Carolina State University at Raleigh	Industrial/Manufacturing Engineering	NC	Masters degree	40
Alcorn State University	Industrial/Manufacturing Technology/Technician	MS	Bachelors degree	40
Texas A & M University-Commerce	Industrial Technology/Technician	TX	Masters degree	40
University of Southern California	Systems Engineering	CA	Masters degree	39
Iowa State University	Systems Engineering	IA	Masters degree	39
University of Kansas Main Campus	Engineering/Industrial Management	KS	Masters degree	39
Naval Postgraduate School	Systems Engineering	CA	Masters degree	39
Ohio University-Main Campus	Industrial/Manufacturing Engineering	OH	Bachelors degree	39
University of Iowa	Industrial Engineering	IA	Bachelors degree	38
Appalachian State University	Industrial/Manufacturing Technology/Technician	NC	Bachelors degree	38
New Mexico State University-Main Campus	Industrial/Manufacturing Engineering	NM	Masters degree	38
California State University-Fullerton	Operations Research	CA	Masters degree	38

Institution	CIP Description	State	Degree	Grads.
University of Michigan-Dearborn	Industrial/Manufacturing Engineering	MI	Masters degree	38
Southwest Missouri State University	Industrial/Manufacturing Technology/Technician	MO	Bachelors degree	38
Wayne State University	Engineering/Industrial Management	MI	Masters degree	38
Patrick Henry Community College	Industrial/Manufacturing Technology/Technician	VA	Associates degree	37
Universidad Politecnica De Puerto Rico	Industrial Engineering	PR	Bachelors degree	37
Iowa State University	Transportation/Transportation Management	IA	Bachelors degree	37
Johns Hopkins University	Industrial/Manufacturing Engineering	MD	Masters degree	37
Georgia Southern University	Logistics and Materials Management	GA	Bachelors degree	36
Ohio State University-Main Campus	Industrial/Manufacturing Engineering	OH	Masters degree	36
Western Carolina University	Industrial/Manufacturing Technology/Technician	NC	Bachelors degree	36
Drexel University	Engineering/Industrial Management	PA	Masters degree	36
Arizona State University East	Industrial Technology/Technician	AZ	Bachelors degree	36
Ohio Northern University	Industrial Technology/Technician	OH	Bachelors degree	35
Dalton State College	Industrial/Manufacturing Technology/Technician	GA	Associates degree	35
University of Pennsylvania	Systems Engineering	PA	Bachelors degree	35
Eastern Illinois University	Industrial Technology/Technician	IL	Bachelors degree	35
Mississippi State University	Industrial/Manufacturing Technology/Technician	MS	Bachelors degree	34
Tufts University	Engineering/Industrial Management	MA	Masters degree	34
Johns Hopkins University	Systems Engineering	MD	Postbaccalaureate certificate	34
San Jose State University	Industrial/Manufacturing Engineering	CA	Bachelors degree	34
University of St Thomas	Systems Engineering	MN	Masters degree	33
Ivy Tech State College-Northeast	Industrial Technology/Technician	IN	Associates degree	33
Naval Postgraduate School	Purchasing, Procurement/Acquisitions and Contracts Management	CA	Masters degree	33
Massachusetts Institute of Technology	Systems Engineering	MA	Masters degree	33
Rutgers University-New Brunswick	Industrial/Manufacturing Engineering	NJ	Bachelors degree	33
Eastern Illinois University	Industrial Technology/Technician	IL	Masters degree	33
George Mason University	Systems Engineering	VA	Masters degree	32

Institution	CIP Description	State	Degree	Grads.
Oklahoma State University-Main Campus	Industrial/Manufacturing Engineering	OK	Bachelors degree	32
Clemson University	Industrial Engineering	SC	Bachelors degree	32
Middle Tennessee State University	Industrial/Manufacturing Technology/Technician	TN	Bachelors degree	32
University of Houston-University Park	Industrial Engineering	TX	Masters degree	31
Oklahoma State University-Main Campus	Engineering/Industrial Management	OK	Masters degree	31
Portland State University	Engineering/Industrial Management	OR	Masters degree	31
Farmingdale State University of New York	Industrial Technology/Technician	NY	Bachelors degree	31
Clackamas Community College	Industrial Technology/Technician	OR	Associates degree	31
Devry University-California	Purchasing, Procurement/Acquisitions and Contracts Management	CA	Masters degree	31
Georgia Institute of Technology-Main Campus	Operations Research	GA	Masters degree	31
Portland State University	Logistics and Materials Management	OR	Bachelors degree	31
Iti Technical College	Industrial/Manufacturing Technology/Technician	LA	Associates degree	31
Ivy Tech State College-Southwest	Industrial Technology/Technician	IN	Associates degree	30
University of Arkansas Main Campus	Logistics and Materials Management	AR	Bachelors degree	30
New York University	Operations Research	NY	Masters degree	30
Western Washington University	Industrial/Manufacturing Technology/Technician	WA	Bachelors degree	30
Oakland University	Engineering/Industrial Management	MI	Masters degree	30
Suny at Buffalo	Industrial Engineering	NY	Masters degree	30
University of Illinois at Urbana-Champaign	Industrial Engineering	IL	Bachelors degree	29
Suny at Binghamton	Industrial Engineering	NY	Masters degree	29
Western Michigan University	Engineering/Industrial Management	MI	Masters degree	29
Northeastern State University	Industrial Engineering	OK	Bachelors degree	29
Montana State University-Bozeman	Industrial/Manufacturing Engineering	MT	Bachelors degree	29
Washington State University	Engineering/Industrial Management	WA	Masters degree	29
Devry University-Missouri	Purchasing, Procurement/Acquisitions and Contracts Management	MO	Masters degree	29
United States Air Force Academy	Operations Research	CO	Bachelors degree	29
University of Nevada-Reno	Logistics and Materials Management	NV	Bachelors degree	29
Georgia College and State University-Robins Air Force Base	Logistics and Materials Management	GA	Masters degree	29

Institution	CIP Description	State	Degree	Grads.
Phillips Community College of the University of Arkansas	Industrial/Manufacturing Technology/Technician	AR	Award of less than 1 academic year	29
Morehead State University	Industrial/Manufacturing Technology/Technician	KY	Bachelors degree	29
Texas A & M University-Kingsville	Industrial/Manufacturing Technology/Technician	TX	Bachelors degree	28
University of Miami	Industrial Engineering	FL	Masters degree	28
Colorado State University	Industrial/Manufacturing Technology/Technician	CO	Bachelors degree	28
North Carolina A & T State University	Industrial/Manufacturing Technology/Technician	NC	Masters degree	28
Western Michigan University	Industrial/Manufacturing Engineering	MI	Masters degree	28
North Dakota State University-Main Campus	Industrial/Manufacturing Engineering	ND	Bachelors degree	27
University of Washington-Seattle Campus	Industrial/Manufacturing Engineering	WA	Bachelors degree	27
Case Western Reserve University	Engineering/Industrial Management	OH	Masters degree	27
Pennsylvania State University-Main Campus	Industrial/Manufacturing Engineering	PA	Masters degree	27
New England Institute of Technology	Industrial/Manufacturing Technology/Technician	RI	Associates degree	27
University of Arizona	Systems Engineering	AZ	Bachelors degree	26
University of Southern California	Industrial Engineering	CA	Bachelors degree	26
University of Minnesota-Duluth	Industrial Engineering	MN	Bachelors degree	26
University of Missouri-Rolla	Systems Engineering	MO	Masters degree	26
Mississippi State University	Industrial/Manufacturing Engineering	MS	Bachelors degree	26
United States Military Academy	Engineering/Industrial Management	NY	Bachelors degree	26
University of Louisville	Industrial/Manufacturing Engineering	KY	Masters degree	26
Trinidad State Junior College	Industrial/Manufacturing Technology/Technician	CO	Award of at least 1 but less than 2 academic years	26
Wayne State University	Logistics and Materials Management	MI	Bachelors degree	26
Berea College	Industrial/Manufacturing Technology/Technician	KY	Bachelors degree	26
Duquesne University	Logistics and Materials Management	PA	Bachelors degree	25
Louisiana State Univ & Ag & Mech & Hebert Laws Ctr	Industrial/Manufacturing Engineering	LA	Bachelors degree	25
Suny at Buffalo	Industrial Engineering	NY	Bachelors degree	25
California State Polytechnic University-Pomona	Industrial/Manufacturing Engineering	CA	Bachelors degree	25
University of Pittsburgh-Main Campus	Industrial/Manufacturing Engineering	PA	Masters degree	25
Rochester Institute of Technology	Industrial/Manufacturing Engineering	NY	Bachelors degree	25
Southeastern Louisiana University	Industrial/Manufacturing	LA	Associates degree	25

Institution	CIP Description	State	Degree	Grads.
	Technology/Technician			
Northeastern University	Engineering/Industrial Management	MA	Masters degree	25

Appendix 5. Results of Qualitative Interviews

Executive Interviews

Organization	Where there are shortages	What drives hiring;	Experience vs. education	How they recruit	Georgia vs. other states	Relationship with universities
3PL	Primarily middle management positions Degreed professionals for long-term management development (“bench-strength”), particularly with some type of logistics education; candidates must have grasp of operations; does not typically recruit from GT because students are more engineering oriented	Some hiring done for building “bench strength,” management succession Most hiring is direct result of new business, which can change quickly New facilities must sometimes be opened very quickly, as little as 2 weeks	Degrees ideal for low-level managers, required for middle and up At least 1 year experience for low-level managers, who manage hourly employees; 3 to 5 years required for managing supervisors Mix of internal experience and industry/business knowledge ideal when opening new facilities Persons coming out of college without experience do not understand how to manage people, how to communicate with and motivate workers	Through recruiters and internet, as well as internally	Entry-level talent is adequate in Georgia Neither surplus or shortage of logistics talent, except experienced, degreed persons who can move up the management ladder Have not lost people to logistics positions in other locations, re-locations are primarily due to personal reasons; generally the opposite is true: persons in logistics move to Atlanta	Recruits only from universities with formal undergraduate logistics programs; does not recruit from Georgia universities Recruits all levels of students, including Ph.D.s (rarely) University programs need to be more specific to logistics and supply-chain management; must cultivate management and leadership skills; must have an internship program Technical schools only used for existing employees who have management potential but no secondary education Willing to consider

Organization	Where there are shortages	What drives hiring;	Experience vs. education	How they recruit	Georgia vs. other states	Relationship with universities
						<p>in-kind contribution to universities; already working with Clayton State, has worked on GT student projects, would enjoy working with larger universities</p> <p>Interested in working with HBCU, need diversity in upper-level position (industry-wide)</p>
IT	None, occasional needs for specific skills in development engineering (e.g., experienced Windows CE programmer)	Growth and attrition, both are slow and steady Approximately 3 positions currently open only because the hiring cycle time	Degrees generally required for R&D positions, also require a minimum of 4-5 years experience Experience is more important than education for other positions	Recruiters and HR staff No problems finding personnel Not an issue Some hiring from universities and tech colleges	Adequate to good Not an issue	<p>Have hired a fair number of GT grads and use GT interns, also hire from other tech-oriented schools</p> <p>Programs are adequate</p> <p>Make use of seminar programs (Logistics Institute, etc.) for high-potential personnel, feedback from programs has been good</p> <p>Would like to see more RF</p>

Organization	Where there are shortages	What drives hiring;	Experience vs. education	How they recruit	Georgia vs. other states	Relationship with universities
						technology training programs at tech colleges Interested in university partnership on a limited, non-monetary basis
3PL	Transportation management and logistics sales, particularly with experience General talent Largest numeric needs for drivers and warehouse personnel	Acquisitions Long-hours for executives; hiring contract labor	Both degrees and experience required for management positions	Interpersonal networking for higher level positions, some use of recruiters Ads and internet used to recruit lower level positions	Entry-level talent is good Not an issue	No relationships, but approaching GT Would like to see both university and college programs augmented, particularly freight brokerage training in tech colleges Very interested in partnership with universities
3PL, IT	Creative, critical thinkers with industry experience	Business growth and attrition Concerned with "logistics of people," getting talent to the right place quickly, this is a business imperative	Degrees required for all positions, logistics-related experience desired; both can be from diverse sources	Various	Not an issue	Extensive partnerships Hire from universities Students need to cycle between the classroom and marketplace more rapidly; such students could be source of business intelligence for

Organization	Where there are shortages	What drives hiring;	Experience vs. education	How they recruit	Georgia vs. other states	Relationship with universities
						universities
Transportation provider	<p>Experienced, lower-level personnel: agents and drivers</p> <p>Higher-level personnel with combination of technical and leadership skills, experience/ability to work in large-scale operations</p> <p>Persons with strong general work skills and logistics experience, largest shortages in drivers and experienced managers</p> <p>Current need for import agent, import agent, and customs clerks</p>	Customer demand, business growth, attrition, corporate objectives	Experience is much more important, degrees desired for managers and supervisors	<p>Various</p> <p>Constantly networking and interviewing constantly</p> <p>Hire from competitors</p>	<p>Only an issue for persons with experience working in large, high-volume operations</p> <p>Entry-level talent is adequate</p> <p>No surpluses or shortages, but not a lot of interest in the industry in workforce</p> <p>Generally easy to recruit people to Atlanta, away from other major metros</p> <p>Not an issue</p>	<p>Has no relationship with universities or colleges, and does not generally hire from them</p> <p>University grads tend to have high salary expectations and no experience</p> <p>Training is a huge investment, personnel must have a long-term commitment</p> <p>Would like to see programs that give students experience, part-time jobs in logistics</p> <p>College can be important for basic skills, learning ability, and general business knowledge</p> <p>Students should be informed about opportunities in logistics, but must have reasonable expectations about</p>

Organization	Where there are shortages	What drives hiring;	Experience vs. education	How they recruit	Georgia vs. other states	Relationship with universities
						salary and career path Is interested in recruiting from universities
Trucking, 3PL	Shortages is highly trained, certifiably qualified personnel at both the low end (truck drivers, fork lift operators, warehouse workers) and high end (operations research and management, systems engineering, programming, etc.)	Customer requirements and productivity. Constantly pursuing major business (USPS, LG Electronics, Home Depot are recent customers)	Experience and education are both essential, although exact combination varies by customer needs, person and circumstance High-end employees require education in accounting, systems engineering, and computer programming, but must be familiar with customers, their needs and businesses Low-end employees have to have experience and training, now including haz-mat, quality, computers, etc. Quality, ethics, and leadership are important areas for training/education	Primarily from within, via development and succession planning and training/education, and from competitors	Entry-level personnel is adequate Georgia is a favorable location because of industry opportunity, climate, and presence of major metro Atlanta competes with Memphis, Nashville, Louisville, Cleveland, Columbus, Dallas, Chicago	Interviewee is adjunct faculty for two universities, including Georgia Tech Uses interns and co-ops, and has hired undergrads from GT, UGA, Emory Seeking greater diversity in hiring, especially women and minorities Sees need for more education in ethics, leadership, and quality Low-level workers need computer and systems skills
Logistics	Truck drivers, logistics,	The need to fill	Need mid-level	Multistate search	Maritime college	Work with Georgia

Organization	Where there are shortages	What drives hiring;	Experience vs. education	How they recruit	Georgia vs. other states	Relationship with universities
Infrastructure Manager	warehouse workers. Higher demand for scheduling and planning of cargo movement to distribution warehouse Well rounded, understands, business acumen, can beyond a standard business model. Understands multiple transportation modes. Not as much the maritime/marine workers,	land-based demands.	management with an industry background.	Competition for experience and industry familiarity is fierce. Cannot rely on other in-state locales.	level institutions in the states, whether its SUNY or maritime academy. Landside support network is Georgia's largest gap today. Use University of Tennessee and Arizona.	Southern, UT, Arizona.

Academic Interviews

	Strengths	Challenges	Who Hires Graduates	Suggested Initiatives
1	Technical capability, engineering Multinational firm linkages	MLOG at MIT Not well known business program vs. University of Tennessee Lack of strategic business courses Lack of undergraduate program	Multinationals 3PLS Large retailers with many outlets Shippers	MBA+Masters in Engineering Scholarship to retain logistics graduates RFID and information systems Modular curriculum development
2,3	Professional development, Executive programs Multinational firm linkages	Lack of understanding of international logistics issues	International firms Multinationals	Risk Mitigation International Logistics Lean Logistics Logistics portal
4	Some capability in undergraduate business programs Maritime Logistics Innovation Center	Best known programs are out of state: U Tenn, Michigan State, Arkansas, North Florida Lack of academic expertise in maritime logistics Not enough logistics-faculty in any business program Logistics is a discipline, not a skill to be taught	Large firms in Atlanta	Incorporate logistics into core business curriculums Support offer of doctoral level logistics program in Georgia business school Cooperative professional development programs merging business and technical aspects of logistics Draw on existing professional association toolkits
5	Proximity to the Atlanta airport Proximity to distribution firms Advisory board of businesses Some capability in undergraduate business programs It is a competitive advantage for logistics firms to have someone	Best programs are not in Georgia: Penn State, Ohio State, U of Tenn, Michigan State Lack of faculty resources to create an accredited major Logistics is a discipline, not a skill to be taught	Entry level front line supervisory positions Inventory mgt. Fleet mgt. Freight forwarders Distribution centers Warehouses	Offer an undergraduate business concentration in logistics Need at least 3 faculty for this.

	Strengths	Challenges	Who Hires Graduates	Suggested Initiatives
	<p>with a college degree who can see the big picture</p> <p>Most graduates with logistics education want to stay in Georgia</p>		<p>Trucking lines</p> <p>Customs house brokers</p>	
6	<p>Is an important industry in Georgia</p> <p>An increasing number of positions in logistics require college education (growth of IT and importance of linking supply chain)</p>	<p>No undergrad course in logistics</p> <p>Embedding logistics in existing discipline limits possibility of tenure</p> <p>Logistics is a discipline, not a skill to be taught</p>	<p>Industry is probably filling positions with graduates from out-of-state institutions</p>	<p>Most important to have good undergraduate logistics business program (need 3 faculty)</p> <p>Program should be broad-based: transportation, warehousing, purchasing, modeling, network design (Penn State is a model)</p> <p>Embed logistics into business core curriculum</p> <p>Draw on existing professional association toolkits</p>