National Center for Supply Chain Technology Education

RESOURCES FOR EDUCATION & INDUSTRY

Supply Chain Technicians in the U.S.

Nationwide Employer Survey Results

MAY 2013

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RESOURCES FOR EDUCATION & INDUSTRY

The distribution centers of tomorrow require highly trained supply chain technicians to operate and maintain complex robotics and conveyor systems. The NSF National Center for Supply Chain Technology Education is working towards facilitating real time alignment between community college programs and industry needs. Once achieved, supply chain technicians will be prepared with portable (stackable) certifications poised for successful careers. Small businesses will be able to adopt emerging technologies and companies with multiple locations will receive consistently trained technicians across state lines. The speed and accuracy of goods movement will increase while producing a more efficient process. As a result of this important work, the use of technology will expand. Workers skills will be enhanced and the efficiency of our nation's supply chain will improve.

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The Centers of Excellence is an initiative of the California Community Colleges' Economic and Workforce Development Program. In partnership with business and industry, Centers deliver workforce research customized for community college decision making and resource development.

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Executive Summary

The National Center for Supply Chain Technology Education (SCTE) and the California Centers of Excellence recently embarked on a research study to gather information and analyze national trends related to the emerging occupation of Supply Chain Technicians. In a field where business success hinges on competiveness and efficiency, Supply Chain Technicians play an important role in the smooth functioning of warehouses and distribution centers. These technicians oversee a variety of software and equipment related to mechanical, applied electronics, manufacturing, automated systems, and information technology.

Research included identifying geographic concentrations of supply chain activity in all 50 states as well as analyzing employment numbers, sales volume, and the most common industries associated with warehouses and distribution centers. Information on workforce challenges was gathered, and data was collected regarding future employment needs. For the purpose of this study, 625 businesses with warehouses or distribution centers were surveyed nationwide. A mixed method of online and phone questionnaires was utilized to obtain employer responses. Also, a targeted survey of companies that provide supply chain technology and equipment looked at types of technology or equipment offered Supply Chain Technician employment, and technician training.

In the United States, there are an estimated 160,000 businesses represented by industry codes that potentially include warehousing activities. Together, these businesses account for more than $8 trillion in revenue and the employment of 30 million workers. California and Texas lead the nation with the most businesses, greatest number of employees, and largest sales volume.

Current employment for Supply Chain Technicians is estimated to be 203,000. However, over the next two years this field is expected to grow at a significant rate. The employers surveyed project an increase of 30%, or an additional 61,000 jobs in 24 months. Approximately one-third of businesses surveyed expect to increase the number of Supply Chain Technicians they employ.

Our survey also revealed that the top three activities for the businesses engaged in supply chain activities are trucking (freight transport), distribution and manufacturing. These businesses prefer that Supply Chain Technicians have forklift, OSHA, and American Production and Inventory Control Society certifications. Businesses also identified the top skill areas for Supply Chain Technicians. These areas encompass maintaining systems, directing maintenance, maintaining equipment, and operating equipment.

The study concludes that Supply Chain Technicians is a new occupation and therefore there are many divergent opinions among employers about many aspects of this job, including education and training requirements. Clarifying and defining the training/educational obtainment required is an important area of future investigation, and the National Center for SCTE is charged with leading the analysis.

Considering the early stage of development of this occupation, specific recommendations for community colleges include the following: 1) colleges are advised to start building programs to prepare graduates for Supply Chain Technician jobs as this occupation is expected to experience high percentage growth in the next two years; 2) colleges that embark on this path should be located in the states with high concentration in supply chain employment, including California, Texas, Florida, New York, Illinois, Pennsylvania, Ohio, Michigan, North Carolina, Georgia, New Jersey, Wisconsin, Virginia, Massachusetts, Indiana, Minnesota, Tennessee, Washington, and Missouri; 3) variability in skill, education, and certification requirements reported by respondents is warranting a model curriculum to be developed and shared with the community colleges nationwide; 4) colleges should review existing program offerings as many traditional industrial technology skill sets can provide the foundation for a supply chain technician training program, and 5) the four functional skill areas that were overwhelmingly confirmed by employers--operate equipment, maintain equipment, direct maintenance, and maintain systems--should be used by existing certification agencies as a foundation for developing Supply Chain Technician certifications.

Introduction

With the rise in automation, the logistics industry is moving away from traditional blue-collar manual labor toward highly skilled, technical jobs that involve the operation and maintenance of highly automated material handling systems. In the past, warehouses offered labor-intensive, minimum-wage jobs, but those positions are being replaced as technological innovations become more advanced. The modern warehouse or distribution center has white-collar and gray-collar positions for technicians who can maintain sophisticated equipment and software. While these jobs are better paying, with salaries of about $40,000-$50,000, there are fewer.[1]

In the 1990s, the term "supply chain management" became widely used to describe the approaches needed to integrate suppliers, manufacturers, warehouses, and customers, so that merchandise is produced and distributed "at the right quantities, to the right locations, and at the right time."[2]

Complex technologies are becoming increasingly important to logistics companies that are under pressure to constantly improve speed, accuracy, production, and efficiency. This is particularly important in the retail industry, where online orders have placed greater pressure on fast processing and delivery, and for food distribution, where profit margins are shrinking. E-commerce has been a game changer as companies take online orders and ship individual packages. This new way of doing business is overtaking the traditional practice of shipping single item pallets to retailers.

Today's businesses are grappling with shelf-life issues, pricing issues, and storage issues, all of which are being driven by technological changes.[3] To meet these new challenges, distribution centers and warehouses are turning to high-tech inventory control systems and material handling equipment. These supply chain technologies enable goods to be manufactured, assembled, and distributed effectively.[4]

The debacle with the U.S. Air Force's redesign of logistics software in December 2012 illustrates how important supply chain management systems have become to the functioning of businesses and governmental entities. It also shows how expensive it can be if supply management systems are not designed properly. The six-year modernization of the Air Force's logistics software cost $1 billion and had to be scrapped when the government learned it would cost another $1 billion to complete the project.[5]

Regional Logistics Hubs

The epicenter of the logistics industry, a $1.28 trillion industry, is California's Inland Empire, a region just 60 miles east of Los Angeles.[6] This "bustling trade gateway" is the nation's largest logistics hub, a $300 billion industry employing 200,000 people.[7] In Southern California, seven out of the top 10 ZIP codes that specialize in logistics employment are concentrated in the Inland Empire.[8] Nearly 2,900 warehouses, of at least 50,000 square feet each, have been constructed there.[9] Collectively, these warehouses encompass 380-million square feet of space.[10] Goods imported from Asia are funneled to the region from the Ports of

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[1] Lorenzo, George. (2012, Sept. 26) New ATE Center Geared toward Meeting Need for Better Educated and Higher Skilled Supply Chain Technicians. Training Industry.com.
[2] Khan, Mohammad Zubair, Omar Al-Mushayt, Jahangir Alam, and Jorair Ahmad. (2010) *Intelligent Supply Chain Management. Journal of Software Engineering & Applications*, Vol. 3: 404-408.
[3] Lorenzo, George. (2012, Sept. 26) New ATE Center Geared toward Meeting Need for Better Educated and Higher Skilled Supply Chain Technicians. Training Industry.com.
[4] Ibid.
[5] Stross, Randall. (2012, Dec. 8) *Billion-Dollar Flop: Air Force Stumbles on Software Plan*. New York Times.
[6] Gilmore, Dan. (2012, June 14) *Supply Chain News: State of the Logistics Union 2012*. Supply Chain Digest.
[7] Medina, Jennifer. (2012, July 22) *As California Warehouses Grow, Labor Issues Are a Concern*. The New York Times.
[8] Sarkar, Avijit. (2011, June 13) Is Southern California too dependent on logistics? The Institute for Spatial Economic Analysis, University of Redlands School of Business.
[9] White, Ronald D. (2009, July 1) *Unions hope to organize Inland Empire warehouse workers*. The Los Angeles Times.
[10] Cuevas, Steven. (2012, May 15.) *What's driving the Inland Empire's warehouse boom?* The Madeleine Brand Show.

Los Angeles and Long Beach for distribution to the rest of the country. In 2006, 40% of the nation's containerized imports moved through these two ports.[11]

According to John Husing, a regional economist, logistics is the fastest growing segment of the Inland region's economic base due to booming international trade and since 42% of imported goods enter the nation through the two ports.[12]

Other regional centers across the nation include Texas, Ohio, New York, and Florida. According to a report by the Institute for Spatial Economic Analysis at the University of Redlands, the logistics sector has the potential to have a sizeable impact on local economies:

> *"The logistics sector can help to propel local economies with industries that make extensive use of logistics, such as certain specialized manufacturing industries with a large import or export share. Those local industries can leverage that specialization as a competitive advantage relative to competitors in regions with a lower specialization in logistics."*[13]

Meanwhile, a new agreement between Maersk and BNSF is expected to reinforce the role that West Coast distribution hubs play in transporting goods overland to the East Coast, because the deal guarantees service times for inbound goods arriving in Los Angeles that are bound for Chicago, Dallas, Memphis, and Omaha. This will make the land-bridge route to the East Coast quicker and more reliable.[14]

Although there is some concern that the expansion of the Panama Canal could decrease shipping traffic to the ports of Los Angeles and Long Beach, some experts believe the region will remain the predominant entry point for goods from Asia. While the Panama Canal expansion could lower the transportation costs of larger ships traveling to East Coast ports, this threat may not be substantial as ocean vessels are slow and overland shipping may remain a faster option.[15]

Who are Supply Chain Technicians?

Supply Chain Technicians comprise an emerging occupation that is a response to the technological innovations reshaping the field of supply chain management. This occupation is increasingly important for the smooth functioning of warehouses and distribution centers, where business success and vitality hinges on competiveness and efficiency.

Supply Chain Technicians are responsible for installing, operating, supporting, upgrading or maintaining the hardware, software, automated equipment and systems that is needed to support the supply chain. Five areas of expertise have been identified for Supply Chain Technicians (Figure 1). However, it is not enough for a technician to be proficient in just one area.[16]

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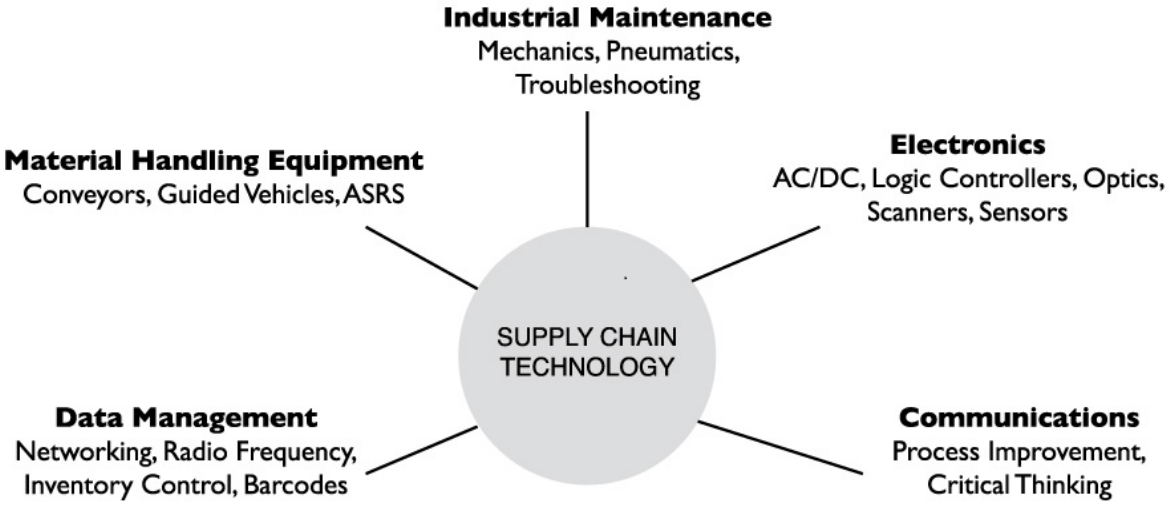
[11] *Advancing goods movement through the Inland Empire*. (May 2009) Published by Southern California Association of Governments, Western Riverside Council of Governments and Riverside County Transportation Commission.
[12] Cuevas, Steven. (2012, May 15.) *What's driving the Inland Empire's warehouse boom?* The Madeleine Brand Show.
[13] Sarkar, Avijit. (2011, June 13) Is Southern California too dependent on logistics? The Institute for Spatial Economic Analysis, University of Redlands School of Business.
[14] McCauley, Douglas, Brad Umansky, Paul Galmarini, Frank Vora, Steven Bellitti and Alex Mogharebi. (April 2012) *Market Highlight*. Western Real Estate Business.
[15] Ibid.
[16] Fleming, Kevin J. and Ned D. Young. 2012, Oct. 25. '*Supplying' Workforce Needs: The Creation of the National Center for Supply Chain Technology Education*. Paper presented at the Joint Conference of the American Association of Community Colleges and the National Science Foundation.

Figure 1 – Five Areas of Expertise of Supply Chain Technicians



Supply Chain Technicians are involved in industries including the public sector, such as the Department of Defense, and the private sector, such as the pharmaceutical industry and food processing industry. For retailers, these technicians play a role in maintaining inventory levels so that companies can keep pace with demand. Supply Chain Technicians play a critical role in the processing and distribution of cargo at the nation's major ports as well as the distribution of goods to major railroad and trucking hubs.

Technicians must be well-versed in new technologies that are constantly evolving. Companies are turning toward these new technologies to keep distribution costs down and to reduce prices for consumers. But in some cases the software can be expensive and it can take time to train employees.[17] Newer technologies include radio frequency identification (RFID), Bluetooth connectivity, speech recognition software, digital imaging, portable printing, and two-dimensional bar coding.[18]

Why study Supply Chain Technicians?

The National Center for Supply Chain Technology Education was established to help meet industry's need for highly skilled supply chain technicians. There are currently too few trained workers to meet the demand for technicians with the skills to keep the modern supply chain humming. As a result, the center's goal is to increase the number of qualified Supply Chain Technicians by 14,000 over the next three years. Until this study, the growing demand for skilled Supply Chain Technicians had not been measured.

This study is the first of its kind to not only define the role of Supply Chain Technicians, but to also examine employer hiring preferences for this emerging occupation. We believe the size and importance of industries and employment related to supply chain technology has never been measured before in the United States. This report provides high-level statistics on the geographic concentrations of the supply chain industry, as well as the projected employment for Supply Chain Technicians and the skills and education levels that employers find most valuable.

The information from this study can be used by community colleges to inform the development of skills-based educational pathways and new curricula. It can also be applied to professional development for faculty. Ultimately, the information included in this report can be used to support the development of highly skilled technicians to meet the future workforce needs of distribution centers and warehouses.

[17] Rafter, Michelle. (2008, May 1) *Let's get visible: Supply Chain Technology*. Inc. Magazine.
[18] Intermec Technologies Corporation. (2011) *Top 10 Supply Chain Technology Trends (White Paper)*.

Methodology

The study was broken into several parts. First, a geographic analysis of industry concentration was conducted. Data were derived from the 2012 InfoUSA business database through Esri Business Analyst Software. The criteria used to identify relevant data included location, minimum business size, and relevant North American Industry Classification System (NAICS) codes[19]. Businesses with 50 or more employees at a given location were sampled. The sampling plan was based on ensuring proportional representation of businesses in the key states with the largest concentration of the identified industries.

To help understand employer needs, a survey of 625 distribution centers and warehouses nationwide was conducted. With a margin of error of +/-3.9%, this sample size allows a confidence level of 95%. For the purpose of conducting the study, Supply Chain Technicians were also referred to as support/repair/maintenance technicians. Employers were asked for information concerning the occupation of supply chain technicians, namely current employment levels, future hiring expectations, job functions, in-demand skills, and education requirements for hiring.

Due to the proliferation of outsourcing and the emerging need for these skilled technicians, a third component involved a smaller survey of vendor companies. Vendors were asked about the type of product or service they provide to warehouses and distribution centers, what specific technologies they use, how they train their technicians, and how many Supply Chain Technicians they employ.

Appendix A provides more detail on study methodology.

Industry Overview

Our data analysis identified approximately 160,000 businesses with 50 employees or more in the United States that could potentially have supply chain operations and employ supply chain workers. Collectively, these businesses account for more than $8 trillion in revenue and employ nearly 30 million workers.

When identifying businesses affiliated with the nation's supply chain, a number of industries need to be studied. Considering that warehousing and goods movement activities often occur in businesses classified under industries other than transportation and warehouses, we took a broad approach to including industries potentially pertaining to supply chain operations. Nine sectors (2-digit NAICS codes) and specific industries within them (3-, 4-, and 6-digit NAICS codes) were identified as relevant. They include manufacturing, wholesale trade, retail, transportation and warehousing, agriculture, and other sectors (see Appendix A for a detailed list). However, only a portion of establishments in each industry identified has supply chain activities. The data collected for these NAICS codes need to be adjusted to only include businesses with warehouse/distribution operations. Therefore, the survey included these activities to establish whether or not a firm was qualified to participate in the study.

Supply Chain Industries

Among the supply chain-related industries identified nationwide, retail trade is the largest sector with 40% of all businesses and is the second largest employer with 8.5 million jobs, comprising 30% of total employment (see Appendix B for more detail). Manufacturing has the second greatest number of establishments (nearly 47,000) and is the second largest employer, 9.2 million jobs. Other large sectors include hospitals (4.5 million employees, 16% of total employment) and wholesale trade (3.4 million employees; 12% of total employment). Only businesses with 50 employees or more were included in the analysis.

However, when these numbers are adjusted to only include businesses with warehouses and distribution centers, the most prominent industries shift away from retail. Based on the survey results, an estimated

[19] North American Industry Classification System or NAICS is used by business and government to classify business establishments according to type of economic activity (process of production) in Canada, Mexico and the United States. Each establishment is classified to an industry according to the primary business activity taking place there.

47,000 businesses out of a total of 160,000 have warehouses or distribution centers (Table 1). Manufacturing dominates as the largest sector, with about 21,000 businesses. Nearly half of all businesses in this sector are affiliated with warehouses/distribution centers. Wholesale trade makes up the second largest sector with nearly 10,000 businesses, and retail rounds out third place with nearly 7,500 businesses.

Table 1. Industry size and employment adjusted to include only businesses with warehouses and distribution centers.

NAICS Code & Industry Description	Total number of Establishments	Percentage of businesses with warehouse/distribution centers	Estimated number of businesses with warehouse/distribution centers
11 Agriculture and Forestry (111 Crop Production; 112 Animal Production; 115 Support Activities for Ag. and Forestry)	1,655	24%	397
31-33 Manufacturing (all)	46,746	45.1%	21,082
42 Wholesale Trade (all)	22,410	44.4%	9,950
44-45 Retail Trade (all)	64,962	11.5%	7,470
48-49 Transportation and Warehousing (481 Air Transp.; 482 Rail Transp.; 484 Truck Transp.; 493 Warehousing and Storage)	6,003	47.6%	2,857
541614 Process, Physical Distribution, and Logistics Consulting Services	1,159	22.2%	257
622 Hospitals	7,518	27.8%	2,090
7211 Accommodation	7,194	22.8%	1,640
811 Repair and Maintenance	2,760	62.5%	1,725
	160,407		**47,468**

Sources: InfoUSA through Esri Business Analyst; Centers of Excellence – employer survey results.

Geographic Concentration

Businesses with the potential for supply chain operations and employment are located across all states, with the largest presence in California and Texas. More than 50% of supply chain businesses nationally are concentrated in the following 10 states, which are ranked by the greatest number of related businesses.

1. California
2. Texas
3. Florida
4. New York
5. Illinois
6. Pennsylvania
7. Ohio
8. Michigan
9. North Carolina
10. Georgia

California leads the nation with the most businesses, over 28,000, followed by Texas, with approximately 11,000. Florida and New York together comprise roughly half as many businesses as California, just over 8,000 each.

States with the greatest number of businesses also employ the greatest number of workers. Most of the top 10 states have the same ranking for both number of businesses and number of employees. For example, California ranks first for number of businesses and workers. Interestingly, however, Ohio ranks seventh by number of businesses, but third by employment. This is due to the fact that there is a higher concentration of large-size businesses for the industries surveyed in Ohio as compared to other states.

It should be noted that the map in Figure 2 depicts the businesses in relevant NAICS codes with 50 employees or more across the nation. The darker shades reflect higher numbers of businesses by state. Data used to develop the map are provided in Appendix B.

States that were not included into the top10, but that have a significant number of supply chain businesses, include New Jersey, Wisconsin, Virginia, Massachusetts, Indiana, Minnesota, Tennessee, Washington, and Missouri.

Figure 2. Map of supply chain-related businesses across the United States.

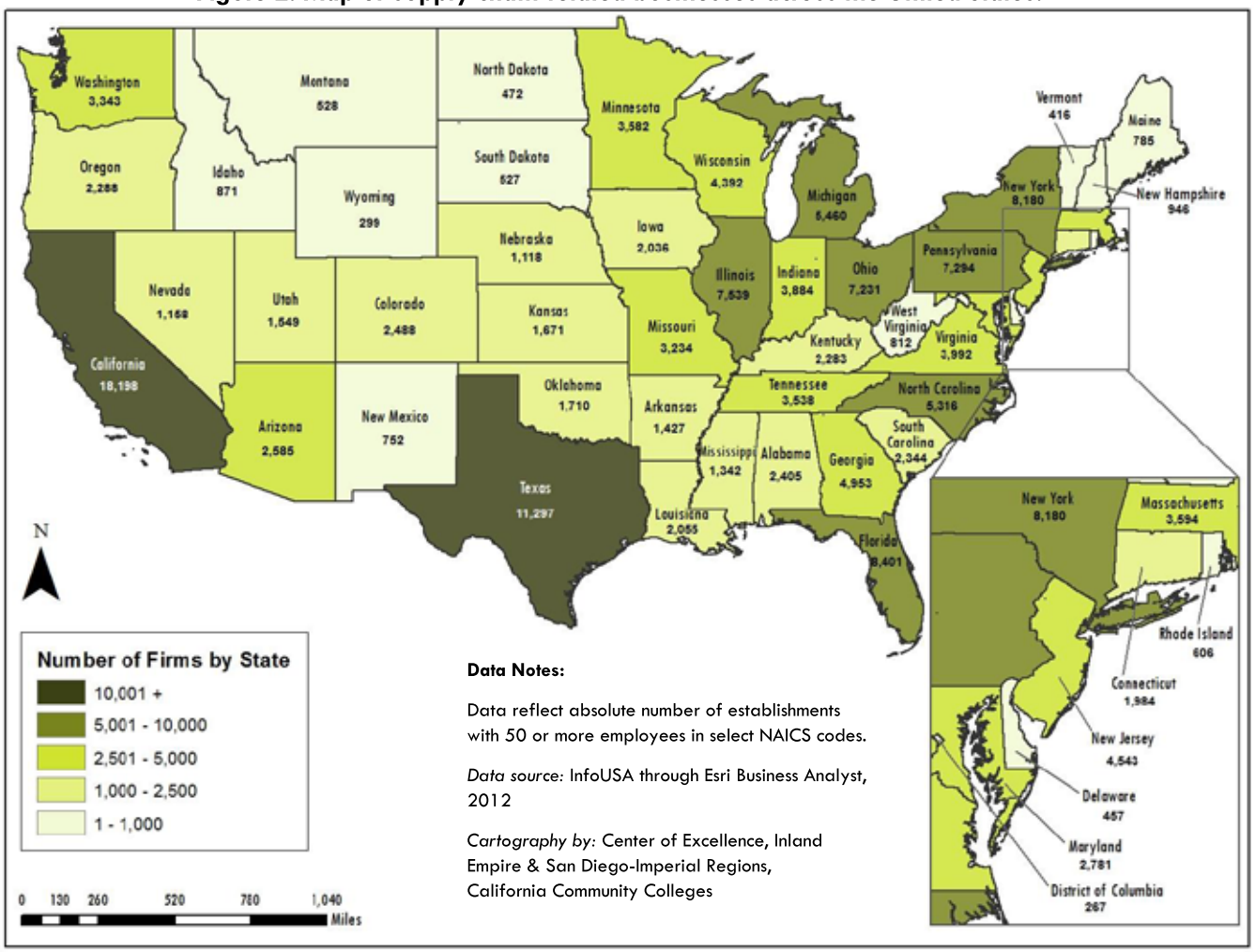
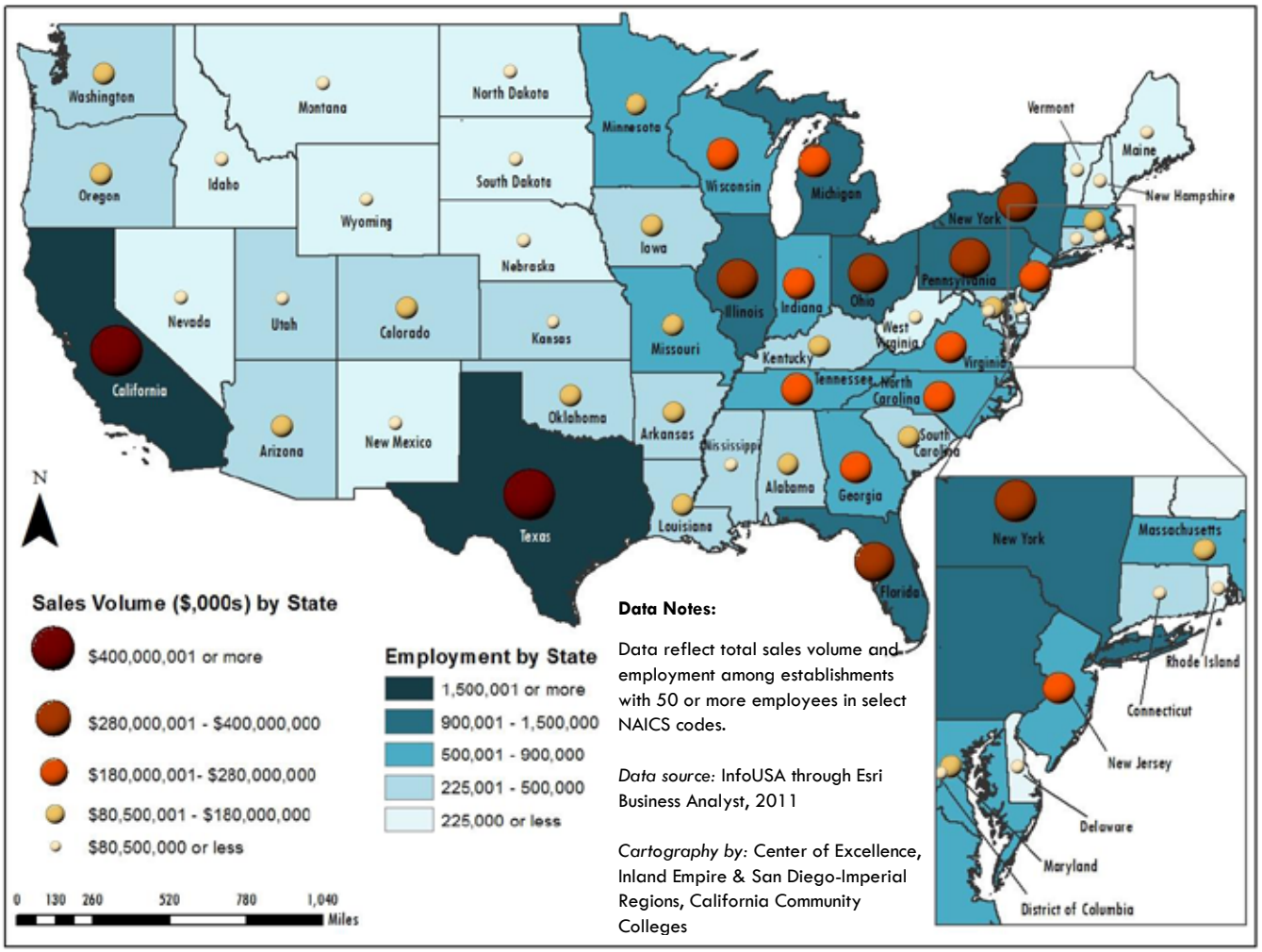


Figure 3 depicts the distribution of employment and economic activity (measured in sales volume) of businesses with potential for warehouses or distribution activity. Only businesses with 50 employees or more across the nation were included in the data. The darker shade within a state area reflects higher employment, while bigger and darker circles reflect higher levels of economic activity. Data table used to develop the map is provided in Appendix B.

California and Texas lead the nation with the largest volume of sales. Each state generates more than $400 billion in sales per year. Five states have the second largest sales volume, between $280 billion and $400 billion: Florida, Illinois, New York, Ohio, and Pennsylvania. The third tier of states, those that generate between $180 billion and $280 billion in sales, include Georgia, Indiana, Michigan, New Jersey, North Carolina, Tennessee, Virginia, and Wisconsin.

Likewise, California and Texas are also the largest employers in the nation, with 1.5 million workers or more. Florida, Illinois, Michigan, New York, Ohio, and Pennsylvania follow California and Texas in employing the most workers. Those states employ between 900,001 and 1.5 million workers.

Figure 3. Map of employment and revenue for supply chain-related businesses in the United States.



Characteristics of Warehouse/Distribution Centers

A separate component of the study targeted distribution centers and warehouses that employ Supply Chain Technicians. A total of 625 businesses with distribution centers/warehouses participated in our survey and provided information about employment needs, required education level for Supply Chain Technicians, and the technologies that are used by employed Supply Chain Technicians who are their employees. Appendix C details the questions asked of surveyed businesses.

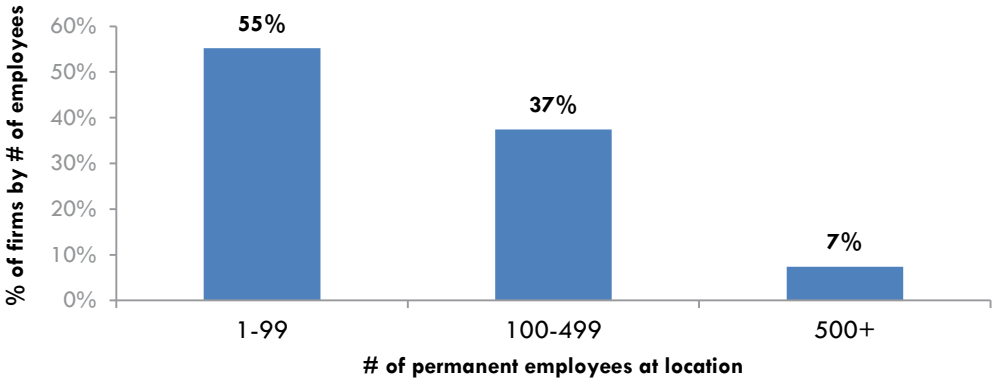
The three states with the greatest number of respondents were California, Texas, and Ohio. Together, responses from these three states represent one-quarter (1/4) of all responses, generally reflecting the

geographic distribution of supply chain employment. The top 10 states, by number of firm responses, are shown in Appendix B.

To understand the size of businesses that employ Supply Chain Technicians, the survey asked respondents how many permanent employees work at their location. Their responses were categorized into three distinct groups, shown in Figure 4.

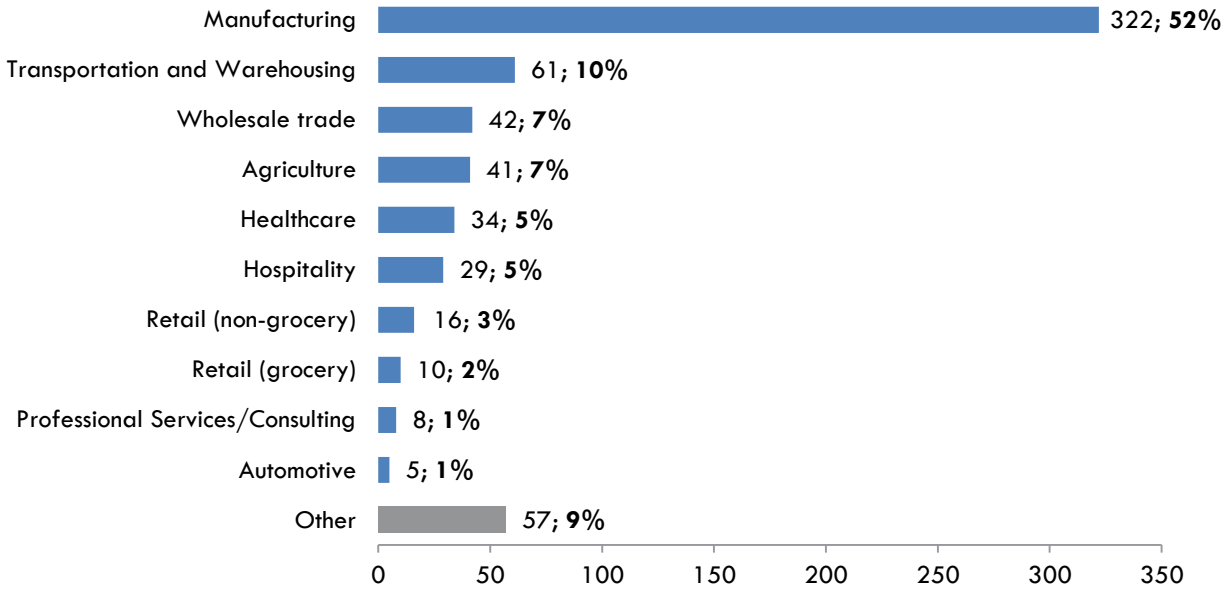
The U.S. Small Business Administration defines a small business as one that has fewer than 500 employees. Thus, the majority (92%) of warehouse and distribution centers that responded to the survey would be considered small businesses. The data reveal that just over half of the businesses (55%) employ between 1 and 99 permanent employees at their location. Thirty-seven percent of respondents have between 100 and 499 permanent employees. Only 7% employ more than 500 at their location.

Figure 4. Firm size by number of employees (n=625).



Within our sample size, 52% businesses identified as a Manufacturing firm, 10% as a Transportation and Warehousing firm, and 7% of respondents identified as either a Wholesale Trade or Agriculture firm (Figure 5).

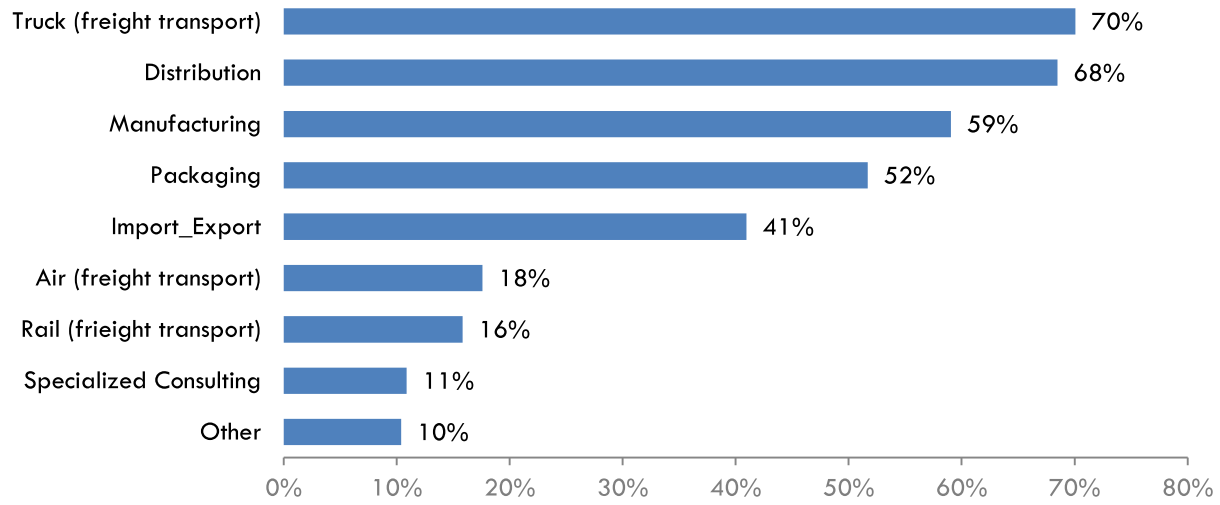
Figure 5. Businesses by industry type (n=625).



Survey participants also had the option of writing a different industry choice. More than 50 businesses opted to do so. Responses included construction, newspapers, logging, and hazardous waste. A full list of write-in responses is supplied in Appendix D.

Survey takers were given a list of common supply chain activities and asked to choose those in which they are involved. Respondents were allowed to choose more than one response. The majority (70%) of respondents are engaged in freight transportation by truck, while 68% indicated that their businesses are involved in distribution, and 59% handle manufacturing activities. The summary of responses is provided in Figure 6.

Figure 6. Supply Chain Activity Reported (n=625).
Multiple responses were permitted.



Businesses that participated in the survey provided additional activities in which they are involved (Table 2). The most common activities included health care, hospitality, and retail.

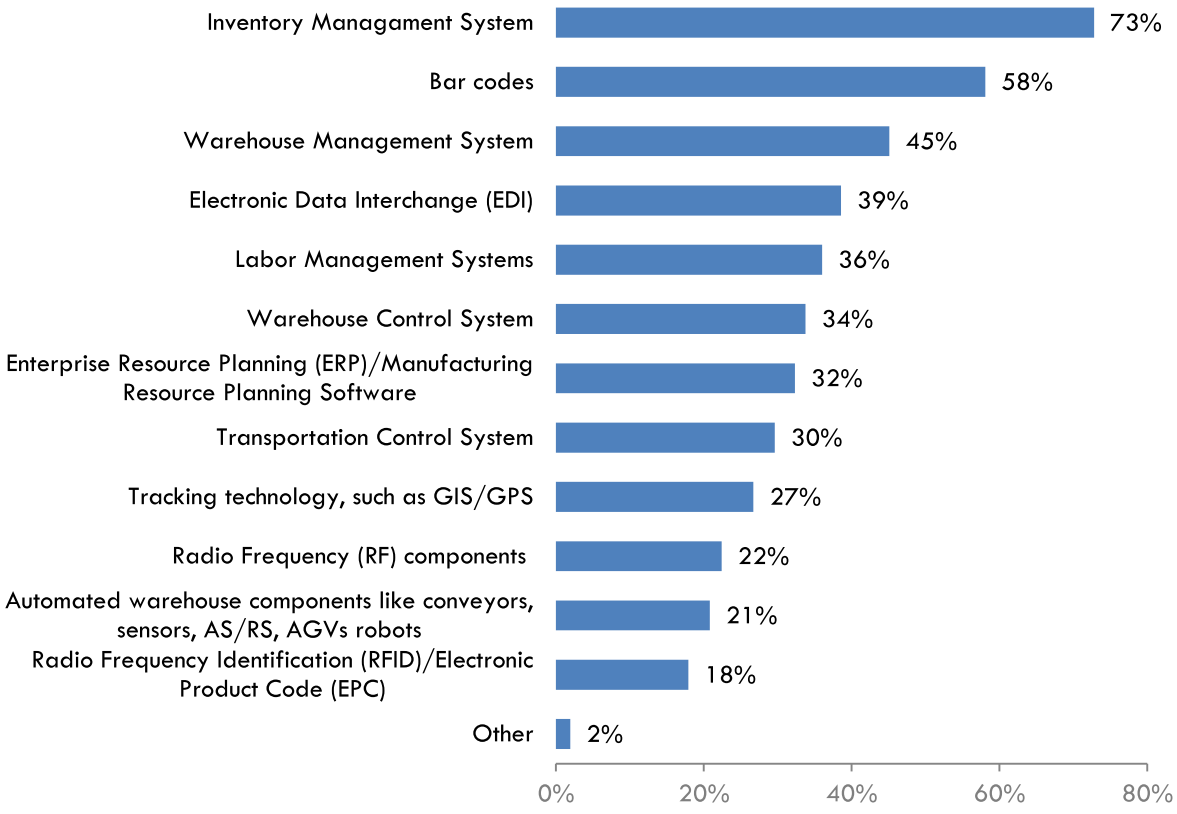
Table 2. Additional activities handled by warehouses and distribution centers participating in the survey. *Number of businesses participating in each activity is in parentheses.*

Health Care (18)	Fire Fighters (1)
Hospitality (16)	Just in delivery and Pick and Pak (1)
Retail (5)	Metal Finishing (1)
Construction (2)	Metal goods (1)
Management services (2)	Ocean (1)
Airplane maintenance (1)	Ordering supplies (1)
Bakery (1)	Private Golf Resort (1)
Basic Science Department (1)	Telecommunications Services (1)
Casino (1)	Sell big tractors (1)
Electrical Contracting (1)	Service and maintenance company (1)
Farming (1)	Shipping and Receiving out daily needs for operations (1)
Finishing aluminum (1)	

Supply Chain Technologies

Supply Chain Technicians implement a variety of technologies and equipment in warehouses and distribution centers. The survey asked supply chain businesses about the technologies or equipment that they are currently using or planning to use. Inventory Management Systems are being used by 73% of the responding businesses, 58% are using bar codes, and 45% are using Warehouse Management Systems (Figure 7).

Figure 7. Technologies/Equipment in use by supply chain businesses (n=625).
Multiple responses were permitted.



Other technologies used by distribution centers and warehouses that responded to the survey include:

- ADP
- Auditing systems
- CAD Technology
- Raymond System
- Tenant management systems
- Transportation Management Software

Supply Chain Vendors

A second, less wide-ranging survey was made available to companies that manufacture or develop software or other kinds of technological services for distribution centers and warehouses. The survey was distributed through the National Center for Supply Chain Technology Education network. These vendors were asked a series of questions to better understand the landscape of Supply Chain Technology and the scope of their services.

Ten vendor businesses completed the online survey. The companies that responded were located in seven different states. Table 3 details the names of the companies who responded to the survey as well as the states in which they are located.

Table 3. Location of vendor companies that responded to survey.

Company Name	State
Alien Technology	California
Danby Group	Georgia
Streator Dependable Mfg. Co.	Illinois
Stratum Global	Illinois
Twinlode Corporation	Indiana
Auto Craft Tool & Die	Michigan
Rotary Products Inc.	Ohio
Hy-Tek Material Handling	Ohio
Hänel Storage Systems	Pennsylvania
SI Systems	Pennsylvania

Vendor businesses were asked what type of product or service they provide to distribution centers or warehouses. Most vendors, 70%, provide material handling or storage equipment, while 40% develop software, and 30% provide hardware.

The survey then asked respondents to detail what specific technologies they supply to warehouses or distribution centers (Table 4). Half of vendor businesses provide Radio Frequency (RF) components, 40% provide both Automated Warehouse Components and Radio Frequency Identification (RFID)/Electronic Product Code (EPC) technologies. A number of companies provide more than one type of technology or equipment. For example, Stratum Global identified six categories and Auto Craft Tool & Dye identified four.

Table 4. The type of technology/ equipment provided to distribution centers or warehouses by each vendor that responded to the survey.

	Warehouse Control System	Transportation Management System	Inventory Management System	Bar Codes	Warehouse Management System	Radio Frequency Identification (RFID)/Electronic Product Code (EPC)	Automated Warehouse Components	Radio Frequency (RF) Components	Other*
Twinlode Corporation					x				
Rotary Products Inc.									x
Danby Group				x		x		x	
Auto Craft Tool & Die		x				x	x	x	
Hänel Storage Systems							x		
Streator Dependable Mfg. Co.									x
SI Systems	x								
Hy-Tek Material Handling					x		x	x	
Stratum Global			x	x	x	x	x	x	
Alien Technology						x		x	

* "Other" includes Loading Dock Equipment (Rotary Products Inc.) and Fabricated Containers/Racks (Streator Dependable Manufacturing Co.)

The survey also investigated how vendors train their technicians. Nearly 90% use in-house trainers, while 22% obtain customized training through a private company or consultant, and 11% through a local, two-year college. We asked vendors if they would be willing to share their training materials or training information with the National Center for Supply Chain Technology Education. Of the nine who responded, four said yes.

Occupational Employment

Using the responses gathered through the survey of 625 supply chain businesses, we were able to estimate the current employment and expected growth for the Supply Chain Technician occupation. Details and information used to determine these estimates are provided in Appendix E. Currently, there could be as many as 203,000 Supply Chain Technicians employed nationally. Over the next two years, employment is expected to increase by 30%, or 61,000 jobs, bringing total employment to 264,000 (Table 5).

Table 5. Current employment and projected growth for Supply Chain Technicians.

	Current Employment*	Projected Employment in 2 Years*	2-year Growth/ New Jobs*	% Growth
	Estimated for 47,500			
Sum	**203,000**	**264,000**	**61,000**	**30%**

* Overall nationwide employment and projections are estimated using the arithmetic mean from the sample of 625 businesses and approximate number of establishments in the U.S. that manage a warehouse and/or distribution center. Responses from statistical outliers were eliminated from the calculation of the means.

Current Employment

As part of the survey of warehouse and distribution centers, businesses were asked to tell us how many Supply Chain Technicians they currently have on staff. The majority (77%) of respondents employ between 1 and 10 Supply Chain Technicians (Table 6). Thirteen percent do not have any Supply Chain Technicians on staff. A small minority, 8 %, employ more than 10 Supply Chain Technicians. The average number of Supply Chain Technicians employed by respondents is 6.

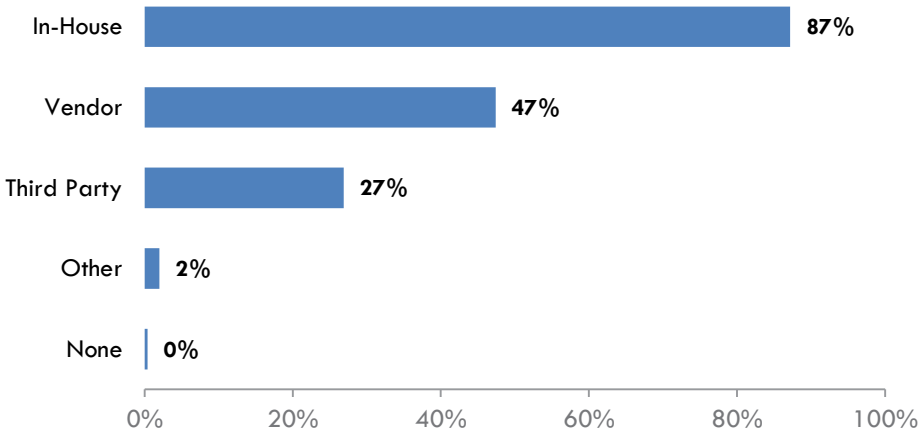
Table 6. Number of Supply Chain Technicians employed by survey takers (n=625).

Current number of supply chain technicians	Number of businesses responding	% of businesses responding
0	84	13%
1-10	484	77%
11-20	28	4%
21+	27	4%

As part of the smaller survey, we asked 10 vendor businesses about the number of Supply Chain Technicians they employ. One vendor reported employing 80 support technicians. The remaining of the respondents only reported employing between 0 and 8 Supply Chain Technicians.

To get a more complete picture of who is handling supply chain technological functions at businesses with warehouses and distribution centers, we asked survey participants to tell us who maintains and supports the technologies and equipment used at their location. Multiple responses were allowed to this question. In-house staff support was the most common response reported. Nearly 90% of businesses rely on in-house personnel (Figure 8). But 47% also employ external support from vendor companies. Nearly 30% of respondents said they use third-party, or external staff.

Figure 8. Type of technological maintenance and support used by supply chain businesses (n=625). *Multiple responses were permitted.*



The "Other" category includes:

- Combination of all
- Direct manufacturer
- In-house and external vendors

Future Need for Supply Chain Technicians

The survey also attempted to gauge potential employment growth for the Supply Chain Technician field. Businesses that operate warehouses and distribution centers were asked whether they anticipate needing to hire more Supply Chain Technicians, whether they expect to employ fewer technicians, or believe their current employment numbers will remain the same over the next two years.

The majority of businesses (60%) said they do not expect to hire more Supply Chain Technicians. About one-third of businesses, however, do expect to increase the number of Supply Chain Technicians they employ. Less than 7% said they expect to employ fewer technicians.

Of the 625 businesses who responded to the survey:

- 377 businesses (60%) indicated they would need about the same number of Supply Chain Technicians in the future.
- 206 businesses (33%) indicated a future need for more Supply Chain Technicians.
- 42 businesses (7%) indicated a need for fewer Supply Chain Technicians in the future.

Of the businesses that indicated they would need more Supply Chain Technicians and specified how many more (n=161 businesses), 43% said they would only need one additional technician over the next two years. Another 34% said they would only need two more technicians, and 19% said they would need to hire 3-5 technicians over the next two years (Table 7).

Table 7. The number of Supply Chain Technicians businesses will hire in the next two years.

Number of technicians needed in 2 years	Number of businesses responding
1	70
2	55
3	13
4	6
5	12
6	3
7	1
10	1

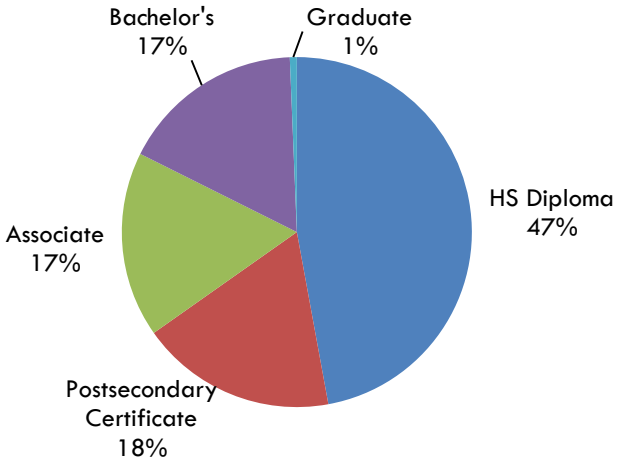
Education & Skill Requirements

The knowledge base required for supply chain technicians has become interdisciplinary in nature. Today's technicians must be well versed in the areas of industrial maintenance, electro-mechanical systems, and information technology.[20] To measure the type of education and skills needed for qualified Supply Chain Technicians, we used a number of survey approaches.

Minimum Education Requirements

First, a qualitative analysis of Supply Chain Technician education levels required by warehouses and distribution centers was conducted. Respondents provided information about the minimum education levels needed for employment at their businesses. Nearly one half of businesses require only a high school diploma for employment, while 18% require a postsecondary certificate and 17% require an associate degree (Figure 10). Also, 17% reported a need of a Bachelor's degree for this job. Such diversity in responses signifies the lack of consistency among employers and the true emergent nature of this occupation. Employers rely on workers with varying levels of educational preparation to perform the job of a supply chain technician.

Figure 10. Minimum education level required by businesses employing Supply Chain Technicians (n=624).



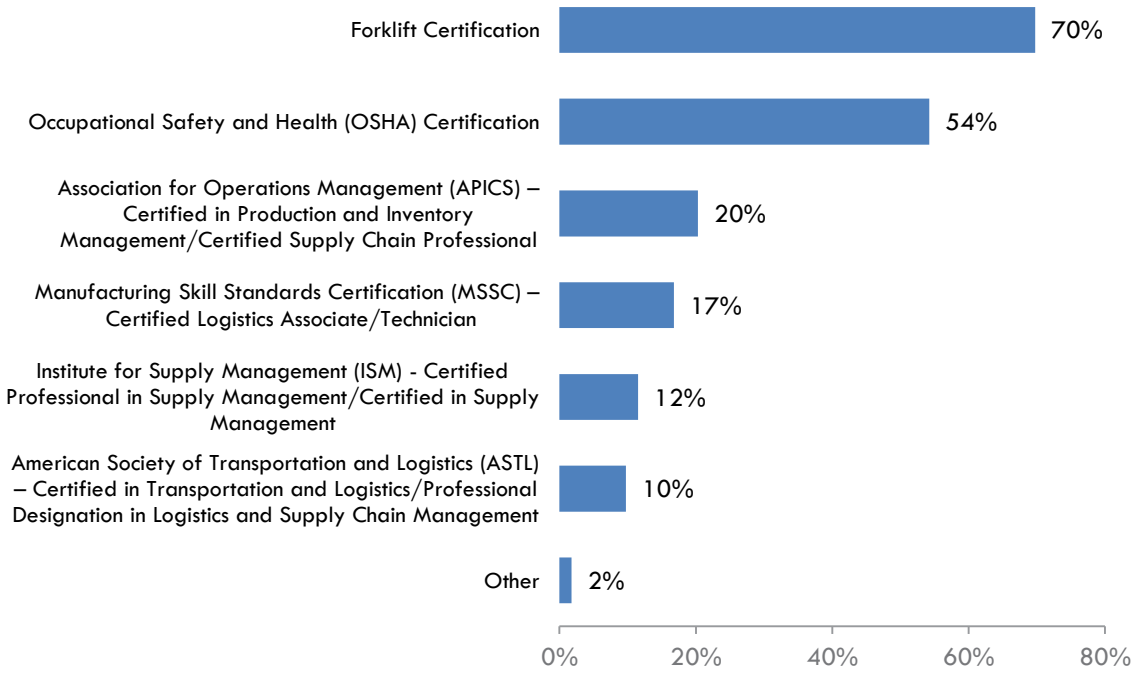
[20] Lorenzo, George. (2012, Sept. 26) New ATE Center Geared toward Meeting Need for Better Educated and Higher Skilled Supply Chain Technicians. Training Industry.com.

Our smaller survey of vendors revealed their hiring preferences regarding education as well. Thirty-seven percent require at least a high school diploma; 37% require a postsecondary certificate; 13% require an associate degree; and 13% require a bachelor's degree.

Certification Requirements

Businesses were asked which industry certifications were important for Supply Chain Technicians. Forklift certification is the most commonly preferred certification, with 70% of businesses selecting that option. Moreover, 54% of businesses find it important for Supply Chain Technicians to have OSHA certification, and 20% of businesses require APICS certification (Figure 11).

Figure 11. Certifications most in demand for Supply Chain Technicians (n=625).



Other certifications for Supply Chain Technicians reported by businesses include:

- Boom lift
- Crain operator certification
- Electrical licensure from state
- HAZMAT certification (required by two businesses)
- In-house, task-specific training
- ISO-type certifications
- State certification for purchasing

Through the survey, businesses had the opportunity to outline what type of training or certifications they would like to have available for Supply Chain Technicians at their locations. About half of all businesses responded that they did not know the answer, utilized vendors for supporting their supply chain technologies, or provided in-house training. There were 192 responses that were relevant. Table 8 provides a summary of the write-in responses by category. Detailed responses that were offered are supplied in Appendix F. Training in supply chain technologies and software (e.g. warehouse management systems and material handling software) as well as computers and information technology education were most desired, followed by basic skills and digital literacy training, general technical education or certificate, and hands-on technical training or apprenticeship.

Table 8. Training desired by supply chain businesses (n=192).

#	Training Needed by Employers	Number of Businesses
1	Supply Chain Technology/Systems	33
2	Computer/IT training	18
3	Basic Skills & Digital Literacy	14
4	Soft Skills/Customer Service	14
5	General / Technical School	13
6	Apprenticeship/Hands-on training	11
7	Online training	9
8	Mechanical training	9
9	Electrical/Electronics	9
10	New technology training	8
11	Maintenance Basics	8
12	Safety training	8
13	Crain and Forklift Training	6
14	Operating Equipment training	5
15	Manufacturing Process Training	5
16	Industry certification	5
17	Continuing Education	4
18	Other (International trade, management training, CAD, transportation and scheduling, etc.)	13

A number of businesses highlighted the importance of employees having company-specific or product-specific training. Some of the specific comments related to supply chain technology and/or software training included:

- *Material and software handling is very important*
- *Material moving, ERG*
- *Warehouse Management System*
- *Automated scanning system inventory system*
- *Build on top of training for a Raymond or Crown forklift with the IT piece for the WMS.*
- *Certification in applicable modules from WMS/ERP provider*
- *Programmable logic controls*
- *Expanded training in the management of inventory and supply chain*
- *Familiarity with servo motors, drives and controls. Also, how to read flow diagrams and other diagrams*
- *How to best utilize ERG systems to manage warehouse inventory*
- *Maintenance PM type training for mechanical and systems training for users and follow up on systems*
- *Need to be thoroughly trained for our SAP software*
- *Training from the ERG systems*
- *Supply chain equipment training, mostly is done through tech college*
- *Supply chain management training*
- *Training in conveyer systems*
- *Systems specific training.*
- *Systems training, Sysco, Juniper*
- *The biggest things are EDI, forklift training, and ERP/MRP.*

Skill Requirements

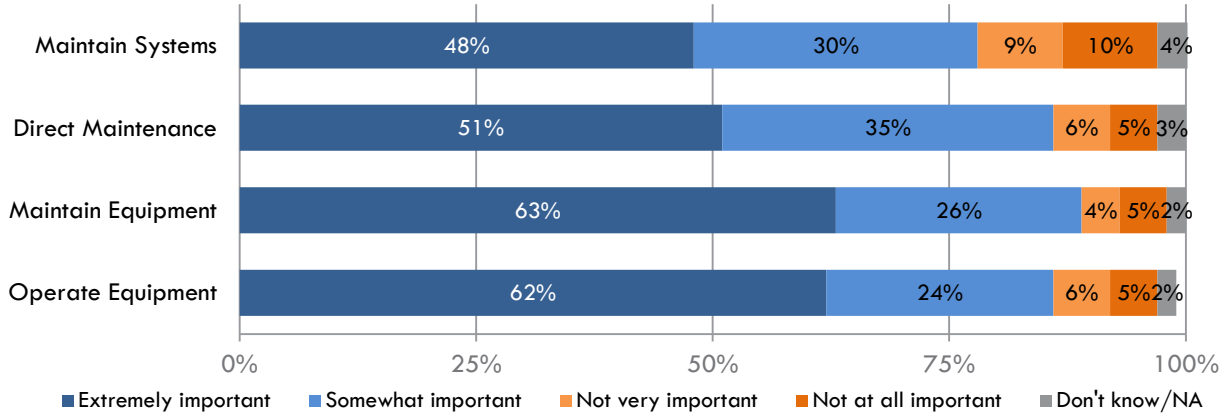
In addition to understanding the certifications needed by Supply Chain Technicians, we also wanted to understand how important certain job functions will be for this occupation in the future. We used the following definitions to describe four areas of expertise for Supply Chain Technicians.

- **Operate Equipment**: Operate material handling equipment to unload, move, and retrieve products in a warehouse.
- **Maintain Equipment**: Perform corrective and preventative maintenance of the material handling equipment and the necessary systems to manage, schedule, and record this activity.
- **Direct Maintenance**: Coordinate projects related to installation, maintenance, and repair work.
- **Maintain Systems**: Use warehouse management system; implement, evaluate, and test the changes to the WMS; and update configuration of the WMS to achieve production accuracies and efficiencies

Figure 12 takes a detailed look at these four functional skill areas and how important survey respondents think they will be in the next two years.

More than half of businesses believe that all four areas will be extremely important for Supply Chain Technicians in two years. Two categories in particular were of the greatest importance — operating equipment and maintaining equipment.

Figure 12. Importance of functional knowledge/skill areas for Supply Chain Technicians (n=625).



Conclusion & Recommendations

Although the field for Supply Chain Technicians is somewhat narrow and technicians have a specialized role in providing services for warehouses and distribution centers, this study confirms that this evolving occupation will continue to expand in the future. The Supply Chain Technician occupation is relatively new and employers have varying opinions regarding many of its aspects. However, there are some areas of agreement.

One of the study's most significant findings concerns the rate that this occupation is expected to expand. We found that there are an estimated 203,000 Supply Chain Technicians currently employed nationwide, and that over the next two years, this occupation could gain up to 61,000 jobs. Employment is expected to increase by 30% in two years, which is a substantial rate for an occupation that plays such a targeted role in supporting technological adoption within supply chain related businesses.

Our survey of supply chain companies also uncovered that there seems to be confusion about what educational requirements should be applied to the Supply Chain Technician occupation. For example, only 17% of businesses require a bachelor's degree, but 47% require a high school diploma. Our finding that

18% require a postsecondary certificate and 17% require an associate degree indicates that community colleges can play a significant role in preparing future generations of Supply Chain Technicians. Clarifying and defining the training/educational obtainment required is an area of future research for the National Center for Supply Chain Technology Education.

Similarly, there is a considerable range of certifications and training that employers require for Supply Chain Technicians. The most commonly preferred certifications, however, are forklift, OSHA, and inventory control related certifications, such as APICS. Unfortunately, this research didn't identify any existing industry recognized certification focused on automated systems operation or maintenance.

We believe the four functional skills areas that were selected with the help of the industry leadership team accurately represent the most critical areas that constitute the Supply Chain Technician occupation. The four areas are: operate equipment, maintain equipment, direct maintenance, and maintain systems. A large percentage of employers ranked each area as extremely important.

It is also significant that a majority of businesses currently use in-house technicians for support and maintenance. But 47% also employ external support from vendor companies. According to experts, this percentage of businesses is using external support because the new equipment or technology they have recently purchased still has active warrantees. Once those warrantees expire in the next few years, the businesses will have to move toward using more in-house support. As a result, the external vendor segment will shrink over time, opening up a potential training opportunity for community colleges which could step into preparing employees for this new role.

Finally, this study is unique and noteworthy because the survey responses and data gathered establish that the nascent Supply Chain Technician occupation exists and is rapidly growing; even though this occupation is not currently recognized by the Bureau of Labor Statistics' Standard Occupational Classification system. The information collected in this study related to businesses with warehouse and distribution centers as well as the education and skill requirements for Supply Chain Technicians is new and previously undocumented.

Other key findings of the study not mentioned above include the following:

- Of businesses with distribution centers or warehouses, manufacturing dominates as the largest sector nationwide, with approximately 21,000 businesses. Wholesale trade makes up the second largest sector with nearly 10,000 businesses, and retail has nearly 7,500 businesses.
- California and Texas lead the nation with the most businesses, greatest number of employees, and largest sales volume. Each state generates more than $400 million in sales per year and has 1.5 million workers or more.
- The top five industries of surveyed businesses are: manufacturing, transportation and warehousing, wholesale trade, agriculture, and health care. The most common activities they engage in are freight transport, distribution, manufacturing, and packaging.
- Nearly 80% of surveyed businesses employ between 1 and 10 Supply Chain Technicians, and 13% do not have any Supply Chain Technicians on staff. Only 8 % employ more than 10 Supply Chain Technicians.
- The future need for more Supply Chain Technicians was also measured, with 43% of businesses responding that they would only need one more technician over the next two years. Another 34% said they would only need two more technicians, and 19% said they would need 3-5 technicians over the next two years.

Based on the analysis of the data collected, this study recommends the following:

1) Because the projected employment growth for Supply Chain Technicians is significant (30% in the next two years) and the businesses are expecting to hire more in-house staff to maintain and support their supply chain technologies, who will need to meet the vocational certificate or

associate degree qualifications, community colleges are well positioned and should start building programs to prepare graduates for this new opportunity.

2) Community colleges that embark on the path of addressing employer needs in supply chain workforce should be located in the states that lead the nation in supply chain employment and sales volume: California, Texas, Florida, New York, Illinois, Pennsylvania, Ohio, Michigan, North Carolina, Georgia, New Jersey, Wisconsin, Virginia, Massachusetts, Indiana, Minnesota, Tennessee, Washington, and Missouri.

3) Since the majority of businesses that were surveyed are considered small businesses, community colleges could have a sizeable role in providing educational programs to re-train current staff as well as educate entry-level workforce. Small businesses do not usually have budgets ample enough to pay for in-house training, and education through community colleges tends to be more cost effective.

4) Variability in skill, education, and certification requirements that was discovered through this study is warranting a model curriculum to be developed and shared with the community colleges in high areas of concentration in supply chain activities. Qualitative input from employers provided to related questions in this study as well as other employer engagement activities could inform the model curriculum.

5) Community colleges should also review existing program offerings as many traditional industrial technology skill sets can provide the foundation for a supply chain technician training program.

6) The four functional skill areas and their corresponding definitions utilized in this study--operate equipment, maintain equipment, direct maintenance, and maintain systems--can be used by community colleges as a starting point in developing Supply Chain Technician programs.

7) There are no existing industry recognized certifications focused on automated systems operation or maintenance. An agency/organization with the capacity and/or experience in facilitating industry certifications should consider developing a certification for supply chain technicians.

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Appendix A – Study Methodology

Summary

In November 2012 – January 2013, the National Center of Supply Chain Technology Education (SCTE National Center) and California Community Colleges Centers of Excellence (COE), with the help of Davis Research, collected workforce data from supply chain technology employers and vendors. The purpose of the survey was to understand employer needs of supply chain technicians (i.e. staff who installs, operates, supports upgrades or maintains the software, hardware or material handling equipment) as well as job functions, in-demand skills and education requirements for these employees.

Table A-1. Primary Research Method Summary

Field Dates	November 26, 2012 to January 7, 2013
Method	Phone and online questionnaire
Sample	1) 625 businesses in the U.S. with a warehouse and/or distribution center 2) 10 vendor companies that provide supply chain technology to warehouses
Universe	About 47,500 U.S. businesses with a warehouse and/or distribution center
Level of Confidence	For questions answered by all 625 businesses, 95% level of confidence was achieved, with a maximum margin of error of +/-3.9%

Research Objectives

The study was to accomplish the following objectives:

- Identify industry sectors (NAICS codes) relevant to the study, including:
  - Industries that are directly involved Supply Chain activities, and
  - Industries where supply chain activities are not the main purpose or service, but rather one of the functions performed in-house.
- Understand the composition of the industry sectors related to supply chain technology, their size, and regional concentration.
- Quantify and qualify technician-level jobs in these sectors within main regions of concentration.
- Project current and future employment for the U.S.
- Identify main skill clusters in demand and educational requirements.
- Understand employer needs for training in supply chain technologies.

Questionnaire

In order to collect the data, two questionnaires were developed:

1) **Survey Instrument for Supply Chain Technology Users/Businesses.** This survey targeted businesses in the U.S. with a warehouse/distribution center. The questionnaires were built for both online and phone data collection. The tool included questions related to an occupation of Supply Chain Technicians. For the purposes of the study, Supply Chain Technicians were also referred to as support/repair/maintenance technicians. Employers were asked for information concerning their involvement with supply chain technologies, as well as their current employment levels of Supply Chain Technicians, future hiring expectations, job functions, in-demand skills, and education requirements for hiring. The survey instrument also included appropriate screener questions in order to determine whether the respondent qualifies for the survey and to capture general information about each respondent (industry, company size, etc.)

2) **Survey Instrument for Supply Chain Technology Vendors.** This small online only survey targeted vendor companies that develop, manufacture and provide products/software/equipment to warehouses and distribution centers. Vendors were asked about the type of product or service they provide to warehouses and distribution centers, what specific technologies they use, how they train their technicians, and how many Supply Chain Technicians they employ.

Prior to data collection, the questionnaires were reviewed by the research team as well as pre-tested by the subject matter experts to ensure the most effective wording of the questions for a respondent. In order to factor out survey fatigue and mitigate order biases, answer options in some questions were presented to the respondents in a random order.

Data Collection Method

Both web and phone recruitment strategies were utilized to drive potential respondents to the survey and collect data:

Phone Recruitment: Davis Research recruited respondents by telephone in accordance with the sampling plan specifications. Each potential respondent was screened for qualification criteria prior to being offered a phone survey. On average, a phone interview lasted from 10 to 15 minutes. *600 survey completes from the businesses with warehouses/distribution centers were obtained using this recruitment strategy.*

Online Campaign: The COE set up an online survey tool that used appropriate screeners to direct a respondent to either the web questionnaire for the businesses with warehouse/distribution centers or the web questionnaire for vendor businesses. The SCTE National Center and its partners nationwide forwarded the link to their networks of supply chain professionals. *35 survey completes were obtained using this recruitment strategy; 25 completes were from the supply chain businesses, and 10 completes from vendors.*

The data collection period was November 26, 2012 to January 7, 2013.

Universe and Sample

Understanding the universe for this study involved a geographic analysis of industry concentration. Data were derived from the 2012 InfoUSA business database through Esri Business Analyst Software. The criteria used to identify relevant data included location, minimum business size, and relevant North American Industry Classification System (NAICS) codes. Businesses with 50 or more employees at a given location were sampled. The sampling plan was based on ensuring proportional representation of businesses in the key states with the largest concentration of the identified industries.

Universe for this study was estimated to comprise approximately 47,500 businesses in the United States. More information on this can be found in Appendices B and E.

Based on the findings about the universe of supply chain related businesses and the requirements of the research, we applied a proportional sampling method based on regional concentration of businesses (Table A-2). The following tiers were utilized for the proportional sampling:

> ***Tier 1– Primary:*** Since the top ten states account for 52% of all relevant establishments in the nation, proportional representation of each of these states in the sample was targeted.
>
> ***Tier 2 – Secondary:*** This tier includes nine states that follow the first top ten by the number of supply chain related businesses. For this tier, we targeted 22% in proportional representation of this group in the sample without setting specific targets for each state.
>
> ***Tier 3 – Remaining:*** This tier includes the remainder of the states. A combined target of 26% was pursued for this tier. The responses did not need to represent all of the states, but could include any of those in this tier.

Table A-2. Sampling Plan Targets by Geographic Group

State	# of Businesses in the Universe	Proportion in universe & sample	# of Businesses in Sample (Target)
Tier 1 – Primary (5%+)			
California	18,198	11%	110
Texas	11,297	7%	70
Florida	8,401	5%	50
New York	8,180	5%	50
Illinois	7,539	5%	50
Pennsylvania	7,294	5%	50
Ohio	7,231	5%	50
Michigan	5,460	3%	30
North Carolina	5,316	3%	30
Georgia	4,953	3%	30
Total for Tier 1	**83,869**	**52%**	**520**
Tier 2 – Secondary (2-3%)			
New Jersey, Wisconsin, Virginia, Indiana, Massachusetts, Minnesota, Tennessee, Washington, Missouri	**34,102**	**22%**	**220**
Tier 3 – Remaining			
Maryland, Arizona, Colorado, Alabama, South Carolina, Oregon, Kentucky, Louisiana, Iowa, Connecticut, Oklahoma, Kansas, Utah, Arkansas, Mississippi, Nevada, Nebraska, New Hampshire, Idaho, West Virginia, Maine, New Mexico, Hawaii, Rhode Island, Montana, South Dakota, North Dakota, Delaware, Vermont, Alaska, Wyoming, DC	**42,436**	**26%**	**260**
Total	**160,407**	**100%**	1,000

Due to the data collection difficulties and limited budget, we were able to obtain 625 completes out of 1,000 targeted in the sampling plan. However, the sample is still large enough to be statistically significant and it is diverse enough to represent the geographic concentration and diversity of this industry in the U.S., single and multi-location companies, various industry codes, and various company sizes. For questions answered by all businesses, 95% level of confidence was achieved, with a maximum margin of error of +/-3.9%. Table A-3 represents the number of responses obtained from each state and percentage of these responses in the total.

Table A-3. The top states represented by supply chain companies that responded to the survey (n=625).

#	State	# of Responses	% of Total
1	California	73	11.7%
2	Texas	42	6.7%
3	Ohio	35	5.6%
4	Florida	33	5.3%
5	Wisconsin	32	5.1%
6	Illinois	30	4.8%
7	Washington	30	4.8%
8	New York	29	4.6%
9	Pennsylvania	29	4.6%
10	Michigan	27	4.3%

#	State	# of Responses	% of Total
13	Oregon	17	2.7%
14	Utah	14	2.2%
15	Iowa	13	2.1%
16	North Carolina	11	1.8%
17	Tennessee	10	1.6%
18	Missouri	9	1.4%
19	Arizona	8	1.3%
20	Colorado	8	1.3%
21	Georgia	8	1.3%
22	Kansas	8	1.3%

#	State	# of Responses	% of Total
11	Indiana	25	4.0%
12	Minnesota	19	3.0%
25	South Carolina	8	1.3%
26	Virginia	8	1.3%
27	Louisiana	7	1.1%
28	Massachusetts	6	1.0%
29	South Dakota	6	1.0%
30	Maine	5	0.8%
31	Mississippi	5	0.8%
32	North Dakota	5	0.8%
33	Nevada	5	0.8%
34	Maryland	4	0.6%
35	Nebraska	4	0.6%
36	Vermont	4	0.6%

#	State	# of Responses	% of Total
23	New Jersey	8	1.3%
24	Oklahoma	8	1.3%
37	Alabama	3	0.5%
38	Arkansas	3	0.5%
39	Hawaii	3	0.5%
40	Idaho	3	0.5%
41	Montana	3	0.5%
42	New Hampshire	3	0.5%
43	Alaska	2	0.3%
44	Connecticut	2	0.3%
45	Kentucky	2	0.3%
46	West Virginia	2	0.3%
47	Wyoming	2	0.3%
48	New Mexico	1	0.2%

Collected responses closely represent targeted sample parameters by geographic tier/group:

Tier 1: 317 responses (51% of total)
Tier 2: 145 responses (23% of total)
Tier 3: 162 responses (26% of total)

For additional information on data methodology or to request a copy of the survey questions for the vendor survey, please contact the Center of Excellence.

Appendix B - Statistics on Supply Chain Related Industries & Businesses

Table B-1. Supply Chain Related Industries in the U.S.

NAICS Code & Industry Description	Number of Establishments	2011 Sales Volume, $blns	2012 Number of Employees	% share of industry employment in total employment
11 Agriculture and Forestry (111 Crop Production; 112 Animal Production; and 115 Support Activities for Ag. and Forestry)	1,655	40.8	235,251	1%
31-33 Manufacturing (all)	46,746	2,662.3	9,207,369	32%
42 Wholesale Trade (all)	22,410	2,440.7	3,386,187	12%
44-45 Retail Trade (all)	64,962	2,133.3	8,533,387	30%
48-49 Transportation and Warehousing (481 Air Transp.; 482 Rail Transp.; 484 Truck Transp.; and 493 Warehousing and Storage)	6,003	117.7	868,504	3%
541614 Process, Physical Distribution, and Logistics Consulting Services	1,159	41.4	186,280	1%
622 Hospitals	7,518	399.1	4,583,047	16%
7211 Accommodation	7,194	183.2	1,359,983	5%
811 Repair and Maintenance	2,760	35.7	311,926	1%
	160,407	**8,054.3**	**28,671,934**	

Source: InfoUSA through Esri, Inc. Business Analyst software and data.

Table B-2. Statistics on Supply Chain Related Businesses in the U.S.

State	# of Businesses	Sales Volume (billions)	# of Employees	Share of businesses in the U.S.	Share of employment in the U.S.
California	18,198	834.76	3,000,921	11.4%	10.5%
Texas	11,297	625.52	2,009,626	7.1%	7.0%
Florida	8,401	378.97	1,431,406	5.3%	5.0%
New York	8,180	392.61	1,510,328	5.1%	5.3%
Illinois	7,539	347.84	1,367,492	4.7%	4.8%
Pennsylvania	7,294	348.55	1,277,004	4.6%	4.5%
Ohio	7,231	387.22	1,445,721	4.5%	5.0%
Michigan	5,460	281.15	1,082,139	3.4%	3.8%
North Carolina	5,316	274.99	934,536	3.3%	3.3%
Georgia	4,953	268.03	908,635	3.1%	3.2%
New Jersey	4,543	225.47	793,641	2.8%	2.8%
Wisconsin	4,392	200.72	787,885	2.7%	2.7%
Virginia	3,992	195.32	676,891	2.5%	2.4%
Indiana	3,884	240.52	776,881	2.4%	2.7%
Massachusetts	3,594	148.15	648,122	2.2%	2.3%
Minnesota	3,582	171.45	671,867	2.2%	2.3%
Tennessee	3,538	220.49	701,695	2.2%	2.4%
Washington	3,343	141.32	514,078	2.1%	1.8%
Missouri	3,234	178.09	620,249	2.0%	2.2%
Maryland	2,781	127.41	440,189	1.7%	1.5%
Arizona	2,585	130.34	519,835	1.6%	1.8%
Colorado	2,488	110.61	404,081	1.6%	1.4%
Alabama	2,405	137.14	441,771	1.5%	1.5%

State	# of Businesses	Sales Volume (billions)	# of Employees	Share of businesses in the U.S.	Share of employment in the U.S.
South Carolina	2,344	134.37	450,142	1.5%	1.6%
Oregon	2,288	163.40	374,727	1.4%	1.3%
Kentucky	2,283	141.58	442,563	1.4%	1.5%
Louisiana	2,055	125.91	340,830	1.3%	1.2%
Iowa	2,036	115.55	382,707	1.3%	1.3%
Connecticut	1,984	76.60	330,067	1.2%	1.2%
Oklahoma	1,710	98.00	323,336	1.1%	1.1%
Kansas	1,671	82.34	307,477	1.0%	1.1%
Utah	1,549	73.20	257,981	1.0%	0.9%
Arkansas	1,427	94.12	344,717	0.9%	1.2%
Mississippi	1,342	75.96	259,104	0.8%	0.9%
Nevada	1,158	50.65	187,714	0.7%	0.7%
Nebraska	1,118	63.37	223,831	0.7%	0.8%
New Hampshire	946	41.04	151,750	0.6%	0.5%
Idaho	871	36.69	137,399	0.5%	0.5%
West Virginia	812	40.12	137,000	0.5%	0.5%
Maine	785	39.93	134,083	0.5%	0.5%
New Mexico	752	32.75	112,404	0.5%	0.4%
Hawaii	626	22.64	108,069	0.4%	0.4%
Rhode Island	606	23.34	116,393	0.4%	0.4%
Montana	528	19.45	72,124	0.3%	0.3%
South Dakota	527	19.89	80,110	0.3%	0.3%
North Dakota	472	19.06	71,617	0.3%	0.2%
Delaware	457	31.59	97,162	0.3%	0.3%
Vermont	416	13.96	68,354	0.3%	0.2%
Alaska	372	16.83	58,136	0.2%	0.2%
Wyoming	299	13.37	42,715	0.2%	0.1%
DC	267	9.62	75,289	0.2%	0.3%
Unknown	476	12.00	19,140	--	--
Total	160,407	8,054	28,671,934		

Source: InfoUSA through Esri, Inc. Business Analyst software and data.

Appendix C – Questionnaire for Warehouses/Distribution Centers

Introduction:

INTRO1

Hello, my name is _____ calling from Davis Research and I am calling today on behalf of the National Center for Supply Chain Technology Education. I am not selling anything. The SCTE is funded by the National Science Foundation to address the education of supply chain technicians. We are conducting a nation-wide study that will help us understand employer needs of supply chain technicians as well as job functions, skills and education requirements.

May I please speak with _____ or a person knowledgeable about your workforce needs?

[ONCE CORRECT PERSON IS ON THE PHONE RE-INTRODUCE]

[IF ASKED HOW LONG SURVEY WILL TAKE SAY "The survey should take about 10 minutes to complete."

Firm Information:

1a. In relation to material handling technology, for example, automated conveyer systems or GPS tracking devices, which of the following would best describe your firm? [READ LIST. SELECT ONE RESPONSE]

1 A user of material handling technology and equipment
2 A supplier or installer of material handling technology and equipment [TERMINATE]
3 None of the above [TERMINATE]

1b. Are you knowledgeable about the employment and workforce needs of your firm's distribution center?

1 Yes [SKIP TO INTRO2]
2 No [TERMINATE]

1c. May I please speak with someone in your company who is knowledgeable about the employment and workforce needs of your firm's distribution center?

1 Yes – RESPONDENT AVAILABLE [GO BACK TO INTRODUCTION]
2 Yes but not at the moment [SCHEDULE CALLBACK AND BEGIN AT INTRODUCTION]
2 No/Refused [TERMINATE]

INTRO2

Just some quick background information before we begin.

A supply chain technician is a person who installs, operates, supports upgrades or maintains the software, hardware or material handling equipment which supports the supply chain.

The information you provide will be utilized to develop skills-based educational pathways, build new curricula, guide professional development for faculty, and develop the high skilled employees your firm will need in the future. Your input into this study is valuable and appreciated.

Please note that all survey data will be aggregated. Individual responses will not be published.

2. What is the name of your company? _____

3a. In what state is your firm's distribution center located? If your company has multiple distribution centers, please specify the location of the one that you work at or work with most.

State:_____ [SHOW ALPHA LIST OF STATES]

3b. What is the zip code where this distribution center is located?

Zip:_____ [SKIP TO 3d]
9 Don't know [ASK 3C]

3c. In what city is this distribution center is located?

City:_____

3d. How many permanent employees work at your firm at your location, including full-time and part-time staff? [DO NOT READ LIST. RECORD RESPONSE BELOW.]

1	1-19 **TERMINATE**	6	500-999
2	20-49 **TERMINATE**	7	1,000-4,999
3	50-99	8	5,000-9,999
4	100-249	9	10,000+
5	250-499		

4. Which of the following best describes your company's industry? [READ LIST. SELECT ONE RESPONSE.]

1	Agriculture	7	Healthcare
2	Manufacturing	8	Transportation and Warehousing
3	Retail (grocery)	9	Professional Services/Consulting
4	Retail (non-grocery)	10	Automotive
5	Wholesale Trade	11	Other (specify):
6	Hospitality		_____

5. Is your firm currently responsible for any of the following? Please say "yes" or "no" to each of the following:[READ LIST, SELECT ALL THAT APPLY.]

1	Manufacturing	6	Importing and Exporting
2	Distribution	7	Packaging
3	Freight Transport by air	8	Specialized Consulting Services (e.g. 3PL)
4	Freight Transport by rail	9	Other (specify): _____
5	Freight Transport by truck		

Workforce and Training:

6. Which of the following material handling or supply chain technologies or equipment does your firm currently use or plan to use? Does your firm currently or plan to use…[READ LIST – SELECT ALL THAT APPLY]

1 Warehouse Management System
2 Warehouse Control System
3 Transportation Management System
4 Inventory Management System
5 Enterprise Resource Planning (ERP)/Manufacturing Resource Planning (MRP) software
6 Radio Frequency (RF) components like RF on forklift for picking, pick-to-light, pick-to-voice
7 Radio Frequency Identification (RFID)/Electronic Product Code (EPC)
8 Bar codes
9 Tracking technology, such as GIS/GPS
10 Electronic Data Interchange (EDI)
11 Automated warehouse components like conveyors, sensors, AS/RS, AGVs robots
12 Labor Management Systems
13 Other (specify): _____
14 [DO NOT READ] None of these

6a. For the technologies that you just mentioned your firm currently uses or plans to use, who is **maintaining and supporting** them? Please say "yes" or "no" to each of the following:[READ LIST. SELECT ALL THAT APPLY.]

1 In-house staff/employees
2 External (vendor) staff
3 External (third party) staff
4 Other (specify): _____

7. How many supply chain technicians – technicians who install, operate, support or maintain the software, hardware or material handling equipment – do you **currently** have on staff at your location?
_____

8a. Thinking about supply technicians, 2 years from now do you think you'll have MORE or FEWER supply chain technicians than you currently have on staff?

1 More
2 Fewer
3 [DO NOT READ] About the same [SKIP TO Q9]

8b. How many (insert response from Q8a) supply chain technicians are you planning to have on staff at your location **2 years from now**?

[DISPLAY IF Q8A=MORE] More_____
[DISPLAY IF Q8A=LESS] Less_____

9. What is the minimum level of education required for your **entry level** employees who install, support, or maintain supply chain technologies? [READ LIST]

1 High school diploma or equivalent
2 Postsecondary certificate from a community college or private technical college
3 Associate/2-year degree
4 Bachelor's degree
5 Graduate-level degree

10. Which of the following industry certifications does your firm find important for your technicians who install, support, or maintain supply chain technologies? Please say "yes" or "no" to each of the following:[READ LIST, SELECT ALL THAT APPLY]

1 **Manufacturing Skill Standards Certification (MSSC)** – Certified Logistics Assistant/Technician
2 **Association for Operations Management (APICS)** – Certified in Production and Inventory Management/Certified Supply Chain Professional
3 **Institute for Supply Management (ISM)** – Certified Professional in Supply Management/Certified in Supply Management
4 **American Society of Transportation and Logistics (ASTL)** – Certified in Transportation and Logistics/Professional Designation in Logistics and Supply Chain Management
5 **Occupational Safety and Health (OSHA) Certification**
6 **Forklift Certification**
7 Other (specify): _____
8. None of the above

11. For each of the following functional areas of Supply Chain Technicians, please indicate how important you feel each job function will be for your organization over the next two years. Please indicate if each is extremely important, moderately important, slightly important or not important. The first area is…

Extremely important (1)Somewhat important (2) Not very important (3) Not at all Important (4) DK/NA (5)

[RANDOMIZE LIST]

A. **Operate Equipment**: Operate material handling equipment to unload, move and retrieve products in a warehouse.

B. **Maintain Equipment**: Perform corrective and preventative maintenance of the material handling equipment and the necessary systems to manage, schedule and record this activity.

C. **Direct Maintenance**: Coordinate projects related to installation, maintenance and repair work including planning, scheduling work and equipment.

D. **Maintain Systems**: Use warehouse management system; implement, evaluate and test the changes to the WMS; and update configuration of the WMS to achieve production accuracies and efficiencies

11a. Are there any other important functions I did not mention?

1 Yes (specify): _____
2 No

12.Lastly, please describe the type of training your firm would find useful for your technicians who install, support, and maintain material handling equipment and technologies?_____
_____

Additional Information:

Thank you for taking the time to answer our questions.

13. In case it is necessary to confirm your responses, may I please have your contact information? Note that this information will only be used for research purposes and your individual responses will not be published, unless you give us explicit permission to do so.

1 Your name:_____
2 Your position or job title:_____
3 The name of organization:_____
4 The address of organization:_____
5 Your email address:_____
6 Your phone number:_____

14. May we contact you for further information about your organization and your training needs?
1 Yes
2 No

Closing:

15. Are you interested in receiving a report on the findings of the research?
1 Yes
2 No

16. Any additional comments or thoughts that you would like to share with us?
1 Yes (SPECIFY) _____
2 No

Thank you very much for your time! Your input is very valuable! Have a great day.

Appendix D – Other Industries Reported by Supply Chain Businesses

Fifty-one (51) businesses did not identify with one of the pre-defined industries and instead provided write-in responses that more accurately reflect their industry.

Industry	# of businesses	Industry	# of businesses
Construction	8	Hazardous waste facility, recycling plant	1
Newspapers	8	Low voltage industry	1
Aerospace	2	Machine to machine software communication	1
Educational	2	Material Distribution	1
Logging	2	Material Handling	1
Printing	2	Medical and residential	1
Beverage	1	Multimedia	1
Carpet Samples	1	Professional Services and Engineering Support	1
Casino	1	Publishing	1
Commercial printer	1	Racing	1
Communications	1	Railroad Ties	1
Containers	1	Real estate	1
Custom Garments	1	Repair and recondition valves	1
Customs still fabrication	1	Service Industry	1
Electric Utility / Power Plant	1	Shread metal	1
Energy Software	1	Support non-profit Organizations	1
Fire protection	1	Transportation warehousing, forest chemical ag.	1
Food Distributor or warehouse	1	Welding Supplies and Industrial Supplies and Distribution	1
Food Processing Equipment	1	Wholesale	1
Forrestry Fire Fighters	1		

Appendix E – Employment & Universe Estimates

Extrapolations were based upon conservative employment numbers obtained through the survey of employers and by eliminating statistical outliers. The average employment data for the sample and the number of businesses in the universe were used to extrapolate the number of employees for the occupation of study. A similar method was used to extrapolate 2-year growth. Percentage growth within the sample was applied to the extrapolated employment numbers, yielding the 2-year projected growth for the Supply Chain Technicians in the U.S.

Table E-1. Sample Data for Supply Chain Technicians 2013 Employment & 2-year Projected Growth

	Current Employment	Projected Employment in 2 Years	2-year Growth (New Jobs)	% Growth
	n=581	n=581	n=581	
Sum	**2,479**	**3,228**	**749**	**30%**
Mean	4.27	5.56	1.29	0.35
Median	2	2	0	0
Min	0	0	-8	-100%
Max	200	200	100	5000%

Table E-2. Universe Estimates for Supply Chain Industries

NAICS Code & Industry Description	Number of All Establishments in Industry*	% of Supply Chain Businesses in Industry**	Estimated Number of Supply Chain Businesses
11 Agriculture and Forestry (111 Crop Production; 112 Animal Production; 115 Support Activities for Ag. and Forestry)	1,655	24%	397
31-33 Manufacturing (all)	46,746	45.1%	21,082
42 Wholesale Trade (all)	22,410	44.4%	9,950
44-45 Retail Trade (all)	64,962	11.5%	7,470
48-49 Transportation and Warehousing (481 Air Transp.; 482 Rail Transp.; 484 Truck Transp.; 493 Warehousing and Storage)	6,003	47.6%	2,857
541614 Process, Physical Distribution, and Logistics Consulting Services	1,159	22.2%	257
622 Hospitals	7,518	27.8%	2,090
7211 Accommodation	7,194	22.8%	1,640
811 Repair and Maintenance	2,760	62.5%	1,725
TOTAL	**160,407**		**47,468**

* Source: InfoUSA through Esri, Inc. Business Analyst software and data.

** Source: Percent of supply chain businesses in each industry is estimated based on the survey incidence rate calculated as a number of businesses that qualified for the study based on the incidence of the warehouse/distribution center activity relative to all businesses that were contacted for the survey within each NAICS code.

Appendix F – Training Needed by Supply Chain Businesses

The following list reports specific employer responses regarding the training that they would see beneficial.

Assigned Category	Employer Comments
Supply Chain Technology/Systems	It would be our map specific training.
	Training in map, b-pacs software.
	Any kind of training that would better the handling
	Depending what it is - some background in material handling and maintenance and management Material and software handling is very important. Hazardous materials and waste training Material moving, ERG
	Warehouse Management System
	Automated scanning system inventory system
	Build on top of training for a Raymond or Crown forklift with the it piece for the WMS.
	Certification in applicable modules from WMS/ERP provider.
	Program logistics controls
	Expanded training in the management of inventory and supply chain. So that's true management skill and management of the actual physical inventory.
	Familiarity with servo motors, drives and controls. Also, how to read flow diagrams and other diagrams. Go to state regulated classes for systems
	How to best utilize ERG systems to manage warehouse inventory.
	It would be nice to have training on the systems for our group.
	Maintenance PM type training for mechanical and systems training for users and follow up on systems More from manufacturing companies of the software some educational school not satisfy more in-house driven Our software is used for the whole operation and material handling is part of that. Need to be thoroughly trained for our SAP software.
	Pretty much the only training that would be important would be the training from the erg systems themselves to increase in knowledge of the specific system. Some hands-on training on our products. Especially with those systems.
	Supply chain equipment training, mostly is done through tech college or
	Supply chain management training
	Systems specific training.
	Systems training, Sysco, Juniper
	The biggest things are EDI, forklift training, and ERP/MRP.
	The systems along with the training for basic knowledge
	They should be knowledgeable on the product that they are using the technology on.
	They should have a specific knowledge of wholesale distribution and at least some experience in that field, professionalism, efficient in warehousing, and an OSHA safety certificate. They should have supply chain knowledge and industry knowledge.
	Training in conveyer systems.
	Want them to have some background in our system and have some background in the construction of boats.

Computer/IT training	Background in warehousing, for example, UPS world ship software.
	Certificate type training especially in Oracle
	Computer courses
	Computer programmer, lean manufacturing training, basic computer knowledge
	Computer systems in general knowledge of computer programming
	Have the training already in IT. Computer background, knowledge of and usage of.
	I need people who are skilled in IT and who are skilled in healthcare
	Computer skills to enter data into computer system.
	People who have a good working knowledge and experience in electronics and understanding with computer interface with electronics. We want people that have a keen eye on identifying problems and acting to correct them. That is what we expect.
	Software education training would be good.
	Software training
	Software update training would be important after initial software and hardware is installed.
	Some type of computer based training.
	Someone who has had schooling in computers.
	The software skills to manage it behind the scenes. To make sure the software is running correctly.
	They should have a great working knowledge of computer programs.
	They would be an IT professional.
	We have good mechanical skills, but not training. Somebody who can organize the layout. Programming items to adapt for different customers. Also, the skill to interface your system with other companies.
Basic Skills & Digital Literacy	Anybody that can read and write and do graphics and is computer literate.
	Basic skill sets, on the job training
	Basic training based on organization
	Basic working knowledge of the map. Also, knowledge of the carriers we use.
	Business understanding
	Classroom, verbal and on the job training
	Computer use, literacy.
	Literacy. Equipment, operating, transport equipment.
	Basic computer training and customer services
	Good computer skills, knowledge of repair and maintenance
	Read, write, and basic.
	Math skills, verbal and written communication skills
	They need to be computer literate, fork lift literacy reading, writing, math skills
	Working with the software. Word and excel
Soft skills	Understanding of our customer needs
	How to pick up a telephone call
	Training in customer service and negotiating are a plus.
	Conflict management skills
	Excellent communication skills and extreme organization.

Soft skills ***(continued)***	Getting people who understand the importance of paying attention to detail. We ship 70 percent overseas so the detail attention is extremely important. It is further complicated by recent government legislation on imports and exports.
	Just following instructions. We have to bring someone to fix the issues. We have people to fix Networking
	On-the-job training, openness to learning, problem solving, math and logic skills, troubleshooting. They have to have the mechanical aptitude and we do in-house training ourselves
	Train common sense. Real-life skills.
	Training customer service skills, communications skills on the radio, able to read and write English. Troubleshooting skills, and critical thinking skills.
	Understanding people needs and being able to communicate to the new hires.
General / Technical School	I would say more generic type training, since specific training goes in and out so quickly. Then when trained in individual training they can adapt more easily. Its basic equipment and basic knowledge
	More than a high school education like technical school
	Some sort of it background coming out of college would be important. Technical training, engineering would require specialized training in trade for example construction and welding. Technical college probably
	Technical schools tend to be more productive. In electrical keeping everything running.
	The least they would need would be some type of vocational school.
	There should be accredited training to know what someone knows. We like the proper experience when we hire in this field.
	Trade school degree, Cydia license
	Trade school type thing or 2 year school that they can train.
	Vocational schools graduates or industrial engineering
	We use the local technical college
	2 year of matching certificate.
Apprenticeship/Hands-on training	College degree apprenticeships certifications within in industry hands on experience
	Hands on experience/ reasonable aptitude
	Hands on training
	Having some hands on experience
	In house training
	In-house training. Most of OSHA and forklift training is in-house.
	Hands on training some who has training the trainer.
	Mostly based on experience. Or on hand training
	Mostly hands-on training. Background experience.
	Probably more hands-on training.
	The best training would be in house training.
Online training	Computer-based training. Remote, computer-based training. Subject matter experts available for questions.
	Internal online training
	Live internet and computer-based training.
	Online training and hands on experience

Online training *(continued)*	Online training would very helpful
	Probably video training with DVD's, CD's things like that.
	Video and actual driving. Updated knowledge.
	Video through the computer; two-way training and communication.
	Web based training, through the internet
Mechanical training	Any type of mechanical school and training on the job.
	Certifications, mechanics, streamlining and lean management
	Diesel mechanic certification forklift certification pomp project manager planer.
	Mechanical
	People have vacuum training and machine job training
	Training as diesel mechanics
	Mechanical and electrical hydraulic training, PLC knowledge
	Mechanical and safety training
	Mechanical training
Electrical/Electronics	Electrician, experience with working with wiring, welder experience, industrial training.
	Electronics, electrical, industrial electricians
	More electrical experience and be able to read blue prints and schematics.
	On the job training. Electronics training.
	Other than electrician training, we mainly look for experience as opposed to actual education
	Require a lot of electronic experience
	Specific technical training in electronics and software from a regionally based program.
	Technical Training - PLC/Basic Electricity
	Well we need people who are electricians, weld and supervise.
New technology training	Basically, seeing what new is out there.
	Basically, the only computerized system we have is our sales system, if we ever do get an accounting system I would say we would need training for all of those systems.
	Don't know, people who have experience in this area, map training, drip training
	Mostly for repairing for any new equipment that comes along and having knowledge about the new equipment.
	On the job along with periodic updates and we have the manufacturer come in to show us how to use new equipment
	Re training once a year
	Small hands on specialty courses to keep technicians up to date
	Would like a specific certification program for local community ot technical college that would provide background in key technologies for my technicians.
Maintenance Basics	A firm basic understanding of all of the sciences related to maintenance as listed in AIB course.
	Basic computer skills with background in maintenance - preventative
	Troubleshooting, upgrading and hands-on training is important.
	Maintaining skills upgrading and updating as the technologies update - we need our technicians to be as up to date as possible on these new technologies
	Lockout, takeout procedures, basic operations, preventative maintenance.
	Solid troubleshooting skills
	That they know how to maintain the equipment
	Basic industrial maintenance

Safety training	Localized safety training
	OSHA and forklift
	Outside training bring some one in like safety
	Safety training
	Stress safety
	Well forklift training, safety training and we bring in OSHA training. Safety has to be number 1. OSHA VASA FASA on hands safety training We are working on evaluations and maintaining certifications in OSHA. Ways of keeping up the certifications.
Crain and Forklift Training	Crain training and forklift operation training.
	Forklift training course/certification
	Forklift training
	We like forklift operating.
	Forklift equipment maintenance
	Training the forklift operation.
Operating Equipment training	Equipment, operating, transport equipment.
	Focused around the gas platform along with being able to operate the ground units.
	Knowledge of the equipment that they will be working with good communications skills.
	Knowledgeable in hydraulics; operation of plus (logic control) (microcomputers); Servo drives and motors.
	SOP standard operating procedures.
Manufacturing Process Training	Broad training on manufacturing process
	Equipment knowledge of production, and hands on training
	Know how to work it manufacturing training
	Manufacturing skills.
	Prior training or experience. Also, any kind of manufacturing experience.
Industry certification	APICS certification
	It would be nice to have them certified or have some technical education.
	On the job training, and forklift training, and certifications they would need, experience and training. They have certification and continuing education as well. We need additional training than the schooling provides.
	We try to have state of the art technologies but most of our functions are different. We are looking to add staff that may have the certifications mentioned before.
Continuing Education	Constant training
	Constant training involving programs and equipment.
	Continuing education
	Refresher training on forklifts, equipment, erg system
Other	Need to be familiar with international terms. International trade.
	Periodically, we send our warehouse supervisor to classes. Customs and export/import training would be important.
	Inventory accuracy training. Marking product to put in proper location.
	Understanding inventory and logistics.
	Management training

Other ***(continued)***	Training would be for managers and assistant managers. Transportation and scheduling Shipping/receiving A lot of welding experience and certifications. Metal fabrication, welding Four year degree is more relevant than a two-year degree. Just a cad. Driver training