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BIOMEDICAL INDUSTRY CLUSTER

Labor Market Survey 2004

Conducted for the Orange County Workforce Investment Board

January 2005

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INTRODUCTION

Godbe Research & Analysis (Godbe Research) is pleased to present the results of a labor market study conducted for the Orange County Workforce Investment Board. This particular report will focus on the Biomedical (BIOM) cluster, which includes firms that manufacture a variety of medical and laboratory devices, pharmaceutical, and biological products as well as firms engaged in research and development focusing on biotechnology. This report is organized into the following sections:

- The *Executive Summary* includes a summary of the *Research Findings* from the survey, *Conclusions & Recommendations* for OCWIB, as well as a short description of the survey methodology.
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- The *Summary of Findings* section offers a question-by-question analysis of the survey. The discussion is organized into the following sections:
 - Biomedical: Industry Analysis on page 5
 - Biomedical: Occupational Analysis on page 17
 - Biomedical: Education and Skill Occupational Assessment by Occupation on page 27
- *Appendix A* includes a complete description of the methods and procedures used to conduct this research.
- *Appendix B* provides the survey questionnaire.

EXECUTIVE SUMMARY

Introduction

In July 2004, the Orange County Workforce Investment Board hired Godbe Research to conduct three industry cluster studies focusing on key industry sectors identified in *Orange County Workforce 2004: Where Do We Fit in a Global Marketplace*. The three industry clusters included: Biomedical, Business and Professional Services, and Computer Software. Each study included a quantitative survey component that gathered detailed information about the area's industries, firms, and occupations.

This particular report focuses on the Biomedical (BIOM) cluster, which includes firms that manufacture a variety of medical and laboratory devices, pharmaceutical, and biological products as well as firms engaged in research and development focusing on biotechnology.

Survey Methodology

Table 1 briefly outlines the methodology used in this project. Using a database compiled from InfoUSA and Inside Prospects, firms with at least five employees in the Biomedical cluster were called to complete either a phone survey interview or an Internet survey (n = 103), representing a total of 769 Biomedical firms in Orange County. Interviews were conducted from August 26 through September 22, 2004 and each interview typically lasted 20 to 30 minutes.

Table 1 Summary of Survey Methodology

Technique	Telephone Interviewing and Internet Survey
Universe	Firms from the Biomedical cluster located in Orange County with at least five employees
Field Dates	August 26 - September 22
Interview Length	20-30 minutes
Sample Size	103 Biomedical firms

Sample size was driven by the goal to interview as many firms in the Biomedical cluster as was possible. For BIOM, the margin for error was at $\pm 8.99\%$. Because the number of firms employing individuals in each of the Biomedical occupations was lower than the overall number of firms in the sample, the occupational data is less reliable than the data for the industry analysis.

For a more detailed description of the methodology please see Appendix A.

Research Findings

Orange County is one of the nation's established centers for the emerging Biomedical industry. In the last 3 years this industry has been impacted by some of the negative gyrations of the macro-economy including lower stock prices, less available venture capital funding, and generally diminished growth prospects. However expectations for increased employment in this industry within the region provide an indication that employment trends for this cluster may be changing.

Overall job growth for this cluster in Orange County is expected to increase by a robust six percent, over the next 12 months, with substantially higher growth prospects found in specific occupations. In the region there are currently over 25,000 individuals employed in this cluster and if expectations are met the total employment figure in the region will increase by over 1,500.

A brief profile of the Biomedical cluster in Orange County, include the following salient characteristics:

- Eighty-seven percent of employees in this cluster are employed full-time with a corresponding low proportion of part-time employment (13%). Thirteen percent of the employees in this industry were working on a temporary basis.
- Generally, employers in this cluster were willing to recruit individuals from outside the County, but less willing to recruit outside of the Southern California region. Thirty percent of BIOM employers would "always" or "frequently" recruit individuals outside of Orange County, but only 5 percent said the same for outside Southern California. Almost half of employers (49%) said they recruited from outside of Orange County at least "sometimes".
- The workforce issues of primary concern for the cluster were recruiting qualified non entry-level and entry-level candidates as well as recruiting employees with reasonable salary requirements. At least half of employers indicated they had either some difficulty or great difficulty "Recruiting non entry-level employees with adequate skills and experience", "Recruiting entry-level employees with adequate training and education", and "Recruiting employees with reasonable salary requirements".
- Generally, employers in this cluster were more likely to have formal employee development practices than employers in other clusters. For example, almost half of BIOM employers in the County had some form of career ladders (49%) and tuition assistance at a local college or university (46%).

The occupational needs of this industry fall into three generalized categories that have very different training and educational requirements. Any policies or strategies to better train and educate the region's workforce to support this cluster should be directed to at least one of these occupational segments.

- **Senior Researcher's:** This group of occupations is made up primarily of scientists (Biology, other Life sciences, Physical sciences, and Bio-statistician) who are likely to have a PhD. or at least some type of graduate degree. While these position do not have good growth expectation for the next 12 months, employers indicated they had difficulty finding qualified applicants. "Physical Scientists" were the most difficult to recruit qualified candidates of the occupations evaluated, and they were the second most likely to be recruited from outside the region. Employers had less difficulty finding qualified "Biological Scientists" and were less likely to be recruited from outside the County. These two occupations, along with Chemists, had

the three highest educational requirements. The educational requirements associated with these positions can only be met at University's with extensive graduate training programs in the life and physical sciences, like the University of California at Irvine.

- **Production and Manufacturing employees:** This group of occupations is made up primarily of assemblers & fabricators, technicians, technologists, inspectors, and auditors. These positions have strong growth expectations for the next 12 months. Of the occupations evaluated for this cluster, employers had the third most difficulty finding "Medical Lab Technologists". The educational and training requirements associated with these positions can largely be met at a community college that have the appropriate certificate program or even developed internally with some of the larger biomedical employers.
- **Sales Agents and Representatives:** Of the occupations evaluated for this cluster, "Sales Representatives" were near the middle in the difficulty of finding qualified candidates, and the third most likely to be recruited from outside the County. The sales positions within this cluster have more fluid educational requirements, sixth out of nine in educational requirements, but often require experience in the industry as well as strong sales and communication skills. It is interesting to note, that 34 percent of employers still cited "technical competence" as the most important skill for this position, while only 27 percent indicated "communication skills were the most important skill for this occupation.

Conclusions and Recommendations

Findings from the research reveal several opportunities for OCWIB to further develop Orange County's Biomedical workforce. These opportunities include expanding certificate programs at regional community colleges to train and educate Orange County residents for production and manufacturing positions in the Biomedical cluster, and prepare Orange County students for senior research positions in the Biomedical cluster.

Expand Certificate Programs at Community Colleges

Three occupations in the Biomedical cluster stood out in terms of expected job growth for the next 12 months they were "Assemblers and fabricators", "Medical lab technologists", and "Chemical technicians". These positions are all expecting over 20 percent growth and as the Biomedical cluster emerges the skills required for these production and manufacturing positions are likely to change as well. Maintaining and expanding the available pool of qualified applicants within the County is an important objective for the OCWIB. Some of the skills and programs that should be considered for the community colleges include;

- Manufacturing skills for "Assemblers and Fabricators",
- Laboratory bench skills for many of the technicians and technologists that work in this industry.

Results of the survey show that employers are having more difficulty recruiting qualified applicants for those manufacturing and production positions that require relative more education, such as "Medical lab technologists" and "Chemical technicians".

Prepare Orange County Students for Senior Research Positions

Results of the survey show that employers do not expect to increase the number of Senior Research positions (“Biological Scientists”, “Chemists” and “Physical Scientists”) in the short run (over the next 12 months), they did indicate some difficulty finding qualified applicants even under the current diminished hiring expectations.

Follow-up interviews with a few of the larger Biomedical employers indicate that some of the larger firms are currently moving into a production driven cycle, but in the long-run they will need a qualified pool of Senior Researchers for the long term sustainability of this cluster. If Orange County is going to remain one of the geographic centers for this industry, it will need to provide qualified Senior Researchers to the Biomedical industry.

BIOMEDICAL: INDUSTRY ANALYSIS

The first five questions of the survey asked respondents about the nature of their workforce. In particular, respondents were asked how many permanent full- and part-time employees worked at their business location, how many of them were temporary or seasonal workers, and what they believed would be their expected growth in the next 12 months. In addition, respondents were asked to estimate the percentage of their current employees that plan to retire in the next three years.

- Q1. How many permanent full-time employees work at your business location?
- Q2. How many permanent part-time employees work from your business location?
- Q3. How many temporary and/or seasonal employees currently work at your business location?
- Q4. Including all full-time and part-time employees, how many **permanent** employees do you expect to have 12 months from now?
- Q5. How many temporary and/or seasonal employees do you expect to have 12 months from now?
- Q9. In the next 3 years, what percentage of your current employees do you expect will retire?

As shown by Table 2, 87 percent of the Biomedical employees, who worked in firms with at least 5 employees, worked full-time and 13 percent worked part-time. Approximately 13 percent of employees in this cluster work in temporary positions. Looking out 12 months from the time the survey data were collected, BIOM firms expected an increase of 1,471 employees in Orange County, representing a six percent growth rate. In addition, two percent of BIOM employees were expected to retire within the next three years, opening up an additional 530 potential positions.

Table 2 Industry Employment Practices

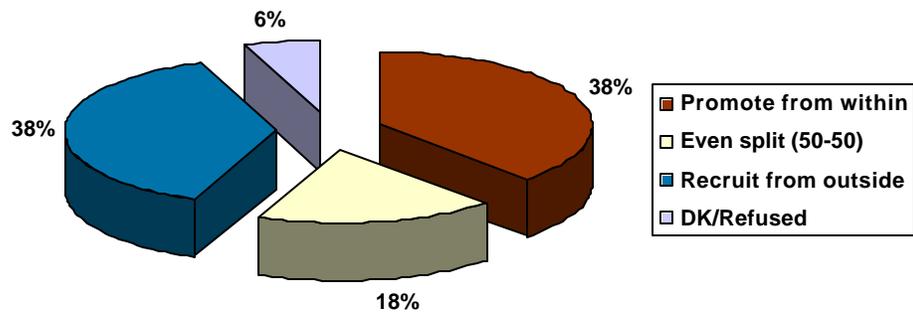
	Total Employees	Full-Time Employees	Part-Time Employees	Temporary Employees	Expected Growth in Employment Over 12 Months	Expected Retirement in Next 3 Years
BIOM	25,854 2%	22,398 87%	3,456 13%	3,334 13%	1,471 6%	530 2%

Next, respondents were asked a series of questions pertaining to their hiring practices. Specifically, Question 6 asked respondents about their hiring practices for non entry-level positions.

Q6. When a non entry-level position becomes available in your firm, do you more often hire from outside or promote from within the company?

As shown by Figure 1, 38 percent of Biomedical firms reported that they recruit candidates from outside of the firm and an identical percentage indicated that they recruit internally in order to fill non entry-level positions. Eighteen percent reported an even split between recruiting from outside of the company and promoting from within. Six percent of respondents either did not know or declined to reveal their hiring practices.

Figure 1 Hiring practices for Non Entry-Level Positions



Businesses were then asked about the frequency in which they recruit candidates from outside of Orange County and Southern California respectively.

Q7. How often does your business recruit individuals from outside the County but within the Southern California region for employment?

Q8. How often does your business recruit individuals from outside Southern California for employment?

Thirty percent of Orange County Biomedical firms either “Always” (13%) or “Frequently” (17%) recruit candidates from outside of the County. Nineteen percent of firms “Sometimes” recruit outside the County, while 51 percent reported that they “Rarely” (24%) or “Never” (26%) recruit individuals from outside of Orange County.

Figure 2 Frequency of Recruiting Outside of Orange County

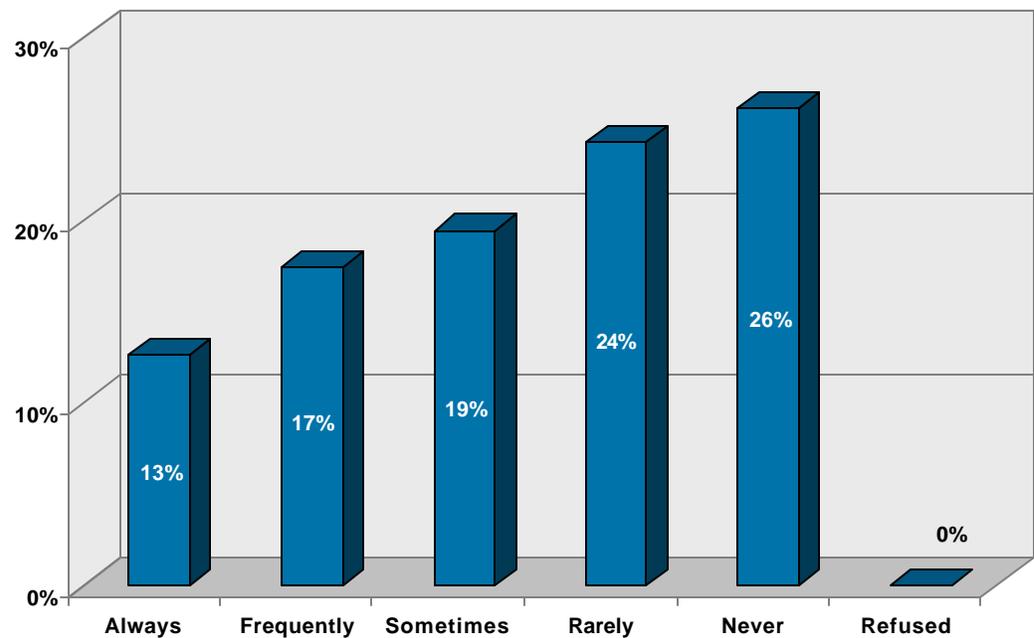
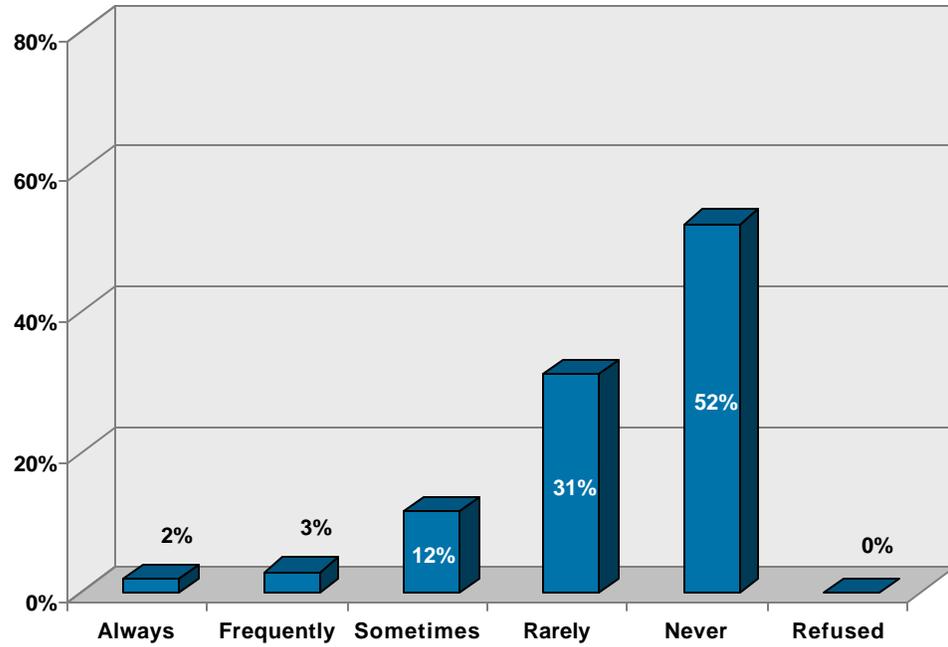


Figure 3 shows that Biomedical firms rarely recruit individuals from outside the Southern California region. A majority of firms (52%) reported that they “Never” recruit candidates from outside of Southern California and another 31 percent “Rarely” go outside of the region. Twelve percent “Sometimes” go outside the region to hire new employees, whereas only five percent of businesses either “Frequently” (3%) or “Always” (2%) recruit individuals who live outside of Southern California.

Figure 3 Frequency of Recruiting Outside of Southern California



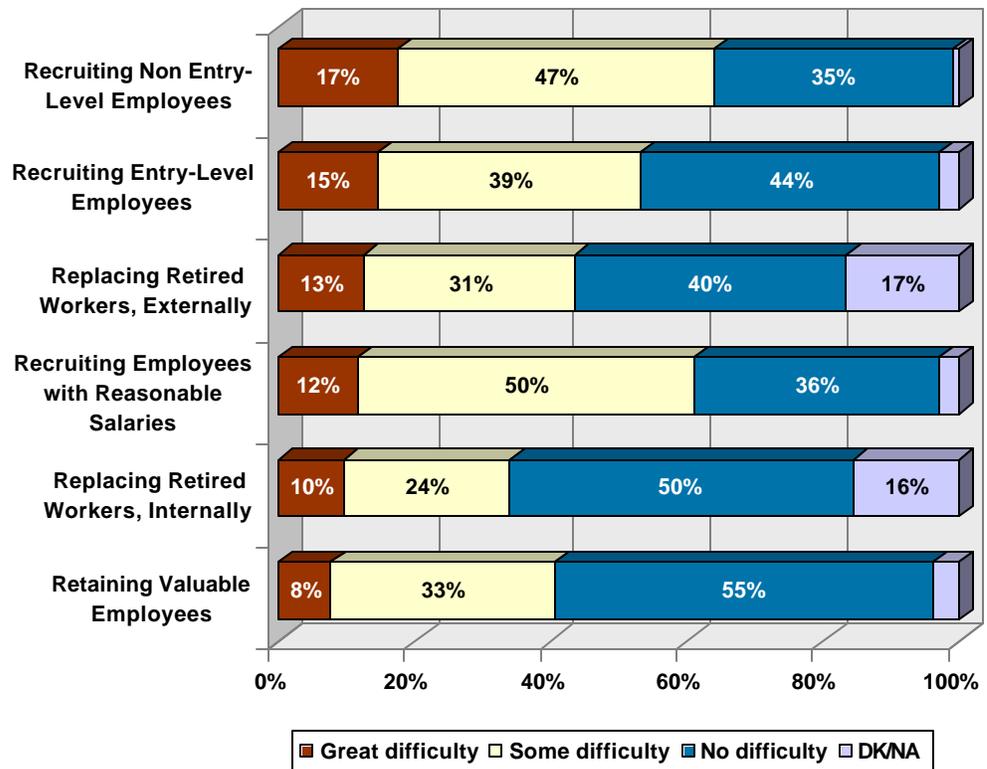
Question 10 asked respondents to anticipate the level of difficulty their businesses face in addressing a series of workforce issues related to recruitment and retention of employees in the next few years.

Q10. Next, I'm going to read a list of issues facing the region's workforce in the coming years. Please tell me how much difficulty your firm faces in addressing these workforce needs.

Here's the (first/next) one: _____. Please tell me whether your business has no difficulty, some difficulty, or great difficulty in dealing with this issue.

Firms in the Biomedical cluster did report some difficulty with the recruitment and retention issues tested in the survey. In particular, firms reported the most difficulty "Recruiting non entry-level employees with adequate skills and experience" (64% great or some difficulty), "Recruiting employees with reasonable salary requirements" (61% great or some difficulty), and "Recruiting entry-level employees with adequate training and education" (53% great or some difficulty). On the other hand, 55 percent of firms reported no difficulty "Developing strategies to retain valuable employees."

Figure 4 Difficulties in Recruitment and Retention



The next set of questions asked respondents various questions pertaining to outsourcing, the process where companies move a division of their business to another location.

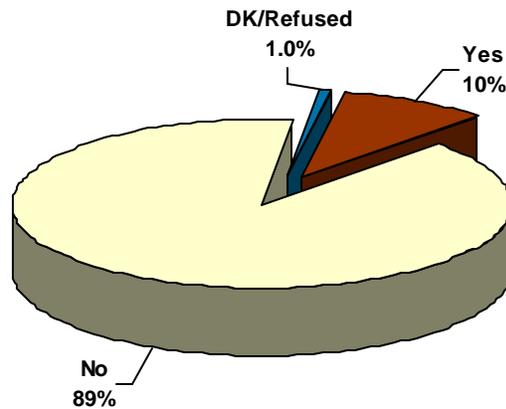
Q11. During the past two years, has your company relocated any of its business processes, including production and services, to a lower cost location outside of Orange County?

Q12. Which type of business process did your company relocate outside of the County? Did your company move its production or manufacturing processes, its services, or both?

Q13. Where did your company relocate to outside of the County?

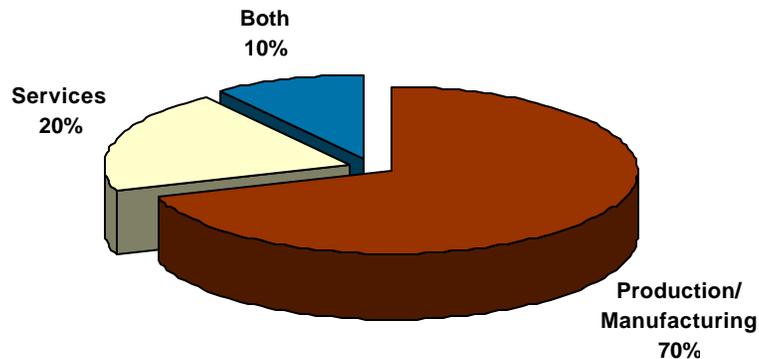
Approximately ten percent of Orange County Biomedical firms have outsourced some part of their business processes to a location outside of the County during the past two years. Most BIOM companies (89%), however, have not relocated their business processes outside of the County.

Figure 5 Outsourcing in Orange County



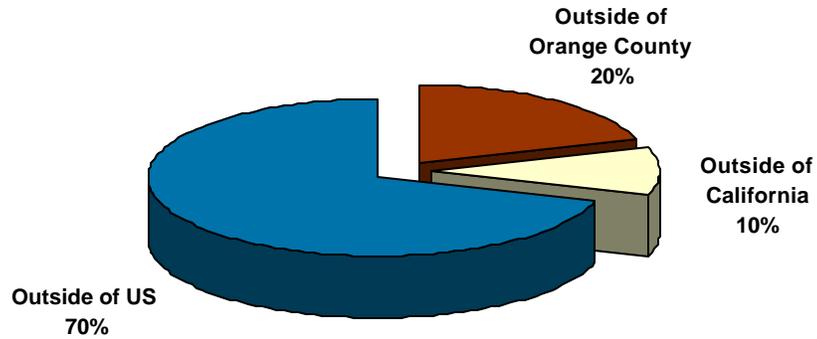
Of the ten companies that reported that they outsource some part of their business, seven reported that they outsourced divisions relating to “Production or manufacturing,” two moved its “Services,” and one moved both types of processes.

Figure 6 Type of Outsourcing (n = 10)



Seven out of the ten companies reported that they relocated a part of their businesses outside of the United States, one moved outside of California, and two moved divisions outside of the County.

Figure 7 Location of Outsourcing (n = 10)

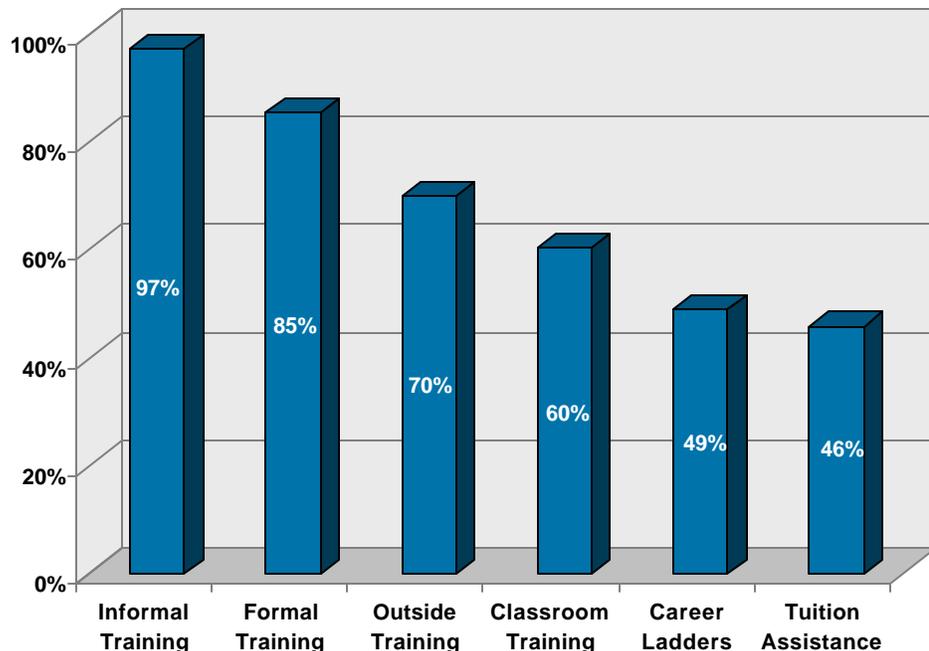


In order to identify areas where the Orange County Workforce Investment Board can assist businesses with employee development programs, Question 14 asked respondents to indicate which training programs they currently use.

Q14. Next, I'd like to ask you about employee development practices at your business location. As I read each of the following employee development practices, please indicate whether your business uses each practice.

Most firms in the Biomedical cluster rely on “Informal on-the-job training” (97%) to develop their employees, followed by “Formal on-the-job training” (85%), “Employer-Paid outside training” (70%), and “In-House classroom training” (60%). About half of BIOM firms reported offering “Career Development/Career Ladders” (49%) or “Tuition assistance at a college or university” (46%) for their employees.

Figure 8 Employee Development Practices



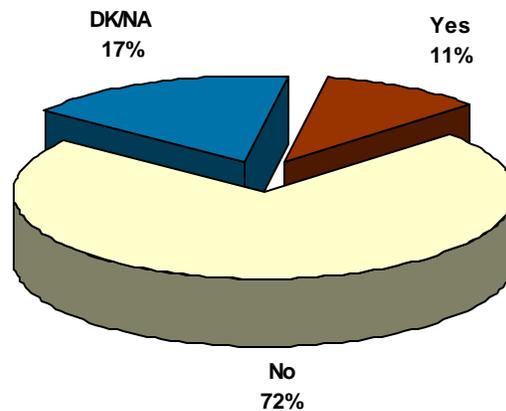
Questions 15 and 16 were designed to assess the need for GIS or geospatial technology training programs.

Q15. Does your firm use or have GIS or geospatial technology?

Q16. (IF YES TO Q15, ASK): Has your firm had any difficulty hiring or finding employees internally with GIS or geospatial technology skills? (IF YES) Is that some difficulty or great difficulty hiring or finding employees internally with GIS skills?

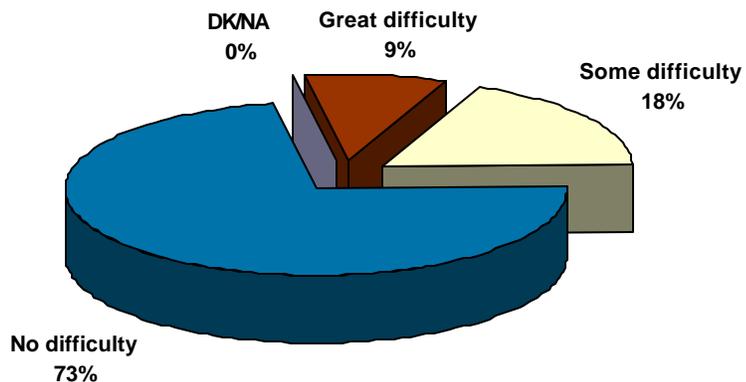
Figure 9 shows that most Biomedical firms (72%) do not use GIS technology. About 11 percent reported that GIS technology is present in their companies. Furthermore, a sizable percentage of respondents (17%) were unaware if their companies used GIS technology.

Figure 9 Use of GIS Technology



Most Biomedical firms (73%) who use GIS technology reported no difficulty in finding employees within the firm with the necessary GIS skills, over a quarter (27%) indicated that they had at least some difficulty in finding employees internally with GIS skills (“Great difficulty” 9%; “Some difficulty” 18%).

Figure 10 Difficulty Finding Employees with GIS Skills (n = 11)



BIOMEDICAL: OCCUPATIONAL ANALYSIS

Ten occupations were investigated in the Biomedical cluster: Assemblers and Fabricators, Sales Representatives, Chemists, Chemical Technicians, Product Inspectors, Testers, and Graders, Biological Scientists, Physical Scientists, Medical and Clinical Lab Technologists, Quality Assurance Auditors, and Veterinary Technologists and Animal Caretakers. Unfortunately, not enough firms answered the occupational questions for Veterinary Technologists and Animal Caretakers, so information about this occupation does not appear in this report.

Respondents were first asked if their business employed individuals for any of the twelve occupations included in the survey. Respondents were then asked detailed, occupation-specific questions about four randomly selected occupations from among those present at their company.

- Q18. As I read each of the following occupations, please tell me how many individuals at your business location are currently employed in the occupation.
- Q19. How many of the current _____, do you expect, will **NOT** be working at this company in the same position **12 months from now**?
- Q20. As I read each of the following occupations, please tell me how many total individuals you estimate will be employed in each of the occupations **12 months from now**.

Respondents in the Biomedical cluster were asked about their expectations for occupational turnover and growth over the next 12 months. The results presented in Table 3 show that “Medical Lab Technologists” (18%) and “Chemists” (15%) are expected to have the highest turnover rate in the next year. Conversely, BIOM firms estimated that “Chemical Technicians” and “Physical Scientists” would have the lowest turnover rate (2%).

“Chemical Technicians” (32%), “Medical Lab Technologists” (28%), and “Assemblers and Fabricators” (24%) had the highest 12-month expected growth rate among the BIOM occupations tested in the survey. On the other hand, “Physical Scientists” (-21%)ⁱ, “Chemists”, and “Biological Scientists” (0%) were projected to have either negative or flat growth over the next 12 months.

ⁱ The negative projected growth rate in Physical Scientists can be attributed to one company that plans to downsize its numbers in this occupation from 150 to 100 in the next year; however, the company plans to hire significant numbers for three other occupations.

Based on the turnover and growth rates, we can project the number of openings that will become available in the next year. “Assemblers and Fabricators” (1,530), “Sales Representatives” (315), and “Medical Lab Technologists” (301) will have the most openings in the next 12 months.

Table 3 Occupational Retention and Turnover Over the Next 12 Months

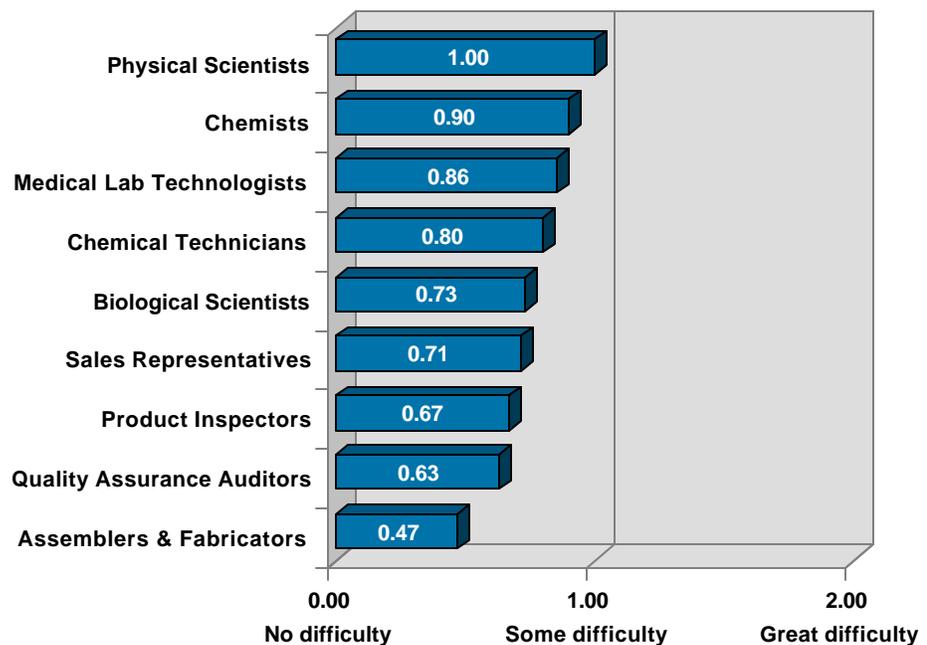
	Number Employed	% of Cluster Employment	Expected Turnover	Growth Rate	Openings
Assemblers & Fabricators	4,859	18.8%	8%	24%	1,530
Sales Representatives	2,254	8.7%	10%	4%	315
Product Inspectors	1,075	4.2%	5%	9%	153
Physical Scientists	679	2.6%	2%	-21%	-130
Medical Lab Technologists	657	2.5%	18%	28%	301
Quality Assurance Auditors	418	1.6%	11%	2%	54
Chemists	234	0.9%	15%	-12%	9
Chemical Technicians	211	0.8%	2%	57%	126
Biological Scientists	207	0.8%	11%	0%	22
Cluster Total	25,854	100%			

Respondents were subsequently asked whether they had “Great difficulty,” “Some difficulty,” or “No difficulty” finding qualified applicants for each of the Biomedical occupations. To ease interpretation of the results, responses to this question were coded in the following manner: “Great difficulty” = +2, “Some difficulty” = +1, and “No difficulty” = 0. The aggregate responses to each item are presented below in the form of a mean, which is simply a summary statistic obtained by taking the overall average of the response codes for the entire sample. A mean of 1.00, for example, indicates that, overall, respondents felt that they had “Some difficulty” finding qualified candidates for that particular occupation.

Q21. For the same list of occupations, I'm interested in the level of difficulty your business has in finding applicants who meet the company's hiring standards. As I read each occupation, please tell me whether your business has no difficulty, some difficulty, or great difficulty finding applicants.

On average, firms did not report much difficulty finding applicants who meet their hiring standards, with the mean ratings falling between “No difficulty” and “Some difficulty” for nearly all of the occupations. Firms indicated the most difficulty finding qualified “Physical Scientists” (1.00), “Chemists” (0.90), “Medical Lab Technologists” (0.86), and “Chemical Technicians” (0.80). Conversely, firms reported the lowest difficulty levels finding qualified “Assemblers and Fabricators” (0.47).

Figure 11 Mean Difficulty Finding Qualified Applicants

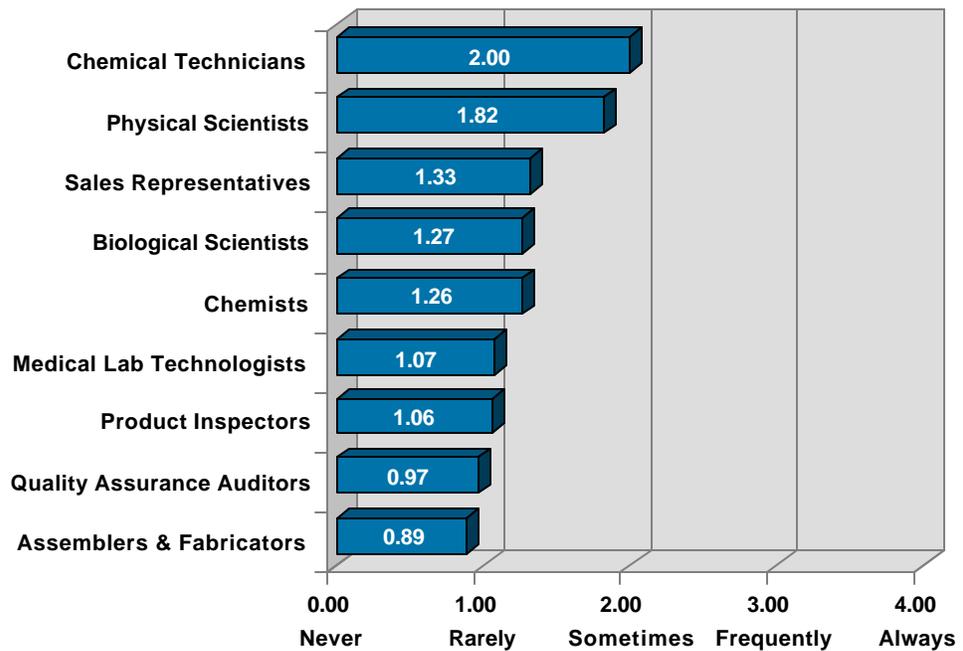


Next, respondents were asked how often they recruited candidates outside of Orange County for each occupation. Answers to this question were coded such that “Always” = +4, “Frequently” = +3, “Sometimes” = +2, “Rarely” = +1, and “Never” = 0.

Q22. We're interested in how often your business recruits individuals from outside of Orange County for an occupation. As I read each occupation, please indicate if you always, frequently, sometimes, rarely or never recruit individuals from outside of Orange County for that occupation.

For each occupation, a majority firms in the Biomedical industry indicated that, on average, they “Rarely” or “Sometimes” recruit individuals from outside of Orange County. Firms reported the highest frequency of recruiting outside the County for “Chemical Technicians” (2.00) and “Physical Scientists” (1.82). Companies were least likely to seek “Assemblers and Fabricators” (0.89) and “Quality Assurance Auditors” (0.97) from outside of the County.

Figure 12 Mean Frequency of Hiring Outside of Orange County



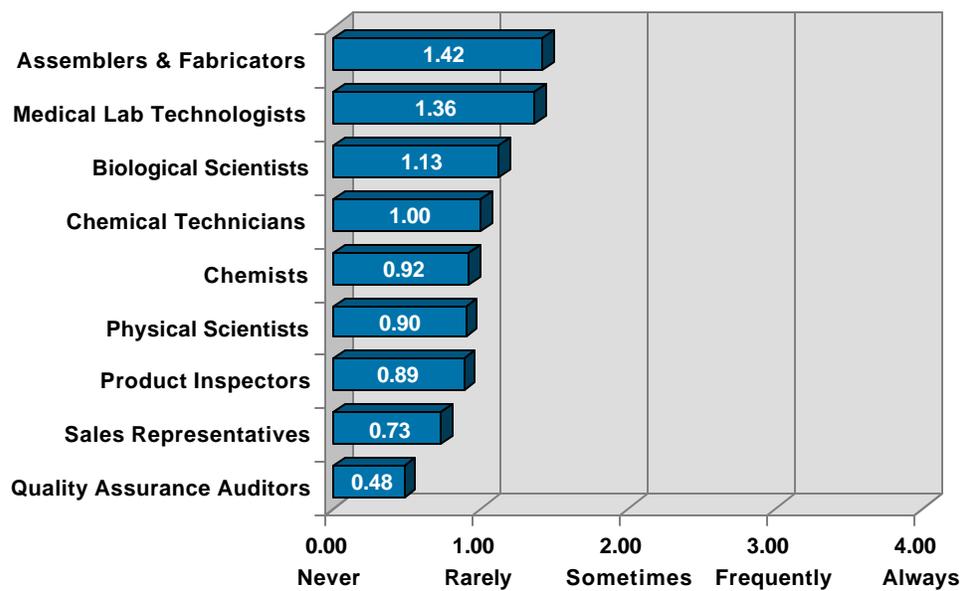
Using the same frequency scale as the previous question, respondents were asked how often their businesses hire part-time and temporary workers, respectively. An average frequency score of 2.00 would indicate that the Biomedical firms “Sometimes” hired part-time or temporary workers at their business location.

Q23. For the same list of occupations, we'd like to know how often your business hires **part-time** workers at your business location. As I read each occupation, please indicate whether your business always, frequently, sometimes, rarely or never hires **part-time** workers for that occupation.

Q24. Same question, only this time we're interested in **temporary workers**. As I read each occupation, please indicate whether your business always, frequently, sometimes, rarely or never hires **temporary workers** for that occupation.

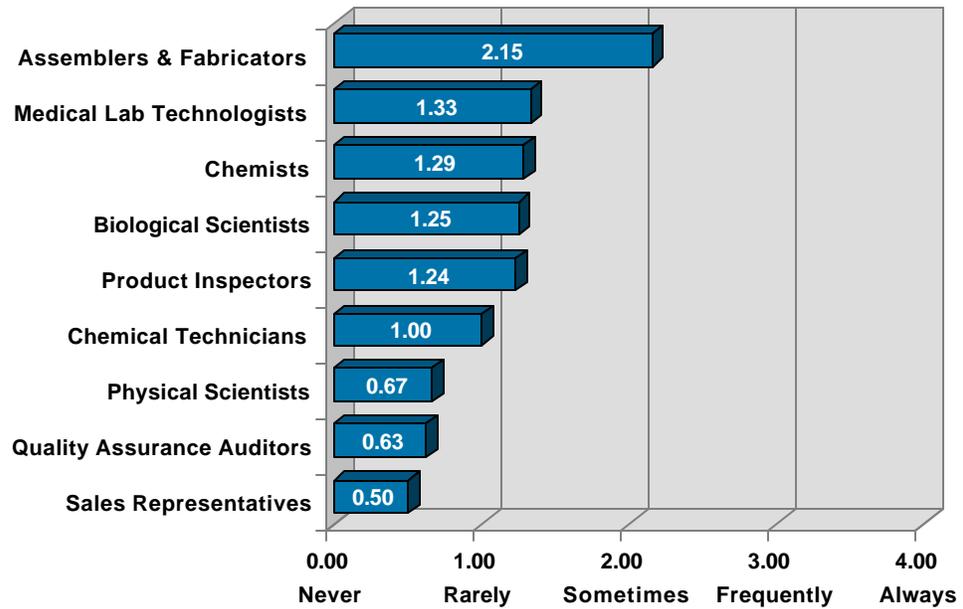
In general, Biomedical firms hired “Assemblers and Fabricators” (1.42), “Medical Lab Technologists” (1.36), “Biological Scientists” (1.13), and “Chemical Technicians” (1.00) in part-time positions with greater frequency than they did for the other occupations. Even so, their frequency of hiring part-time position was closer to “Rarely” than “Sometimes.” Respondents were least likely to hire part-time “Quality Assurance Auditors” (0.48).

Figure 13 Mean Frequency of Hiring Part-Time Employees



Within the Biomedical cluster, the frequency of hiring temporary workers varied from one occupation to the other.ⁱⁱ Specifically, on average firms “Sometimes” hired “Assemblers and Fabricators” (2.15) in temporary positions, but “Rarely” to “Sometimes” hired temporary “Medical Lab Technologists” (1.33), “Chemists” (1.29), “Biological Scientists” (1.25), and “Product Inspectors, Testers, and Graders” (1.24), and “Chemical Technicians” (1.00). Firms reported a very low frequency of hiring temporary “Sales Representatives” (0.50), “Quality Assurance Auditors” (0.63), and “Physical Scientists” (0.67).

Figure 14 Mean Frequency of Hiring Temporary Employees



ⁱⁱ Since less than ten responses were obtained for “Medical Lab Technologists,” “Biological Scientists,” “Chemical Technicians,” “Physical Scientists,” and “Chemists,” we cannot assume a normal distribution of the responses and therefore, cautious in interpreting the results contained in Figure 14.

BIOMEDICAL: OCCUPATIONAL WAGES

Investigating wage data as part of an occupational survey can present specific challenges. Depending on the occupation, five to ten percent of respondents either refused to answer the typical pay range for each occupation or stated they did not know the range. Where the number of firms responding to an occupation is already relatively low, it can be particularly problematic to gather enough wage data to create a representative sample. For Biomedical, however, only the Market and Survey Research Analysts received less than 30 responses for both low (entry-level) and high (experienced) wages.

For those respondents that did provide the occupational wage range information, the issue of strategic bias should be considered, particularly in the case where the wages seem to be lower than what might be expected. This bias occurs when a respondent acts strategically to affect the survey, in this case lowering the response for the typical wage for an occupation, with the thought that lower published wages will cause prospective employees to accept lower wages. In addition, we cannot discern whether the wages reported by the firm applies only to full-time employees, part-time employees, or both.

As shown in Table 4, Physical Scientists had the highest medianⁱⁱⁱ low (entry-level) annual wage (\$45,000) as well as the highest median high (experienced) annual wage (\$95,000) of the Biomedical occupations examined. Physical Scientists, Chemists, and Sales Representatives were the only occupations to receive more than \$60,000 as the high (experienced) mean^{iv} wage. Of the 12 occupations tested, Assemblers and Fabricators had the lowest median and mean wages for both entry-level employees and experienced employees.

ⁱⁱⁱ The median wage represents the mid point in the range of responses if data points are put in sequential order. For Employment Interviewers the low (entry-level) median wage of \$30,000 means that half of the low wages given for Employment Interviewers lie above \$30,000 and the other half of Employment Interviewers low wages lie below \$30,000.

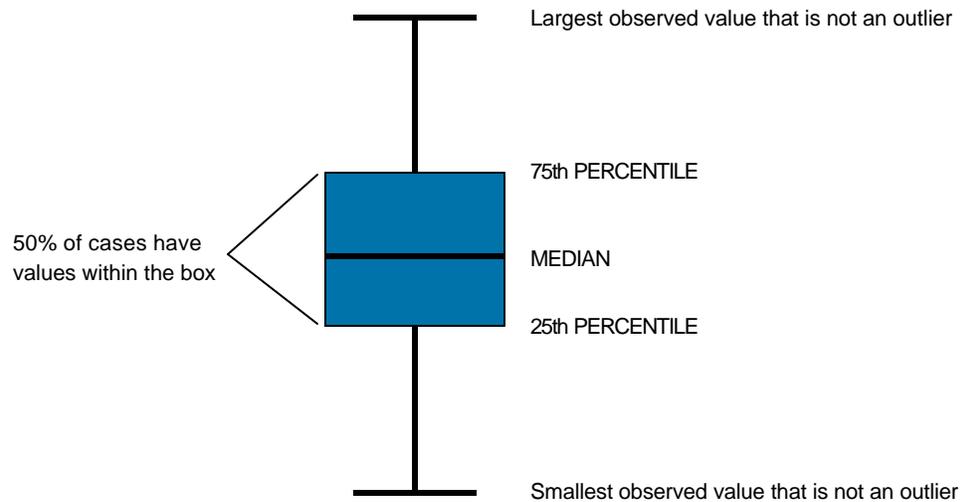
^{iv} The mean wage can also be called the average wage and is derived by adding all the responses for wages and then dividing by the number of responses.

Table 4 Annual Wages for Entry-Level (Low) and Experienced (High) Employees by Occupation

		Median	Mean	N
Physical Scientists	Low	\$45,000	\$48,286	14
	High	\$95,000	\$95,886	14
Chemists	Low	\$40,000	\$45,507	19
	High	\$75,000	\$87,644	19
Sales Representatives	Low	\$37,500	\$40,413	42
	High	\$65,000	\$72,659	41
Quality Assurance Auditors	Low	\$35,000	\$37,413	35
	High	\$52,000	\$59,010	37
Biological Scientists	Low	\$31,200	\$40,040	10
	High	\$71,200	\$81,940	10
Medical Lab Technologists	Low	\$31,200	\$41,123	13
	High	\$52,000	\$65,723	13
Chemical Technicians	Low	\$27,060	\$27,853	8
	High	\$38,300	\$42,800	8
Product Inspectors, Testers, & Graders	Low	\$24,960	\$30,667	30
	High	\$40,000	\$49,004	29
Assemblers & Fabricators	Low	\$20,400	\$22,364	30
	High	\$32,916	\$34,395	30

Data from Table 4 can be used to present each occupation's wage range in the form of boxplot diagrams for the low (entry-level) and high (experienced) annual wages (see Figures 10 and 11). Boxplot diagrams present a distribution of the wage information received for each occupation. Half of the wage responses fall within the shaded box: the middle line within the box represents the median wage, and the outside edges of the shaded box represent responses at the 25th percentile and 75th percentile. The horizontal lines outside of the shaded box indicate the smallest and largest wage responses that are not outliers^v. Therefore, the vertical line between the two horizontal ones captures the entire range of responses (excluding outliers) (see Figure 15 below).

Figure 15 Interpreting a Boxplot Diagram



^v Outliers in the context of the boxplot diagram are defined as those responses that are more than 1.5 shaded box lengths from the 25th or 75th percentile.

Medical Lab Technologists, Sales Representatives, Biological Scientists, and Quality Assurance Auditors had the largest wage ranges for entry-level (low) wages. In other words, these occupations had more variability in entry-level wages than for other Biomedical occupations. Sales Representatives also had the most variability in their range of experienced (high) wages (see Figure 16 and Figure 17).

Figure 16 Distribution of Entry-Level (Low) Annual Wages

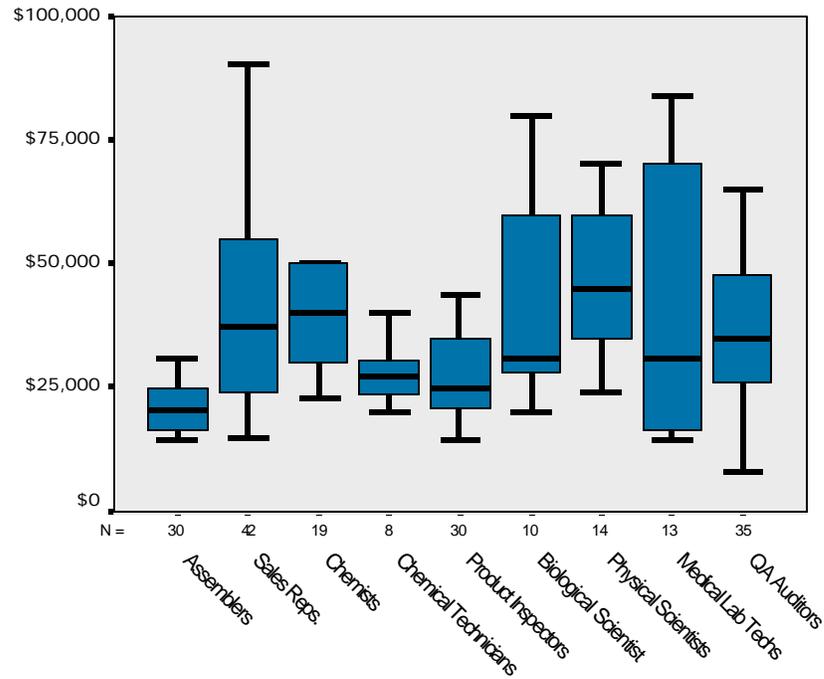
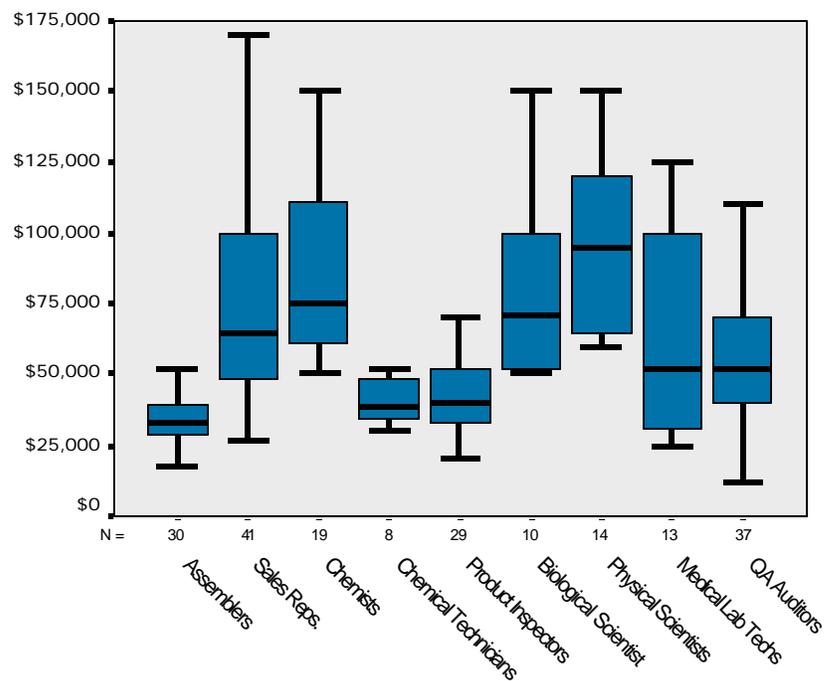


Figure 17 Distribution of Experienced (High) Annual Wages



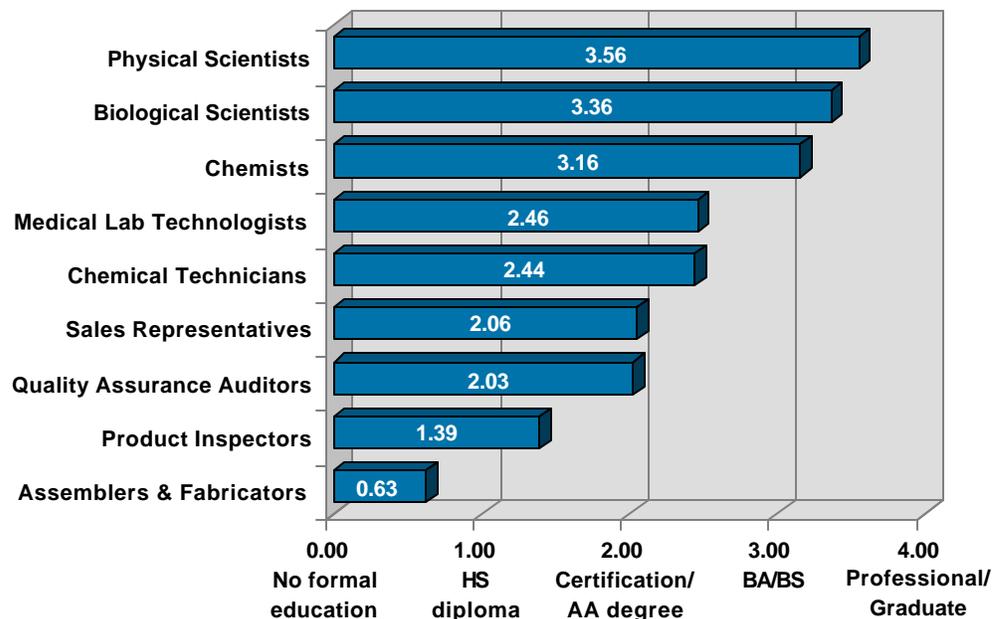
BIOMEDICAL: EDUCATION AND SKILL OCCUPATIONAL ASSESSMENT

To get an idea of the level of training needed for each of the occupations in the Biomedical cluster, respondents were asked to indicate the *typical* education level required for successful applicants within each of the occupations. Responses to this question were coded according to the following education scale: “Professional or Graduate Degree” = +4, “Bachelor’s Degree” = +3, “Certification or Associate’s Degree” = +2, “Completion of High School or Equivalency” = +1, and “No formal education” = 0.

Q23. Next, for the same list of occupations, I'd like to know what are the **typical** education requirements for successful applicants within each occupation. The categories are: (INTERVIEWER READ OPTIONS). Okay, here's the (first/next) one: _____. What are the **typical** education requirements for successful applicants in this occupation at your business location?

On average, “Physical Scientists” (3.56), “Biological Scientists” (3.36), and “Chemists” (3.16) typically required at least a college degree among job applicants. “Medical Lab Technologists” (2.46), “Chemical Technicians” (2.44), “Sales Representatives” (2.06), and “Quality Assurance Auditors” (2.03) had mean typical education requirements between Certification/AA Degree and a college degree. Comparatively, “Assemblers and Fabricators” (0.63) and “Product Inspectors, Testers, and Graders” (1.39) had the lowest typical educational requirements. Firms reported that, on average, successful applicants in the Biomedical field needed at least a certificate or AA degree in seven of the nine BIOM occupations tested in the survey.

Figure 18 Mean Typical Education Requirements



In the last substantive section of the survey, respondents were read a list of general employment skills. Then they were asked to name the most important skill candidates should have when applying for a job with the company for each Biomedical occupation. In addition, a follow-up question asked respondents which skill that their current employees in the occupation were most deficient in. These results are shown in Figure 19 through Figure 27

Q27. I'm going to read a list of general skills. Please tell me which one of these skills is **most important** when considering applicants for _____ (READ OCCUPATION).

Q28. I'm going to read the same list of general skills once more. Please tell me which of these skills your _____ (READ OCCUPATION) are currently **most deficient** in.

Of the skills tested, "Technical competence specific to the position" was the most important to respondents when hiring for eight out of the nine Biomedical occupations. Technical competence was particularly important for Chemical Technicians (80%), Chemists (70%), Physical Scientists (68%), Product Inspectors, Testers, and Graders (63%), and Biological Scientists (58%). "The ability to follow directions" and having a "Conscientious work ethic and positive attitude" were important skills for Assemblers and Fabricators.

Respondents were quite varied in assessing deficiencies of their employees in the various Biomedical occupations. It is particularly noteworthy that many respondents seemed to be concerned about their employees' technical competency specific to their occupation, especially for occupations where technical competence ranked high in importance. For example, large percentages of respondents indicated that their Biological Scientists (42%), Physical Scientists (37%), and Chemists (35%) were lacking skills related to their positions.

Figure 19 Occupation Skill Assessments: Assemblers and Fabricators

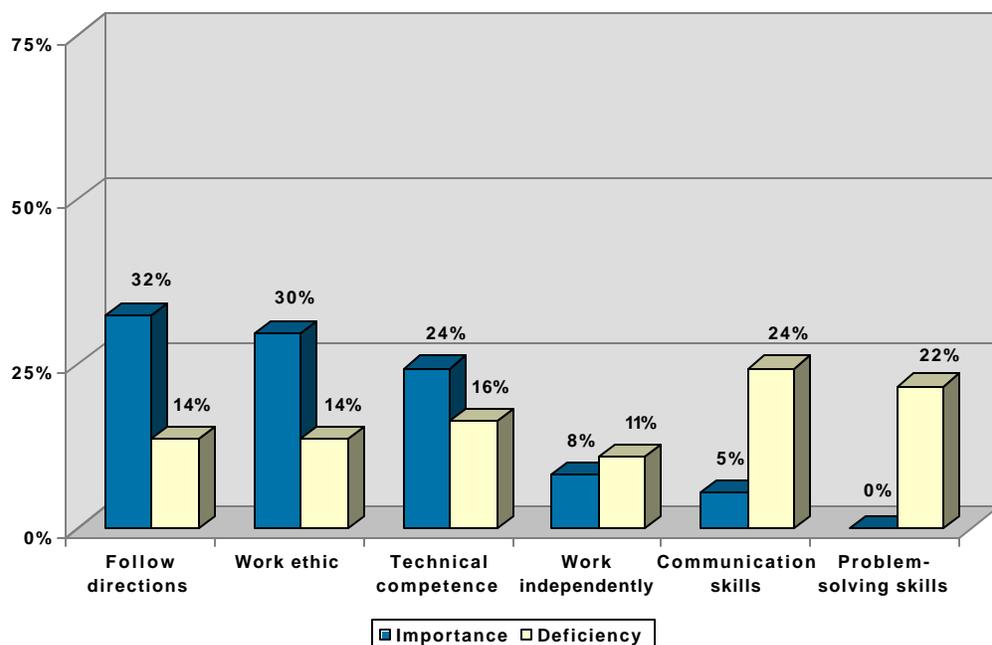


Figure 20 Occupation Skill Assessments: Sales Representatives

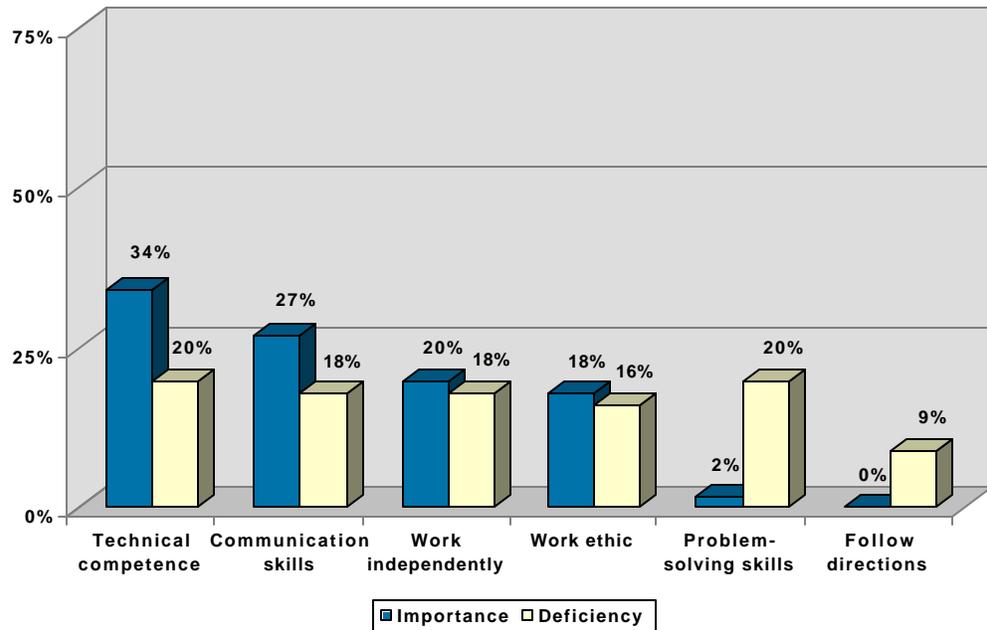


Figure 21 Occupation Skill Assessments: Chemists

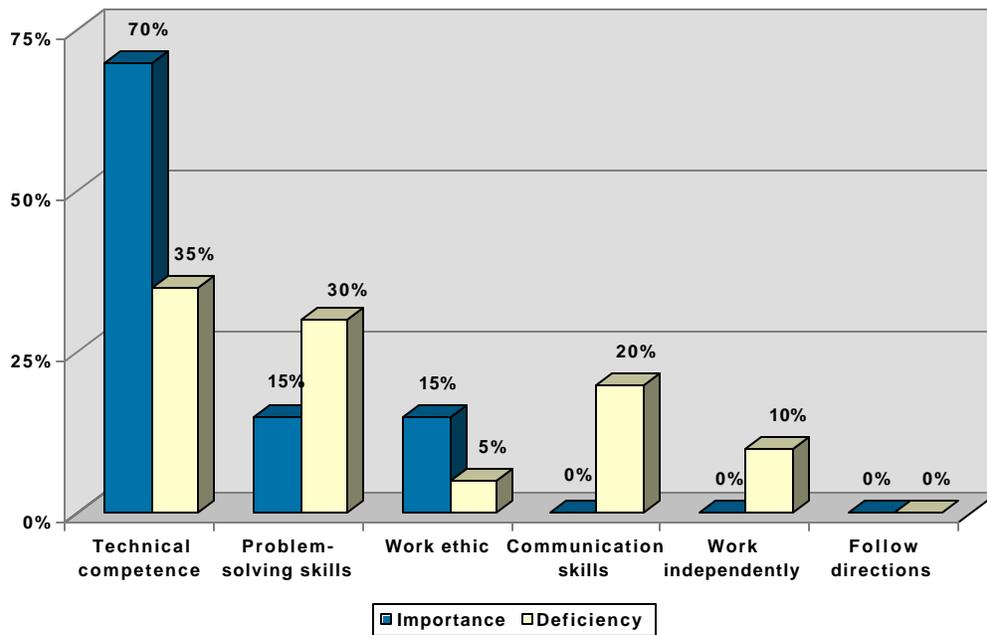


Figure 22 Occupation Skill Assessments: Chemical Technicians

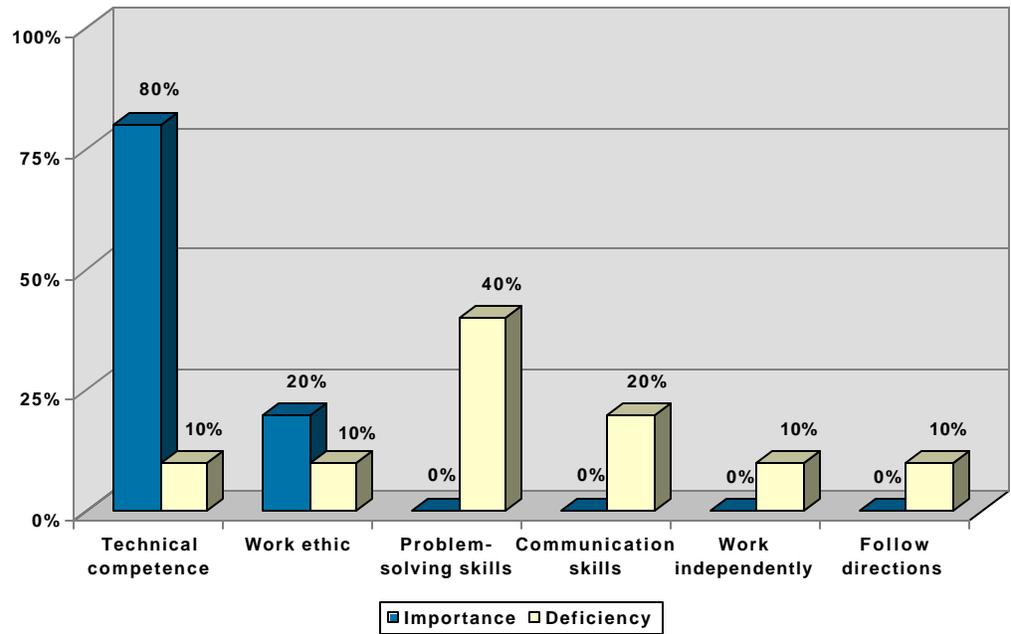


Figure 23 Occupation Skill Assessments: Product Inspectors, Testers, and Graders

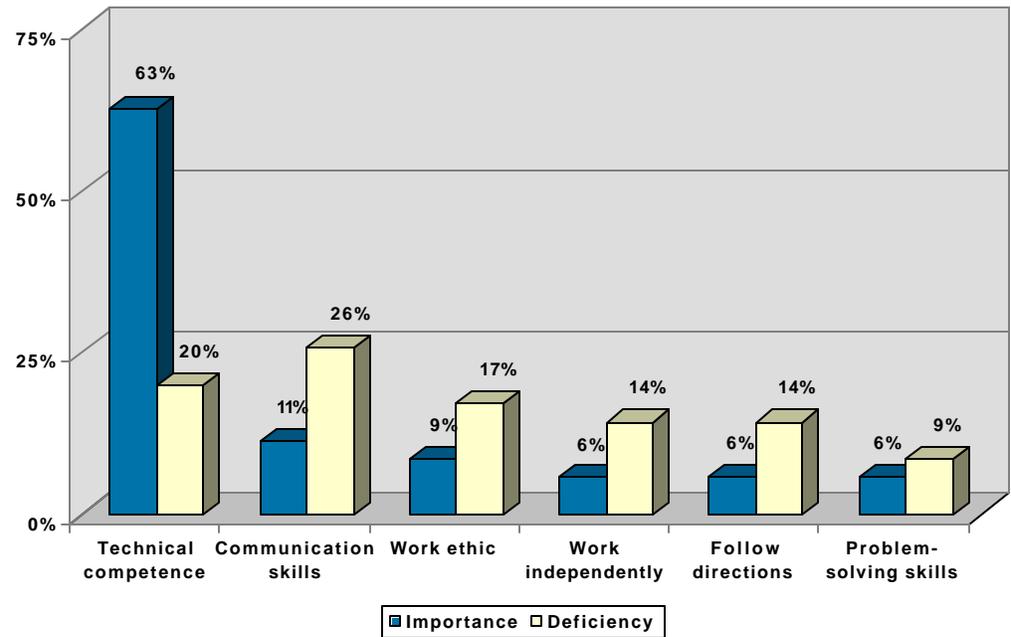


Figure 24 Occupation Skill Assessments: Biological Scientists

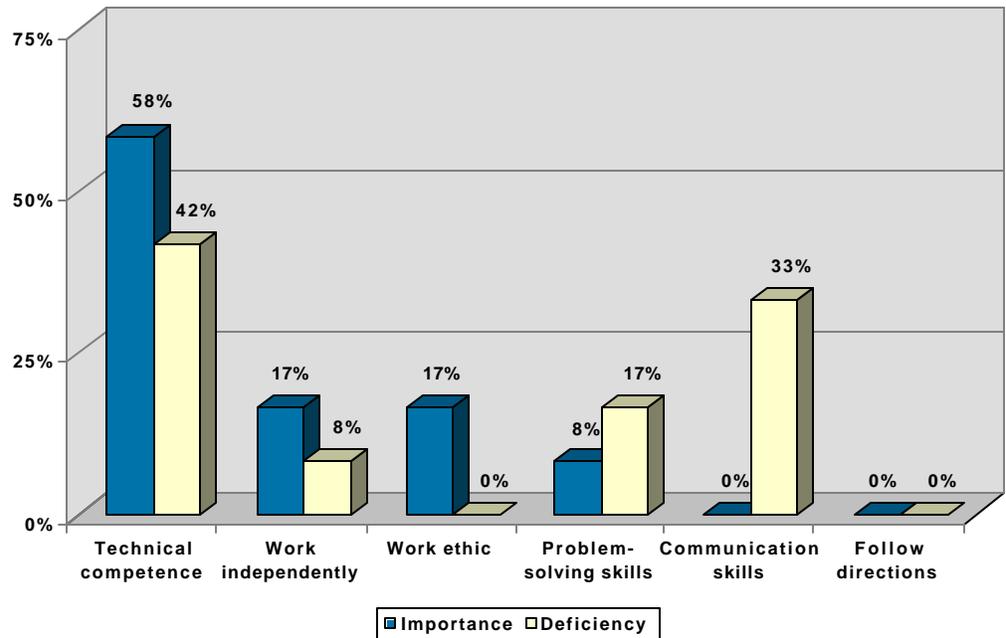


Figure 25 Occupation Skill Assessments: Physical Scientists

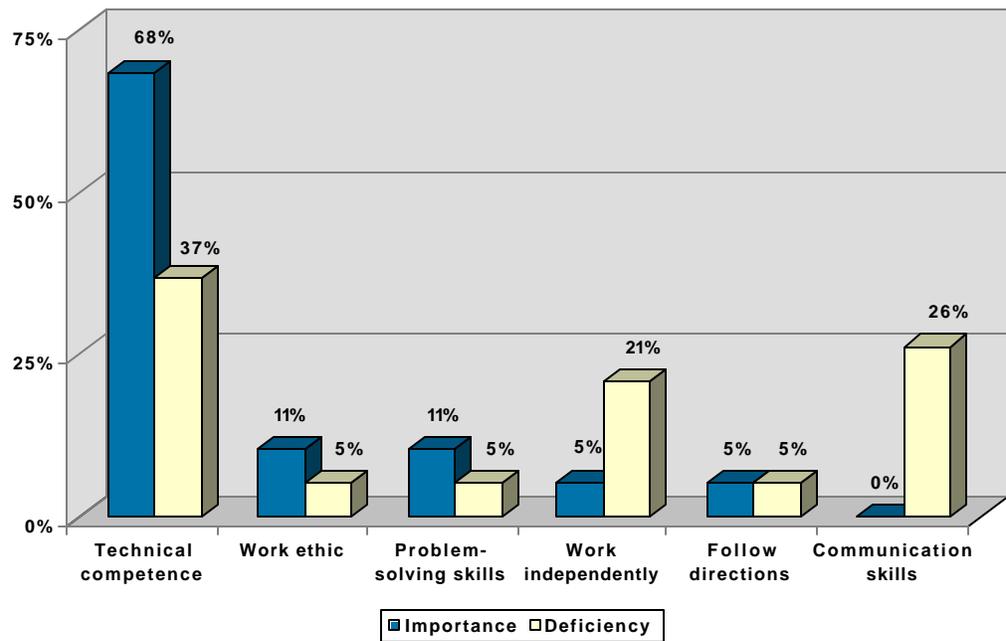


Figure 26 Occupation Skill Assessments: Medical Lab Technologists

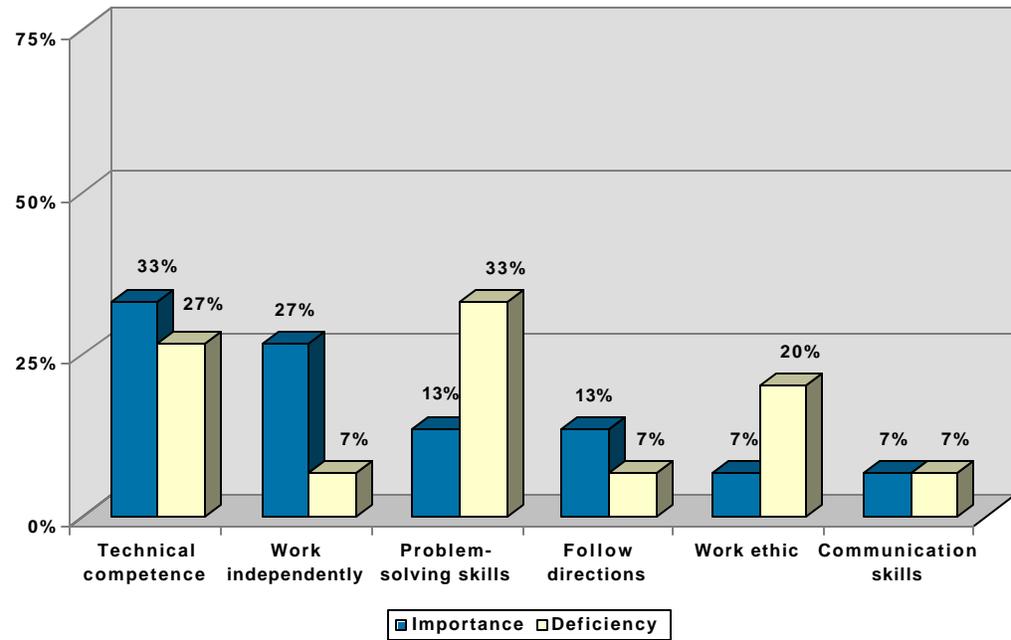
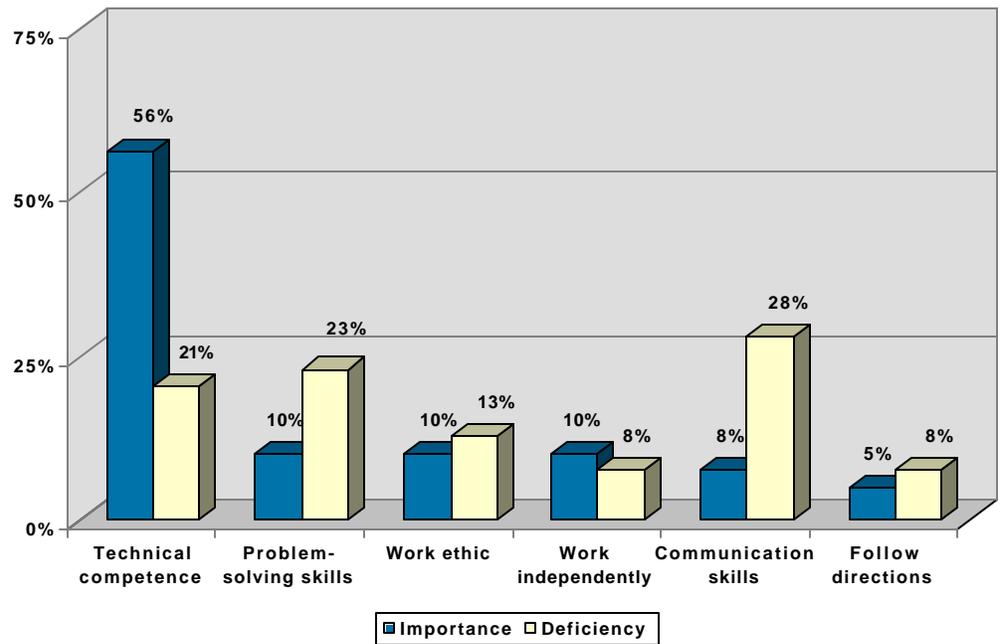


Figure 27 Occupation Skill Assessments: Quality Assurance Auditors



APPENDIX A: METHODOLOGY

Table 5 briefly outlines the methodology used in this project. Using a database compiled from InfoUSA and Inside Prospects, firms with at least five employees in the Biomedical cluster were called to complete either a phone survey interview or an Internet survey (n = 103), representing a total of 769 Biomedical firms in Orange County. Interviews were conducted from August 26 through September 22, 2004 and each interview typically lasted 20 to 30 minutes.

Table 5 Summary of Survey Methodology

Technique	Telephone Interviewing and Internet Survey
Universe	Firms from the Biomedical cluster located in Orange County with at least five employees
Field Dates	August 26 - September 22
Interview Length	20-30 minutes
Sample Size	103 Biomedical firms

Sample size was driven by the goal to interview as many firms in the Biomedical cluster as was possible. For Biomedical, the margin for error was at $\pm 8.99\%$. Because the number of firms employing individuals in each of the Biomedical occupations was lower than the overall number of firms in the sample, the occupational data is less reliable than the data for the industry analysis.

Industry Description

Firms included in the Computer Software cluster were chosen based on the following North American Industry Classification System (NAICS) codes: 325411 Medicinal and botanical manufacturing, 325412 Pharmaceutical preparation manufacturing, 325413 In-vitro diagnostic substance manufacturing, 325414 Other biological product manufacturing, 333314 Optical instrument and lens manufacturing, 334510 Electromedical apparatus manufacturing, 334516 Analytical laboratory instrument mfg., 334517 Irradiation apparatus manufacturing, 339111 Laboratory apparatus and furniture mfg., 339113 Surgical appliance and supplies manufacturing, 339114 Dental equipment and supplies manufacturing, 339115 Ophthalmic goods manufacturing, 532291 Home health equipment rental, 532490 Other machinery rental and leasing, 541380 Testing laboratories, 541710 Physical, engineering and biological research, 541910 Marketing research and public opinion polling, and 541940 Veterinary services.

Occupation Descriptions

The table below gives the title, O*NET – SOC code, and occupation description of the Biomedical occupations used for this study. Further information about these occupations can be found at <http://online.onetcenter.org>.

Table 6 Occupation Descriptions

Occupation	Description
Assemblers / Fabricators 51-2099	Assemble or fit together parts to form complete units or subassemblies. Work may involve the use of hand tools, power tools, and special equipment.
Sales Representatives 41-4011	Sell goods or services requiring scientific or similar knowledge in such areas as biology, engineering, chemistry, and electronics. Sell products such as medical supplies, electronic equipment, chemicals, and precision instruments.
Chemists 19-2031	Conduct qualitative and quantitative chemical analyses or chemical experiments in laboratories for quality or process control or to develop new products or knowledge.
Chemical Technicians 19-4031	Conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses for work involving experimental, theoretical, or practical application of chemistry and related sciences.
Product Inspectors, Testers, Graders 51-9061	Inspect, test, grade, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products. Work may be performed before, during, or after processing.
Biological Scientists 17-2031	Research problems dealing with life processes. Include Biologists, Biochemists, Biophysicists, Pathologists, Bacteriologists, Toxicologists, and Zoologists.
Physical Scientists 19-2099	Conduct research into the phases of physical phenomena; develop theories and laws on the basis of observation and experiments; and devise methods to apply laws and theories to industry and other fields.
Medical, Clinical Lab Technologists 29-2011	Perform complex procedures in the area of the clinical laboratory or perform specialized procedures in such areas as cytology, histology, and microbiology.
Quality Assurance Auditors 13-1111	Perform audits of the production and quality control departments to determine if these organizational units are adhering to regulatory requirements and are complying with company specifications and standards.
Veterinary Technologists, Assistants & Animal Caretakers 29-2056	Prepare vaccines, serums, tissue and blood samples, and execute laboratory tests for use in the treatment and diagnosis of diseases in animals. Clean, sterilize, and maintain instruments, materials, equipment, and machines.

Understanding the “Margin of Error”

Because a survey only contains responses from a limited number of firms, who are part of a larger population group, by mere chance alone there will almost always be some difference between a sample and the population from which it was drawn. For example, researchers might collect information from 100 companies in a town of 2,500 companies. Because not all firms in the population were surveyed, there are likely to be differences between the results obtained from interviewing the sample respondents and the results that would be obtained if all firms in the population were interviewed. These differences are known as “sampling error,” and they can be expected to occur regardless of how scientifically the sample has been selected. The advantage of using a scientifically drawn sample, however, is that the maximum amount of sampling error can be determined based on four factors: the size of the population, the chosen sample size, a confidence level, and the dispersion of

responses to a survey question. Of the four factors, sample size is the most influential variable.

Table 7 shows the sampling variation that applies to various percentage results that might have been obtained through the survey. The table shows that if a sample of 103 firms is randomly drawn from the estimated 769 Biomedical firms in Orange County, one can be 95 percent confident that the margin of error, due to sampling, will not vary by more than the indicated number of percentage points (plus or minus) from the result that would have been obtained if the interviews had been conducted with all people in the universe represented in the sample.

Table 7 Margin of Error

<i>n</i>	Distribution of Responses				
	90% / 10%	80% / 20%	70% / 30%	60% / 40%	50% / 50%
700	0.67%	0.89%	1.02%	1.09%	1.11%
600	1.13%	1.50%	1.72%	1.84%	1.88%
500	1.56%	2.08%	2.38%	2.54%	2.59%
400	2.04%	2.72%	3.11%	3.33%	3.40%
300	2.65%	3.54%	4.05%	4.33%	4.42%
200	3.58%	4.77%	5.47%	5.84%	5.96%
103	5.40%	7.19%	8.24%	8.81%	8.99%
50	8.05%	10.73%	12.29%	13.14%	13.41%

As the table indicates, the maximum margin of error for all aggregate responses is between 5.40 and 8.99 percent for the sample of 103 BIOM firms. This means that for a given question answered by all respondents, one can be 95 percent confident that the difference between the percentages reported here based on the responses of the sample population, and the percentages that would be calculated for responses from the total population, is no greater than 8.99 percent. The percent margin of error applies to both sides of the answer, so that for a question in which 50 percent of respondents said yes, one can be 95 percent confident that the actual percent of the population that would say yes is between 41.01 percent and 58.99 percent (see the last column of Table 7).

The actual margin of error for a given question in this survey depends on the distribution of the responses to the question. The 8.99 percent refers to dichotomous questions, such as a “Yes” or “No” question, where opinions were evenly split in the sample, with 50 percent of respondents saying “Yes” and 50 percent saying “No.” If that same question were to receive a response in which 10 percent of respondents said “Yes” and 90 percent said “No,” the margin of error would be no greater than 5.40 percent (see the first column of Table 7). As the number of respondents in a particular subgroup (e.g., occupation) is smaller than the number of total respondents, the margin of error associated with estimating a given subgroup's responses will be higher. For this reason Godbe Research cautions referencing subgroups with fewer than 25 responses.

Questionnaire Design

Randomization of Questions

To avoid the problem of systematic position bias -- where the order in which a series of questions is asked systematically influences the responses that participants give -- several questions in this survey were randomized such that respondents were not consistently given response options in the same order. The series of items within Questions 10, 14, and 27 were randomized for each interview.

Occupation Selection for Questions

Due to the length of the occupational questions (questions 17 through 30) respondents were asked questions for as many as four occupations if the survey was completed over the phone and up to five occupations if the survey was completed online. If a firm indicated that they had more than four of the occupations being evaluated (or five for the online survey), the occupations that were used for questions 17 through 30 were initially determined randomly. After a few weeks of data collection, certain occupations that had a lower response rate were given a higher priority and were automatically included for questions 17 through 30, if that particular occupation was employed at the specific firm.

Multiple Response Questions

Some questions within the survey were presented as a multiple response format. For this type of question, each respondent is given the opportunity to select more than one response option. For this reason, the response percentages will typically sum to more than 100 and represent the percentage of individuals that mentioned a particular response.

Tables and Charts

The body of this report presents a wide variety of tables, charts, and analytical formats. This section of the Methodology describes the conventions underlying these analyses.

Understanding a "Mean"

In addition to analysis of response percentages, many results will be discussed with respect to a descriptive "Mean." To derive a mean, or average, that represents perceived difficulty in finding qualified applicants (Q21), for example, a number value is first assigned to each response category (e.g., "Great difficulty" = +2, "Some difficulty" = +1, "No difficulty" = 0). The answer of each respondent is then assigned the corresponding number (from 0 to +2, in this example). Finally, all respondents' answers are averaged to produce a final number that reflects the average perceived importance of the different issues. The resulting mean makes interpretation of the data considerably easier.

How to Read a "Means" Chart

In the charts for Questions 21 through 25 of the survey, the reader will find mean scores that represent answers given by respondents. The mean score represents the average response of each group. The following table shows the scales for each corresponding question. Responses of "Don't know/No answer" are not included in calculating the means for any question.

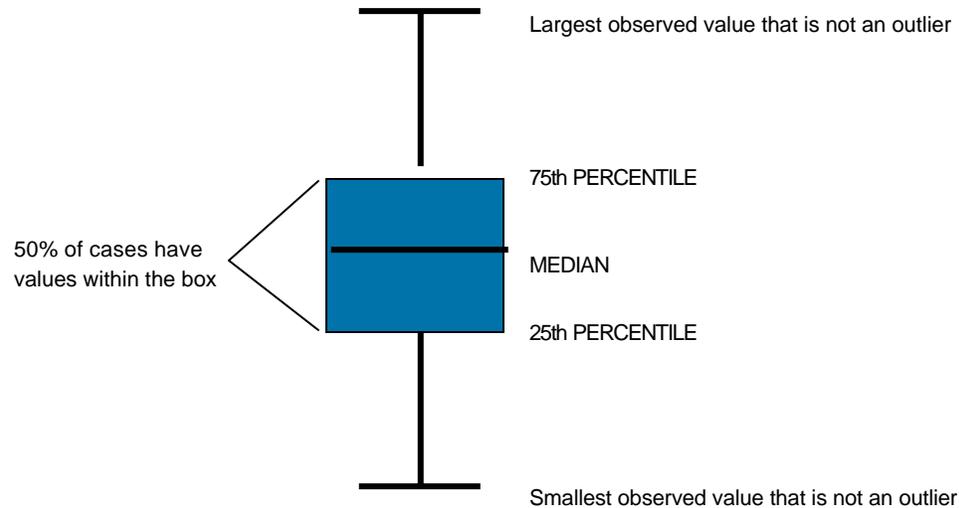
Table 8 Means Questions and Corresponding Scales

Question	Measure	Scale	Values
21	Difficulty Ratings	0 to +2	+2 = Great difficulty +1 = Some difficulty 0 = No difficulty
22, 23, 24	Frequency	0 to +4	+4 = Always +3 = Frequently +2 = Sometimes +1 = Rarely 0 = Never
25	Typical Education Levels	0 to +4	+4 = Graduate/Professional Degree +3 = Bachelor's Degree +2 = Certification/Associate's Degree +1 = High school diploma/GED 0 = No formal education

How to Interpret a Boxplot Chart

Used explicitly for the occupation wage data, boxplot diagrams present a distribution of the wage information received for each occupation. Half of the wage responses fall within the shaded box: the middle line within the box represents the median wage, and the outside edges of the shaded box represent responses at the 25th percentile and 75th percentile. The horizontal lines outside of the shaded box indicate the smallest and largest wage responses that are not outliers. Outliers were those data points that fell 1.5 boxes outside of the 25th and 75th percentiles. Therefore, the vertical line between the two horizontal ones captures the entire range of responses (excluding outliers) (see Figure 28 below).

Figure 28 Example of a Boxplot Diagram



A Note on “Rounding”

Conventional rounding rules are applied (i.e., numbers that include 0.5 or higher are rounded to the next highest whole number and numbers that include 0.4 or lower are rounded to the next lowest whole number). Because of rounding, the reader may notice that percentages in the discussion may not sum to 100 percent.

To display information relevant to a particular analysis in the most efficient manner possible, the sizing of table columns and fonts vary to fit the analytical needs.

APPENDIX B: SURVEY QUESTIONNAIRE

Godbe Research & Analysis
August 2004
FINAL

Orange County Cluster Survey
2004

Hello, my name is _____. May I please speak to [name] or [the person handling human resource issues at [company]?)

Hello, my name is _____ and I'm calling on behalf of the Orange County Workforce Investment Board. I'm following up on a letter sent from [**Name of Cluster Signator**] asking you to participate in a survey that will address your future business needs for trained and educated employees.

As a token of appreciation, we will also enter participants who complete the survey into a drawing for a \$500 cash prize.

<< if needed>> The survey should take no more than ten minutes of your time. By answering this survey, you can help regional workforce agencies develop the appropriate type of training that will prepare the employees you will be looking for in the future.<<end of optional section 2>>

<< if needed>> The survey has been commissioned by the Orange County Workforce Investment Board, which is committed to developing the regional workforce. The survey is being conducted by Godbe Research, an independent research firm. <<end of optional section 3>>

(FOR THOSE WHO AGREE TO PARTICIPATE):

i. Do you have Internet access and e-mail at your work?

Yes -----1 (Go to Qii)
No -----2 (Go to Qiv)
Don't Know/Refuse-----3 (Go to Qiv)

ii. The survey can be taken on the Internet. If you provide me with your e-mail address, I can send you an e-mail with a link to the survey. (GET E-MAIL ADDRESS AND CONFIRM THAT IT IS CORRECT. THANK THEM AND ENCOURAGE THEM TO PARTICIPATE WHEN THEY RECEIVE THE E-MAIL).

(IF NEEDED): Your email address will be confidential and will not be used for any other purpose.

(WAS CONFIDENTIAL EMAIL STATEMENT USED?):

Yes -----1
No -----2

(IF RESPONDENT REFUSES TO PROVIDE E-MAIL ADDRESS, GO TO Qiii)

- iii. Ok, we can either conduct the interview over the phone or we can provide you with the website address and a unique number [PIN #], which you can use to participate online. (IF CHOOSES URL, MAKE SURE TO CONFIRM RESPONDENT HAS WRITTEN DOWN THE CORRECT ADDRESS AND PIN #. IF CHOOSES PHONE, GO TO Qiv)
- iv. (FOR RESPONDENTS WHO ANSWERED NO OR DON'T KNOW TO Qi) We can take your survey responses by phone right now. (IF THE RESPONDENT INDICATES THAT NOW IS NOT A GOOD TIME, TRY TO SCHEDULE A MORE CONVENIENT TIME FOR A CALLBACK).
- v. Record PIN #: _____. (FROM SAMPLE SHEET IF PHONE RECRUITED. IF CALLED 1-888 PHONE NUMBER, ASK THEM TO READ THE PIN FROM THE LETTER)

First, I'd like to ask you a few general questions about your business.

- 1. How many permanent full-time employees work at your business location?
Record # full-time: _____
- 2. How many permanent part-time employees work at your business location?
Record # part-time: _____
- 3. How many temporary and/or seasonal employees currently work at your business location?
Record # temporary: _____
- 4. Including all full-time and part-time employees, how many **permanent** employees do you expect to have 12 months from now?
Record # employees: _____
- 5. How many temporary and/or seasonal employees do you expect to have 12 months from now?
Record # temporary: _____

6. When a non entry-level position becomes available in your firm, do you more often hire from outside or promote from within the company?

- Promote from within-----1
- Even split (50-50 outside & promote) -----2
- Recruit from outside -----3
- (DON'T READ) Don't know-----4
- (DON'T READ) Refused -----5

7. How often does your business recruit individuals from outside the County but within the Southern California region for employment?

- Always -----1
- Frequently-----2
- Sometimes-----3
- Rarely-----4
- Never -----5
- (DON'T READ) Refused -----6

8. How often does your business recruit individuals from outside Southern California for employment?

- Always -----1
- Frequently-----2
- Sometimes-----3
- Rarely-----4
- Never -----5
- (DON'T READ) Refused -----6

9. In the next 3 years, what percentage of your current employees do you expect will retire?

Record % Retiring in next 3 years: _____

10. Next, I'm going to read a list of issues facing the region's workforce in the coming years, please tell me how much difficulty your firm faces in addressing these workforce needs.

Here's the (first/next) one: _____. Please tell me whether your business has no difficulty, some difficulty, or great difficulty in dealing with this issue.

Randomize

	<u>No difficulty</u>	<u>Some difficulty</u>	<u>Great difficulty</u>	<u>(DON'T READ) DK/NA</u>
A. Replacing retired workers with qualified employees within the firm-----	1	2	3	4
B. Replacing retired workers with qualified candidates from outside the firm -----	1	2	3	4
C. Developing strategies to retain valuable employees-----	1	2	3	4
D. Recruiting entry-level employees with adequate training and education -----	1	2	3	4
E. Recruiting non entry-level employees with adequate skills and experience -----	1	2	3	4
F. Recruiting employees with reasonable salary requirements-----	1	2	3	4

11. During the past two years, has your company relocated any of its business processes, including production and services, to a lower cost location outside of Orange County?

[NOTE IF ASKED: production includes software programming, research and development]

- Yes -----1 (CONTINUE)
- No -----2 (Skip to Q14)
- Don't know/Refused -----3 (Skip to Q14)

12. (IF RESPONDENT ANSWERED YES IN Q11, THEN ASK:) Which type of business process did your company relocate outside of the County? Did your company move its production or manufacturing processes, its services, or both?

- Production/Manufacturing-----1
- Services-----2
- Both -----3
- Other [Specify]-----4
- (DON'T READ) Don't know/Refused-----5

13. Where did your company relocate to outside of the County? [TRY AND GATHER CITY AND STATE OR IF OUTSIDE THE UNITED STATES GET COUNTRY AND CITY IF POSSIBLE]

Name of location -----
 (DON'T READ) Refused -----98
 (DON'T READ) Don't know-----99

14. Next, I'd like to ask you about employee development practices at your business location. As I read each of the following employee development practices, please indicate whether your business uses each practice.

Randomize

	<u>Yes</u>	<u>No</u>	<u>(Don't Read) DK/NA</u>
A. Formal on-the-job training -----	1	2	3
B. Informal on-the-job training -----	1	2	3
C. In-house classroom training -----	1	2	3
D. Career development programs/ Career ladders -----	1	2	3
E. Employer-paid outside training -----	1	2	3
F. Tuition assistance at a college or university-----	1	2	3

15. Does your firm use or have GIS or geospatial technology?

Yes -----1
 No -----2 [SKIP TO Q17]
 (DON'T READ) Do not know GIS -----3 [SKIP TO Q17]
 (DON'T READ) Refused -----4 [SKIP TO Q17]

16. Has your firm had any difficulty hiring or finding employees internally with GIS or Geospatial technology skills? (IF YES) Is that some difficulty or great difficulty hiring or finding employees internally with GIS skills.

No difficulty -----1
 Some difficulty -----2
 Great difficulty-----3
 (DON'T READ) Don't know/Refused -----4

Occupation - Related Questions

17. Now, I'm going to ask you about specific occupations within your business/company. The occupational titles we are using may differ from the specific position titles used in your company. For these questions, I would like you to try to equate your company's specific position titles with the more generic ones we will use here. Please tell me if your company employs, at your location, individuals in positions matching the following generic occupational titles:

Here's the (first/next) one: _____ (READ ITEM & BRIEF DEFINITION, THEN ASK): Do you have employees who fit this occupational description at your business location?

Occupational List <<number of occupations is dependent on cluster>>

- 1 (occupation 1 – brief definition)
- 2 (occupation 2 – brief definition)
- 3 (occupation 3 – brief definition)
- 4 (occupation 4 – brief definition)
- 5 (occupation 5 – brief definition)
- 6 (occupation 6 – brief definition)
- 7 (occupation 7 – brief definition)
- 8 (occupation 8 – brief definition)
- 9 (occupation 9 – brief definition)
- 10 (occupation 10 – brief definition)
- 11 (occupation 11 – brief definition)
- 12 (occupation 12 – brief definition)

(RANDOMLY SELECT UP TO 4 OF THE OCCUPATIONS THAT THE RESPONDENT INDICATED ARE REPRESENTED AT THEIR BUSINESS LOCATION IN Q6. ASK Q.'S 18-30 IN THE SELECTED BUSINESSES – FOR INTERNET SURVEY SELECT UP TO 5 OF THE OCCUPATIONS THAT THE RESPONDENT INDICATED ARE REPRESENTED AT THEIR BUSINESS LOCATION)

Next, I'm going to ask you a few questions about several of the occupations you mentioned.

18. As I read each of the following occupations, please tell me how many individuals at your business location are currently employed in the occupation. (READ ITEMS IN SEQUENCE).

- A. Occupation 1 ----- ### (3 digit number)
- B. Occupation 2 ----- ### (3 digit number)
- C. Occupation 3 ----- ### (3 digit number)
- D. Occupation 4 ----- ### (3 digit number)

19. How many of the current _____ [USE NUMBER FROM ABOVE & NAME OF OCCUPATION], do you expect, will **NOT** be working at this company in the same position **12 months from now?**

- A. Occupation 1 ----- ### (3 digit number)
- B. Occupation 2 ----- ### (3 digit number)
- C. Occupation 3 ----- ### (3 digit number)
- D. Occupation 4 ----- ### (3 digit number)

[This number can not be larger than the number in Q18 for each occupation]

20. As I read each of the occupations, please tell me how many total individuals you estimate will be employed in each of the occupations **12 months from now.**

- A. Occupation 1 ----- ### (3 digit number)
- B. Occupation 2 ----- ### (3 digit number)
- C. Occupation 3 ----- ### (3 digit number)
- D. Occupation 4 ----- ### (3 digit number)

21. For the same list of occupations, I'm interested in the level of difficulty your business has in finding applicants who meet the company's hiring standards. As I read each occupation, please tell me whether your business has no difficulty, some difficulty, or great difficulty finding applicants. (READ IN SEQUENCE)

	<u>No</u> <u>difficulty</u>	<u>Some</u> <u>difficulty</u>	<u>Great</u> <u>difficulty</u>	<u>(DON'T</u> <u>READ)</u> <u>DK/NA</u>
G. Occupation #1 -----	1 -----	2 -----	3 -----	4 -----
H. Occupation #2 -----	1 -----	2 -----	3 -----	4 -----
I. Occupation #3 -----	1 -----	2 -----	3 -----	4 -----
J. Occupation #4 -----	1 -----	2 -----	3 -----	4 -----

22. We're interested in how often your business recruits individuals from outside of Orange County for an occupation. As I read each occupation, please indicate if you always, frequently, sometimes, rarely or never recruit individuals from outside of Orange County for that occupation.

	<u>Always</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Rarely</u>	<u>Never</u>	(DON'T READ) DK/NA
A. Occupation #1 -----	1	2	3	4	5	6
B. Occupation #2 -----	1	2	3	4	5	6
C. Occupation #3 -----	1	2	3	4	5	6
D. Occupation #4 -----	1	2	3	4	5	6

23. (ASK Q23 ONLY IF Q2 IS GREATER THAN 0) For the same list of occupations, we'd like to know how often your business hires **part-time** workers at your business location. As I read each occupation, please indicate whether your business always, frequently, sometimes, rarely or never hires **part-time** workers for that occupation.

	<u>Always</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Rarely</u>	<u>Never</u>	(DON'T READ) DK/NA
A. Occupation #1 -----	1	2	3	4	5	6
B. Occupation #2 -----	1	2	3	4	5	6
C. Occupation #3 -----	1	2	3	4	5	6
D. Occupation #4 -----	1	2	3	4	5	6

24. (ASK Q24 ONLY IF Q5 IS GREATER THAN 0) Same question, only this time we're interested in **temporary workers**. As I read each occupation, please indicate whether your business always, frequently, sometimes, rarely or never hires **temporary workers** for that occupation.

	<u>Always</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Rarely</u>	<u>Never</u>	(DON'T READ) DK/NA
A. Occupation #1 -----	1	2	3	4	5	6
B. Occupation #2 -----	1	2	3	4	5	6
C. Occupation #3 -----	1	2	3	4	5	6
D. Occupation #4 -----	1	2	3	4	5	6

25. Next, for the same list of occupations, I'd like to know what are the **typical** education requirements for successful applicants within each occupation. The categories are: (INTERVIEWER READ OPTIONS). Ok, here's the first one: (READ ITEM A). What are the **typical** education requirements for successful applicants in this occupation at your business location? (CONTINUE UNTIL ALL ITEMS ARE READ).

- No formal education requirements -----1
- Completion of high school or equivalency-----2
- Certification or Associates Degree-----3
- Bachelor's Degree (B.A., B.S.)-----4
- Professional or Graduate Degree
(M.S, Ph.D., J.D., MBA, P.E.)----- 5
- DK/NA (Don't Read) -----6

Education Requirements	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
A. Occupation #1 -----	1	2	3	4	5	6
B. Occupation #2 -----	1	2	3	4	5	6
C. Occupation #3 -----	1	2	3	4	5	6
D. Occupation #4 -----	1	2	3	4	5	6

26. What is the typical pay range for each occupation, from entry level to most experienced employees in that occupation? [After each response to the pay range, please clarify whether the intended response was for hourly, monthly, or annual salary]

PAY RANGE	<u>Low</u>	<u>High</u>	<u>Salary Type</u>
A. Occupation #1	###	###	H, M, or A
B. Occupation #2	###	###	H, M, or A
C. Occupation #3	###	###	H, M, or A
D. Occupation #4	###	###	H, M, or A

+++++

(Questions 27 and 28 are a loop to be repeated for each of the occupations selected for previous question set Q18-26)

Ok, for the next few questions, please answer for the: _____ (READ OCCUPATION) occupation.

27. I'm going to read a list of general skills. Please tell me which one of these skills are **most important** when considering applicants for _____ (READ OCCUPATION)?

Randomize

- A. Technical competence specific to the position -----1
- B. Interpersonal and communication skills ----2
- C. Conscientious work ethic and positive attitude -----3
- D. Ability to work independently-----4
- E. Ability to follow directions -----5
- F. Creative problem-solving skills -----6

Important Skills	1	2	3	4	5	6
A. Occupation #1 -----	1	2	3	4	5	6
B. Occupation #2 -----	1	2	3	4	5	6
C. Occupation #3 -----	1	2	3	4	5	6
D. Occupation #4 -----	1	2	3	4	5	6

28. I'm going to read the same list of general skills once more. Please tell me which of these skills, your _____ (READ OCCUPATION) are currently **most deficient** in?

Follow same order as given in Q27.

- A. Technical competence specific to the position -----1
- B. Interpersonal and communication skills ----2
- C. Conscientious work ethic and positive attitude -----3
- D. Ability to work independently-----4
- E. Ability to follow directions -----5
- F. Creative problem-solving skills -----6

Deficient Skills	1	2	3	4	5	6
A. Occupation #1 -----	1	2	3	4	5	6
B. Occupation #2 -----	1	2	3	4	5	6
C. Occupation #3 -----	1	2	3	4	5	6
D. Occupation #4 -----	1	2	3	4	5	6

29. Lastly, we would like to know which occupations successful candidates for _____ (READ OCCUPATION) usually have before they become _____ (READ OCCUPATION) (INDICATE ALL THAT APPLY).

Occupations: -----
(DON'T READ) Don't know-----98
(DON'T READ) Refused -----99

30. And which occupations do current _____ (READ OCCUPATION) usually move onto after working successfully as a _____ (READ OCCUPATION) (INDICATE ALL THAT APPLY).

Occupations: -----
(DON'T READ) Don't know-----98
(DON'T READ) Refused -----99

We've completed all the questions about occupations. Before we finish, I'd like to verify your contact information so we can enter you in the lottery.

Please verify for us your company Information.

- D1a Company name _____
- D1b Company address (include City and Zip) _____
- D1c Web address _____
- D1d Fax number _____

Please verify for us your personal information, so we can enter you into the lottery for the \$1,000 cash prize.

- D2a Name _____
- D2b Title _____
- D2c E-Mail _____



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