This study surveyed a sample population of manufacturing companies in Oregon. Respondents were surveyed concerning their perceptions of ergonomics and their use of ergonomic consulting services from three potential sources of ergonomic consulting services. The sources of ergonomic consulting services were the Oregon Occupational Safety and Health Administration (OR-OSHA), Workers’ Compensation insurance carriers and private consultants.

The study found that companies with less than 100 employees were the least likely to be familiar with ergonomics. Such companies were also the least likely to have used ergonomic consulting services.

The perception of manufacturing companies of ergonomic consulting services was positive. Respondents felt that recommendations provided by consultants from the different sources were effective in meeting their ergonomic objectives. They indicated that ergonomic consulting services were useful and should be used more frequently. This was particularly true of respondents who had used services from OR-OSHA or services from their Workers’ Compensation insurance carriers.
Use and Perceptions Among Selected Oregon Manufacturing Companies Concerning Ergonomic Consulting Services

by

Joy L. Linn

A THESIS submitted to Oregon State University in partial fulfillment of the requirement for the degree of Master of Science

Completed June 29, 1995
Commencement June 1996
I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.
ACKNOWLEDGMENT

As my husband, family, friends and professors know, the attainment of my graduate degree has been an interesting adventure. I am thankful for all the support, understanding and encouragement that the various individuals in my life have provided for me during my adventure. However, there are a few individuals whose roles I would like to specifically mention.

I would like to thank my major professor, Dr. Anthony Veltri for his inspiration. As an instructor, his enthusiasm for his subject is unequaled and contagious. As an advisor, he has guided me through my graduate career.

I would also like to thank my committee members Dr. Kenneth Funk, my minor professor, and Dr. Annette Rossignol. I had the pleasure of having both of these inspired individuals as instructors. They contributed greatly to my positive experience as a graduate student at Oregon State University.

Mostly however, I would like to express my appreciation for the love, support and encouragement I received from my husband, Scott. He encouraged me to return to school and supported me through my trials and tribulations. He heralded my accomplishments and picked me up when the going got rough. Without him I would not be writing this acknowledgment.
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USE AND PERCEPTIONS AMONG SELECTED OREGON MANUFACTURING COMPANIES CONCERNING ERGONOMIC CONSULTING SERVICES

INTRODUCTION

As regulations from the Occupational Safety and Health Administration (OSHA) increase, it is becoming essential for companies to increase their understanding of ergonomics effectively and efficiently. Ergonomic consultants are in a position to help facilitate this response by providing companies with a level of expertise in ergonomics that is generally lacking in companies. Using ergonomic consultants eliminates the need to hire an ergonomic specialist. The number of ergonomic specialists is growing but it is not keeping pace with the interest and demand for ergonomic expertise. Consequently, ergonomic consulting services are able to fill in the gap.

Occupational injuries and illnesses related to overexertion and repetitive motion are increasing in number. In 1992, overexertion was the event or exposure causing 28.3% of nonfatal occupational injuries and illnesses in private industry (1). Repetitive motion caused 3.9%. In 1993 these numbers changed slightly, to 28.2% and 4.2% (2). These two years show a slight increase of 0.2%. However, this may be due to the decrease in the reported number of nonfatal injuries and illnesses involving days away from work. The reported numbers went from 2,331,100 total cases in 1992 to 2,252,600 total cases in 1993, a 3.4% decrease.

Bureau of Labor Statistics (1-4) data for 1992 and 1993 shows the manufacturing industry as having the highest rates of repetitive motion injuries and illnesses. In 1993, the manufacturing industry had 53% of all repetitive motion cases.

The increased incidence of repetitive motion and overexertion as causes for occupational injuries and illnesses is becoming an expensive problem for companies. Since these numbers seem to be high in the manufacturing industry, manufacturing companies were selected as the target population for study.
The Federal Occupational Safety and Health Administration released a draft of their Proposed Ergonomic Protection Standard (PEPS) in March 1995 (5). When finalized, the new standards will require companies to look at ergonomic considerations in the workplace, beyond the application of the General Duty Clause. With the introduction of ergonomic standards, companies will need to be more active in the prevention of ergonomic injuries. Consequently, there is likely to be an increased demand in ergonomic consulting services.

The purpose of the PEPS is to “prevent the occurrence of work-related musculoskeletal disorders such as tendinitis, low back pain, and carpal tunnel syndrome, by controlling employee exposure to the workplace risk factors which can cause or aggravate them.” (5) The PEPS will apply to any workplace with the five signal risk factors cited below. It will also apply to workplaces that have had musculoskeletal disorders (6). The PEPS includes: Approach, Scope and Application, Identification of Problem Jobs, Control of Risk Factor Exposures, Ergonomic Design and Controls for New or Changed Jobs, Training, Medical Management, and Phase-in Period for Compliance.

In creating the proposed rule, OSHA identified five “signal risk factors" that are believed to indicate the need for a closer look at a job under the proposed rule. The factors are:

- the performance of the same motion or motion pattern every few seconds for more than (2, 3 or 4) hours at a time
- a fixed or awkward work posture for more than a total of (2, 3 or 4) hours
- forceful hand exertions for more than a total of (2, 3 or 4) hours
- use of vibrating or impact tools or equipment for more than a total of (2, 3 or 4) hours
- and unassisted frequent or forceful manual handling (5)

The duration of these activities, 2, 3 or 4 hours, is for discussion in the draft.

The PEPS carefully defines its terminology. For example, an awkward posture is defined as “a deviation from the neutral position of any particular joint.” (5) The definition of ergonomics is “the field of study that seeks to fit the job to the person, rather
than the person to the job. This is achieved by the evaluation and design of workplaces, environments, jobs, tasks, equipment, and processes in relationship to human capabilities and interactions in the workplace.” (5) A work-related musculoskeletal disorder is defined as “an injury or an illness of the muscles, tendons, ligaments, peripheral nerves, joints, cartilage (including invertebral discs), bones and/or supporting blood vessels in either the upper or lower extremities, or back, which are associated with musculoskeletal disorder workplace risk factors and which are not the result of acute or instantaneous events (e.g., slips or falls).” (5)

The purpose of this study is to identify methods of improving the use of ergonomic consulting services. Specifically the study will focus on what size companies are using ergonomic consulting services. If services were used, what specific services were utilized by companies and how were those services perceived by the company using them. Improving ergonomic consulting services will enhance the ability of manufacturing companies in Oregon to address the increasing incidence of certain types of occupational injuries and illnesses. It will also help companies respond to pending federal ergonomic protection standards.

The Oregon Occupational Safety and Health Administration (OR-OSHA), Workers' Compensation insurance carriers, and private consultants are three possible sources of ergonomic consulting services. This study provides information regarding the use of ergonomic consulting services among a sample population of companies in three manufacturing industries in Oregon.

The survey data provides information about the familiarity with ergonomics among selected manufacturing companies in Oregon. It also provides information on use patterns of ergonomic consultants from the three identified areas. Additionally, the study provides consumer satisfaction information compared among the three sources of services. All of this information will provide guidance to ergonomic consultants in their areas of strength and weakness as perceived by respondents.

By identifying problem areas and populations that may need targeting, this study will enable ergonomic consulting service providers to improve their services. These improvements will enable companies in Oregon to respond to the federal Ergonomic
Protection Standard in an effective and efficient manner. They will also enable companies to address the high numbers of injuries due to overexertion and repetitive motion.
LITERATURE REVIEW

Ergonomics is the applied science that "seeks to design or match the built environment to meet the capacities and characteristics of the user" (7). Leamon defines ergonomics as "the application of anatomical, psychological and physiological knowledge to the problems of the human within the environment (social or occupational)." (8) Various terms are utilized somewhat interchangeably, representing similar ideas. Some of these terms are human factors, human factors engineering, engineering psychology, human engineering, ergonomics, industrial ergonomics and biomechanics. Ergonomics, often interchanged with human factors engineering, is the study of the capabilities and limitations of people related to products and their environment. It involves tailoring job tasks and the physical environment, including air and noise, in which these tasks are completed to the human performing the tasks.

The field of ergonomics is gaining in popularity partly because of the increasing incidence and cost of cumulative trauma disorders (CTDs). They have been increasing both in number and in the percentage of total injuries and illnesses reported (9). The increases are likely attributable to several causes. Some of the possible causes are: changes in job structure, increased knowledge about CTDs, and changing demographics in the workforce. The changing demographics are leading to an increase in diversity and an overall aging of the workforce.

Cumulative trauma disorders are a subset of "disorders associated with repeated trauma" as identified by the Bureau of Labor Statistics (BLS) (10). These are, in turn, a subset of occupational illnesses. In the 1990 BLS report, 50% of all occupational illnesses were associated with repetitive trauma. Of these, nearly 75% of new cases were in manufacturing industries (9).

According to the 1991 BLS report upper extremity cumulative trauma disorders accounted for approximately 60% of all recordable workplace illnesses (11). Upper extremity is defined in the OSHA Proposed Ergonomic Protection Standard as "the hand, wrist, elbow, arm, shoulder and/or neck." (5) According to the National Safety Council,
22% of all occupational injuries in 1991 were back injuries, often associated with repeated twisting, bending and lifting (12). Back injuries most frequently result from repetitive overexertion of the vertebral disks and the spine. Only about 4% of back injuries result from a single traumatic event (13).

In the 1992 data from the BLS, disorders associated with repeated trauma made up about 62% of all occupational illnesses. Repeated trauma disorders accounted for 3.9% of all occupational health problems, which combines injuries and illnesses (10). Figure 1 shows the distribution of injuries and illnesses requiring days away from work. Sprains and strains accounted for about one million of the 2.3 million nonfatal injuries and illnesses in 1992 and 1993 (1, 2). In 1993, sprains and strains were the leading injury and illness category in every major industry division, accounting for 42.6% of all nonfatal injuries and illnesses (2).

Figure 1: The Nature of the Disabling Condition, Occupational Injuries and Illnesses Involving Days Away from Work, 1992 (1)
Sprains and strains accounted for 39.8% of all manufacturing nonfatal occupational injuries and illnesses in 1992 that resulted in days away from work (1). Carpal tunnel syndrome accounted for 2.8%. This gives a total of 42.6% of manufacturing occupational injuries and illnesses possibly related to ergonomic issues. In 1993, sprains and strains accounted for 38.1% of all manufacturing nonfatal occupational injuries and illnesses that resulted in days away from work (5). When strains and sprains, 38.1%, are combined with carpal tunnel syndrome, 3.2%, and tendonitis, 2.3%, the total percentage of occupational injuries and illnesses that could be related to ergonomic issues in the workplace rises to 43.6% in the manufacturing industry.

Figure 2: The Manner in which the Disabling Condition Occurred, Occupational Injuries and Illnesses Involving Days Away from Work, 1992 (1)
Figure 2 (page 7) shows how the injuries and illnesses occurred. Overexertion and contact with objects accounted for over half of the 2.3 million nonfatal occupational injuries and illnesses that resulted in days away from work in 1992 (1).

The Bureau of Labor Statistics (BLS) data shows that repeated trauma disorders increased from 50% of occupational illnesses in 1990 to 62% in 1992. This shows an increase in the number of repeated trauma illnesses during recent years. Table 1 (page 10) shows manufacturing is the primary industry where repetitive motion cases (1).

Repetitive motion accounted for 94,300 or 4.2% of all occupational injuries and illnesses in 1993 (2). This shows a slight increase from 1992. In 1993, manufacturing is again shown to have the most repetitive motion injuries with 49,600 or 53% of the 94,300 total. Carpal tunnel syndrome and tendonitis accounted for 3% of all occupational injuries and illnesses in 1993. Both of these specific diagnoses were highest in manufacturing.

The manufacturing industry has the fifth highest incidence rate for all occupational injuries and illnesses per 10,000 full-time workers (2). However, the incidence rate of repetitive motion cases for 10,000 full-time manufacturing workers, at 27.7, is more than twice as the incidence rate for private industry as a whole, at 12.0. It is three times the nearest industry division, transportation and public utilities, which was 9.4 repetitive motion incidences per 10,000 full-time workers.

The BLS data for 1992 and 1993 suggests that the United States manufacturing industry needs to address repetitive motion injuries and illnesses (1-4). Ergonomic consulting services can assist the US manufacturing industry in this area.

The use of ergonomic consultants can benefit companies by improving their safety programs, which, reduces the rates of occupational injuries and illnesses (9, 11, 14). Some examples of services provided by ergonomic consulting services are: the establishment of ergonomic programs, worksite evaluations, training and education, and follow-up evaluations. Ergonomic consultants provide knowledge in the fields of biomechanics, engineering and human dynamics equipping them to facilitate the creation of an ergonomics program without requiring a company to expand its staff (15). The use of consultants can reduce or eliminate the need for companies to maintain their staff trained in ergonomics. Ergonomic consultants are particularly helpful in smaller
companies in which hiring a full-time staff ergonomist is not practical (11). In addition, consultants provide access to programs that have demonstrated effectiveness (15).

The use of consultants may reduce some of the pressures safety managers face (16). Outside consultants can provide a wide range of skills for safety management, especially ergonomics, allowing the safety manager to focus on other areas of occupational safety. Consultants bring a level of expertise that will help a company meet and exceed standards and regulations while reducing occupational injury and illness rates.

A literature review found no articles surveying potential users of ergonomic consulting services. One article by Chovil and Alexander (17) looked at the use of industrial hygiene and safety professionals in South Carolina manufacturing plants. Their survey showed a low usage of both types of professionals. A lack of perception of need by management may have been a factor contributing to the low usage. Small plants would not be financially capable of hiring industrial hygienists or safety professionals and “may either be unaware of or reluctant to make use of available consulting services” (17). The state OSHA of South Carolina provides consulting services at no cost, as does the state OSHA of Oregon. The survey did not specifically identify Workers’ Compensation insurance services; but the authors question the validity of Workers’ Compensation consulting services “...as it is a courtesy service, it may not necessarily be the best or most complete...” consulting service (17).

The general conclusion of the study seemed to be that industrial hygiene and safety professionals were very under-utilized by manufacturing plants in South Carolina. The authors suggest educating management with respects to the cost benefits of utilizing such professionals.

The scarcity of literature on ergonomic consultants applies to the benefits of using ergonomic consultants as well as the use of ergonomic consulting services. Most of the literature addressed safety and health consultants, as a general group. Ergonomic consultants could be construed as a specialist area of this larger group. The future federal Ergonomic Protection Standard suggests companies will need to identify a way to address the new regulations. If companies know of and use ergonomic consulting services from any source, they will have a head start in complying with the new standards.
Table 1: Percent Distribution of Nonfatal Occupational Injuries and Illnesses Involving Days Away From Work\(^1\) by Selected Injury or Illness Characteristics and Industry Division, 1992.
(Abbreviated from: Work Injuries and Illnesses by Selected Characteristics, 1992) (1)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Goods-producing</th>
<th>Service-producing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private industry(^2)</td>
<td>Agriculture, forestry, and fishing(^2)</td>
</tr>
<tr>
<td>Total (2,331,100 cases)</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Nature of injury, illness:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprains, strains</td>
<td>43.9</td>
<td>38.8</td>
</tr>
<tr>
<td>Carpal tunnel syndrome</td>
<td>1.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Part of body effected:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trunk</td>
<td>39.1</td>
<td>35.0</td>
</tr>
<tr>
<td>Shoulder</td>
<td>4.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Back</td>
<td>28.0</td>
<td>24.6</td>
</tr>
<tr>
<td>Upper extremities</td>
<td>22.8</td>
<td>23.5</td>
</tr>
<tr>
<td>Wrist</td>
<td>4.8</td>
<td>3.2</td>
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<tr>
<td>Event or exposure:</td>
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<tr>
<td>Overexertion</td>
<td>28.3</td>
<td>20.6</td>
</tr>
<tr>
<td>Repetitive motion</td>
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<td>2.3</td>
</tr>
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<td>Source of injury, illness:</td>
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<td></td>
</tr>
<tr>
<td>Worker motion or position</td>
<td>13.4</td>
<td>12.4</td>
</tr>
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</table>
Table 1 (continued): Percent Distribution of Nonfatal Occupational Injuries and Illnesses Involving Days Away From Work\(^1\) by Selected Injury or Illness Characteristics and Industry Division, 1992.

(Abbreviated from: Work Injuries and Illnesses by Selected Characteristics, 1992) (1)

1 Days away from work cases include those which result in days away from work with or without restricted work activity.

2 Excludes farms with fewer than 11 employees.

3 Data conforming to OSHA definitions for mining operators in coal, metal, and nonmetal mining and for employers in railroad transportation are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor, and the Federal Railroad Administration, U.S. Department of Transportation. Independent mining contractors are excluded from the coal, metal, and nonmetal mining industries.

NOTE: Because of rounding, data may not sum to the totals.
METHODS

This survey was a cross-sectional study on the use and perceived effectiveness of ergonomic consulting services as experienced by selected companies in three manufacturing industries in Oregon. The 1992 Bureau of Labor and Statistics, Survey of Occupational Injuries and Illnesses (1, 3) was reviewed to determine industries where injuries and illnesses commonly associated with ergonomic problems occur.

Identifying the Population

Table 1 (page 10) indicates manufacturing industries have the highest number of injuries and illnesses related to overexertion and repetitive motion (1, 3). Both of these characteristics of injuries and illnesses have been linked to ergonomic workplace issues.

The following Standard Industrial Classification (SIC) codes were selected as the survey population based on a review of the Bureau of Labor Statistics 1992 Survey of Occupational Injuries and Illnesses (1, 3):

- 20 Food and kindred products (manufacturing, nondurable goods)
- 35 Industrial machinery and equipment (manufacturing, durable goods)
- 36 Electronic and other electric equipment (manufacturing, durable goods)

The names, addresses and telephone numbers of companies in Oregon in these SIC codes were obtained from the Oregon Directory of Manufacturers, 1993-1994 (18). These populations were stratified based on the number of employees divided into five groups based on number of employees, following the break down in the Oregon Directory of Manufacturers, 1993-1994. The five groups included: 20-49, 50-99, 100-249, 250-499, and 500 or more employees. Using recommendations from the Survey Consulting Services, Statistics Department at Oregon State University, 30% of the first three strata were surveyed and 100% of the last two strata were surveyed. This was because of the
small number of companies with 250-499 and 500 or more employees. This created a total sample population of 141 companies in Oregon.

Companies in the list of manufacturers with 0-19 or no number of employees listed were eliminated from the survey population. In general, safety regulations are different for employers with less than eleven employees. For example, most employers with ten or fewer employees, during a calendar year, are exempt from OSHA record keeping (OAR 437-01-701) (19-21). In addition, in Oregon, companies with less than eleven employees are not required to have safety committees (OAR 437-40-045) (22). Establishment employment size 1-19 has the lowest incident rates in manufacturing industries (1). Employers in the mid-size range (20-500 employees) have the highest incidence of injury and illness (3).

**Development of the Questionnaire**

A questionnaire (see Appendix A) was created with the assistance of the Survey Consulting Services, Statistics Department, Oregon State University. The questionnaire follows the format outlined by Dillman (23) and has four sections. The first section consisted of general questions regarding the company and familiarity with specific terminology. The three subsequent sections were identical and applied to one of the three possible sources of ergonomic consulting services. These were Oregon Occupational Safety and Health Administration (OR-OSHA), Workers’ Compensation insurance carriers and private consultants. The questionnaire contained a total of 42 questions; each participant was asked a maximum of 18 questions. If a respondent had used more than one provider of ergonomic consulting services, they were surveyed with respect to the most recently used service.

A pilot study involving five safety professionals was conducted to clarify language and content of the questions and determine the approximate length of time needed to complete the survey in its entirety.
Survey Technique

To assure the random selection of a sample population within each company size, random numbers were generated for each stratum using the statistics program S-PLUS. The companies randomly selected were contacted by telephone. The interviewer asked to speak to the individual responsible for occupational safety in that corporation.

If the person responsible for occupational safety was unavailable, questions were asked to ascertain when the individual might be available. Repeat phone calls were made in an attempt to contact the appropriate individual. Calls were placed on a maximum of four separate days. Follow-up calls on the same day, after being told the respondent would be available later that day, counted as one day. Calls made on a day when a company was closed were not counted. Once the appropriate individual was reached, the interviewer began the questionnaire. The individuals who were surveyed were reassured that all the information they provided would be held in confidence by the interviewer.
RESULTS

Each respondent was the individual responsible for occupational safety at the company being surveyed. The responses to the survey questions were analyzed for frequency distribution regarding the total group, company size, and type of ergonomic consulting services used. There was a total of 104 responses from the 141 companies surveyed. This amounted to a 74% response rate.

To assist with classifying respondents, respondents were asked if they knew their company’s Standard Industrial Classification (SIC) code. Only 27% of the 104 respondents responded to this question with a number. Consequently, it was not possible to utilize the SIC codes to verify the classification of the respondents. Without this information it is not possible to analyze the data with respect to industry class.

Company Size Distribution

Figure 3: Company Size Distribution
Figure 3 (page 15) shows the number of respondents in each of six company size categories. These size categories follow the breakdown used in the Oregon Directory of Manufacturers, 1993-1994. Despite the attempt to eliminate companies with less than 20 employees, 11 of the respondents represented companies in this size category.

Familiarity With Terminology

Respondents were asked whether they were familiar with the terms: human factors, ergonomics and human engineering. Although these terms are technically different in their definitions, they are often used to represent a similar idea that encompasses matching the task to the human. As Figure 4 shows, respondents were most familiar with the term ergonomics. Only 12 of the 104 respondents were unfamiliar with all three terms. These respondents were not asked any additional questions.

Figure 4: Respondents’ Familiarity with Terminology*

*Many respondents were familiar with more than one term.
If respondents were familiar with one term, they were often familiar with additional terms. Of the 92 respondents familiar with one or more of the terms: 19 were familiar with one, 32 with two and 41 with all three. Eighteen of the 19 respondents familiar with only one term were familiar with ergonomics. The remaining respondent was familiar with human factors. Figure 5 shows a somewhat predictable distribution of familiarity with terminology along company size. All but one of the 12 respondents unfamiliar with all three terms were in companies with less than 50 employees.

![Figure 5: Respondents' Familiarity with Terminology by Company Size*](image)

Ergonomic Specialist

Respondents were asked if their company had an ergonomic specialist on staff. Surprisingly, respondents who indicated they had an ergonomic specialist on staff were fairly evenly distributed among the company sizes (Table 2). The distribution may have been influenced by an open interpretation of the term “specialist” by some of the respondents.
Table 2: Ergonomic Specialists by Company Size
(actual numbers)

<table>
<thead>
<tr>
<th>Company Size</th>
<th>1-19</th>
<th>20-49</th>
<th>50-99</th>
<th>100-249</th>
<th>250-499</th>
<th>500+</th>
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<td>2</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>N=</td>
<td>5</td>
<td>14</td>
<td>23</td>
<td>25</td>
<td>16</td>
<td>9</td>
</tr>
</tbody>
</table>

Identifying a Qualified Consultant

Figure 6: How Respondents Would Identify a Qualified Consultant

Using a fill-in-the-blank question, respondents were asked how they would identify a qualified consultant if they needed to do so. Figure 6 shows 40 out of 92 responses or 44% indicated they would go directly to a possible source to identify a qualified
ergonomic consultant. Ten respondents did not know how they would identify a qualified consultant.

The most frequent responses in the “other” category included corporate [headquarters] (4), hospital or some other medical facility (3), prior history (6) and the Yellow Pages (2).

Use of Ergonomic Consulting Services

Using a multiple choice question, respondents were asked if they had ever used ergonomic consulting services from each of three sources. The three sources were: the Oregon Occupational Safety and Health Administration (OR-OSHA), Workers’ Compensation insurance carriers, and private ergonomic consultants. Figure 7 (page 20) shows all uses of ergonomic consulting services. It illustrates that Workers’ Compensation insurance carriers were used most frequently, followed by OR-OSHA. The frequent use of services from these two areas is probably influenced by their usually being free. Workers’ Compensation insurance carriers often include ergonomic consulting services for their clients. A total of 34 of 92 respondents had not used any ergonomic consulting services. One respondent indicated that he/she did not know if any ergonomic consulting services had been used. Fifty-seven respondents remained who had used ergonomic consulting services.

Of the 57 respondents who had used ergonomic consulting services, 27 had used services from two sources. One respondent had used services from all three sources. The respondents who had used more than one source were asked which source had been used most recently. They were then surveyed concerning their previous use of ergonomic consulting services from the most recently used source. Of the respondents who had used ergonomic consulting services, 37 were surveyed on their use of their Workers’ Compensation insurance carrier; 12 had used a private consultant, and eight had used OR-OSHA.
Figure 7: All Uses of Ergonomic Consulting Services

Table 3: Use of Ergonomic Consulting Services by Company Size (actual values)

<table>
<thead>
<tr>
<th>Company Size</th>
<th>1-19</th>
<th>20-49</th>
<th>50-99</th>
<th>100-249</th>
<th>250-499</th>
<th>500+</th>
</tr>
</thead>
<tbody>
<tr>
<td>All uses*</td>
<td>1</td>
<td>7</td>
<td>14</td>
<td>28</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>N=86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surveyed uses</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>19</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>N=57</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Population</td>
<td>5</td>
<td>14</td>
<td>23</td>
<td>25</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>N=104</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 28 respondents had used services from more than one source
Table 3 demonstrates the distribution of use of consulting services among the different company sizes. The smaller the company, the less likely they were to have used ergonomic consulting services of any type. The table also shows all reported uses of ergonomic consulting services. Twenty-eight respondents had used services from more than one source.

Figure 8a: Source of Ergonomic Consulting Services by Company Size
(actual number surveyed)

Figure 8a shows a breakdown of source of consulting service used most recently by company size. The use of private ergonomic consulting services appears to be fairly evenly distributed among companies of various sizes. A higher percentage of companies with 500+ employees had used private consulting services (Figure 8b, page 22). This distribution is understandable since larger companies are more likely to have funds available to pay for ergonomic consulting services.
First Learned of Consulting Services

After establishing which source of ergonomic consulting services had been most recently used, respondents were asked a series of questions relating to that use.

In response to a multiple choice question, a strong majority of respondents indicated they first learned of the source’s ergonomic consulting services directly from that source (see Figure 9, page 23). Respondents who had used private ergonomic consulting services had the most diverse responses. Responses in the category of "other" included:

- a conference (two responses)
- a Workers’ Compensation Division seminar
- directly from the Worker’s Compensation Division
- asked Workers’ Compensation insurance carrier if they provided the service
- and from the corporate office

The media, one of the possible choices, was not the means of informing any of the respondents of the ergonomic consulting services they used.
Use of Services

For those respondents who had used ergonomic consulting services, the average frequency of use was four times in the past twelve months. This excludes respondents who had not used ergonomic consulting services in the identified time period. Table 4 shows the mean frequency of use by source of services. The maximum use of services in the past 12 months was 48 times by a respondent using their Workers' Compensation insurance carrier's ergonomic consulting services. The relatively infrequent use of OR-OSHA could be a result of the delayed response time (Table 5, page 25).
Table 4: Mean Frequency of Use of Services in Past Twelve Months

<table>
<thead>
<tr>
<th></th>
<th>All Services</th>
<th>OR-OSHA</th>
<th>Workers’ Comp</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (Mean)</td>
<td>3.9</td>
<td>1.3</td>
<td>4.9</td>
<td>5.6</td>
</tr>
<tr>
<td>N</td>
<td>52</td>
<td>3</td>
<td>37</td>
<td>12</td>
</tr>
</tbody>
</table>

The majority of respondents reported talking to one representative to obtain the services requested. Most respondents indicated they spoke with the individual they had worked with before. Eleven of 57 respondents spoke to more than one representative. Three respondents indicated they did not know how many representatives had been spoken to in order to obtain services because they did not make the request for services. The maximum number of representatives spoken to was three, reported by one respondent using OR-OSHA.

Tables 5 and 6 (page 25) show the average number of days between requesting and receiving services, and the overall satisfaction rates with the response time. OR-OSHA had the longest average wait, more than double the average for all services. They also had the lowest satisfaction with response time. It is interesting that all three sources had similar maximum delays between requesting and receiving services. In the case of the Workers’ Compensation insurance carrier, the respondent indicated the carrier was located outside the state of Oregon.
Table 5: Mean Number of Days Between Requesting Services and Receiving Services

<table>
<thead>
<tr>
<th></th>
<th>All Services</th>
<th>OR-OSHA</th>
<th>Workers' Comp</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>16.2</td>
<td>39.4</td>
<td>12.4</td>
<td>16.9</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.5</td>
<td>5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Maximum</td>
<td>90</td>
<td>90</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>N=</td>
<td>57</td>
<td>4</td>
<td>36</td>
<td>12</td>
</tr>
</tbody>
</table>

Respondents were satisfied with the response time between requesting and receiving services, with a mean satisfaction rating of 1.41. The variation among the three sources is minimal. Only three respondents indicated they were somewhat or very dissatisfied with the response time for services, one with OR-OSHA, two with their Workers' Compensation insurance carrier.

Table 6: Mean Satisfaction with Response Time
(1-very satisfied, 2-somewhat satisfied, 3-somewhat dissatisfied, 4-very dissatisfied)

<table>
<thead>
<tr>
<th></th>
<th>Overall Mean</th>
<th>OR-OSHA</th>
<th>Workers' Comp</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=</td>
<td>1.41</td>
<td>1.80</td>
<td>1.35</td>
<td>1.42</td>
</tr>
</tbody>
</table>

|                  | 49           | 5       | 34            | 12      |
Implementation and Effectiveness of the Consultant's Recommendations

Respondents reported that the consultant's recommendations were implemented. Only four of 57 respondents said the recommendations had not been implemented. Figure 10 shows the perceived effectiveness of the recommendations in meeting company objectives by source. Nine of 53 respondents indicated that not enough time had elapsed since implementing the recommendations to make a determination. The mean perceived effectiveness of the recommendations from the three sources is shown in Table 7.

Figure 10: Effectiveness of Consultants' Recommendations in Achieving Objectives by Source

![Bar chart showing effectiveness of recommendations by source](chart.png)
Table 7: Mean Effectiveness of Consultants’ Recommendations  
(1-very effective, 2-somewhat effective, 3-somewhat ineffective, 4-very ineffective)

<table>
<thead>
<tr>
<th>All Services</th>
<th>OR-OSHA</th>
<th>Workers’ Comp</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>1.43</td>
<td>1.54</td>
<td>1.44</td>
</tr>
<tr>
<td>N=</td>
<td>42</td>
<td>7</td>
<td>26</td>
</tr>
</tbody>
</table>

The effectiveness of the consultants’ recommendations was rated high, with a mean of 1.50 out of 4, across all three sources of ergonomic consulting services. No respondent rated them as somewhat or very ineffective. There appears to be minimal variation in the effectiveness of the consultant’s recommendations from the various sources.

Adverse effects from the consultant’s recommendations were reported by 9.4% of the respondents. The comments explaining adverse effects included:

- [changes] slowed down production
- [changes resulted in] a few disgruntled employees; retraining of employees;
- financial outlays to come into compliance
- went to new S-style keyboards, only one person in 10 likes them

Six of the 53 respondents felt not enough time had elapsed to determine whether there were adverse effects from the consultant’s recommendations.

Thirty-nine percent of respondents indicated that the use of an ergonomic consultant had reduced the number or severity of ergonomic accidents and injuries in their companies. Nineteen percent of respondents indicated there had been no reduction, while 35% felt not enough time had elapsed. Four respondents indicated they did not know. Several of the respondents who felt the use of an ergonomic consultant had not reduced ergonomic injuries indicated they had never had an ergonomic injury or accident.
Use of Specific Services

Through the use of a multiple choice question, respondents were asked if they had used specific services. These services may or may not have been available to them from their ergonomic consulting service. If they had used the specified service, they were then asked to rate the service as excellent (1), good (2), fair (3), or poor (4). Three respondents indicated they did not know if any of the services had been used.

Figure 11: Percentage Use of Services within each Source

Figure 11 shows the percentage of respondents who had used each identified service. Services specified in the “other” category, as stated by the respondents, included:

- hazardous product evaluation, tank entry evaluation
- loss control
• provided a booklet about services provided and ergonomic program information; and established an ergonomics program
• walk throughs for safety issues
• sound studies, audited water areas for contamination
• pre-employment testing
• sound level monitoring
• evaluation of ergonomic program’s effectiveness

Figure 12: Total Number of Services Used by Respondents

The majority of respondents used more than one service with six of 57 using only one of the specified services (Figure 12). Most services received were rated as good or excellent by respondents (Table 8, page 30). Training and education and follow-up evaluations were the services that received the most fair and poor ratings, with a total of five each. Manufacturing worksite evaluations and product recommendations each received a combination of four fair and poor ratings. The highest number of poor ratings received by a service was one. OR-OSHA’s services had the lowest satisfaction rating, 2.07, for services received of the three sources of services. Next were Workers’
Compensation insurance carriers with an overall rating of 1.84. Private ergonomic consulting services had the highest overall rating of 1.58.

Table 8: Mean Ratings of Services Received
(1-excellent, 2-good, 3-fair, 4-poor)

<table>
<thead>
<tr>
<th>Service</th>
<th>OR-OSHA</th>
<th>Workers' Comp</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Services</td>
<td>2.07</td>
<td>1.84</td>
<td>1.58</td>
</tr>
<tr>
<td>N= 14</td>
<td></td>
<td>115</td>
<td>37</td>
</tr>
<tr>
<td>Worksite eval - manufacturing</td>
<td>2.00</td>
<td>1.80</td>
<td>1.60</td>
</tr>
<tr>
<td>N= 4</td>
<td></td>
<td>31</td>
<td>10</td>
</tr>
<tr>
<td>Worksite eval - office</td>
<td>2.00</td>
<td>1.70</td>
<td>1.40</td>
</tr>
<tr>
<td>N= 3</td>
<td></td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Training &amp; Education</td>
<td>2.00</td>
<td>2.00</td>
<td>1.70</td>
</tr>
<tr>
<td>N= 2</td>
<td></td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Product Recommendations</td>
<td>2.30</td>
<td>2.10</td>
<td>1.70</td>
</tr>
<tr>
<td>N= 3</td>
<td></td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Follow-up Evaluations</td>
<td>0</td>
<td>1.90</td>
<td>1.50</td>
</tr>
<tr>
<td>N= 0</td>
<td></td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td>Americans with Disabilities Act Evaluations</td>
<td>2.00</td>
<td>1.70</td>
<td>1.70</td>
</tr>
<tr>
<td>N= 1</td>
<td></td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>2.00</td>
<td>1.40</td>
<td>1.50</td>
</tr>
<tr>
<td>N= 1</td>
<td></td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>
Continued Use of Services

Only one respondent indicated he/she would not reuse his/her previously used ergonomic consulting services. These services were provided by a private ergonomic consulting service. The respondent stated the “[q]uality of the recommendations, I didn’t feel the recommendations were realistic” was the reason he/she would not use the private services again.

The last question of the survey asked if the respondent had any additional comments to make about the consulting services he/she had used. There was a range of additional comments provided by a total of 25 respondents. Of these, five had used OR-OSHA, 17 had used their Workers’ Compensation insurance carrier’s ergonomic consulting services and three had used private ergonomic consulting services. Appendix B contains respondents’ comments which were generally positive.
DISCUSSION

The purpose of this study was to survey selected manufacturing companies in Oregon with respect to their use and perception of ergonomic consulting services from three possible sources. The possible sources were Oregon Occupational Safety and Health Administration (OR-OSHA), Workers' Compensation insurance carriers and private ergonomic consultants. The survey was directed at the individuals who were responsible for occupational safety in the selected companies.

Problems

Of the 141 companies in the survey, there were 37 non-participants. Of these, thirteen had telephone numbers that were disconnected or in error. A review of telephone directories was made in an attempt to locate current phone numbers. The surveyor received no response from 14 companies following four contact attempts. Six respondents declined to participate. The remaining four were not involved for a variety of reasons. One company was a one person office; one indicated that decisions were made corporate-wide; one indicated there was no one on-site responsible for occupational safety; and one was out of business.

In the questionnaire, the term “corporation” was used to label the business entity being surveyed. One respondent indicated he/she did not think his/her business was a corporation. In light of this comment, the use of the term corporation was reconsidered. A corporation is defined in Webster's New World Dictionary as “a group of people organized, as to operate a business, under a charter granting them as a body some of the legal rights, etc. of an individual.” (26) Consequently, the word company has been substituted for corporation in this text. Company has a broader definition as “a group of people gathered or associated for some purpose.”
Conclusions

Respondents representing companies with less than 50 employees were less knowledgeable in the area of ergonomics and similar terminology compared to respondents from larger companies. All but one of the respondents who were unfamiliar with all three of the terms, human factors, ergonomics, and human engineering, were from companies with less than 50 employees.

Companies with fewer than 50 employees were also less likely to have used ergonomic consulting services than larger companies. Only six of 30 companies with less than 50 employees had used ergonomic consulting services of any kind. Additionally, only 10 of 24 companies with 50-99 employees had used ergonomic consulting services. This is consistent with the results found by Chovil and Alexander (17). They found that small companies showed a low level of utilization of industrial hygiene and safety professionals. In addition, the literature suggests smaller companies would most benefit from the use of ergonomic consulting services (11).

It would seem that ergonomic consulting service providers should focus their attention on smaller companies, those with fewer than 100 employees. Of the respondents in those size categories, only 30% had utilized ergonomic consulting services. This percentage compares with 82% of companies with 100 or more employees. The low rate of usage by small companies suggests they are currently an open market for ergonomic consulting service providers.

According to Bureau of Labor Statistics 1992 data (1, 3), the highest incidence of nonfatal occupational injuries in manufacturing occurs in companies with 20-49, 50-99 and 100-249 employees. These companies have an incidence rate of 12.3, 13.1, and 12.5 per 100 full-time workers, respectively (3). These numbers are consistent with the 1993 data (4). Companies with less than 20 employees have the lowest incident rate of nonfatal occupational injuries. The incidence rate for companies with 1-19 employees is 7.6 per 100 full-time workers. If companies with less than 20 employees are excluded, only 35% of companies with 20-99 employees had used ergonomic consulting services.
Smaller companies would be less likely to have a person whose responsibilities only included issues of occupational safety. Since the individual is unable to focus solely on occupational safety, he/she is less likely to be familiar with concepts, methods and terminology. Organizations supplying ergonomic consulting services should consider providing educational and outreach services to smaller employers. These services would make them aware, not only of services available, but of some of the risks that may be reduced by ergonomic interventions.

It is interesting that the satisfaction rates were similar when comparing the number of days respondents waited for services. Companies using OR-OSHA had to wait twice as long, on average, to receive services than companies using other sources. Despite the extended wait, the users remained satisfied with the response time. Perhaps the services requested were not considered time-critical by the users, or respondents were familiar with the duration of the response time.

Figure 13: Comparison of How Respondents Would Identify a Consultant, Use of Services and How Learned of Services*

*Percentages eliminate use of multiple services.
Figure 13 (page 34) compares how respondents would identify a qualified consultant, what service they used, and how they first learned of the service they used (See Figures 6, 8a, and 9, pages 18, 21, and 23). When compared with the usage of ergonomic consulting services from the three sources, the percentage of respondents indicating they would go directly to the source for information closely follows the use pattern. There is a similar link between the use of services and how the respondents' first learned of the services they used. This suggests that companies utilized sources when the respondents heard directly from the service provider.

Workers' Compensation insurance carriers were the most popular source of ergonomic consulting services with 65% of the respondents being surveyed on their services. This is understandable since most companies have Workers' Compensation insurance carriers. Only large companies tend to be self-insured. Companies with 500+ employees had the highest percentage for using private ergonomic consulting services, at 34%.

It is unclear how effective the use of an ergonomic consulting service is to reduce ergonomic injuries and illnesses. With 35% of respondents indicating not enough time had elapsed, the data is not definitive. Several respondents indicated they had never had an injury related to ergonomics; thus the use of a consultant had not reduced their incidence rate. Consequently, it may be that the use of an ergonomic consultant helped them maintain their zero incidence rate, as opposed to having actually reduced their incidence rate. This would have biased the 19% of “not reduced” responses.

When surveyed regarding specific services, most respondents, 89%, had used more than one service from their ergonomic consultants. Nearly 83% of the respondents had received manufacturing worksite evaluations. Considering that these companies are in manufacturing industries, this is not surprising.

No respondents had received follow-up evaluations by OR-OSHA. This may be related to the delays encountered between requesting and receiving services from OR-OSHA. The average wait for services was 39.4 days (Table 5, page 25). Additionally, follow-up services may not be provided by OR-OSHA ergonomic consulting services.
The comments made in response to an open ended question about their ergonomic consulting services suggests positive feelings for the services received (see Appendix B). Respondents were aware of how much the individual influences the quality of the services. As one respondent stated, “I think it's the individual who provides the services, more than the Workers’ Comp[ensation] carrier. The previous person was not so easy to work with and not as helpful.” Several respondents felt more people should know about and utilize OR-OSHA’s and their Workers’ Compensation insurance carriers’ ergonomic consulting services. One OR-OSHA user observed that he/she “[k]ind of stumbled upon it. I’d suggest making it more publicly known and the benefits of it.” Perhaps agencies and companies providing ergonomic consulting services should do more outreach.

The results indicate that the ergonomic consulting services provided by OR-OSHA, Workers’ Compensation insurance carriers and private sources are well received and considered effective by the companies who utilize their services. However, smaller companies, with less than 100 employees, are the least likely to have utilized ergonomic consulting services. These companies should be targeted since BLS statistics (1-4) suggest they have the highest incidence rates of occupational injuries and illnesses. In addition, the literature (11) suggests companies with less than 100 employees might benefit the most from the use of ergonomic consulting services.

Recommendations for Further Study

There are several extensions of this study that would be of interest to pursue. Questions that might be asked include:

- Why are small companies, with less than 100 employees, less likely to have used ergonomic consulting services? Is it because management is unaware of the importance of safety, as suggested by Chovil and Alexander (17)?
- What would encourage small companies to take advantage of ergonomic consulting services available to them?
- Establish criteria to measure the effectiveness of ergonomic consulting services.
• What percentage of respondents using ergonomic consulting services had full-time environmental health and safety (EH&S) professionals? Is the presence or absence of a full-time EH&S professional linked to usage of ergonomic consulting services?

• How do the providers of ergonomic consulting services advertise their services? Do companies feel that this advertisement is adequate to inform them of the services available?

• In other industries, beside manufacturing, who does or does not use ergonomic consulting services? Do they follow similar use patterns to the companies in the manufacturing industry?
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21. 29 CFR 1904.15 Employers Exempt from Record Keeping.


APPENDICES
APPENDIX A

ERGONOMIC CONSULTING SURVEY
Ergonomic Consulting Survey

First I am going to ask you some general questions regarding your corporation and ergonomic consulting services.

**GENERAL QUESTIONS**

1. How many employees are in your corporation, at your site?
   
   EMPLOYEES ................................................. ____
   DO NOT KNOW/NO ANSWER ......................... 0

2. Do you know your corporation's Standard Industrial Classification or SIC code?
   
   S.I.C. ..................................................... ____
   DO NOT KNOW/NO ANSWER ......................... 0

3. Are you familiar with the term human factors, ergonomics, human engineering?
   
   a. Human Factors 1 2 0
   b. Ergonomics 1 2 0
   c. Human Engineering 1 2 0
   (IF NO TO ALL OF THE ABOVE - STOP HERE)

4. Do you have an ergonomic specialist on staff?
   
   YES ......................................................... 1
   NO ......................................................... 2
   DO NOT KNOW/NO ANSWER ......................... 0

5. If you were interested in obtaining ergonomic consulting services, how would identify a qualified consultant?
   
   OREGON OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION . . . 1
   WORKERS' COMPENSATION INSURANCE CARRIER ......................... 2
   PRIVATE CONSULTANT .................................... 3
   PROFESSIONAL SOCIETY .................................. 4
   PROFESSIONAL CONTACTS .................................. 5
   CONFERENCES ........................................... 6
   OTHER ....................................................... 7
   DO NOT KNOW/NO ANSWER ................................ 0
6. I am now going to read to you 3 possible sources of ergonomic consulting services. Please indicate whether or not you have ever used each of these services either by telephone or on-site visit.

The first one is:

a. Oregon Occupational Safety & Health Administration
b. Workers' Compensation Insurance Carrier (skip to #19)
c. Private (skip to #31)
d. DO NOT KNOW/NO ANSWER

(If no or do not know, stop here. Thank you for your cooperation.)

(If yes to more than one source of ergonomic consulting services.)

6b. Which of these sources did you use most recently?

OREGON OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
WORKERS' COMPENSATION INSURANCE CARRIER
PRIVATE CONSULTANT
DO NOT KNOW/NO ANSWER
QUESTIONS CONCERNING
OREGON OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
ERGONOMIC CONSULTING SERVICES

Now I will ask you some questions regarding your previous use of OR-OSHA ergonomic consulting services.

7. Did you first learn about OR-OSHA ergonomic consulting services?

From Other(s) Who Have Used The Service ........ 1
Directly From OR-OSHA .................................. 2
From the Media ........................................... 3
Other .................................................................... 4
Do Not Know/No Answer ................................. 0

8. How many times have you used OR-OSHA ergonomic consulting services by telephone or on-site visit in the past twelve months?

TIMES USED .................................................

9. During the most recent use of OR-OSHA ergonomic consulting services, approximately how many different representatives did you have to speak to before locating a representative who could respond to your request for consulting services?

NUMBER OF REPRESENTATIVES ......................
DO NOT KNOW/NO ANSWER .......................... 0

10. During the most recent use of OR-OSHA ergonomic consulting services, approximately how many days elapsed between requesting services and a consultant providing services either by telephone or by an on-site visit?

DAYS ......................................................
DO NOT KNOW/NO ANSWER .......................... 0

11. During the most recent use of OR-OSHA ergonomic consulting services, how satisfied or dissatisfied were you with the response time between the requesting of services and a consultant providing services? Were you very satisfied, somewhat satisfied, somewhat dissatisfied or very dissatisfied?

VERY SATISFIED ........................................ 1
SOMewhat SATISFIED ................................. 2
SOMewhat DISSATISFIED .............................. 3
VERY DISSATISFIED .................................... 4
DO NOT KNOW/NO ANSWER .......................... 0
12. During the most recent use of OR-OSHA ergonomic consulting services, were the consultant's recommendations implemented by your corporation?

YES .............................................. 1
NO (skip to #15) .............................. 2
DO NOT KNOW/NO ANSWER (skip to #15) ....... 0

THE NEXT FEW QUESTIONS PERTAIN TO THE CONSULTANT'S RECOMMENDATIONS WHICH WERE IMPLEMENTED BY YOUR CORPORATION.

13. How effective or ineffective were the consultant's recommendations in achieving your objectives? Were they very effective, somewhat effective, somewhat ineffective, very ineffective or has not enough time elapsed?

DO NOT KNOW/NO ANSWER .................. 0
NOT ENOUGH TIME ELAPSED ................ 5
VERY EFFECTIVE ............................... 1
SOMewhat EFFECTIVE .......................... 2
SOMewhat INEFFECTIVE ...................... 3
VERY INEFFECTIVE ............................. 4

13a. Would you briefly explain why you felt the consultant's recommendations were ineffective?

____________________________________________________________________________________

14. Were there any adverse effects from the consultant's recommendations to your corporation?

DO NOT KNOW/NO ANSWER .................. 0
NOT ENOUGH TIME ELAPSED ................. 3
NO, ADVERSE EFFECTS ....................... 2
YES, ADVERSE EFFECTS ....................... 1

14a. Would you briefly explain any adverse effects.

____________________________________________________________________________________

15. Has the use of an OR-OSHA ergonomic consultant reduced or not reduced the number or severity of ergonomic accidents and/or injuries in your corporation?

REDUCED (YES) .............................. 1
NOT REDUCED (NO) .......................... 2
NOT ENOUGH TIME ELAPSED ................ 3
DO NOT KNOW/NO ANSWER .................. 0
16. Now I will read you a list of services that may have been available to you during your most recent use of OR-OSHA ergonomic consulting services.
   a. Please indicate whether or not you used the service?
   b. (IF USED THE SERVICE) How would you rate that service, as excellent, good, fair, or poor?

<table>
<thead>
<tr>
<th>Service</th>
<th>Used</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Or Assembly Work Site Evaluations</td>
<td>1 2 0</td>
<td>2 3 4 0</td>
</tr>
<tr>
<td>Office Work Site Evaluations</td>
<td>1 2 0</td>
<td>2 3 4 0</td>
</tr>
<tr>
<td>Training And Education</td>
<td>1 2 0</td>
<td>2 3 4 0</td>
</tr>
<tr>
<td>Product Recommendations</td>
<td>1 2 0</td>
<td>2 3 4 0</td>
</tr>
<tr>
<td>Follow-Up Evaluations</td>
<td>1 2 0</td>
<td>2 3 4 0</td>
</tr>
<tr>
<td>Americans With Disabilities Act Evaluations</td>
<td>1 2 0</td>
<td>2 3 4 0</td>
</tr>
<tr>
<td>Other</td>
<td>1 2 0</td>
<td>2 3 4 0</td>
</tr>
</tbody>
</table>

17. Will you use OR-OSHA ergonomic consulting services again?

   DO NOT KNOW/NO ANSWER .................................. 0
   YES, WILL USE SERVICES ................................... 1
   NO, WILL NOT USE SERVICES ............................... 2

17a. Now I will read to you some reasons why corporations decide not to use OR-OSHA ergonomic consulting services. Please indicate whether or not each was a reason for you.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes, A Reason</th>
<th>No, Not A Reason</th>
<th>DNK</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I believe the service is too costly</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>b. I do not feel consulting services are necessary at my corporation</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>c. I am concerned about confidentiality</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>d. I am concerned OR-OSHA ergonomic consulting services will issue citations</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>e. Other (Describe)</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

18. Do you have any additional comments you would like to make about OR-OSHA ergonomic consulting services?

That completes my survey. I would like to thank you very much for your cooperation and help in answering my questions.
QUESTIONS CONCERNING YOUR WORKERS' COMPENSATION INSURANCE
ERGONOMIC CONSULTING SERVICES

Now I will ask you some questions regarding your previous use of workers’ compensation insurance ergonomic consulting services.

19. Did you first learn about your workers’ comp carrier's ergonomic consulting services?

   From Other(s) Who Have Used The Service ........... 1
   Directly From Workers’ Comp Carrier ............... 2
   From the Media ........................................ 3
   Other .................................................... 4
   Do Not Know/No Answer .............................. 0

20. How many times have you used your workers’ comp carrier's ergonomic consulting services by telephone or on-site visit in the past twelve months?

   TIMES USED ..............................................

21. During the most recent use of your workers’ comp carrier's ergonomic consulting services, approximately how many different representatives did you have to speak to before locating a representative who could respond to your request for consulting services?

   NUMBER OF REPRESENTATIVES ....................
   DO NOT KNOW/NO ANSWER ....................... 0

22. During the most recent use of your workers’ comp carrier's ergonomic consulting services, approximately how many days elapsed between requesting services and a consultant providing services either by telephone or by an on-site visit?

   DAYS ....................................................
   DO NOT KNOW/NO ANSWER ....................... 0

23. During the most recent use of your workers’ comp carrier's ergonomic consulting services, how satisfied or dissatisfied were you with the response time between the requesting of services and a consultant providing services? Were you very satisfied, somewhat satisfied, somewhat dissatisfied or very dissatisfied?

   VERY SATISFIED ................................. 1
   SOMEWHAT SATISFIED ............................ 2
   6SOMEWHAT DISSATISFIED .......................... 3
   VERY DISSATISFIED ......................... 4
   DO NOT KNOW/NO ANSWER ............... 0
24. During the most recent use of your workers' comp carrier's ergonomic consulting services, were the consultant's recommendations implemented by your corporation?

   YES ........................................ 1
   NO (skip to #27) ............................... 2
   DO NOT KNOW/NO ANSWER (skip to #27) .... 0

THE NEXT FEW QUESTIONS PERTAIN TO THE CONSULTANT'S RECOMMENDATIONS WHICH WERE IMPLEMENTED BY YOUR CORPORATION.

25. How effective or ineffective were the consultant's recommendations in achieving your objectives? Were they very effective, somewhat effective, somewhat ineffective, very ineffective or has not enough time elapsed?

   DO NOT KNOW/NO ANSWER ...................... 0
   NOT ENOUGH TIME ELAPSED .................... 5
   VERY EFFECTIVE ................................. 1
   SOMewhat EFFECTIVE ............................. 2
   SOMEWHAT INEFFECTIVE ......................... 3
   VERY INEFFECTIVE ............................... 4

   → 25a. Would you briefly explain why you felt the consultant's recommendations were ineffective?

26. Were there any adverse effects from the consultant's recommendations to your corporation?

   DO NOT KNOW/NO ANSWER ...................... 0
   NOT ENOUGH TIME ELAPSED .................... 3
   NO, ADVERSE EFFECTS ........................... 2
   YES, ADVERSE EFFECTS .......................... 1

   → 26a. Would you briefly explain any adverse effects?

27. Has the use of your workers' comp carrier's ergonomic consultant reduced or not reduced the number or severity of ergonomic accidents and/or injuries in your corporation?

   REDUCED (YES) ................................. 1
   NOT REDUCED (NO) .............................. 2
   NOT ENOUGH TIME ELAPSED .................... 3
   DO NOT KNOW/NO ANSWER ...................... 0
28. Now I will read you a list of services that may have been available to you during your most recent use of your workers' comp carrier's ergonomic consulting services.
   a. Please indicate whether or not you used the service.
   b. (IF USED THE SERVICE) How would you rate that service, as excellent, good, fair, or poor?

<table>
<thead>
<tr>
<th></th>
<th>USED</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>a. Manufacturing Or Assembly Work Site Evaluations</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>b. Office Work Site Evaluations</td>
<td>1</td>
<td>2</td>
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<tr>
<td>c. Training And Education</td>
<td>1</td>
<td>2</td>
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<tr>
<td>d. Product Recommendations</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>e. Follow-Up Evaluations</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>f. Americans With Disabilities Act Evaluations</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>g. Other</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

29. Will you use your workers' comp carrier's ergonomic consulting services again?

<p>| | |</p>
<table>
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<tbody>
<tr>
<td></td>
<td>DO NOT KNOW/NO ANSWER</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

29a. Now I will read to you some reasons why corporations decide not to use their workers' comp carrier's ergonomic consulting services. Please indicate whether or not each was a reason for you.

<table>
<thead>
<tr>
<th>WAS THIS A REASON, YES OR NO?</th>
<th>YES, A REASON</th>
<th>NO, NOT A REASON</th>
<th>DNK</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I believe the service is too costly</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>b. I do not feel consulting services are necessary at my corporation</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>c. I am concerned about confidentiality</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>d. Other (Describe ____________________________)</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

30. Do you have any additional comments you would like to make about your workers' compensation carrier's ergonomic consulting services?

That completes my survey. I would like to thank you very much for your cooperation and help in answering my questions.
QUESTIONS CONCERNING
PRIVATE ERGONOMIC CONSULTING SERVICES

Now I will ask you some questions regarding your previous use of private ergonomic consulting services.

31. Did you first learn about private ergonomic consulting services?

   From Other(s) Who Have Used The Service ........ 1
   Directly From The Private Consultant ............. 2
   From the Media .................................... 3
   From a Professional Society ....................... 5
   Other ............................................... 4
   Do Not Know/No Answer ........................... 0

32. How many times have you used private ergonomic consulting services by telephone or on-site visit in the past twelve months?

   TIMES USED ........................................

33. During the most recent use of private ergonomic consulting services, approximately how many different representatives did you have to speak to before locating a representative who could respond to your request for consulting services?

   NUMBER OF REPRESENTATIVES ...................
   DO NOT KNOW/NO ANSWER ........................

34. During the most recent use of private ergonomic consulting services, approximately how many days elapsed between requesting services and a consultant providing services either by telephone or by an on-site visit?

   DAYS .............................................
   DO NOT KNOW/NO ANSWER ........................

35. During the most recent use of private ergonomic consulting services, how satisfied or dissatisfied were you with the response time between the requesting of services and a consultant providing services? Were you very satisfied, somewhat satisfied, somewhat dissatisfied or very dissatisfied?

   VERY SATISFIED ................................. 1
   SOMEWHAT SATISFIED ............................ 2
   SOMEWHAT DISSATISFIED ......................... 3
   VERY DISSATISFIED ............................... 4
   DO NOT KNOW/NO ANSWER ........................ 0
36. During the most recent use of private ergonomic consulting services, were the consultant’s recommendations implemented by your corporation?

   YES .............................................. 1
   NO (skip to #39) ................................. 2
   DO NOT KNOW/NO ANSWER (skip to #39) .... 0

   THE NEXT FEW QUESTIONS PERTAIN TO THE CONSULTANT’S RECOMMENDATIONS WHICH WERE IMPLEMENTED BY YOUR CORPORATION.

37. How effective or ineffective were the consultant’s recommendations in achieving your objectives? Were they very effective, somewhat effective, somewhat ineffective, very ineffective or has not enough time elapsed?

   DO NOT KNOW/NO ANSWER .......................... 0
   NOT ENOUGH TIME ELAPSED ..................... 5
   VERY EFFECTIVE ................................... 1
   SOMEWHAT EFFECTIVE ............................ 2
   SOMEWHAT INEFFECTIVE ........................... 3
   VERY INEFFECTIVE ................................ 4

   37a. Would you briefly explain why you felt the consultant’s recommendations were ineffective?


38. Were there any adverse effects from the consultant’s recommendations to your corporation?

   DO NOT KNOW/NO ANSWER .......................... 0
   NOT ENOUGH TIME ELAPSED ..................... 3
   NO, ADVERSE EFFECTS ............................ 2
   YES, ADVERSE EFFECTS ............................ 1

   38a. Would you briefly explain any adverse effects?


39. Has the use of a private ergonomic consultant reduced or not reduced the number or severity of ergonomic accidents and/or injuries in your corporation?

   REDUCED (YES) ................................... 1
   NOT REDUCED (NO) ................................. 2
   NOT ENOUGH TIME ELAPSED ..................... 3
   DO NOT KNOW/NO ANSWER ........................ 0
40. Now I will read you a list of services that may have been available to you during your most recent use of private ergonomic consulting services.
   a. Please indicate whether or not you used the service.
   b. (IF USED THE SERVICE) How would you rate that service, as excellent, good, fair, or poor?

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1 2 0</td>
<td>1 2 0</td>
<td>1 2 0</td>
<td>1 2 0</td>
<td>1 2 0</td>
<td>1 2 0</td>
<td>1 2 0</td>
</tr>
</tbody>
</table>

41. Will you use private ergonomic consulting services again?

- DO NOT KNOW/NO ANSWER ................. 0
- YES, WILL USE SERVICES .................. 1
- NO, WILL NOT USE SERVICES ............... 2

41a. Now I will read to you some reasons why corporations decide not to use private ergonomic consulting services. Please indicate whether or not each was a reason for you.

| a. I believe the service is too costly .......... | 1 2 0 |
| b. I do not feel consulting services are necessary at my corporation .......... | 1 2 0 |
| c. I am concerned about confidentiality .......... | 1 2 0 |
| d. Other (Describe __________________________) | 1 2 0 |

42. Do you have any additional comments you would like to make about private ergonomic consulting services?

That completes my survey. I would like to thank you very much for your cooperation and help in answering my questions.
APPENDIX B

VERBATIM RESPONSES TO OPEN ENDED QUESTION
VERBATIM RESPONSES TO OPEN ENDED QUESTION:

Do you have any additional comments you would like to make about [OR-OSHA, your Workers’ Compensation insurance carrier’s, private] ergonomic consulting services?

Oregon Occupational Safety and Health Administration Users

I think they're really good, know what they're talking about, willing to come out and help.

I'd have to say that I've been pleasantly surprised with my encounters with them, even the compliance enforcement side of things.

We kind of stumbled upon it. I'd suggest making it more publicly known and the benefits of it.

Need more employees available, more consultants. Too long a wait. Entire on-site consulting is bad because too long to get people out to the site.

[The consultant] seemed to know what he was talking about.

Workers’ Compensation Insurance Carriers

I found them to be very, very helpful.

We've got a good one, staff is wonderful. Don't ever feel like they're too busy for you.

The technical assistance covered a variety of areas. [Including] health hazards from chemicals at work.

Best place to get [consulting services] is from Workers' Comp. But one of the first things cut back is consulting staff.

Very effective.
They do a really good job for us. [The consultant] takes time to learn what works for us, not just what's in the book. Takes time to learn personalities and work place to make recommendations that work for them.

Since with current carrier and talked about problems, have reduced comp cases and claims.

I love them. They're wonderful people and they're great to work with. They're very helpful. Nice to call them up and ask them questions, the personal touch.

Effective because had specific issues to address. Previous carrier good at pointing out potential problems, felt overwhelming.

Found them to be helpful

Good program for employers to take advantage of.

Ergonomics consultation and consideration of ergonomics is still fairly new. I see continued growth and trying to reduce ergonomic type injuries and workers' comp costs. Cumulative trauma type injuries keep increasing, either because of employee recognition or workstation problems.

Very good. Recommend that anyone with a good comp carrier utilize their services.

At this point I'm satisfied with it.

I think it's the individual who provides the services, more than the workers' comp carrier. The previous person was not so easy to work with and not as helpful.

Been real satisfied with it so far. We have more training scheduled. I expect to be satisfied with that also.

**Private Ergonomic Consulting Services**

Everyone's getting into the business so you have to do some checking to make sure they have the background.

Consulting program from the corporation trains customers and the dealership on safety and ergonomic issues.

The one's we've worked with have been very good.