

## CHAPTER 3: IMPACT ASSESSMENT VIA CLOSED-ENDED SURVEYS

### 3.1. INTRODUCTION

Most private and public sector environmental agencies agree that P2 ideas are diffusing to businesses and industries at a slower rate than one may expect (Lindsey, 1998b). It has become important to use technical assistance programs to serve as change agents and help spread P2 ideas to companies. An innovative internship program in pollution prevention (P2), called the Partners in Pollution Prevention (P3) program has been developed at the University of Nebraska-Lincoln (UNL). This program contains educational, research, and outreach components and recently finished its eighth year (1997-2004). In the program, undergraduate student interns provide summer P2 technical assistance to small businesses and industrial clients in Nebraska while cooperating with a wide range of environmental and business assistance providers and partners.

The P3 program is unique in that it provides assistance in different regions throughout Nebraska and works with clients of different size and knowledge levels of P2. The regions in which projects are conducted range from the metropolitan Omaha area to smaller communities in Nebraska. To meet the needs of such a varied client base, the P3 program offers three modes of technical assistance (small business, industrial assistance and industrial placement). The modes allow clients to assess their company's resources and needs in an effort to choose the appropriate intensity of assistance.

After assisting 229 businesses in five years (1997 – 2001), the success of the P3 program was measured by a survey. The survey determined clients' perceptions on the benefits of participating in the P3 program. This paper analyzes survey results. The goal

of the survey analysis was to observe differences in client responses based on the assistance mode and geographic region of the assistance. The general trends observed from this survey may be relevant to other P2 technical assistance programs.

### **3.2. PROGRAM DESCRIPTION**

Each summer, between seven and seventeen undergraduate student interns from eight universities (Nebraska, Kansas State, Kansas, Iowa State, Iowa, Missouri-Columbia, Missouri-Rolla, and Washington University in St. Louis) and four engineering majors (biological systems, chemical, civil and industrial) delivered P2 technical assistance to Nebraska businesses. The undergraduate interns participated in an intensive two-week training course before spending nine weeks providing technical assistance to clients. For participating, each intern received both a stipend (\$4,900 in 2004) and three credit hours of senior level engineering technical electives. A detailed description of the program is provided by Dvorak et al. (2003).

#### ***3.2.1. Pollution Prevention Training***

The two-week training course prepared the interns for their summer's work and taught them the fundamentals of P2. Topics covered in the training included environmental regulations, how to perform waste assessments, safety precautions in an industrial setting, economic calculations, research skills and interaction with equipment vendors. An introduction to other Nebraskan P2 service providers from whom the interns could request help during the summer was also given.

Intern familiarity to other P2 service providers was important in order to meet this program's goals of promoting student and public education on P2. More than twelve

organizations and numerous vendors assisted the P3 program. These partners were instrumental in:

1. helping train interns on topics in which the P3 team leaders did not have expertise (for example, how to respond to regulatory questions and waste exchange operations),
2. answering interns' questions during the summer on topics in which P3 team leaders did not have expertise (for example, regulatory and energy efficiency questions), and
3. helping connect business clients with the P3 program.

One organization, University of Nebraska (NU) Cooperative Extension, has been an indispensable partner in the program, particularly in giving it a statewide reach. Cooperative Extension is a government supported program whose primary goal is to extend a university's resources to meet the public's needs, such as technology transfer, though non-formal, non-college credit programs. Cooperative Extension has provided interns with office space, daily support and assistance with obtaining clients.

### ***3.2.2. Client Assistance***

When providing assistance, all interns were required to: (1) analyze the company's current processes or operations, (2) research and evaluate the options for reducing waste streams, (3) work with the company's management and employees to determine the feasibility of the P2 and waste reduction options, (4) develop a cost comparison of P2 alternatives, and (5) outline all suggestions in a final report. Typically, businesses participating in the program have limited experience with P2 and waste

assessments; consequently, involvement with the P3 program increases P2 activity at a company.

To meet clients' varied needs, the program offers three modes of technical assistance. Multiple assistance modes are offered because the program is Nebraska's only state-wide P2 provider and, consequently, attracts clients of various sizes and business types. The three modes used are small business, industrial assistance and industrial placement. These types are explained below.

#### *Small Business*

Small business interns were located in University of Nebraska (NU) Cooperative Extension county and district offices throughout the state. The extension office staff helped the interns make contacts with small businesses in the area. Daily supervision was provided by a combination of local NU Cooperative Extension staff (non-technical issues) and UNL faculty and staff (technical issues, primarily via e-mail and telephone).

Clients assisted by small business interns were significantly smaller organizations than the two industrial groups. Based on survey results of past clients, more than 60% of the clients assisted by small business interns had less than ten employees; 92% employed fewer than one hundred people. Typically, these businesses did not have an employee formally assigned to address environmental and safety issues.

The diminutive nature of these businesses helped keep this type of assessment short. Small business interns visited the clients only two to four times, with each assessment taking a total of one to two weeks of the intern's time to complete. Examples of small businesses assisted include auto repair shops, farm cooperatives, dry cleaners and print shops.

Keeping with the mission of Cooperative Extension, public education was a goal of the small business interns. The small business students were involved in P2-related community education activities. These activities included staffing booths at county fairs, participating in community affairs programs on local radio stations, and speaking to local civic organizations. Interns also gave, on average, eleven presentations each summer to numerous organizations, such as Cooperative Extension boards, Kiwanis Clubs and Lions Clubs. Each summer the small business interns educated an average of eight hundred people in Nebraska about P2.

#### *Industrial Assistance*

Industrial assistance interns provided technical assistance to larger industries in Nebraska while working out of UNL offices. The industrial assistance interns received direct support from UNL graduate research assistants as well as the rest of the P3 project staff. Graduate assistants typically spent five to twenty hours a week helping the industrial assistance interns.

Each intern worked closely with one or two industries over the summer to minimize their waste streams. Industrial assistance students typically visited the clients two to five times during the summer. Because many industrial assistance projects were complex, the interns performed in-depth research on the processes of their assigned industries.

Clients participating in the industrial assistance mode tended to be businesses of a moderate to large size. Most clients receiving this mode of assistance had more than one hundred employees, even though some clients could be considered small businesses according to the U.S. Small Business Administration size standards. Companies in this

mode typically did not have full-time staff members to address environmental and health issues. Consequently, P2 was often a new idea to the company and there was interest in learning more from the interns.

### *Industrial Placement*

Industrial placement required the intern to be based at and work directly from the client's office. The client's staff provided daily supervision. Businesses assisted by an industrial placement intern often had full-time employees assigned to manage environmental and safety issues. Typically, this employee supervised the intern and spent eight hours a week assisting the intern.

Clients with industrial placement interns characteristically had a more defined organizational hierarchy to their company than those assisted by small businesses interns. The environmental staff assisted by industrial placement interns usually had some general knowledge about P2. Clients were interested in using interns to pursue P2 directions they have identified.

A few clients assisted by industrial placement interns were considered small business according to U.S. Small Business Administration size standards but most were not. In general, this mode's clients had more employees than other modes. Clients participating in this assistance mode were required to pay about one-half of the intern's stipend. Clients assisted by small business and industrial assistance interns were not required to pay for the assistance.

Out of the 229 clients assisted from 1997 to 2001, 85% (195) were small business, 11% (25) were industrial assistance and 4% (9) were industrial placement. Small business assistance was the shortest-termed mode yet most frequent type of assistance

that was provided; 52% of the total time spent by the interns involved small businesses assistance. This compares to 18% and 30% of the total time spent providing industrial assistance and industrial placement clients with assistance, respectively. A detailed description of UNL's P3 program and the three types of technical assistance is provided by Dvorak et al. (2003).

### ***3.2.3. Regions Assisted***

Like all states, Nebraska has communities of different sizes and business types throughout. P3 assistance providers observed that businesses in different geographic regions appear to experience different degrees of benefit (i.e., more money saved) from the P3 program. For analysis, the clients were separated into three regions (Omaha, Lincoln and the rest of the state). The Omaha metropolitan area, which includes both Douglas and Sarpy counties, has nearly 600,000 inhabitants (34% of the state's population and is the main business center of the state). The Lincoln area, UNL's home city, includes all of Lancaster County and has a population of 250,000 (15% of the state's population). The rest of the state comprises 51% of the Nebraska's population but has no cities greater than 50,000 in population. Of the 229 companies assisted, 16% were from the Omaha area, 34% were from the Lincoln area and 50% were from the rest of the state of Nebraska.

### **3.3. IMPACT ASSESSMENT SURVEY**

In 2001, the UNL Bureau of Sociological Research (BOSR) collaborated with P3 program staff to evaluate the impact of the P3 technical assistance on the past clients. The two programs co-developed an eight question survey that was closed-ended in that it

consisted of yes/no questions with no room for a client's written opinions. Many responses in the survey were provided on a 5-point Likert scale, which meant responses were measurements of attitude that ranged from strongly positive to neutral to strongly negative. The rest of the survey consisted of multiple choice questions profiling the client's business. The closed-ended survey was sent to the original contact person (name and job title) at the businesses that participated in the program from 1997 to 2001. A copy of the survey can be found in Appendix B.

### ***3.3.1. Survey Methods***

The P3 program supplied BOSR with a list of all 229 business participants of the program within the study period. After initial contact was made with clients, the BOSR received notice that seven of the businesses were no longer in operation. A pre-notification postcard was sent to the remaining 222 businesses to prepare the business contacts for the arrival of the survey, followed by the actual survey one month later.

### ***3.3.2. Survey Response Rate***

To increase the response rate, a professional telephone interviewer was trained and supervised by BOSR to verify quality of responses. The interviewer made follow up phone calls to ask the survey questions to those who did not respond to the mailed survey. After the phone interview process a total of 145 clients (65% of those contacted) responded. An average response rate of 60% – 70% is statistically acceptable for this type of survey (Mangione, 1995). Industrial assistance and industrial placement clients had a response rate of around 80% to the survey. This was considerably larger than the

small business client response rate of 58%. The response rate did not appear to be influenced by the length of time that had passed since the assistance was provided.

Preliminary analysis of the survey results showed a noticeable difference in the response rate to the survey questions by Omaha businesses and those in the rest of the state. In addition, Omaha area businesses had a lower response rate compared to the rest of the state. A second round of telephone calls was placed to non-responsive businesses statewide in an effort to increase Omaha's response rate to one similar to the rest of the state. After the second round of calls, BOSR compiled the data and supplied the results to the P3 staff in the spring of 2002.

### **3.4. RESULTS**

The purpose of the survey was to learn more about clients' opinions on the value of the technical assistance provided by interns. The results from each of the main survey questions are discussed in the following subsections. The survey results were analyzed by assistance mode and the geographic region of the business.

#### ***3.4.1. Did the client remember the assistance?***

The first question asked if the client remembered the original P2 technical assistance. It was shown that 88% (127) of the respondents remembered the assistance. The clients who remembered the assistance were asked to answer subsequent questions.

All of the survey respondents that stated they did not remember the assistance were assisted by interns operating in the small business mode. This is not surprising, since this assistance provided was the shortest in duration and least in-depth. As expected, clients who participated in the program recently were more likely to remember

the assistance. Further investigation into businesses that did not remember the assistance showed that often the primary contact left the position in the client's company before the survey was administered.

### ***3.4.2. What was the value of the technical assistance?***

Two survey questions (one question consisting of four parts) concerned the client's opinion on their perceived value of benefits of the P3 program. These benefits were (1) the increase in awareness of P2, (2) improvement of working conditions, (3) monetary savings, (4) reduction of waste, and (5) savings of time.

#### *Changing Awareness of P2*

Table 3.1 contains the responses to the question, "Did the internship change your awareness of P2 as another consideration when making business decisions?" The percentage of respondents in each category is provided in the table while the actual number of respondents is given in parenthesis. Note that some clients returned the survey but chose not to answer some questions, thus the total number of responses is less than the 127 total clients surveyed. Results are separated by type of assistance and are presented as the percent of surveyed clients.

***Table 3.1. Percent of Responses to the Change in Awareness Question by Assistance Mode.*** (Actual number of responses is given in parenthesis)

	Industrial Placement	Industrial Assistance	Small Business	Total
Yes	64% (7)	29% (6)	61% (52)	56% (65)
No	36% (4)	71% (15)	39% (33)	44% (52)
Total	100% (11)	100% (21)	100% (85)	100% (117)

More than one-half (64%) of the industrial placement clients responded positively that the intern increased their awareness of P2. Because of their typically larger size,

clients with industrial placement interns often had a support staff that was better educated on waste issues. This mode was the most knowledgeable before the intern arrived; however, due to the daily contact with the intern they gained new ideas and insights concerning P2.

Less than one-third (29%) of the industrial assistance clients felt their awareness of P2 was increased. Conversely, small business clients had a higher occurrence of their awareness of P2 being increased (61%). Small business clients often knew very little about P2 before the intern's arrival; basic instruction benefited them greatly. Industrial assistance clients, on the other hand, often had some knowledge of P2 before the intern's arrival so fewer felt their awareness was significantly increased.

#### *Improving Working Conditions*

Clients were asked, "What is the value of the program to your business in terms of improved working conditions?" Percent responses to this question and three other value questions are separated by assistance mode and listed in Table 3.2. The total numbers of responses to each question are different because some clients chose to not answer some questions. Note that "valuable" and "very valuable" responses are combined because clients' responses are relatively evenly split between the two responses.

As presented in Table 3.2, about one-third of respondents that had industrial placement or industrial assistance interns found the program to be valuable or very valuable in improving working conditions. More clients with small business interns found this mode to be effective in improving working conditions (about one-half, 52%, found it to be valuable or very valuable).

Client's perception of an improvement in small business working conditions can be explained by considering that most clients in this mode did not have a designated safety officer. Reducing waste, especially hazardous waste, often resulted in a noticeable improvement in safety at the business. Most clients with industrial assistance and industrial placement interns had a safety officer working to improve safety; so many suggestions with obvious safety implications had already been implemented.

**Table 3.2. Percent of Responses to Four Value Questions by Assistance Mode.** (Actual number of responses is given in parenthesis. Total respondents are not the same because some clients chose not to answer some questions)

<b>Improvement of Working Conditions</b>				
	Industrial Placement	Industrial Assistance	Small Business	Total
Valuable/Very Valuable	33% (4)	37% (7)	52% (42)	47% (53)
No Value	8% (1)	42% (8)	36% (29)	34% (38)
Not Applicable	59% (7)	21% (4)	12% (10)	19% (21)
Total	100% (12)	100% (19)	100% (81)	100% (112)

<b>Money Saved</b>				
	Industrial Placement	Industrial Assistance	Small Business <sup>a</sup>	Total
Valuable/Very Valuable	75% (9)	75% (15)	39% (32)	49% (56)
No Value	8% (1)	15% (3)	50% (41)	39% (45)
Not Applicable	17% (2)	10% (2)	11% (9)	12% (13)
Total	100% (12)	100% (20)	100% (82)	100% (114)

<sup>a</sup> 3 SB clients stated the program was detrimental. Responses are included with "no value".

<b>Waste Reduced</b>				
	Industrial Placement	Industrial Assistance	Small Business	Total
Valuable/Very Valuable	100% (11)	82% (14)	29% (20)	47% (45)
No Value	0% (0)	18% (3)	34% (23)	27% (26)
Not Applicable	0% (0)	0% (0)	37% (25)	26% (25)
Total	100% (11)	100% (17)	100% (68)	100% (96)

<b>Time Saved</b>				
	Industrial Placement	Industrial Assistance	Small Business	Total
Valuable/Very Valuable	80% (8)	100% (19)	71% (51)	77% (78)
No Value	20% (2)	0% (0)	29% (21)	23% (23)
Not Applicable	0% (0)	0% (0)	0% (0)	0% (0)
Total	100% (10)	100% (19)	100% (72)	100% (101)

Clients with industrial assistance and industrial placement interns frequently gave the “not applicable” response to the working conditions question. The “not applicable” response may represent cases where the clients did not feel that the question was applicable based on their goals for the specific projects.

### *Monetary Savings*

Three-quarters of clients with industrial placement and industrial assistance interns answered the survey question, “What was the value of the internship to your business in terms of monetary savings?” by stating that the assistance was “valuable” or “very valuable,” as listed in Table 3.2. The difference between clients with industrial (placement and assistance) interns and small business interns is statistically significant based on the Fisher’s Exact test (Blalock, 1979). No other comparison between modes in this paper was found to be statistically significant, possibly due to small sample size. The larger positive response for clients in both industrial modes might be attributed to them frequently having sufficiently sized operations to allow P2 to save significant amounts of money.

Over one-third (39%) of those with small businesses interns found the assistance “valuable” or “very valuable” for saving money. Three clients indicated that the assistance was detrimental in saving money. These responses are included in Table 3.2 as “no value” responses. Clients with small business mode interns often felt there was no savings from P3 assistance, as is reflected in the survey responses. Some may have felt that the implementation cost equaled or surpassed the savings. Upon a more comprehensive study, it was found that small business projects were able to quantify a

cost savings more often than clients in the other modes, but the average savings were smaller per client (Chapter 4).

#### *Waste reduction*

Clients were then asked, “What was the value of the internship to your business in terms of reduced waste?” Most clients in the industrial placement and industrial assistance modes found the assistance “valuable” or “very valuable” in reducing waste (100% and 82%, respectively – Table 3.2). Only 29% of those in the small businesses mode found the assistance “valuable” or “very valuable” in waste reduction - a trend similar to monetary savings.

#### *Time Savings*

The last of the “value” questions in the survey was, “What was the value of the internship to your business in terms of time saved solving waste-related questions?” Generally, time savings in researching waste management issues was the most valuable result of the assistance to all clients (Table 3.2). Even if no suggestions were implemented, as described in the subsequent section, the assistance saved most clients time by providing research of P2 suggestions and feasibility analyses. Between 100% (industrial assistance) and 71% (small business) of the clients found the assistance “valuable” or “very valuable” in this respect, as listed in Table 3.2.

All clients with industrial assistance interns found the assistance to be “valuable” or “very valuable” in saving time. One reason for such a high rate of positive responses is that industrial assistance interns tended to research specific issues of concern for the client. This is as opposed to the small business mode where general assessments on waste streams are provided. Also, clients in the industrial assistance mode were required

to spend very little time assisting interns, compared to the time commitment required by the industrial placement mode.

One disadvantage of the industrial placement mode for technical assistance is that these clients were required to provide daily supervision to the interns. In many cases, clients felt their time spent on supervision was worth the time savings resulting from interns' assistance (80%). A few clients (20%) found that they put in as much time supervising as they saved from the intern's research.

When ranking the value of the P3 program, clients with industrial placement interns found waste reduction (100%), time saved (80%), monetary savings (75%) and an increase in awareness (64%) to be most beneficial. Clients with industrial assessment interns found that time savings (100%), waste reduction (82%) and monetary savings (75%) were the strongest aspects of the program. Clients with small businesses interns found time savings (71%), an increase in P2 awareness (61%) and improved working conditions (52%) to be the greatest benefits of the program.

The P3 program's survey was successful at determining clients' opinions on the value of the program. The survey was limited because it did not provide any data on the actual amount of savings. A majority of the clients that were surveyed indicated that the program was valuable in savings money and reducing waste. To quantify monetary and waste savings, the P3 program began conducting reassessment interviews with clients in 2001. Reassessments are follow-up, on-site interviews that quantify the clients' actual savings from assistance projects. An analysis of reassessments is provided in Chapter 4.

The survey also concluded that most clients felt the P2 technical assistance was valuable in increasing awareness of P2, improving working conditions and saving time.

The monetary values of these benefits are often considered intangible by businesses and are much more difficult to quantify precisely. A study to quantify the cost benefits of some intangibles is found in Chapter 5.

### ***3.4.3. Implementation of P2 suggestions***

Ultimately, the success of the P3 program relates to whether clients decide to implement any ideas based on interns' suggestions. Table 3.3 contains responses to the question, "Did your business implement any of the suggestions given by the intern?". Survey responses were notably different among the clients participating in different assistance modes.

***Table 3.3. Percent Implementation Rate of P2 Suggestions.*** (Actual number of responses is given in parenthesis)

	Industrial Placement	Industrial Assistance	Small Business	Total
Yes	67% (8)	57% (12)	49% (44)	53% (64)
No	8% (1)	29% (6)	23% (20)	22% (27)
Not Sure	25% (3)	14% (3)	28% (25)	25% (31)
Total	100% (12)	100% (21)	100% (89)	100% (122)

Results showed two-thirds of clients with industrial placement interns answered "yes" to the implementation question, compared to around half of the clients with industrial assistance and small business interns.

Predictably, clients in the industrial placement mode had the highest implementation rate. Interns working with these clients spent nine weeks assisting the business. Thus, they had a better understanding of clients' decision making process. Also, clients with the industrial placement interns were required to pay a part of the interns' stipends. Consequently, there tended to be more client buy-in to interns' suggestions.

### *Implementation Rate of “Not Sure” Responses*

Clients had the option of answering “not sure” to the implementation question. One-quarter (25%) of clients with industrial placement and small business interns answered “not sure”. Reassessments, on-site visits involving in-depth client interviews, were performed one to six years after the initial assistance to quantify implementation rates (discussed further in Chapter 4). Reassessments were used to help determine the meaning of a “not sure” answer. Of the 19 clients who responded “yes” to this question and were reassessed, 18 were found to have actually implemented a suggestion. Of the 7 clients who responded that they did not implement any suggestions, reassessments proved that only 3 truly implemented nothing and 4 implemented at least one suggestion but had small monetary savings (average of \$500 per client versus \$2,000 for those who responded in the survey that they implemented at least one suggestion). Ten clients responded that they were “not sure” of their implementation and also were reassessed. Reassessments proved that all ten implemented at least one suggestion and the average per client monetary savings is similar to those that responded in the survey that they implemented at least one suggestion. Although the sample size is small, reassessments indicate that the P3 program has reason to be optimistic about “not sure” responses in this survey.

#### ***3.4.4. Regional Trends***

Anecdotal evidence from interns and clients indicated that there is a difference in the value of the P3 assistance among the various regions of Nebraska. When the survey data were analyzed for differences between regions, only small business responses were

considered. The small business mode was the only mode with notable numbers of responses from each region. The regions that were analyzed for this study are Omaha, Lincoln and the rest of Nebraska (see Section 3.2.3 for regional descriptions). All survey responses were analyzed for regional trends. Relatively little regional difference was observed for most questions on the survey. The only meaningful regional difference in the data was for the change in awareness and implementation questions but the significance of this relationship can not be conjectured statistically.

Regional trend results are summarized in Table 3.4. It was found that 66% of the clients from smaller communities in Nebraska (rest of Nebraska) reported an increase in P2 awareness. Only around one-half of clients from Omaha and Lincoln reported a change in awareness. Also, it appears that one-half of the Lincoln and rest of Nebraska clients implement interns' suggestions compared to one-quarter of the Omaha clients.

**Table 3.4. Percent of Small Business Mode Responses to the Change in Awareness Question and Implementation Rate by Region.** (Actual number of responses is given in parenthesis).

<b>Change in Awareness of P2</b>				
	Omaha	Lincoln	Rest of Nebraska	Total
Yes	50% (7)	57% (12)	66% (33)	61% (52)
No	50% (7)	43% (9)	34% (17)	39% (33)
Total	100% (14)	100% (21)	100% (50)	100% (85)

<b>Implementation Rate</b>				
	Omaha	Lincoln	Rest of Nebraska	Total
Yes	25% (3)	58% (15)	51% (26)	49% (44)
No	33% (5)	15% (7)	24% (13)	22% (25)
Not Sure	42% (4)	27% (4)	25% (12)	28% (20)
Total	100% (12)	100% (26)	100% (51)	100% (89)

Survey responses indicate P3 technical assistance offered in Omaha is not as successful as the other regions in terms of improving P2 awareness and implementation of suggestions. The P3 program speculates two reasons for this regional trend based on anecdotal evidence collected after eight years of assistance. First, the regions in the state

may have differing degrees of receptiveness to UNL/Cooperative Extension assistance. Also, the regions may have differing access to P2-related products and services.

Exit interviews with P3 interns suggested Omaha-based interns struggled to gain credibility with the businesses they were assisting. Many small business clients were identified through the UNL Cooperative Extension offices. Cooperative Extension is a program affiliated with UNL and other land grant institutions in the state that interact with communities by offering educational programming to citizens of the state. UNL generally, and UNL Cooperative Extension specifically tend to have the strongest relationships with businesses in agricultural communities and the weakest in highly urbanized areas such as Omaha. A strong relationship is important when attempting to gain credibility when spreading P2 knowledge (Lindsey, 1998a). Therefore, the P3 program has a weaker relationship with small businesses in Omaha because the program's primary contact in the community, Cooperative Extension, tends to have a weaker relationship with businesses there.

Another indicator of the difficulty P3 interns have finding receptive clients in Omaha may be seen from UNL enrollment data. The data from 2002 to 2003 indicates Omaha high school graduates are less likely to enroll in the University of Nebraska's engineering program than graduates from the rest of the state (Ballard, 2003). One can, therefore, assume that college bound engineering high school students from Omaha are attending other institutions. Omaha's under-representation at the university's engineering college is evidence that many business owners in Omaha might not be as familiar with the UNL College of Engineering or the P3 program as the rest of the state. Clients who

are not familiar with UNL may not be as receptive to the university's technical assistance programs.

Contact with industrial equipment vendors also influences a company's awareness of P2. In 1996, the Illinois Waste Management and Research Center (WMRC) conducted a survey to determine what activities would best cause a company to carry out a P2 idea; 82% of the respondents stated that an on site presentation at their industrial facility with the intention of identifying relevant P2 suggestions would be effective (Lindsay, 1998b). Product vendors and state offered P2 service providers would typically give this type of presentation.

Most industrial equipment vendors in Nebraska are based in western half of the state, in and around Omaha. It is logical to assume these vendors are more inclined to visit small businesses located near their offices than those several hours away; Omaha businesses proximity to vendors may allow clients to better keep abreast of new technology in their fields.

A client's receptiveness to P3 assistance and the availability of P2-related services and products may explain the regional trend observed in P3 survey responses. Note, however, that the P3 has not collected data to prove causation beyond anecdotes after eight years of assistance. A future study on factors that influence intern-based P2 assistance within rural and urban communities may be needed to explain the regional trends seen in survey responses.

### 3.5. CONCLUSIONS

Although the results from this study are specific to businesses in Nebraska, conclusions may apply to other P2 technical assistance programs. One can conclude the following.

1. Clients responded that their awareness of P2 was increased from participating in the P3 program more often when they received assistance through the industrial placement and small business modes. It is likely that clients with industrial placement interns benefited from the more in-depth (longer-term) projects provided through that mode. Awareness may have been increased for clients in the small business mode more often because those clients typically did not have as much existing knowledge of P2 before assistance.
2. Time savings were regarded, on average, as the most significant result of P3 assistance. All clients who had interns operating in the industrial assistance mode found time savings to be a valuable benefit. Clients with industrial assistance interns may have found time savings a valuable benefit because this mode allowed clients to select an assistance project of interest and also required minimal staff time with interns.
3. Improvements in working conditions were regarded as a valuable benefit of the P3 program most often from clients with interns operating in the small business mode. Clients in this mode may have perceived assistance as valuable in improving working conditions more often because they typically do not have an employee dedicated to waste and safety issues. Assistance from interns can result in considerable improvements in safety.

4. Monetary savings and waste reductions were regarded as valuable benefits of the P3 program most often from clients assisted by industrial placement and industrial assistance modes. One reason for this trend is that the industrial placement and industrial assistance mode focus on more in-depth (larger-scale) projects that have the potential for larger monetary savings and waste reductions than the small business mode.
5. The industrial placement mode had the highest number of clients stating that they had implemented some of the student's suggestions. Presumably, this is because of the increased time spent with an intern and projects that were often selected by the client.
6. Reassessment interviews were conducted with previous clients to determine the meaning of "not sure" responses to the question concerning whether a client implemented any of an intern's P2 suggestions. All of the clients (10) who answered "not sure" to this question and were reassessed were found to have implemented at least one intern's suggestion. Although the sample size is small, the P3 program has reason to be optimistic about "not sure" responses in this survey.
7. A regional difference was noticed in the survey responses. Clients from Omaha were less likely to rate the program as valuable in improving P2 awareness or to implement any of an intern's suggestions. A study is needed to determine factors that influence intern-based P2 assistance within various communities.
8. Surveys were limited because they could not be used to quantify savings from assistance projects. Surveys indicate the program is valuable in savings money,

reducing waste, saving time and improving safety. Additional studies are needed to quantify these benefits.