# CHAPTER 1: INTRODUCTION

## 1.1. BACKGROUND

For years the U.S. Environmental Protection Agency (USEPA) supported a regulatory structure that placed an emphasis on end-of-process pollution control devices. In 1990, the Pollution Prevention Act was passed changing the priorities of waste management. Since then, promoting of pollution prevention (P2) has been the prevailing regulatory approach on waste management (Goldberg et al., 1998a).

P2 is a waste management strategy that encourages small businesses and industries to reduce or eliminate the quantity and/or toxicity of wastes at the source. In other words, P2 is the elimination of environmental problems before they occur by promoting source reduction.

Many businesses have long supported end-of-process waste management as their company standard. Regulators would like these businesses to consider waste reduction at the source. Without providing effective change agents, P2 methods are not diffusing within these industries as quickly as is desired (Lindsey, 1998a). Thus, there is a need to find ways to educate companies on source reduction methods. Many states have approached this need by developing or funding voluntary technical assistance programs to provide companies with consultation and education.

The only P2 program in Nebraska solely dedicated to on-site technical assistance is the University of Nebraska's (UNL) Partners in Pollution Prevention (P3) program. Since 1997 the P3 program has employed student interns to provide summer consultation to companies statewide. In eight years (1997 – 2004) the program has assisted 305 companies. It is the P3 program's belief that when clients experience successful and

profitable intern-driven P3 projects, the client will decide to use P2 methods when making future business decisions.

Regulators and P2 service providers place an emphasis on quantifying the savings that result from implemented P2 suggestions. Savings quantification is used to assess the impact on clients' businesses and to help develop programs. Consequently, there is a need for P2 programs to conduct self-analysis studies and share any conclusions that may impact the field.

The P3 program is unique when compared to many other P2 technical assistance programs because it provides intern-led projects, assistance projects of varying scale and magnitude of technical assistance to both metropolitan and agricultural communities. Because of the programs' unique scope, the P3 program is in a prime position to conduct an analysis on their impact data to determine factors influencing program metrics, benefits of the varying assistance intensities, a comparison of metrics to other programs and trends from indirect financial gains (e.g. time saved, future liabilities reduced).

After five years, the P3 program began evaluating its impact on Nebraska's businesses. In 2001 a closed-ended survey (yes/no questions that do not allow for clients' written opinions) was conducted to determine clients' values of technical assistance. The need for more in-depth analysis if the program was identified through survey results, thus a second study was conducted involving reassessment interviews with 75 previous clients. Reassessments are used to determine an average implementation rate and savings from clients. During the summer of 2004 the P3 program conducted a third study, in-depth interviews with previous clients, to estimate various difficult to quantify savings from twenty projects.

## 1.2. OBJECTIVES

Three studies were conducted to learn more about the success of the P3 program. Each study worked to answer questions that arose from the preceding study. The first study involved analyzing the data from a closed-ended survey of 145 previous clients. The objectives of the survey analysis were to:

1. determine clients' impressions of the relative value of P2 assistance in various ways (e.g. cost savings); and
2. compare results by geography and assistance mode to identify factors that influence the benefits and implementation rates of projects.

Surveys were limited because they could not quantify implementation rates or savings from projects.

The second study addressed quantification issues by conducting reassessment interviews of 75 previous clients. The objectives of the reassessment analysis were to:

1. use the data to compare assistance modes; and
2. compare the P3 program's average implementation rates, ratio of savings to grant funding and total monetary savings to those of others P2 programs.

Although surveys and reassessments were useful, a need was identified in both studies to quantify the monetary savings from indirect benefits. Indirect benefits are defined as those that are not easy to precisely quantify but can result in significant savings (e.g. cost savings from reduced future liabilities).

The third study addressed quantification of indirect savings by conducting in-depth studies of twenty previous clients. Indirect benefits that were quantified include the financial gains associated with time saved from intern research, operating cost

reductions, regulatory burdens avoided and future liability reductions. The objectives of the in-depth study analysis were to:

1. evaluate indirect savings data to determine circumstances when various types of indirect savings are larger for studied clients; and
2. examine the relationship between clients' indirect and direct savings.

### 1.3. THESIS ORGANIZATION

This thesis is based on three manuscripts which will be submitted for possible publication. The thesis is organized with Chapter Two as a literature review covering the P3 program's logistics, societal factors influencing P2 projects, research performed by other P2 programs and background on the methods used in the indirect benefit analyses.

Chapters Three through Five present the three manuscripts to be submitted. In general, these chapters are organized with each first describing one of the analysis projects and then describing the results. Chapter Three details the closed-ended survey analysis. Chapter Four discusses the analysis of the reassessment interviews. Chapter Five discusses studies to determine the monetary indirect savings from twenty previous clients.

Chapter Six concludes this thesis by summarizing the main conclusions from the three manuscripts and discussing the need for additional P2 technical assistance research. Appendix A describes an example of technical assistance work performed by the P3 program. Some of the analyzed P3 data were not included in the scope of the journal articles and is presented in Appendices B through J.