

**Final Report for 2006 AICPA Summer Internship:  
AICPA Practice Analysis Methodology for Sampling  
Design and Selected Topics**

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# **Final Report for 2006 AICPA Summer Internship: AICPA Practice Analysis Methodology for Sampling Design and Selected Topics**

## **Introduction**

In June 2006 the content of the final deliverable for the AICPA summer internship was agreed upon. The goal of this report is to fulfill that deliverable and provide information on the current practice analysis to the following groups: the AICPA Examinations Team, the Psychometric Oversight Committee, and the Oversight Group. This report will focus on (i) methodology for sampling design, (ii) recommendations on the composition of Subject Matter Expert panel for review of the 1999 Task Survey, and Knowledge and Skill Survey (1999 surveys), and (iii) recommendations on the process for updating the 1999 surveys.

## **Methodology for Sampling Design**

“The BOE must ensure that the CPA Exam continues to measure the knowledge and skills needed by entry-level CPAs to protect the public” (Practice Analysis: Project Charter, 2006, slide 2). To this end, the goal of the current practice analysis is to identify the knowledge, skills and tasks required by newly certified CPAs. The methodology for the sampling design proposed for the current practice analysis will build upon the 1999 practice analysis. Thus, the methodology section is presented in two parts: a review of the 1999 practice analysis sampling methodology, followed by the proposed current methodology for sampling design.

## **Part One: Review of 1999 Practice Analysis Methodology for Sampling Design**

The population of interest for the 1999 practice analysis sampling methodology was entry-level CPAs. Entry-level CPAs were defined as “all practicing CPAs who have been licensed within the past five years” (Practice Analysis, 2001, p. 27). The CPAs “were selected using a stratified random design” (Practice Analysis, 2001, p. 27). To utilize this sampling strategy, the authors “(1) determined the population entry-level CPAs (i.e., how many entry-level CPAs exist), (2) identified sampling strata, and (3) selected the sample” (Practice Analysis, 2001, p. 27). The CPAs “were randomly selected to be representative with respect to jurisdiction, gender, race/ethnicity, and firm size” (Practice Analysis, 2001, Executive Summary).

The survey sample size was 5,000. A total of 5,000 surveys were sent to entry-level CPAs with 2,500 entry-level CPAs receiving the Task Survey and 2,500 entry-level CPAs receiving the Knowledge & Skill Survey (Practice Analysis, 2001, Executive Summary).

To determine the population of entry-level CPAs, the AICPA membership database and the National Association of State Boards of Accountancy (NASBA) database were used (Practice Analysis, 2001, p. 27). The survey sample was chosen to target a “90/10 percent split on CPAs in public practice versus private industry” to reflect the split determined using NASBA information (Practice Analysis, 2001, p. 34).

The overall response rate for the survey was 27.5% with a total of 1,349 out of 5,000 surveys returned. For the Task Survey the response rate was 29.1% with 714 out of 2,457 surveys returned, and for the Knowledge & Skills survey the response rate was 25.9% with 635 out of 2,453 surveys returned (Practice Analysis, 2001, Executive Summary).

Pilot-testing for the task, and knowledge and skill surveys was conducted with five CPAs in a full-day workshop (Practice Analysis, 2001, p. 25). The process for pilot-testing the surveys included an introduction to the surveys, followed by specific activities for each survey. Exercises were completed for the knowledge & skills survey, including completion of the survey, individual review of the survey, and group discussion. This process was repeated for the task survey (Practice Analysis, 2001, Appendix 10).

## **Part Two: Proposed Current Practice Analysis Methodology for Sampling Design**

The proposed methodology was influenced by discussions with the AICPA Examinations Team, the Psychometric Oversight Committee and the Oversight Group. Most recently, discussion with the Oversight Group on Monday August 28 had an influence on the proposed methodology for sampling design.

The first decision to be addressed in the methodology for sampling design is whether there will be one or two practice analysis surveys covering the knowledge, skills and tasks of a newly certified CPA. While this decision does not specifically fit within the jurisdiction of sampling area, the decision is critical to the methodology chosen for sampling design. Based on recent discussion during the August 10 teleconference with members from the AICPA Examinations Team, the Psychometric Oversight Committee, and Practice Analysis Working Group, the Psychometric Oversight Committee agreed that knowledge, skills and tasks would be grouped in the same survey, suggesting the use of one survey. Thus, this report is based on the assumption that one survey will be developed covering knowledge, skills and tasks of a newly certified CPA.

The second decision in addressing the methodology for the sampling design is the mode of survey delivery. Recent discussions with the Oversight Group and members of the AICPA Examinations Team confirmed the use of web-based technology to deliver the survey. One advantage is the cost effectiveness of web-based surveys which are less expensive than paper-based surveys. Another advantage of web-based surveys compared to other survey delivery modes is the "...more refined appearance to which color can be added, but also (web-based surveys) provide survey capabilities far beyond those available for any other type of self-administered questionnaire" (Dillman, 2000, p. 354). Utilizing web-based technology has several implications for developing the methodology for the sampling design.

### **Web-Based Technology**

First, the availability of current email addresses is required for the primary method of communication. Based on information provided by an AICPA Information Technology Senior Systems Analyst, a recent count of active AICPA members showed over 80% of members with an email address. This represents about 255,000 members with an email address.

For members who do not have an email address included in the database, members may not want to receive email from AICPA, or members may not have an email address. Thus, while the use of a web-based approach will be possible for the survey, a sampling methodology question to be answered is whether AICPA members without email addresses listed would respond to the practice analysis survey in a manner that is substantively different from those members who have listed email addresses. The sampling methodology question also applies to CPAs who are not members of the AICPA. During the August 10 teleconference with members of the AICPA Examinations Team, the Psychometric Oversight Committee, and the Practice

Analysis Working Group, I suggested that there are likely no substantive differences in the knowledge, skills and tasks performed by newly certified CPAs who were not members of the AICPA. Empirical research could be undertaken to determine if no substantive differences exist between (1) practice analysis survey results for AICPA members who have an email address and those who do not list an email address, and (2) practice analysis survey results for AICPA members and non-AICPA members.

Second, the vendor selection process is critical in the administration of a web-based survey. To the extent that a vendor can facilitate the random assignment of items or sections of a survey, and provide parts of a survey to selected respondents and not others, the goals of the survey are accomplished.

### **Definition of Newly Certified CPA**

The term “entry-level CPA” was used in the 1999 practice analysis for the survey population (Practice Analysis, 2001, p. 27) and the term “newly certified CPA” appears to be the term used to describe the survey population in the current practice analysis. Notwithstanding the choice of term selected for the survey population in the current practice analysis, there is a need to define the term. To define the survey population for the current practice analysis, input from NASBA, several States, industry and public practice is recommended with the goal of capturing the profile of the survey population. Further, “what is expected” of a newly certified CPA, and “how a newly certified CPA will perform” should be considered in defining the survey population. Throughout this report the term “newly certified CPA” has been used for the survey population based on recent communication with the AICPA Examinations Team.

## **Allocation of Sample Between Public Accounting and Industry**

The allocation of the sample between public accounting and industry needs to be decided for current practice analysis. With changes in the business environment since the last practice analysis in 1999, and changes to state requirements for eligible work experience, consideration should be given to changing the weighting between public accounting and industry from 90/10 to an allocation that reflects changes since 1999. Based on information provided by an AICPA Information Technology Senior Systems Analyst, a recent count of active AICPA members showed approximately 38% of members are in public practice and 42% are in industry, with other job class codes accounting for the remaining 20%. The Oversight Group is reviewing this allocation to determine a balance that better reflects the changing environment. A critical point addressed by the Oversight Committee during the August 28 teleconference was the number of newly certified CPAs in industry who have received their “newly certified CPA” work experience in an industry environment.

## **Sample Size**

Knapp states that “the size of the sample required is a question frequently raised by boards” and further adds that “there is no magic number for the size of the sample necessary to obtain good data” (1995, p. 111). Thus, there is no clear standard for determining sample size. The better approach would be to ensure the sample “include(s) the full range of professional experience and demographic characteristics in order to get an accurate picture of the relative values for different scales used in the survey” (Knapp, 1995, p. 110).

### **Sample for Pilot Test**

Thirty to forty CPAs who are familiar with the knowledge, skills and tasks of newly certified CPAs are recommended for the pilot test. A key requirement is that CPAs selected for the pilot are individuals who have not participated in the development of the survey (Knapp, 1995, p. 103). Those individuals chosen for the pilot should be representative of all work experience areas where newly certified CPAs currently perform their duties. Further, if the CPAs chosen for the 1999 practice analysis pilot are familiar with the knowledge, skills and tasks of a newly certified CPA, it may be appropriate to consider including these individuals in the pilot test for the current practice analysis. In addition to including these individuals in the pilot, it may be possible to analyze data from these CPAs as a subgroup.

### **Availability of Data**

The options proposed for the sampling design are based on the availability of membership data in the AICPA database. At this point, information from NASBA is not considered in the sampling design since it has not been requested. While the current AICPA membership database contains valuable information, the database does not include data on whether a member supervises a newly certified CPA. This is the major group to which the survey is targeted. In addition, while the AICPA membership database includes areas of interest and industry specialization that could facilitate grouping for matrix sampling purposes, concern was expressed by members of the Oversight Group during the August 28 teleconference about the accuracy of the interest and industry specialization data. Reliance on outdated information for the

selection of interests and industry specialization may have the potential of compromising the validity of the survey data.

### **Options for Sampling**

Two different options are outlined in the report for the sampling design methodology, and the second option is recommended for implementation.

#### **Option One**

Select a sample by randomly sampling supervisors of newly certified CPAs with subgroups of newly certified CPAs, public accounting partners, CFOs, and educators. Review course providers would be excluded from this sample. A limitation exists to the extent that the current AICPA membership database does not include information on whether a member supervises a newly certified CPA. However, this information could be obtained by requesting this data at the outset of the survey. The sampling approach under this option would target members based on respondent demographics including geographical jurisdiction, gender, CPA firm size and industry. This information is currently available in the AICPA membership database. This sample would differ from the 1999 practice analysis to the extent that entry-level CPAs were chosen as the sampling target in the 1999 practice analysis. However, to the extent that comparative data could inform the current practice analysis, collection of data on a subset of newly certified CPAs is suggested for the current practice analysis.

This sampling option would require every respondent to complete the entire survey. An advantage of this option is the relative ease in facilitating comparative data analysis. However, the potential length of the survey presents a challenge. For example, the 1999 Task Survey

included over 235 items, while the 1999 Knowledge & Skill survey included over 300 items. (Practice Analysis, 2001, Appendix 12 & 13).

There is no expectation that the survey developed for the current practice analysis will be substantially shorter. Thus, the length of the survey is the biggest detractor for using this sampling option. This is especially relevant based on the web-based mode of delivery.

### **Option Two**

Option two utilizes a matrix sampling approach. To facilitate this approach in a web-based delivery environment, the structure of a survey and responsiveness of survey vendor technology offers unique advantages to enhance sampling. Matrix sampling requires initial determination of logical groupings of work-related fields (e.g., audit and attestation) to establish cells of a matrix. The first part of the survey could ask demographic questions, questions common to each matrix cell, and an allocation of time spent working in each cell. Once a respondent has entered a response, the computer could randomly assign parts of the survey based on input from the respondent. The determination of survey parts provided to a respondent could be based on time spent in a cell of the matrix. For example, if there are four cells and a respondent spends at least 25% of his time working in a particular cell, the computer might provide survey questions specifically addressing this cell. Respondents could then complete survey questions provided to them. It is possible that a respondent could be provided with questions from more than one cell and possibly questions from all cells.

Although the AICPA membership database includes information on interests and industry specialization, members of the Oversight Group suggested during the August 28 teleconference

that this information is not updated on a regular basis. Thus it may be more effective to have respondents self-select areas that match current areas of interest or industry specialization. This sampling option is an interactive approach to addressing potentially obsolete information. An alternative to computer generated cell selection would be to have respondents self select the cell associated with the questions to which they respond.

This sampling option could be based on sampling in waves and start with randomly sampling every fifth AICPA member with an email address in the database. If insufficient responses were received from the first wave of data collection, subsequent requests for information could be generated (e.g., every third AICPA member of the remaining database – sampling without replacement). While data analysis for matrix sampling is more challenging, benefits exist for generating solid data for analysis.

### **Potential Self-Exclusion of Members from Sample**

Preferably the selection of the sample would exclude members who had recently received requests for participation in surveys. For example, on July 17 certain members received a request to complete an Online AICPA Member Satisfaction Survey. This survey was sent to the email address provided by a member and indicated that the AICPA was "...interested in learning about your experience with us during the last (6) six months and your overall satisfaction with our organization" (Email from AICPA, July 17). The survey invitation indicated that "only a small portion of our membership has been randomly selected to participate" and was electronically signed by Barry Melancon, CPA, President & CEO. Based on recent information from the

Information Technology group at AICPA, data is not readily available on which members have received surveys in the past 6 months.

### **Planning Data Analysis**

The optimal time to plan for data analysis in a survey is during the survey development process since more challenges can be anticipated. Thus to facilitate data analysis for this survey, it is suggested that the first group of questions on the survey address demographics of the respondent. Raymond suggests that “samples for practice analyses should be representative of the relevant population in terms of practice setting, ethnic background, educational level, gender and possibly other demographic factors” (2001, p. 379). In this survey, these “other factors” would include whether the respondent supervises newly certified CPAs, how often the respondent supervises newly certified CPAs and how recently the respondent has supervised newly certified CPAs.

The importance of demographic information is further underscored by Raymond’s comment on respondent diversity, “respondent diversity is particularly important because a practitioner’s demographic characteristics may have a significant bearing on the type of clients served, the types of problems encountered, and other practice-related activities” (2001, p. 379). In addition to respondent diversity, it is also important to capture data on whether the respondent supervises newly certified CPAs, how often the respondent supervises newly certified CPAs and how recently the respondent has supervised newly certified CPAs.

### **Design of Data Analysis**

Analyzing data by type of respondent will be an important part of the analysis (e.g., supervisors of newly certified CPAs, newly certified CPAs, etc.). A key concern in the execution of matrix sampling is determining if meaningful differences exist between and among subgroups. To minimize the risk that there will be an inadequate number of respondents and insufficient power in the analysis, it will be important to choose a sampling option that provides the necessary information for each area of the matrix. Raymond states that “questionnaire length should be carefully evaluated in terms of its potential effect on response rates. The use of matrix sampling and related procedures, although not common, should be effective for holding questionnaire length to a minimum in an effort to increase response rates” (2001, p. 380). This is an example of why sampling option two is recommended.

In designing the data analysis of a survey, decisions will need to be made to determine how to impute data for missing values (e.g., missing completely at random (MCAR), missing at random (MAR), non-ignorable missingness, item non-response). To address data for missing values, it is advisable to request data from the survey vendor in raw data format such that after-the-fact statistical adjustments can be made. Estimations that could be made include pattern analysis, listwise versus pairwise deletion, mean substitution, multiple regression, maximum likelihood estimation, (MLE), etc.

Reliability and validity of the survey data need to be addressed. Consistent with the 1999 practice analysis, inter-rater reliability is suggested to evaluate the “consistency with which different raters rated the survey items” (Practice Analysis, 2001, p. 46). Validity could be evaluated with assistance from content experts and assessed using logical expectations (Practice Analysis, 2001, p. 47). Validity could also be assessed using either benchmarks from the 1999 practice analysis, or some other recent relevant practice analysis. However, it is important to note

that the sample targeted for the current practice analysis survey differs from the sample targeted in the 1999 practice analysis survey.

### **Vendor Data Format and Access to Vendor Database**

It is suggested that AICPA request that data be provided in Excel, SPSS, or some other format compatible with software used by the individuals at AICPA who will be analyzing data. It is also recommended that the data be received in two files, the first with a complete set of raw data and the second with a clean set of data. Further, data should be stored on a server housed at AICPA rather than a server at the survey vendor's location. Storing the data at AICPA will help facilitate security of the data and ease access to the data since the data will not be stored off-site.

### **Recommendations on Subject Matter Experts**

Knapp recommends that Subject Matter Experts (SMEs) represent “diverse settings and interests” (1995, p. 107). Further, when considering “industry standards of quality and fairness, (SMEs) should be representative of diversity in the profession in terms of geographic region, ethnicity, educational and experiential backgrounds, and practice settings.” (Knapp, 1995, p. 107). In addition to reflecting diversity of the CPA profession, it is important to ensure that SMEs are familiar with current knowledge, skills and tasks of newly certified CPAs such that the public is protected. Across the panel of SMEs, securing expertise in specialty areas where newly certified CPAs work is also desirable (Practice Analysis Project: Subject Matter Expert (SME) Review Panel, 2006, p. 2). Subject matter experts who could provide input into simulations and

the Business Environment and Concepts (BEC) may provide additional value to AICPA as the simulations are under study and the BEC area is being developed. Finally, the personal attributes of independence, integrity, candor, and honesty are suggested for SMEs chosen for the important role of reviewing the 1999 surveys.

One of the most important aspects of updating the 1999 Task Survey and Knowledge and Skill Survey is proper planning and documentation of the process. Effective planning and documentation will not only provide a trail for activities that have been undertaken, but also protect AICPA in the event that the process is questioned and litigation is threatened.

### **Future Opportunities and Research Topics**

I am very interested in future opportunities to work with the AICPA in several capacities including internships, and dissertation-based research projects. My research interests include practice analysis, fairness in CPA examination items, and the impact of international accounting standards on the AICPA and the CPA exam.

## **Epilogue**

There are several individuals who have made this internship possible. I would like thank the staff at AICPA, the Psychometric Oversight Committee, and the Oversight Committee for providing a valuable and rewarding learning experience throughout the past several months. In particular, I would like to thank Krista Breithaupt, Barbara Plake, Gregory Johnson, and Oliver Zhang for their valuable assistance throughout the spring and summer.

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