

## ***Statistical consulting***

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The motivation for this book comes from the statistical consulting course that the authors have been teaching regularly for years. In this sense, the authors use a direct style, incorporating short sentences and a clear client-oriented strategy in the subjects, and focusing on communication and understanding issues. The book looks for the following goals: (a) Understanding the statistical consulting process, (b) developing effective communication skills, and (c) obtaining experience through case studies.

To achieve these objectives the book is divided into two parts. Part I (chapters 1 to 4) is devoted to the methodology of the statistical consulting and Part II (chapters 5 to 9) analyses in detail a wide range of case studies of varying complexity that help the reader understand and appreciate the diversity of projects that can arise in statistical consulting. From «Job Promotion Discrimination» to «A Device to Reduce Engine Emissions», from «Does It Have Good Taste?» to «Expenditure in NY Municipalities» and from «Plastic Explosives Detection» to «Maria'S project (A Market Research Study)» is a motivating list of projects to be solved. The complexity goes from simple case studies requiring only standard statistical methods to research-oriented case studies that often require multivariate methods or specialized statistical methods for the analysis. Finally, three appendices including valuable information on resources, SAS and S-PLUS software packages, and useful reference statistical tables complete the book.

Chapter 1 is an introduction to statistical consulting. From the history of the scientific method and the development of statistics the authors present the need and characteristics of the statistical consultant and they identify the role of the statistician in diverse environments (pharmaceutical, telecommunication, business, government and university).

A detailed discussion on verbal and written communication skills involved in an effective consulting environment is presented in Chapter 2. The interaction consultant-client is considered here. Information on how to write reports, how to make effective presen-

tations as well as basic guidelines for writing and the importance of quality graphics are provided.

The aim of Chapter 3 is to provide the reader with an overview of some techniques that are commonly used in statistical consulting. In keeping with spirit of the book the emphasis of the presentation is on the client's perspective rather than the technical details on the methods. Short description of standard methods (exploratory data analysis, contingency tables,  $t$ -test, analysis of variance and regression) and general methods (non-parametric tests, general linear models, multivariate analysis, categorical data analysis and specialized procedures) are included. The chapter also contains a section devoted to design of experiments issues as well as a section where the capabilities of several statistical software packages are presented.

Chapter 4 reproduces the entire consultation process for a particular project from the initial contact with the client (belonging to the university environment) to the final written report and postcompletion followup. The chapter presents information related to the prior arrangements, the financial issues, the first meeting, the documentation needed, almost the full project analysis (including SAS code for the analysis and S-PLUS code for generating customized graphs), the presentation of the results and the final written report, as well as the comments received from the client. Interesting remarks and advises are included. Specific proposals for forms like contract, project summary and invoice are also shown. The chapter ends with some questions left to the reader to complete the analysis.

Under the perspective that *the best way to learn about statistical consulting is to do it!*, the authors present in Part II a very interesting variety of real projects. Twelve case studies have been analyzed in three groups according on the level of complexity and the type of statistical analysis required. The methodologies illustrated in the case studies are as follows. Group I: Contingency tables, sample survey,  $t$ -test and analysis of variance, and summary statistics; Group II: Probit analysis, factorial designs, regression methods, and time series analysis; Group III: Mixed models, discriminant analysis, factor analysis, and data mining-multistage analysis.

The format for each case study is the following: (1) The context of the problem, questions to be solved and the main statistical issues, (2) The data. Description and format of the database and properties of the relevant variables, (3) Methods. Details on the statistical procedures that can be used for analysis, (4) Some preliminary results, including SAS and S-PLUS outputs and (5) Questions left to the reader as a exercise.

A very important and pedagogical issue is that the reader can reproduce the analysis of the projects because all the data are available via the Springer-Verlag or the authors' websites: [www.springer-ny.com](http://www.springer-ny.com), [www.rci.rutgers.edu/~cabrera](http://www.rci.rutgers.edu/~cabrera) and [www.csam.montclair.edu/~mcdougal](http://www.csam.montclair.edu/~mcdougal).

At the end of Part II, Chapter 9 proposes eight open case studies to be solved for the reader.

Appendix A presents a very useful reference information (in particular on the world wide web) and the outline for a fifteen weeks course on statistical consulting. The course is addressed to second-year graduate students and the proposal uses this book as a textbook and real case studies (presented by invited speakers) for the analysis. Appendix B is a introductory and comprehensive SAS and S-PLUS guide for beginners (but not only for) that includes very practical material. Finally, in Appendix C, the reader can found a Statistical Addendum consisting of univariate and multivariate distributions, standard tests and sample size tables.

In summary, this is a very accessible book, easy reading and very practical. The material is presented in a well-organized, itemized and structured way and is clearly motivated by the case studies experience of the authors. Although the reader would need to complement the book with some other more technical references in statistical methodology for a consultancy in depth, the book perfectly achieves the proposed objectives. This is the reason I would strongly recommend this book for library purchase.

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